Biodevelopmental Approach to Clinical Child Psychology

Sebastiano Santostefano

A BIODEVELOPMENTAL APPROACH TO CLINICAL CHILD PSYCHOLOGY

COGNITIVE CONTROLS AND COGNITIVE CONTROL THERAPY

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To my son Sebastian whose brilliant flight was tragically interrupted. And to my son Damon who flies on creatively and courageously. For we are from him who was called "Paraceddu" — ''he soars like a bird."

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PREFACE

On May 12, 1955, the Department of Psychology of the University of Colorado convened a symposium that addressed the problem of cognition. The sponsors believed that until that time, psychology in America "had slighted what may be considered to be its ultimate purpose, the scientific understanding of man's cognitive behavior."

In the early years of the development of psychology as a science, cognition occupied the center of the stage. Why did interest in cognition decline among both researchers and clinicians by the 1930s? One reason was the rise of behaviorism with its "glorification of the skin," as Fritz Heider noted. Another was the emphasis being placed by contemporary psychoanalysis on unconscious motivation, drive, and psychic conflict.

To compensate for this slight the "Colorado Symposium" invited leading psychologists of the day to discuss cognition. Several motifs emerged from the presentations and debates: (1) cognition is at the center of a person's adaptations to environments;(2) the environments to which a person adapts are essentially cognitive representations or symbols; (3) underlying cognitive structures, dispositions, or codes make representations possible; that is, these structures determine "which pictures, so to speak, the organism takes of a specific environment" (Bruner et al., 1957). The sponsors of the symposium hoped that the published discussions would stimulate further theoretical developments and observations, which would return cognition to its rightful position as the major lens through which psychology studies and understands man.

It seems to me the Colorado Symposium has accomplished just that. Shortly before the symposium was held, the "New Look" in perception—a movement that was attempting to weave together perception, thought processes, emotions, and needs—hung its newly fashioned garment in the shops of academic psychology, hoping that researchers would try it on (Blake and Ramsey, 1951). A few years after the symposium, Jerome D. Frank (1962), addressing a special conference of psychologists interested in psychotherapy, presented a paper entitled "The role of cognitions in illness and healing." Frank's elegant clinical example from the treatment of an adult female patient illustrated, if only with a glimpse, the value of viewing psychotherapy through the lens of cognition. At about the same time Robert R. Holt (1964) informed psychoanalysts that cognitive psychology was emerging as a powerful point of view and urged them to begin considering how this approach could affect their work and clinical concepts.

During the past 25 years, that tiny stream, first fed by the Colorado Symposium and the "New Look" in perception, has grown into a mighty river of cognition with tributaries traveling into virtually all branches of psychology, psychiatry, psychoanalysis, and special education. Although this river has grown and spread rapidly, there is much to be done to channel and direct it, with dams, locks, and canals, so that clinicians and researchers can derive benefit from its potential power and energy.

This book represents one such attempt. I have tried to integrate the power of cognitive psychology with biodevelopmental principles, psychoanalytic concepts, and the child clinician's need for new technology. This integration suggests to me that the concept of cognitive controls, as a guide to behavioral assessment and treatment, is one main source of power that can be recovered from the river of cognition.

Yet although I present techniques to assess cognition and a treatment method I call "cognitive control therapy," my basic intention is to illustrate the value of looking at normal and pathological human behavior through the lens that is formed by cognitive, developmental, and psychoanalytic principles and observations, placing the psychodynamic concept of cognitive controls at the center.

What does an observer see when peering through this lens? He sees a person engaged in purposeful cognitive activity—regulating body tempos, scanning, selecting, avoiding, remembering, organizing, conceptualizing— all behaviors that shape and direct information, including feelings and needs, permitting the person to maintain an active, purposeful, adaptive balance between information from external and internal stimulation.

From discussions with various professionals, I have learned that the preceding statement frequently does not communicate my point of view. It is difficult for some to see anything at all when looking through the lens. Others see nothing more than what they are accustomed to observing. When a psychodynamically oriented clinician observes a person's behavior through the lens proposed here, he frequently sees a galloping horse of motivation and drive, with cognitive behavior a helpless rider. When a cognitively oriented researcher looks through the lens, he often perceives a set of intersecting rectangles. Each observer fails to see what captures the other's attention, and neither recognizes that the behavior of the adapting person—the galloping drives and the intersecting rectangles—are in fact a single entity.

The possibility that an observer is limited in registering the total view provided by the lens described here relates to the very premise on which this book is based. What one sees is a function of the shape one's cognitive controls impose on information. We determine and cognitively control what we see and know. Another premise of this book is that changing or restructuring the shape or control one imposes on information takes time and particular stimulation. I hope that the book will serve as a source of stimulation for professionals interested in restructuring their cognitive controls to provide an additional point of view capable of guiding innovation for practice and increasing the clinical relevance of cognitive research.

That research should address questions "largely suggested by current clinical problems" was eloquently proposed in 1889 by G. Stanley Hall, one of the founders of American Psychology (Santostefano, 1976a). A few years later Shepherd Ivory Franz, the father of research for clinical practice, who was trained initially as an experimental psychologist, launched a career devoted to the research of clinical problems and technique (Santostefano, 1976b). Yet despite the integration of research and practice that is part of psychology's heritage, these two endeavors became segregated in the years that followed. Only recently have we heard pleas that echo Hall's proposal.

I have been a practicing clinical psychologist for the past 20 years and a practicing psychoanalyst since 1970.

Throughout this time I have also attempted to conduct formal studies suggested by clinical experiences. I agree with Charles (1970) that "the helping attitude of the clinician does not always further the establishing of a sound theoretical and empirical basis for a science of human psychological development." But I also subscribe, as does Charles, to the position Hall and Franz took at the turn of the century: that clinical practice must be the source of insights for formal psychological research, and that research in turn must provide a scientific basis for practice. Yet those of us who have attempted to be clinician and researcher simultaneously, "two-headed monsters," know that the journey is difficult. At any point along the way the canons of research or of practice become compromised. For this reason, researchers may view some of the material in this book as "too clinical," whereas to clinicians some material may appear to be "too experimental." Again these value judgments are based on the cognitive attitudes or controls of one or another camp. I hope that readers from both camps accommodate into a common focus the lenses of research and practice when surveying this project.

This book was prepared for an audience of child clinical psychologists. However I believe its contents could be of use to clinical psychologists working with adults, to educators who have been influenced by the possibilities of cognitive controls for educational practice (Lesser, 1971), and to psychiatrists and psychoanalysts who accept the suggestion of Holt (1960) and Arieti (1965) that cognitive psychology provides a new door to innovation in practice. Certainly I hope that this project will be a source of stimulation to child researchers who, though removed from clinical application, are following in Franz's footsteps.

I recognize that each reader will find certain sections of this book of more use than others. Ideally, however, the chapters should be experienced in sequence, as developmental stages, with each chapter elaborating issues discussed previously and preparing the reader for issues discussed in the next. Part I discusses the reasons for the segregation of child development research and practice and the consequences of this segregation. The same issues raised in this historical analysis of child psychology, I believe, could apply to the fields of psychiatry, education, and psychoanalysis. Following the historical analysis, a treatment plan is proposed—the construction of a single conceptual scaffold called the *biodevelopmental framework*—which is then used as a roadmap to guide technical and conceptual innovation.

Part II describes the biodevelopmental framework and relates it to psychological diagnosis. In Part III the treatment plan is implemented. The concept of cognitive controls, originally formulated by George Klein, is discussed and elaborated to include issues of development and adaptation. Studies are reported that support the validity of the construct and the reliability and validity of the methods devised to assess cognitive controls in children. Then, guided by the biodevelopmental roadmap, the subsequent chapters take us to observations of the developmental course of cognitive controls and to the role played by cognitive controls in long-term and short-term adaptation. These chapters state and gradually elaborate a hypothesis that describes cognitive activity as central in balancing information, affects, and needs, in normal and pathological functioning and adaptation.

Part IV uses the biodevelopmental framework and the various reported observations of cognitive controls in development and adaptation as a guide to shape a psychological treatment method, “cognitive control therapy.” This method relies on psychoanalytic and developmental concepts and was designed explicitly to restructure cognitive controls in children whenever the organization of these controls serves to maintain a balance of information and affects that is growth restricting and maladaptive. The cognitive control therapy programs devised and research conducted to explore their utility are presented in Parts V and VI.

To paraphrase Thomas Wolf and Sigmund Freud, a person is the sum of all moments of his life; all that is in him is in them. In developing the thinking and work reported in this book I have benefited in particular from moments spent with several individuals, and I express my gratitude to them. When in my first faculty appointment, at the University of Colorado Medical Center, John Conger demonstrated the value of integrating the spirit of psychological research and clinical practice. The late Harold Keely, a brilliant child clinical psychologist, revealed the excitement and gratification inherent in the struggle of clinical practice. Gaston Blum and the late John Benjamin introduced me to the scope of psychoanalytic-developmental principles.

I then joined the faculty of Clark University, the home of Heinz Weiner. There I learned a great deal about organismic-developmental psychology and research from Donald Krus, Bernard Kaplan, Joachim Wohlwill, and Seymour Wapner. At the same time I continued my commitment to clinical child psychology and launched my training in psychoanalysis. Here I am indebted to James Mann, who skillfully helped me live psychoanalysis and thereby come to learn the power of psychoanalytic technique and concepts, and to Bernard Rosenblatt, a developmental psychologist and psychoanalyst. I next joined the faculty of Boston University School of Medicine, and there I derived much benefit from my discussions with Louis Sander and Gerald Stechler, both developmentalists, researchers, and psychoanalysts.

Many thanks are due to colleagues and students who helped me with the studies described here. I owe special gratitude to Steven Berk and Robert Brooks, who assisted me in conducting the longitudinal studies of cognitive controls and who have applied cognitive control therapy in the treatment room, joining me in the task of refining and testing the method.

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Chapters 1, 2, 12, 18, 19: The following articles published in the *McLean Hospital Journal* appear, in part, within the chapters noted:

"On the relation between research and practice in psychiatry and psychology: The laboratory of the McLean Hospital, 1889," 1976.

"Principles of infant development as a guide in the psychotherapeutic treatment of borderline and psychotic children," 1976.

"New views of motivation and cognition in psychoanalytic theory: The horse (id) and rider (ego) revisited," 1977.

Chapter 9: "Cognitive controls and adaptation in children," a thesis by Faye I. Shapiro, 1972, is reported extensively.

Chapter 9: "Changes in cognitive functioning under stress: A study of plasticity in cognitive controls," by Gerald Guthrie, 1967, is reported extensively.

Part 1

ON THE INTEGRATION AND SEGREGATION OF DEVELOPMENTAL THEORY, RESEARCH, AND CLINICAL PRACTICE: HISTORICAL CONSIDERATIONS

CLINICAL CHILD PSYCHOLOGY AND DEVELOPMENTAL PSYCHOLOGY: IS A PARTNERSHIP POSSIBLE?

The 1970s have brought increasing pressure on investigators from practicing psychologists, as well as from various social and political groups, to give priority to research problems concerning human welfare and to find applications of research knowledge, so carefully gathered over the past five decades, in techniques of clinical practice. The field of child development research has not been free of this pressure. Leon Yarrow (1973), a prominent researcher, recently expressed the following view in a report concerning the interface of child development research and application:

> . . . not too many years ago there was a halo around pure science. Among the most revered members of our society were the scientists who carried on their esoteric activities in ivory towers. They were dispassionate men and women, aloof from society and its bothersome and inconsistent demands. They were given laboratories, research support and inordinate respect, with no immediate returns expected of them. ... At the present time there seems to be a growing disenchantment with pure science. The relevance of basic research is being questioned. . . .

Why have child development research laboratories produced so few studies offering relevance to clinical child psychologists working in private practice, in various institutional settings, clinics, schools, and residential centers? Why is it so difficult for clinicians to establish relevance between much child development research reported and the questions and problems they are asked to handle by society?

To convey some sense of how the clinician experiences this segregation of laboratory research from clinical practice, the reader is asked (albeit with tongue in cheek) to imagine adjacent rooms, separated by a two-way-vision mirror. One room represents a clinician’s office, and the other a researcher’s laboratory. The clinician is standing by the mirror, looking into the laboratory where an experiment is being conducted. On one wall he notices a row of portraits of persons who are obviously venerated: Wundt, Watson, Hull, Skinner, and others. All, however, is not serious and reverent. Touches of humor can be seen, for example, in abstract paintings depicting a critical flicker frequency and a goal gradient. Set off conspicuously in one corner of the lab is a Skinner box, sculpted in bronze. On a bookshelf are reproductions of once famous pieces of research equipment, such as Zwaardemaker’s original olfactometer. Among these museum pieces, the clinician notices a wax reproduction of Galton’s whistle, apparently displayed as concrete evidence that the researcher is aware of, tolerates, and even accepts the existence of a clinical world. The clinician’s attention is suddenly brought back to the researcher, who is bursting with excitement. The last college student subject, who had been performing nicely according to instructions, has been released from the experimental room, and the researcher is loudly proclaiming the outcome of the experiment. The clinician presses his ear against the glass. The researcher has found, the clinician hears, that anxious subjects pressed a lever significantly faster than non-anxious ones to escape from or turn off a 70-decibel tone. But, the researcher continues with the excitement of one who has just made a discovery, when a 95-decibel tone was sounded, the nonanxious subjects pressed the lever faster.

As the researcher rushes to prepare the data for publication, the clinician, disappointed and frustrated, slowly returns to his desk. He puzzles over what he has just observed. He knows that experiments are ways of asking and exploring questions, to learn what nature cannot tell us systematically, directly, and spontaneously. But he wonders, should not the questions asked make some difference to the practitioner? Casually he picks up a recent journal and begins browsing. He notices one researcher found that persuasibility and self-esteem are inversely related in the children studied; in another article the authors conclude that reserpine affected afterimages in a direction opposite to that of chlorpromazine, whereas chlorpromazine affected flicker fusion and tapping speed in a direction opposite to dextroamphetamine sulfate. The clinician ponders, there must be some inner meaning that he just is not catching.

A buzzer announcing the arrival of the next patient shakes the clinician back to the reality of his office. He greets a shy, frightened 7 year old. The clinician's mood of frustration quickly slips away as he attempts to establish with the child an allied, working relationship through which he hopes to collect his observations. When the clinician takes out his pictures and inkblots, he hears, he thinks, the snickering of the researcher who is now watching through the screen. The clinician becomes embarrassed and annoyed but tries to push on. Tomorrow he must report to the school and family his understanding of the problem presented and what could be done to relieve the child of his suffering.

The recently revised *Carmichael's Manual of Child Psychology* (Mussen, 1970), which can be taken as the major statement of the content and questions that occupy child researchers, reflects this sense that practice and research are different worlds, each viewing the other as alien, and indicates the paucity of meaningful connections between the two. As Mussen points out in his preface to the two-volume compendium, since the previous 1954 revision of the *Manual,* although developmental researchers have turned more of their attention to applied problems, advances in application offered by developmental research are modest relative to "the knowledge explosion" that has been observed. It is interesting to note that only three of the 29 chapters of the 1970 revision of the *Manual* are devoted exclusively to psychopathology in childhood, with some studies bearing relevance for clinical practice sprinkled within a few of the remaining chapters. Moreover, the three chapters appear last in the two-volume series—a detail that most dynamically oriented clinicians would interpret as a form of avoidance and rejection. It is as if child development is considered in the first 26 chapters; then applied problems are treated in chapters on "mental retardation," "behavior disorders," and "childhood psychosis." Not only do these three topics leave out much that concerns the practitioner, but they stand alone, outside child development. The first 26 chapters consider various areas of child development without psychopathology and practical issues as the focus, and the last three chapters deal with aspects of child psychopathology without developmental principles as the focus.

Why do child development research and clinical child psychology live and work in segregated worlds for the most part, with each experiencing the other as alien? Since the present functioning of a profession, like that of a person, can be understood in terms of past experiences and influences, a brief examination of the historical antecedents of each discipline may give us some insight into this question. An understanding of the ideological heritage and past identifications of each may help us understand the self concepts and ideologies that guide current functioning and in turn may suggest a treatment plan capable of achieving more integration between child research and practice.

THE HERITAGE AND DEVELOPMENT OF CLINICAL CHILD PSYCHOLOGY

If we turn first to clinical child psychology, we find conflicting accounts in the literature of the origin and history of this specialty. Part of the confusion appears to have come about because the emergence of clinical child psychology is interpreted by some writers (e.g., Wallin, 1958; Watson, 1953) to be a phase of the development of general clinical psychology, a phase that is all too readily homogenized with other so-called origins of clinical psychology such as the "psychology clinic movement" and the "psychometric tradition." This confusion is also reflected in Ross's (1959) text discussing the profession and techniques of clinical child psychology. In sketching the history of this specialty, he proposes that its two parents were child academic psychology and general clinical psychology.

Contrary to this view, it is my opinion, based on the available literature, that the specialty of clinical child psychology had its inception in a development that was geographically and ideologically quite outside the mainstream of general clinical and academic psychology (Charles, 1970; Levy, 1952; Watson, 1953; Wallin, 1958; Senn, 1946). General clinical psychology is usually viewed as beginning with the establishing of Witmer's psychological laboratory in 1896. Several similar psychological laboratories soon followed in universities or hospitals (e.g., Seashore's at the University of Iowa, Wallin's in Pittsburgh, and Franz's at McLean Hospital). The primary focus of these clinics, as Watson (1953) pointed out, was the assessment of aspects of physical and intellectual functioning; the clinics mainly handled referrals of mental deficiency or school retardation and played little or no role in treatment. In spite of later events such as the founding of the Association of Consulting Psychologists, and the efforts of individuals such as Seashore and Goldstein to establish greater rapprochement between psychology and psychiatry, one early writer (Louttit, 1939) concluded that clinical psychology in the 1920s and 1930s "generally speaking is not greatly interested in practical problems of human behavior." A later writer proposed (Watson, 1953) that after World War II the emphasis in clinical psychology has been clinical practice, but primarily with adult patients.

In sharp contrast, clinical child psychology, with child psychiatry as its twin, had its inception in 1909 in the home of the child guidance movement, when William Healy, a psychiatrist, opened the Juvenile Psychopathic Institute, in Chicago. To appreciate fully the effects of this beginning, it is important to examine in some detail the setting in which the specialty began. As we shall see, the unique circumstances that existed during the formative years imprinted on clinical child psychology particular characteristics that have become indelible hallmarks of the field.

First, when Dr. Healy established this clinic for children his clinical method differed quite radically from that of his contemporaries in terms of the working relationships that developed between him and his staff, a psychologist and a social worker. Though officially the psychiatrist was the head of this project, the psychologist and the social worker contributed professional diagnostic knowledge with equal status. By way of contrast, the several psychologists already employed in the hospital or university laboratories established by Franz and Wallin outside this movement performed their services primarily independently, usually submitting their data (which were mostly neurological) to be reviewed and used by the psychiatrist as he chose.

Other elements unique to the origin of clinical child psychology are contained in this interdisciplinary collaboration that developed in Flealy’s setting. The team jointly approached the clinical problem of delinquency by means of the child guidance method, a method predicated on the conviction that antisocial behavior was treatable with psychological means. The goal guiding the work of all three disciplines was to assist the child to adjust to the life field in which he lived. Therefore the initial focus was on psychological treatment and adaptation. In accomplishing this goal, the concepts of “total personality” and “multiple causation” were employed. Sources of information and other professional contacts, in addition to contemporary contact with the patient, were vigorously utilized. Dynamic case histories were obtained of physical and social factors in the child’s development, as well as information about attitudes and relationships of members of the immediate family, other relatives, peers, and other significant individuals. To this history was added the psychologist’s evaluation, at first with performance tests and later with projective tests, and also the psychiatrist’s interview material. These data were then reviewed and integrated at a diagnostic staff conference, sometimes with teachers, ministers, and family doctors invited, and recommendations were formulated. Eventually such recommendations solicited the assistance of various family and community agencies. This work was community oriented, and the emphasis was preventive.

From the start, then, child clinical psychology developed and worked collaboratively with social work and child psychiatry within a professional, geographical, and conceptual setting that was very much oriented in terms of the community, treatment, and prevention, since it dealt at first with the disorder of delinquency and gradually with other clinical and social mental health problems presented by children of all ages.

What became of clinical child psychology after this beginning? When Dr. Healy first opened his clinic, he hired as his psychologist and co-worker Dr. Grace Fernald. She was replaced in a short while by Dr. Augusta Bronner. Perhaps the beginning of clinical child psychology is represented metaphorically in the fact that Drs. Healy and Bronner were soon married. One of the first productions of this marriage was a psychological test, the Healy form board—and clinical child psychology was on its way.

In 1917 Healy and Bronner left the Juvenile Psychopathic Institute to organize a clinic in Boston that eventually became the Judge Baker Guidance Center. This clinic was enormously successful from the start and had considerable influence on the development of other clinics that soon followed. At the turn of 1920, the National Committee for

Mental Hygiene established demonstration clinics in a variety of cities and rural areas. Called for the first time "child guidance clinics," these organizations were set up deliberately to collaborate with various other agencies such as university teaching hospitals, courts, and local charities. The professional staff of these clinics included a psychiatrist, a psychologist, and a social worker. As the clinics flourished during the 1920s and 1930s, a gradual shift in focus occurred. No longer was the delinquent of primary interest, as at the first clinic in Chicago, nor was major effort devoted to mental defectives or neurological cases, as in psychology laboratories outside the child guidance movement. Instead, increasing attention was given to personality disorders in children whose difficulties appeared to have emotional roots.

It was during this period that the child guidance movement first represented itself organizationally with the founding, in 1924, of the American Orthopsychiatric Association. Its first president was William Healy, and a few years later the first psychologist to be president was his wife, Augusta Bronner. Thus clinical child psychology continued to find its identity in organizational relationships with child psychiatry and social work. Also, as child psychiatry and pediatrics found a meeting ground in providing training and service, clinical child psychology was naturally drawn into this collaboration.

As the child guidance movement grew, the need for professional and training standards became apparent. During the 1940s the National Committee for Mental Hygiene organized meetings of child clinic directors to which social workers and psychologists were soon included for the specific task of defining standards of training and practice. At one of these meetings it was decided to create the American Association of Psychiatric Clinics for Children (now called American Association of Psychiatric Services for Children, AAPSC). It is significant that this first formal recognition of the specialty of clinical child psychology did not occur within the context of the American Psychological Association; rather, it took place in organizational developments quite apart from the mainstream of either general or clinical psychology. It was not until 1965 that Section I (Clinical Child Psychology) of Division 12 of the American Psychological Association was established, giving the specialty of clinical child psychology formal recognition in the parent psychological association.

From the 1920s to the 1950s, while elaborating diagnostic and treatment activities in the growing number of child guidance clinics and establishing professional identity in medically related organizations, the specialty of clinical child psychology (along with psychiatry and social work) vigorously embraced as a working model the psychoanalytic framework of Sigmund Freud and the later elaborations of psychoanalytic ego psychologists such as Heinz Hartmann, Anna Freud, Erik Erikson, and David Rapaport.

As Bronfenbrenner (1963) cogently points out, the model one uses, with its explicit concepts and hypothesis, to guide professional work is but a small portion of the iceberg above the water. "Beneath is a mass of often unrecognized assumptions and modes of thought which reflect the scientific ethos about the kinds of questions that should be asked, how problems are to be formulated, and what strategies are best employed in pursuit of an answer" (p. 517). The model one assimilates and uses, then, is a major source of professional identification and exerts profound influences on how one views and conducts professional work. Therefore let us pause to examine the psychoanalytic model that clinical child psychology embraced, with its explicit concepts above the water and its mass of assumptions and modes of approaching behavior below. Such an examination is critical to our interest in the segregation between the practitioner and research.

Following Reese and Overton's (1970) articulate analysis of models of development, the psychoanalytic model qualifies as an organismic model that accepts the metaphor of man as an active organism. That is, the individual is represented as inherently and spontaneously active rather than as a collection of acts initiated by external forces. The individual is the source of his own actions, thoughts, and wishes. Another hallmark of this model is its view of man as an organized whole, a configuration of parts and functions, each one deriving its meaning from the whole in which it is embedded. Because of these two basic assumptions, the fundamental mode for analyzing (measuring) and understanding behavior within the organismic model concerns the form of behavior. From this point of view, the concepts of psychological structures and functions and alternative means and ends are accepted as given rather than taken as behaviors to be inferred. Questions are asked and methods used that uncover principles of organizations of behavior and of the relation between parts and wholes, rather than questions concerning how these structures were derived from elementary processes such as conditioned reflexes.

Change is also accepted as given, and as qualitative as well as quantitative. The active organism model represents man as a system in which the basic configuration of behavioral parts changes, as well as the parts themselves. As each new level of psychological organization is achieved, the total takes on new behavioral properties that cannot be reduced to those of lower levels and therefore are qualitatively different from them. While accepting the existence of an external reality, this model further assumes that the individual, on the basis of his inherent activity and the changing, evolving organizations of his behaviors, actively participates in the construction of the known reality. The individual can know the world only through the structures that mediate his behavior and through the interaction between these and things-in-themselves.

As Reese and Overton (1970) point out, the worker who follows the active organism model favors various theories and techniques and rejects others. The worker emphasizes the importance of behavioral process over achievements or behavioral responses. Behaviors are used to denote psychological structures. Changes in psychological structures are viewed as changes in levels of organization or stages, and these changes are accepted as the basic core and content of development. Experience is seen as important in terms of its facilitating or inhibiting the course of these structural changes. In analyzing or measuring behavior, emphasis is given to describing the structures that characterize a given stage, the relation of these structures to functions, the sequence of these stages, the rules that govern a transition from one stage to another, and the treatment conditions that facilitate or inhibit structural change.

It is important to note the philosophical roots of the organismic model. It began with Leibnitz, who maintained that the fundamental nature of the mind was found in its activity and in its consisting of a whole composed of forces. This position was elaborated by Kant, Hegel, and the “act” psychology of Brentano; it is represented currently in the theories of Freud, especially in psychoanalytic ego psychology, and of von Bertalanffy, Werner, and Piaget.

If we now view clinical child psychology in relation to the historical antecedents just summarized, we can articulate the life history unique to this specialty. Over the years, clinical child psychology has performed in close collaboration with psychiatry and pediatrics in various clinics and treatment centers for children that have long been oriented in terms of the community, treatment, and the “team approach”; it has employed the organismic model of man to shape questions and methods to answer them, and it has identified itself professionally in organizations such as the AAPSC and the American Orthopsychiatric Association, and only more recently in the American Psychological Association.

THE HERITAGE AND DEVELOPMENT OF CHILD DEVELOPMENT RESEARCH

The field of child development research sailed a very different course. It began as a specialty in the descriptive and theoretical accounts of the development of children written in the late 1890s by leading psychologists based primarily in universities for example, G. S. Hall and J. M. Baldwin (Dennis, 1949; Baldwin, 1960; Charles, 1970). A major shift in the interests of these investigators took place a few years later with the introduction in 1903 of Binet’s work with mental testing. For the next two decades developmental researchers were almost totally occupied with the ages at which various test items were passed and failed by children and with the construction of mental growth curves based on the notion of “percent passing.” This interest and method laid the ground for the point of view that psychological growth could be described in much the same way that weight and height curves describe the physical growth of children.

Developmental researchers gave this perspective more prominence in content they chose to observe and in methods they employed during the next two decades (1920-1940), when the course of child development research took another sharp turn. Dominating the field in this phase were a number of longitudinal growth studies (e.g., at the Fels Institute, the Child Research Council at Denver, the Merrill-Palmer Institute, the University of California). Because these long-range studies were designed to chart the physical and physiological, as well as psychological growth of children, the field became more closely linked to biological sciences, departing from the mainstream of psychology, which at that time was turning toward the study of learning as the core problem. The *Zeitgeist* of research with learning, along with growing ties to biological sciences, may have influenced some developmental researchers during this phase to prefer rats as subjects over the too-complex child (Yarrow, 1973).

It was not until the 1940s that child development research turned away from biological growth studies and found its way back into the field of psychology with its interest in studies of various early experiences such as weaning, toilet training, and maternal absence. This new phase in the historical course of child development research was ushered in by the influence of Freud's psychoanalytic hypotheses and clinical reports that were receiving considerable attention in the United States during World War II (Bronfenbrenner, 1963).

For our purpose it is important to note that when developmental researchers reentered the mainstream of psychology and directed their attention to the influences of childhood experience on psychological growth, they embraced learning theories prevailing at the time. Accordingly, studies were typically conducted by translating Freudian concepts into the concepts and observational methods of learning theory. As a result, the research was often so oversimplified, and the methods so ill-suited to capturing the phenomenon, that many psychoanalytically oriented clinicians and investigators could not accept this work as providing valid tests of the propositions in question. Moreover, as Baldwin (1960) points out, the investigations conducted by child researchers at this time gradually became less tied to a common set of theoretical hypotheses or framework that rendered the observations compatible, and focused more exclusively on topics of childhood treated in isolation. This is reflected, for example, by a book reviewing child psychology research (Stevenson, 1963) in which the material is organized around topics such as learning, thinking, moral development, dependence-independence, aggression, achievement, and anxiety, with no common framework relating studies within one topic, or of one topic with those of another.

The professional identity of the field of child development research gradually evolved from the early descriptive accounts of individual children, to the biological growth studies, to the focus on the influence of childhood experiences. The geography in which a discipline grows contributes to its identity, and the work setting throughout this 50-year period was, for the most part, the university. The workers were university professors and their graduate students whose pursuit of knowledge was influenced, in part, by the emphasis given in academic settings to the publication of research findings and by the availability of subjects for study in the university community.

Professional organizations contribute to the professional identity of a group, as well as reflect it. In 1920, when the field of child development was dominated by biological growth studies and the scientists conducting them, the Committee on Child Development of the National Academy of Sciences-National Research Council was established. One of its first actions was the formation of the Society for Research in Child Development (SRCD), which has continued to be the major organization representing the field of child development research. Later the division of Developmental Psychology (Division 7) was established within the American Psychological Association. In terms of our interest in the interface between the specialties of child research and practice, it is useful to note that the ethos of the National Committee with its society of researchers suggested that research and practice were viewed as segregated. For example, in 1960 members of the committee recognized the need for a handbook of facts and principles of child development, which would be of use to both researchers and practitioners in the biological and behavioral sciences. Yet in organizing a handbook, the policy was established that contributions would be limited to research use of methods, as opposed to diagnostic or therapeutic applications (Mussen, 1960). Accordingly, the contributions in the handbook, including those concerning personality development, were by university-based researchers; the practitioner was conspicuously absent. This segregating of research and practice in the world of child development research is also suggested by the child psychology handbook (Stevenson, 1963) sponsored by the National Society for the Study of Education. Again, the editor noted that the planning committee was interested in including discussions of the practical application of knowledge, yet the contributors were university-based researchers. Thus in spite of expressed interest in the application of knowledge of child development, researchers remained set apart in their professional organizations and university work settings from the settings and organizations concerned with clinical practice.

For about a decade in the 1940s the field of child research moved closer to clinical practice than at any other time in its history, with the major research interest in psychoanalytic hypotheses and the influence of early childhood experiences. But this romance between child development research and clinical practice was short-lived, fading by 1960. What direction has the field of child research taken in the years between 1960 and the mid-1970s? As Bronfenbrenner (1963) illustrates, the historical course of the specialty of child development research is revealed by the content and organization of the research handbooks and manuals that appear every decade or so. An examination of recent handbooks indicates that new features have emerged in the field (Mussen, 1970; Goslin, 1969; Hoffman and Hoffman, 1966, 1964). Although it has put away its psychoanalytic lens, the field of child research has maintained an interest in childhood experiences and personality development while adding two major domains of inquiry. One concerns the behavior and experiences of infants. Infancy has always captured the attention of child research, but over the past 15 years there has been a surge of interest in the newborn (Mussen, 1970). Another concerns cognitive behaviors and development.

It is my opinion that the latter area has moved into first place as the topic of interest among child researchers since 1960. For example, nearly half of the 29 chapters in the most recent *Carmichael's Manual of Child Psychology* (Mussen, 1970) are devoted to cognitive development. The explosion of interest in Piaget’s theory of mental development among child researchers appears to be a major factor in the popularity of cognition as a topic of study in both infants and children. Related is the observation that during the 1970s *Child Development* has devoted considerable space to studies related in some way to Piaget’s theory.

What model of man has the field of child research embraced from the studies of early childhood experiences of the 1940s to the current emphasis on cognitive as well as personality development? An examination of the work in child research suggests that two conceptual models have been used in the past 15 years as lenses through which the subject matter is viewed, questions shaped, and methods constructed. Piaget’s stage theory of mental development appears to be a major framework chosen to approach the study of learning and cognition (exceptions exist in work concerned with cognitive styles). Being an example of an organismic model of man (Reese and Overton, 1970) Piaget’s theory has much in common, as a basic point of view, with that of the practitioners discussed earlier. Learning theory, with its more recent elaborations of concepts concerning social learning has remained the major framework used in child research since the 1940s to study personality development as well as to study learning and the development of cognition. [Exceptions exist in Kohlberg's (1964) work concerning moral development.] But learning theory is an example of a mechanistic model of man that is antithetical to the organismic model. Let us pause at this point to examine the mechanistic model as articulated by Reese and Overton (1970).

A mechanistic model accepts the metaphor of man as a reactive, passive organism or machine, inherently at rest. Activity (whether thinking, wishing, wanting, or perceiving) results from external or peripheral forces. When these forces (stimuli) are applied, the person or machine operates, and the result is a discrete, chainlike sequence of events. Given this, we see that the model assumes that in principle, complete prediction is possible. Knowledge about the person-machine at one point in time allows one to infer how the person-machine would operate at another point in time, given knowledge of the forces to be applied. A related characteristic of the mechanistic model is that quantification is recorded a central position, as are functional equations that describe the relationships between the pieces of the person-machine in their operation. Change in the behavior of this person-machine does not result from change in the structure of the organism itself. The individual may reveal qualitatively different operations, but these are reducible to quantitative changes that emphasize the history and level or kind of stimulation presented by outside forces. In terms of the person's knowledge of his environment, the mechanistic model holds that the knower plays no active role in the known (the model of naive realism) and eventually apprehends the environment in a predetermined way.

The history of the model stems from John Locke, who proposed his famous dictum of man as a blank slate on which experience is written. From this point the empiricist movement, first in philosophy and then in psychology, found its way from Berkeley to Hume to Mills to twentieth century behaviorism of Watson and later learning theory. As Reese and Overton (1970) state, even the recent advances in behaviorism maintain the mechanistic model of man and his development. Moreover, they also effectively argue that the mechanistic model cannot be synthesized with the organismic, nor can the two intersect, because of their fundamentally different philosophical presuppositions concerning the nature of man and his development.

If we now view the field of child development research in relation to these historical antecedents, we can articulate the life history unique to this specialty. From the early descriptive writings of child development to the mental test movement, biological growth studies, studies of childhood experiences, and the recent added interest in infancy and cognition, child development research has performed within and under the ethos peculiar to university settings, with their interest in knowledge for the sake of knowledge. Moreover, child development research has identified itself in professional organizations dominated by university-based scientists, and after a period of close relationships with biological sciences it has embraced two antithetical models of man, the organismic and the mechanistic, which are used interchangeably to approach the study of cognition and personality development.

IDENTITIES AND POINTS OF VIEW OF CLINICAL CHILD PSYCHOLOGY AND CHILD DEVELOPMENT RESEARCH

With a comparative historical sketch of child development research and clinical child psychology before us, we can study more closely the question raised at the start concerning the segregation and alienation between the two fields, by inferring the professional identities and points of view unique to each.

The history of child development research suggests the following identity characteristics and philosophical assumptions which have relevance for the plight of the clinician.[1]

1. Except for relatively recent interest in stage theories of cognition, the researcher is guided mainly by the mechanistic model of man and accordingly shows a preference for social-learning theory. Beneath the iceberg of the explicit concepts of social-learning theory lie many assumptions and values that derive from the mechanistic model and influence what the researcher looks at, the questions he asks, and the methods used to answer them.

2. There is the ambition to build a psychology in the image of the physical sciences. This has resulted in a preference for studying relatively isolated, unitary psychological processes in the most consistent situations that can be arranged, with the most controllable subjects that can be obtained. The precise, single-variable experiment is often preferred, sometimes even at the cost of relevance.

3. The researcher presumes that he exercises significant control over his subject and experimental conditions and accordingly determines what the subject knows and experiences and the behaviors determined by the external experimental forces. Minimized or denied is the notion that a child may introduce feelings, interpretations, or fantasies that shape what he knows and experiences within the experimental situation.

4. The measurement of behavior and the statistical prediction of behavior are highly valued.

5. The reification of measurement sometimes leads to an interest in and preoccupation with instrumentation and gadgetry which, from the clinician’s view, approaches fetishism.

6. Because of the value given to controlled experimentation and precise measurement, researchers are averse to using fantasies, wishes, and feelings as content for study.

7. In terms of professionalism, because child development research has resided since 1900 principally in the university setting, research as an activity has become a source of prestige; it is an end in itself, and various motives in addition to scientific curiosity guide the content and direction of a study: the desire to meet the requirements of a Ph.D., therefore the special interests of thesis advisors; the desires to be in print, to win a promotion, to gain acclaim in academic circles. The latter motive on occasion produces a bandwagon effect, with researchers following a concept or laboratory method, sometimes regardless of its relevance for the population used or the questions being pursued. As Bronfenbrenner (1951) has noted, knowledge does not progress by differences significant at the .05 level, but academic achievement does.

From the clinician’s point of view, the professional identity of the researcher may be reflected, albeit emotionally, by a statement Henry Murray made (1960). Watson, Murray noted, came along with his behaviorism, modeled after

Pavlov and, “with this sword he murdered, on his right, the meandering introspections of Tichner, and on his left the nativistic drive theory of McDougall; ever since that triumph, Watsonian behaviorism has constituted the fixed image of American psychology—shallow, mechanistic, Philistine, soulless in the minds of a large number of Continental thinkers.”

On the other hand, the clinical child psychologist, with his roots in the child guidance movement and in the organismic model of man as reflected in psychoanalytic theory, has developed a very different self-concept and mode of professional functioning.

1. He has the ambition to build his profession in the image of medicine in general and psychiatry in particular. The clinician’s security comes in large measure from his reputation and skill as a healer and as someone who is proficient in the art of relating with others, especially patients. Other sources of security are the fees or salary he is able to collect as a result of his reputation, the recognition that society will afford him (especially if communicated in certification or licensing laws), and the notoriety he attains among his patients.

2. Unlike the researcher, whose interest lies in single-variable, highly controlled situations, the clinician must view simultaneously many different aspects of personality functioning. He is interested in a detailed history of a person’s experiences, of current and past perceptions, attitudes, needs, and feelings in awareness as well as those repressed. The clinician is likely to be a glutton for many and different pieces of data (usually more than he uses), whether these be precisely measured or lacking clear operational definitions and only inferred. In general, the clinician is quite tolerant of ambiguity and the absence of rigor in his data, and he accepts the condition that behavior is not completely predictable.

3. The clinician operates with the conviction that his patient, not he, determines and defines the stimuli presented in the professional setting. The clinician may introduce or impose test conditions or verbal responses, but he takes as given that each patient will experience the situation uniquely, and he searches for clues of this uniqueness, including them among his data.

4. From his theoretical orientation, however vaguely defined, the clinician makes observations, decides a course of action, and provides a clinical service, all with the self-assurance of certainty, an attitude he must maintain if he is to operate quickly and perform some service in the face of psychological crises, which are the daily fare of clinical practice.

Although these basic differences in heritage and self-concept have segregated child development research and clinical child practice over the years, there is some evidence from each camp of interest in a rapprochement. On the side of child development research, there has been more active concern during the past 15 years with the potential practical contributions of the systematic study of developmental psychology (Mussen, 1970, p. viii). Some child researchers have turned their attention to promoting cognitive abilities, understanding the etiology and treatment of mental retardation, improving teaching techniques, and preventing delinquency. These studies have made contributions to practice, but they have also had a salutary effect on theory and method. When theoretically based hypotheses and methods are applied in real-life situations, the researcher is sometimes forced to revise the theory and methods, as illustrated in the researcher's experience in using Piaget's concepts to plan preschool curricula. Clinical problems can be a stimulus for basic research.

On the side of clinical child psychology, clinicians are beginning to acknowledge that they are obligated to contribute to the systematic study of development. As Franz From (1960) stated, behaviorism need not scare clinicians away from the study of behavior. Rather, clinicians should take more initiative and should become more active in collecting observations, developing constructs, and conducting research within everyday practice.

THE CLINICAL CHILD PSYCHOLOGIST'S NEED FOR NEW TECHNIQUES

The clinical child psychologist is in dire need of technological advances. Compared to his forefathers in the child guidance movement, the present-day clinician confronts a broad array of social-psychological problems and a wide range of patients from infancy to adolescence, in addition to the childhood neuroses that occupied him in the 1940s and 1950s. The clinician sees children who are unable to learn in spite of adequate intelligence, children and parents whose daily transactions and negotiations are fraught with turmoil and conflict, children who are unable to take in and use the standards of their parents and environment to regulate their behavior, children who are hyperactive and restless with no organic cause, and infants who are not thriving appropriately within their particular parent-child matrix.

As the child clinician approaches these problems with the diagnostic and treatment methods he has inherited since Healy and Bonner first devised their form board, he is finding both the diagnostic methods (interviewing, intelligence, perceptual, and projective tests) and the treatment methods (individual and group psychotherapy) insufficient. The clinician is finding, for example, that aggression a child shows on projective tests does not always correspond to the aggression he shows in the playground. The learning disability that handicaps a child does not always respond to psychotherapy.

How does the clinician proceed to find a solution to his technological needs? Can he turn to the field of child development research for assistance and advice? This avenue does not seem to be promising. The field of child development research views its subject matter sometimes, and only recently, through the lens of the organismic model, and more often through the lens of the mechanistic model, especially if the subject matter is personality development. At the same time the field of clinical child psychology scans its content almost consistently through the lens of the organismic model. Reese and Overton (1970) tell us convincingly that the mechanistic and organismic models are basically incompatible. They can operate at best side by side, and the only rapprochement possible is "like the parallel play of preschoolers in that the protagonists are separate, but equal and mutually tolerant" (p. 166). The field of child research may find that it can conduct its business of studying development now looking at learning, or cognition, or personality through the mechanistic model and social-learning theory, and now looking at cognition through the organismic model and Piaget's theory. For the clinician, this is an untenable position from which to work. The simultaneous use of two antithetical models is not unlike experiencing a schizophrenic process. In my opinion this clash between the mechanistic and organismic models, especially the underlying values and presuppositions unique to each, is one major reason the conditioning therapies have found only isolated use in general clinical practice and have not led to a major change in the organismic, psychodynamic treatment approaches used to relieve children of psychological suffering (see, e.g., Feather and Rhoads, 1972a and *b;* Berger and McGough, 1965).

RECOMMENDATIONS FOR THE CLINICAL CHILD PSYCHOLOGIST

Using the insights offered by an examination of the-historical antecedents of child research and child practice, a treatment plan suggests itself that would help the clinician in his need for technological advances. The clinician should not turn and embrace the field of child development research with its multiple models of man and its particular reliance on the mechanistic view. The treatment plan recommends that the first step lies in constructing a single theoretical framework capable of subsuming all the issues represented by the subject matter of importance to clinicians: cognitive and emotional, intrapsychic and interpersonal, and normal and pathological. This recommendation is compatible with a position stated by Baldwin (1960), who noted that contributions to practice will not come from a frontal attack on clinical problems by child development research, with its accumulated knowledge and historical bias. Rather, Baldwin contends, the first step is to construct a single theoretical model for the guidance of the formulation of new questions and clinical methods.

This book is an attempt to implement this recommendation, in beginning the task of looking for new concepts and clinical technology that shape clinical practice in terms of developmental principles, on the one hand, and embrace developmental principles in terms of practical problems, on the other. The first step is to propose, for the guidance of clinicians, a single developmental framework that returns psychoanalytic theory (especially its advances in psychoanalytic ego psychology) to the center of the stage to interact with organismic-developmental theory. The two together provide a single guide with which it seems that most, or perhaps all, of the issues and problems of clinical import may be approached. Moreover, the framework proposed here appears to be a theoretical iceberg, containing fairly well-defined propositions and hypotheses visible above water, and also bringing together a number of assumptions and biases that derive from the history and identity of child development research, as well as from clinical child psychology.

To implement the treatment recommendation further, the developmental framework proposed as a guide to clinical practice is followed by a discussion of diagnostic and treatment techniques developed specifically for clinical work with cognitive disabilities. These techniques are offered both as useful clinical technology and as one illustration of how the proposed theoretical framework can serve as a guide for the development of new clinical technology.[2] The clinical methods described in this book have been constructed, developed, and studied both in response to questions that emerged in my clinical practice, and out of my interest in using the developmental framework as a guide in devising new technology. Although the diagnostic and treatment methods have been subjected to a number of formal and clinical studies, the “hard-nose” researcher may still find them not “thoroughly” standardized and “completely” tested. However, I believe that the technology proposed can contribute to practice in clinical child psychology and can suggest further lines of technological innovation and clinical and developmental research.

Part II describes the proposed theoretical model, surveys some research studies reported in the literature which illustrate its heuristic value for clinical practice, and considers diagnosis from the viewpoint of development. Part III reviews the concept of cognitive controls, contains instructions for administering and scoring tests of cognitive controls devised to aid in the task of diagnosing cognitive disabilities, presents data to support the validity and reliability of these tests, and illustrates their application in practice. Part III also presents a developmental adaptational model of cognition to which the diagnostic tests can be related and from which the treatment of cognitive disabilities can be prescribed. Parts IV, V, and VI describe a treatment technique, and its rationale, called “cognitive therapy,” which has been developed especially to treat cognitive disabilities and relies on the same developmental framework as its guide.

The psychoanalytic clinician who derives his orientation from pre-1940 psychoanalytic writings will not find very much that is familiar. The concepts employed come from the writings of psychoanalytic ego psychologists who have stressed that a theory of the organization and development of psychic structures, and of man’s adaptation to and conflict with external reality, is critically needed to supplement Freud’s theories of libido development, neurosis, intrapsychic conflict, and mechanisms of defense.

A word is also in order to clinicians who are committed, as I am, to the value of projective and intelligence tests and of psychoanalytically oriented psychotherapy. The diagnostic procedures described here are *not* offered as substitutes for traditional tests, which have long ago proved their worth in practice. They are suggested as useful additional diagnostic strategies. As subsequent chapters note, the procedures described here may be very helpful, when used along with projective instruments, intelligence scales, and academic achievement tests to diagnose, for example, whether a child’s learning disability and hyperactivity in the classroom are due to lags in cognitive development or to neurotic conflicts, and whether psychotherapy or cognitive therapy is the treatment of choice. Along the same line, the treatment methods presented here are intended for children whose problems do not respond readily to psychotherapy or child analysis.

Although I believe that the diagnostic and treatment methods described may be of use to clinicians, they are offered primarily as illustrations of the heuristic value of a single conceptual model that integrates child development and psychoanalytic concepts, in the hope of stimulating practitioners and researchers to make use of the methods and model in efforts to find new ways of understanding and approaching clinical problems.

Notes

[1] For the following discussion of the heritages and self concepts of the researcher and clinician, I make use of information and points of view contained in papers by Murray (1960) and Criswell (1958). However I assume responsibility for the emphasis and interpretation given them here.

[2] I am preparing a book about diagnostic and treatment methods that also derive from the developmental framework proposed here but concern motive expressions in children and parent-child interactions. This work is intended to provide other illustrations of how the proposed biodevelopmental framework can guide the development of new clinical technology.

Part 2

DEVELOPMENTAL THEORY AND DIAGNOSIS IN CLINICAL PRACTICE

THE BIODEVELOPMENTAL FRAMEWORK: CONCEPTS OF DEVELOPMENT FOR CLINICAL PRACTICE[3]

As outlined in the previous chapter, the field of child research grew separately from that of clinical child psychology. This historical segregation has resulted in several complications for the present-day clinician who turn to child theory and research, or to clinical reports, for a single map that could be helpful in innovating developmentally based diagnostic and treatment techniques for practice.

First, current literature suggests that the worlds of child research and child clinical practice remain segregated, for the most part. Clinical reports typically pay little systematic attention to the development of psychopathology, and child research reports typically make no more ado about clinical application. An examination of the contents of several handbooks and texts supports this view. It has already been noted that only three of the 29 chapters in the third edition of *Carmichael's Manual of Child Psychology* (Mussen, 1970) bear on topics of direct significance to the child practitioner (mental retardation, behavior disorders, and childhood psychosis). The first volume of the *Review of Child Development Research* (Hoffman and Hoffman, 1964) does not contain a single chapter devoted to child psychopathology; the second volume (Hoffman and Hoffman, 1966) has two such chapters, one on mental retardation and the other on juvenile delinquency; there is no formal treatment of child psychopathology in the third volume (Caldwell and Ricciuti, 1973); one of the 11 chapters of the fourth volume (Horowitz, 1975) has a clinical topic (drug treatment of children with behavior problems); and two topics that could qualify as “child clinical” emerge in the fifth volume (Hetherington, 1975)—one concerns learning disabilities and the other child abuse. These several volumes, which could be viewed as reflecting the *Zeitgeist* of child development research, show that topics such as achievement, parental discipline, aggression, concept attainment, peer relations, and cognitive and language development have held the interest over the past 15 years, with infant development and Piagetian cognitive pathology emerging as dominant in recent years. When surveying these research reviews, the child clinician may notice that not only do researchers emphasize topics not directly connected to child psychopathology, but researchers rarely apply systematic research designs and methods to some psychopathological forms of the behavior under study. The relative lack of interest in psychopathology by child researchers relates to a review by Sears (1975) of the history of child development. He points out that in the 1930s and early 1940s psychoanalysis, with its emphasis on pathology, exerted some influence on the topics selected for research (e.g., attachment, dependency, sibling rivalry, gender-role development, and achievement motivation). However he believes that since the 1950s the psychoanalytic school has remained more or less isolated from the field of child development, an opinion borne out by our survey of the topics covered in the five reviews of child development research published since 1964.

On the other side of the coin, writings concerned with child psychopathology usually employ a descriptive psychodynamic approach and pay little attention to developmental propositions in their treatment of the subject. One illustration is provided by many of the contributions in Wolman's (1972) *Handbook of Child Psychopathology,* and another by Kessler's (1966) text on child psychopathology. The minor role played by the developmental view of child psychopathology in the clinical world is pointedly underscored by a report of a project (Rhodes and Tracy, 1972) designed to examine models of emotional disturbances in children and to synthesize the concepts of these models. The developmental model is not among the five that were examined: biophysical, learning, sociological, ecological, and psychodynamic.

Psychodynamically oriented texts concerned with child psychopathology typically bring attention to developmental issues through the lens of psychoanalytic ego psychology. For example, disturbances in ego functioning observed in childhood and adolescence are given some consideration developmentally in one text (Copel, 1973). In another (Blanck and Blanck, 1974) “descriptive developmental diagnosis” is proposed as taking several lines of observation simultaneously—object relations, psychosexual maturation; drive-taming processes, defensive functions. One book (Achenbach, 1974) joins the term “developmental” with the term “psychopathology” in its title and points out that psychopathology in children is best understood in relation to changes (progression, regression, deviations, successes, and failures) that occur in the course of children’s attempts to master the developmental tasks that face them. But even in this text, with “developmental” in its title, discussions of classification, drug abuse, antisocial behavior, and intervention are not organized with developmental principles at the core.

Noticing that writings today of child research and of child psychopathology still reveal the segregated status of each, practitioners may find themselves concluding and agreeing with Schopler and Reichler (1976), who state in their text on psychopathology and child development that this segregation has contributed to stereotypes on both sides, which in turn foster the segregation: researchers often stereotype clinicians as being fuzzy-headed and intellectually undisciplined, whereas clinicians often caricature researchers as individuals preoccupied with trivial and socially irrelevant issues.

Another complication that emerges for the practitioner who turns to child research and clinical writings for guidance in innovating technique concerns the concept of “development” itself, which as used in the general psychological literature, is a protean one (Kaplan, 1959; Nagel, 1957; Aigler, 1963; Reese and Overton, 1970; Wohlwill, 1973). Development is variously taken to refer to growth, achievement of a new response, attainment of an ideal end state, change occurring over time, or any study employing children, especially if the subjects are of different ages.

Moreover, no single, generally accepted theory of psychological development exists at this time. Rather, several schools of development have been stimulating a rapidly growing number of studies (Baldwin, 1967). Each emphasizes particular questions and classes of behavior and offers various concepts to account for observations made. Among these schools are social-learning theory; psychoanalysis; the cognitive-developmental theories of Jean Piaget, Heinz

Werner, and Jerome Bruner; the field theory of Kurt Lewin; the sociological theory of Talcott Parsons and Robert Bales; and the biological systems theory of Ludwig von Bertalanffy.

The clinical child psychologist, then, finds that developmental questions, concepts, and research findings do not live in a single house but in many, varied houses. Two houses may claim that an area of development, such as cognition, lives inside, but one is a three-story rambling structure, the other a single-story, efficient, ranch-style house. Moreover, though each of these houses claims to be the place in which psychological development lives, when we look inside one we find thinking and cognition, in another we find social learning, and in still another, interpersonal transactions. Furthermore, houses of developmental psychology have also been constructed in terms of chronological age, with the discipline of infant development residing in one, childhood development in another, and adolescent development in another. The field of life-span developmental psychology has emerged during the past decade to counter this compartmentalizing of developmental psychology and to emphasize that the same developmental principles can serve the study of behavior from birth to old age (Baltes and Schaie, 1973; Goulet and Baltes, 1970).

Because of this state of affairs, and the need for a single model of development discussed in Chapter 1, I found it necessary to construct a conceptual scaffold of development that could offer a comprehensive framework and guidance to the practitioner.

But which planks, of the many offered by developmental theories in vogue, should go into this scaffold? The framework selected derives primarily from three of the schools mentioned earlier, namely, the developmental theory of psychoanalysis represented by writings in ego psychology (e.g., Hartmann, 1958; Gill, 1967; Rapaport and Gill, 1959); the cognitive-developmental theory of Piaget (e.g., Flavell, 1963); and the organismic-developmental theory of Werner (Werner, 1957; Werner and Kaplan, 1963).

There are several justifications for the choice, beyond my own preference for these particular schools, especially those of psychoanalysis and of Werner. First, the three schools selected share basic features: each assumes that “development” is not a phenomenon as such but a set of assumptions defining a point of view from which any behavior can be observed and conceptualized; each was formulated initially within a biological orientation, resulting in a number of similar propositions; and each conceives of normal development as an ideal course of evolving processes, and psychopathology as deviations from this course.[4] Second, the three schools present theories and concepts that fall within the organismic model of man as discussed earlier. Third, the common features of these three schools constitute a framework that is consistent with recommendations by Baldwin (1967), which he formulated after critically evaluating six major developmental positions, and with those of Harris (1957). In the opinions of Baldwin and Harris, a general theory of development should conceive of organisms as active systems, maintaining some degree of integrity, stability, or selfregulation; should view change as a transition toward complexity of organization, involving multilevel functioning and organized wholes; should allow for intrinsic development as well as change due to external stimulation; should account for the acquisition of new behaviors (i.e., the occurrence of a response for the first time); and should include as content for study overt behavioral acts, thoughts, feelings, fantasies, drives, inhibiting acts, and peremptory as well as voluntary behaviors.

It is acknowledged that the framework presented in this chapter emphasizes certain features common to each of the three theories and ignores other aspects that are inconsistent. Systematic, comparative discussions of the critical similarities and differences represented by these theories are available (e.g., Baldwin, 1967; Decarie, 1965; Kaplan, 1959; Rapaport, 1960; Wolff, 1960; Wolf, 1966; Greenspan, 1975), as well as provocative theoretical and methodological critiques of issues presented by developmental psychology (Spiker, 1966; Zigler, 1963, Reese and Overton, 1970; Wohlwill, 1973).

Since the fundamental position regarding development shared by Freud, Piaget, and Werner is oriented to constructs stemming from biology, the term "biodevelopmental" is used to distinguish the view of development under consideration from others reported in the literature.

SOME MAJOR ASSUMPTIONS AND CONCEPTS OF THE BIODEVELOPMENTAL FRAMEWORK

The biodevelopmental framework includes several basic assumptions that in turn lead to a number of propositions, which should be viewed as interrelated. Although emphasizing a particular consideration, each proposition amplifies other assumptions. Alone or in combination, they have guided and can guide investigators in formulating various questions for study of central relevance to practice.

Holism

The psychological properties and meaning of any unit of behavior (a percept, act, fantasy, or social interact) should be determined by the total psychological context of which it is a part. Thus two manifestly similar behaviors could represent different meanings if they are embedded in different contexts (e.g., aggressive acts by a 5 year old and by a 25 year old). At the same time two materially different responses could represent the same meaning if embedded in similar contexts (e.g., the same 5 year old injures the family's newly acquired pet kitten and breaks his baby brother's rattle).

Psychological Givens and Directiveness of Behavior

A person does not experience and react to stimulation passively. Rather, he brings into play, from birth, innately given behavioral and structural organs and models of functioning (e.g., apparatus); examples are motoric rhythm patterns, sensory thresholds, and affective and cognitive response styles by which he actively approaches, avoids, selects, shapes, and organizes stimulation confronting him, and by which he acts on the environment to effect a change in the person-object relation.

A connection or fit is guaranteed between these innately given behavioral structures and functions, on the one hand, and typical stimulation on the other; thus throughout the life span experiences, objects, or persons of certain types represent inherent psychological nutriment for the growth of these behavioral structures. Moreover, the individual directs and regulates these responses at a pace that ensures harmony, coordination, and mutuality between his evolving psychological equipment and the changing demands of the environment. In this way he maintains his integrity in the face of highly variable internal and external conditions, and he ensures that his interactions with the environment result in nutrition-providing experiences that foster psychological development.

The consistent attempt to maintain an integrative existence in the midst of changing stimulation is related to the tendency of the individual to develop toward a relatively mature state under the widest range of conditions. Whenever development occurs, it proceeds from a state of relative globality and lack of differentiation to a state of increasing differentiation, articulation, and hierarchic integration.

Multiple Modes and Goals, Stages of Development, and Consistent Individual Differences

The assumption of an inherent course of change, from global to differentiated, leads to the proposition that each behavioral system of an individual can be ordered along continua defining stages of maturity. When applied to two interdependent issues of psychological development, namely, self-world relations and modes of functioning, the assumption of differentiation leads to the proposal that development is represented by an ideal sequence of stages. The developmentally immature individual is viewed as fused with his world. His responsivity is immediate and tied to particular objects in the environment. Gradually he becomes differentiated from the environment, constructing a complex and delineated self-world relation. He develops the capacity to employ substitutive means to achieve the same end and to utilize several alternative ends as goals of a single mean. Therefore, while the person's self-world relation becomes more articulated, at the same time his modes of behaving (e.g., intellectual, activity, drive expressions) undergo change from being simply organized to becoming differentiated into numerous instrumental behaviors, each related to a specific goal.

Taken together, these simultaneously occurring processes define a progressive sequence. An immature individual functions with a few globally organized modes that are inoperative in the absence of physical contact with the environment. At a more mature level of development, the individual functions with many, highly differentiated and organized modes capable of operating in contact with, or in the absence of, the related environmental object. For example, the infant gathers information about the texture of an object by mouthing, touching, holding, or squeezing it (sensorimotor mode defining a sensorimotor stage) and later uses the mental schemata he has developed through these activities to survey an object at a distance and judge its texture perceptually (perceptual mode defining a perceptual stage). Or a child may express angry feelings by kicking a classmate (action mode defining an action stage) and later express these feelings by imagining that he is victorious in a boxing match with that classmate (fantasy mode defining a fantasy stage).

The progression from one stage in a sequence to the next higher one, therefore, results in multiple means by which the individual can achieve a goal. The child can imagine his baby brother being frightened by a monster, or the child can perform some action to frighten his baby brother. The progression also results in multiple goals that can be served by a single mean. When frustrated by mother, the child can fantasy retaliating against her; and when lonely in her absence, he can fantasy receiving affection from her. The availability of multiple means and alternative ends frees the individual from the demands of the immediate situation, enabling him to express behavior in more delayed, planned, indirect, organized, stage-appropriate terms and to search for detours that acknowledge opportunities and limitations of the environment while permitting successful adaptation.

The developmental status (early versus advanced) of a stage of functioning is assessed not in terms of its time of occurrence but in terms of (*a*) the organizational characteristics it reveals, (*b*) the range of behavioral levels that should be available to the individual (whether as a consequence of his developmental history or of situational factors influencing his current psychological state), and (*c*) environmental circumstances, limits, opportunities, and expectations. Thus the diffuse fantasy of a 5 year old is not primitive in terms of ideal development of fantasy organizations, but the diffuse fantasy of a psychotic adult is.

The concept of differentiating behavioral modes, when related to the concepts of psychological givens and holism, defines the proposition that individuals display consistent, psychologically meaningful differences from birth throughout the life span. In infancy individuals reveal consistent differences in the organization and responsivity of innately given behavioral modes. As a group, for example, infants of one age sustain attention longer than a younger comparison group on a 64 square checkerboard, yet these older infants will show consistent differences. As the behavioral mode undergoes differentiation, these initial differences in responsivity have relevance for the rate and direction of development of the mode in question, for the relationship between the mode and other emerging modes, and for the rank or level the particular individual assumes at each stage of development defined by that mode.

The concepts of differentiating behavioral modes and goals and of stages of development further assume that early forms of functioning are not replaced during this process by new differentiated behavior. Rather, the earlier behavior becomes subordinated by higher forms and hierarchically integrated within them. Although subordinated, earlier forms of behaving remain potentially active; there at each point in development they codetermine all subsequent structures and functions.

Mobility of Behavioral Functions and of Developmental Stages

The potential of subordinated behaviors to become active relates to the concept of mobility of behavioral functions and of stages (i.e., regression and progression in behavior). At no point in the life span is the individual operating only in terms of the behaviors that define a single stage or level, instead, he has available a range of behaviors representing different levels of some hierarchy. The genetically immature individual is characterized by a narrow hierarchy of behaviors or levels and is relatively unable to shift from one to another in response to changes in stimulation, opportunities, and limitations. The more mature individual is characterized by a broad and mobile hierarchy of levels, and he undergoes wide shifts in functioning, sometimes regressing to a stage characteristic of earlier development and sometimes swinging to a more advanced stage in response to changes in stimulation, opportunities, and expectations. For example, the fourth grader upon leaving the classroom and entering the playground for recess “regresses” to the action mode in running, pushing, and wrestling in a vigorous game of “king of the mountain.” Upon returning to the classroom, he shifts progressively to modes of functioning characteristic of higher levels of development—now thinking and fantasy dominate as he subordinates motility, assumes his seat, and completes a page in his workbook.

The progressive or regressive shifts from one stage or function to another is presumed to result in a “good fit” between the individual’s drive tensions, feelings, intentions, and needs (both emotional and cognitive) and the environmental opportunities, limitations, and expectations. Maintaining a “good fit” between levels of functioning and environmental changes is thought to foster development and ensure adaptive success. These considerations point to propositions concerning drives and motivating forces.

Motivating Forces and Regulating Structures[5]

From birth, “long-range” and “short-range” motivating forces activate the individual’s innately given motoric, perceptual, and cognitive apparatuses. These forces are goal directed and require particular qualities, types, tempos, and degrees of stimulation.

Long-range forces correspond to needs or instinctual drives that arise from psychophysiological imbalances. These drives continually press for expression and are inherently coordinated with and directed toward certain classes of objects in the environment that alone can reestablish psychophysiological balance.

Long-range forces repeatedly play out a cycle: the balance of drive tensions is disrupted, contact is made with a drive-satisfying object, balance of drive tension is reestablished ; then the balance of drive tension is disrupted again, and so on. The reduction and equilibrating of tension in contacting a drive-satisfying object is characteristic of long-range forces. Sexual and aggressive drives and their derivatives are viewed as long-range forces.

Experience and intrinsically maturating behavioral modes, in interaction, not only play a role in shaping and modifying the behavioral expressions of long-range forces but also give rise to regulating psychological structures. Experiences teach the individual to utilize substitute goal objects and alternative means, whenever the sought-for object or preferred means of expression is restricted, prohibited, or unavailable because of environmental circumstances. The 2 year old longing to be cuddled by mother, who is away on a trip, may cuddle the blanket mother gave him.

Moreover, maturating modes make available new behaviors for expressing long-range forces. For example, with the emergence of fantasy and representational thought, the child can express a long-range motive in a mentally constructed scene of events rather than in action, thus imagining his mother’s return and caress. This promotes the development of ego-regulating mechanisms that block, delay, modify, or redirect long-range forces, enabling them to coordinate their expression with behavioral modes that have been made available by development and with changes created by the environment in the availability of goal objects.

Short-range motivating forces include the “need to function” and ego-motivational states such as “interest,” curiosity,” and need for change and complexity. They arise when organizations of the individual's perceptual and cognitive apparatus undergo change from the assimilation of a new experience. When the organization of intellectual structures becomes more differentiated, a state of mismatch or disequilibrium occurs that defines a condition of “nutriment hunger,” a need for a particular quality, degree, or tempo of informational stimulation or a need to avoid particular informational stimulation. These short-term forces have no inherent coordination with respect to external objects, but rather to various organizations of information. Seeking stimulation and maintaining a state of balanced tension is a characteristic of short-term forces.

The propositions we have considered to this point, concerning innate givens, holism, multiple behavioral modes, stages of development, mobility of functioning, and motivating forces, all converge in propositions relating to the adaptive process.

The Adaptive Process[6]

The adaptive process involves reciprocal relating between an individual and his environment (e.g., parent, family), and each of these systems attempts to influence the other, to achieve a mutually agreed-on degree of coordination.

The individual phases in and presents to the environment an evolving series of average and expectable behavioral organizations (e.g., perception, cognition, and affectivity) more or less matching environmental expectations, opportunities, and limitations. The environment, in turn, presents the individual with a continuous, evolving series of average, expectable organizations of stimulation (i.e., the stimulation more or less fits the sensing and responding equipment of the individual). These stimulations, moreover, activate psychological structures already available to the individual and suited (preadapted) to handle the confrontation.

Never perfectly matched with the individual’s psychological equipment however, the environment continually changes its opportunities and expectations. In adapting to these environmental fluctuations, the individual shifts from a more recently acquired level of responding to earlier levels, or he evolves newly differentiated modes (e.g., thought in place of action).

Although this adaptive process occurs continuously, at certain critical periods within the life span particular behavioral systems are especially ready to deal with and assimilate a particular class of stimulation. If the critical experience is not made available, the behavioral system assumes a deviant line of growth.

The environment determines, in part, which behaviors are adaptive. What is average and expectable stimulation in one context may represent an atypical stimulus in another; thus a response that would be termed adaptive in one situation may represent developmental failure when resorted to by the same individual under other circumstances.

For the reader interested in pursuing any one of these concepts and propositions in more depth, I suggest in particular the text by Wohlwill (1973) and the chapters by Reese and Overton (1970) and by Kohlberg (1969) from among the references already cited.

THE BIODEVELOPMENTAL FRAMEWORK AND CLINICAL PRACTICE

Applying the biodevelopmental framework to issues of importance to clinical practice clearly leads to particular questions and interests while excluding others.

In most general terms, whether assessing a patient's perceptual activity, problem solving behavior, conceptual thinking, fantasy life, feelings, or overt actions, the framework would require that questions be raised and methods devised that consider the role of psychological givens and of long- and short-range motivating forces. The questions and methods also should assess responses in terms of the context defined by the individual and his environment and in terms of the hierarchical status of the behavioral mode under study and the goals associated with it, as well as taking into account the individual and his environment as reciprocally related systems, each accommodating to and influencing the other.

Consider a few examples. Does the infant show evidence of unique sensory thresholds (e.g., hypersensitivity to complex visual displays—many contours or parts), that relate to the subsequent formation of ego characteristics (marked avoidance or passivity in the face of information) that lead to a significant deviation from the ideal sequence of adaptive development (i.e., later in life the child withdraws from actively exploring the nursery school classroom)? Does the adolescent patient show a degree of differentiation of some mode (e.g., the fantasy mode revealed by Rorschach percepts is diffuse and poorly organized) or of some goal (e.g., winning a game is fused with, and experienced as equal to, destroying the person defeated) that is associated in ideal development with normal individuals functioning at earlier, more immature stages of development (4 year olds)? Can the latency-aged patient flexibly shift his mode of responding among the levels that ideal development conceptualizes as available to him (e.g., from action expressions of aggression to language or symbolic ones) in keeping with changes in environmental expectations and limitations (e.g., from playground to classroom)?

SELECTED RESEARCH RELATED TO THE BIODEVELOPMENTAL FRAMEWORK

The value of the biodevelopmental framework to the practitioner could be illustrated by discussing studies demonstrating that new ways of looking at clinical problems and new approaches to clinical technology are suggested, if observations and methods are organized in terms of one or another of the propositions discussed previously.

The goal of this survey, then, is to present a sampling of illustrative studies, not an exhaustive review. Studies were selected that met two or more of the following criteria: (1) some form of psychopathology in children was the main concern of the study; (2) the questions raised, the methods or subjects employed, or the organization given the observations, could be related directly to biodevelopmental propositions; (3) the study represented an effective illustration of the heuristic value of biodevelopmental propositions; (4) systematic methods were employed, and the observations were statistically treated.

Since the biodevelopmental framework proposes that the same principles of organization can be used to conceptualize development from infancy to old age and encourages comparisons between children and adults to facilitate the study of these organizing principles, selected instances of studies of normal children and psychopathological and normal adults are included whenever these serve to highlight the issue under consideration. Moreover, because reviews are available of child development research, only relevant evaluative statements from the sources that bear directly on the biodevelopmental framework are included here (Hoffman and Hoffman, 1964; Mussen, 1960; Stevenson, 1963; Hoffman and Hoffman, 1966; Mussen, 1970; Caldwell and Ricciuti, 1973; Horowitz, 1975; Hetherington, 1975).

The survey is organized into two sections, for convenience, to acknowledge the topic of the book: namely, cognitive controls. The first section considers studies concerned with various behaviors other than cognitive styles and controls. The second section deals with investigations of cognitive styles and controls, conceptions that integrate a number of biodevelopmental principles.

Survey of General Research

To facilitate discussion, the studies in this section are grouped in terms of their relating to one of four broad propositions of the biodevelopmental framework: (1) holism and psychological-innate givens, (2) differentiation integration and levels of organization, (3) multiple modes and stages of development, (4) the adaptive process.

HOLISM AND PSYCHOLOGICAL-INNATE GIVENS

The proposition of psychological givens views the individual as employing from birth a unique organization of psychobiological functions to select, ward off, and organize surrounding stimuli and to direct responses that influence or yield to this stimulation. Terms such as "innate givens" and "constitutional factors" have been used variously by authors to designate behavioral-physical characteristics of the newborn that play a significant role in coping with and influencing the environment and mother-child interaction (e.g., sensory thresholds, inherited bodily characteristics, physical anomalies deriving from organic stress during pregnancy, and patterns in the newborn's motility level, emotional responses, or sensitivity to various stimuli). Innate givens are seen as playing a critical role in the natural evolution of various psychological structures and functions (e.g., drive level, coping mechanisms) and accordingly in the formation of deviant behavior.

The proposition of innate givens has been of interest especially to clinically oriented investigators in accounting for various observations of infants and children. Several early publications deserve our attention. Studying some 200 newborn infants, Fries and Woolf (1953) proposed the construct of "congenital activity type" (five are suggested, ranging from very active to very quiet) to account for the amount, tempo, rhythm, and intensity of body movements, observed from the first months of life. These factors are organized as unique, stable patterns that influence parental attitudes and modes of relating (e.g., a hyperactive infant upsets and stresses his compulsive, controlled mother) and become critically implicated in the ways in which the infant first tests and masters reality (e.g., the needs of the hypoactive child are waited on by the caretaker and anticipated). Fries and Woolf related these observed innate activity types to the development of defense mechanisms and psychopathology (e.g., the very quiet activity type is associated later in childhood with marked withdrawal and schizoid traits).

Along the same line, Mittelmann (1954), stimulated by longitudinal observations of children and adults, conceptualized motility as an "urge or drive" and as showing a unique pattern of expression that can be observed in many other functions of the growing child (e.g., mastery and testing of the environment, control of impulses, expressions of emotion, and sense of self-evaluation). Mittelmann further detailed how inappropriately coordinated responses by the parent to the child's motor activity lead to the formation of psychopathology; for example, sustained restriction of motility, especially during the second year of life when it is a dominant urge, results later in severe anxiety reactions and compensatory overactivity.

Bergman and Escalona (1949) reported a study of the role played by the infant's "unusual sensitivities" to stimulation; that is, the subjects were easily stressed, or stimulated to enjoyment, by variations in sensory impressions that make little or no difference to the average child. Five children, who subsequently developed psychoses, showed during the first year of life atypical sensitivity to light, human voices, cold air, and certain odors. Ordering their observations in terms of reactions to stimulus intensity (e.g., a whisper produces a startle, or a loud blast produces no reaction), and stimulus quality (e.g., fascination with the color red, upset by texture of wool), and employing Freud's concept of "stimulus barrier" (i.e., an innately given ego function employing perceptual apparatus as protection against stimuli), Bergman and Escalona suggested from their data that these children start life either with a "thin stimulus barrier” (overexcitable child) or “a thick stimulus barrier” (underexcitable child). Moreover, they proposed that in the absence of appropriately timed and modulated stimuli by caretakers, both conditions result in the infant’s evolving premature ego functions to handle his incoordination with available stimuli. These premature ego functions break down under new and more complex stress later in development, resulting in psychotic functioning (e.g., loss of language during psychosis after a premature development of this function). Brazelton (1962) also used the concept of stimulus barrier, and Alpert, Neubauer, and Weil (1956) discussed variations in drive endowment observed in neonates.

Studies by Chess and her associates (e.g., 1963, 1967) could also be viewed as systematically pursuing the role of psychological givens in the development of psychopathology. To organize longitudinal descriptions of children from the age of 2 months, these workers introduced the construct of “temperament”—defined as an inborn behavioral style, identifiable early in life, persisting throughout childhood, and involving, for example, activity level, mood, rhythmicity, approach, withdrawal, adaptability, intensity of reaction, and sensory thresholds. Chess then related these “temperamental styles” observed in infancy with the subsequent development of emotional symptoms. For example, in one analysis of the data, the pre-morbid temperamental styles of children who, on follow-up, presented symptoms classified as “active” were compared with those of children who presented “passive” symptoms, as well as with those of children who were symptom free. From the third month of life to the onset of the psychiatric disturbance, the children with active symptoms showed a higher degree of irregularity, nonadaptability, intensity of reaction, and negative mood. Along the same line, Ferlemann (1972) concluded that many behavior patterns appear to be innately given; the conclusion was based on results of a 20 year longitudinal study that observed, for example, activity-passivity patterns, and the abilities to sublimate and to recognize limitations and interests.

Studies comparing body type, motivation, and temperament also illustrate interest in the role of constitutional givens in the development of psychopathology. Cortes and Gattie (1965), assessing body types and temperament in adolescent boys and girls, found that endomorphs rated themselves as “kind, relaxed, warm,” mesomorphs as “confident, energetic, enterprising,” and ectomorphs as “detached, tense, and shy,” findings in accord with those obtained by Davidson and his associates (1957) with 7 year olds. Observing a relation between achievement motivation and body type with delinquents and nondelinquents, Cortes and Gattie (1967) proposed that body build may predispose an individual to certain temperamental traits, influencing his earliest reactions to and experience with stimulation.[7]

Noting a need for explicating the relations between congenital factors and behavior, Waldrop, Pederson, and Bell (1968) related mild congenital anomalies (e.g., fold of upper eyelid, high steepled palate), revealed by children at birth (delivery judged as having been free from complications), with their preschool behavior. They found, for example, that a primitive behavioral quality (e.g., inability to delay gratification, diffuse play, spilling and throwing) was associated with the presence of these physical defects. They invoke the holistic view in bringing attention to the role played by physical organization and anomalies in the uniqueness of an individual's behavioral responses. Along the same line, observing multiple somatic and neurological defects in emotionally disturbed children, Stott (1968) proposed that genetic factors are major determinants of individual differences in behavioral disorders.

Since these early studies, the extensive, increasingly sophisticated experimental observations of infant behavior made during the past 15 years provide additional evidence to support the notion that the human infant enters the world with a number of complex, purposeful, organized, "built-in" responses to stimuli of all types, responses that would be conceptualized as psychological givens from the biodevelopmental point of view. Not too long ago, because of the limited response capabilities of babies, it was assumed that the infant experienced a perceptual void until he was able to interact actively with the environment and so "learn to perceive and respond" (Kessen et al., 1970). There is much information now indicating that neonates show high selectivity in responding to their environment, even if the information they receive cannot be used yet to direct their own behavior (other than attentional responses) and the behavior of others (other than through relatively global "communications" such as crying and body motility). Since extensive reviews of infant research are available (Cohen and Salapatek, 1975; Fantz, Fagan, and Miranda, 1975; Kessen, Haith, and Salapatek, 1970), and since the core of infant research falls outside the focus of this book, we briefly note here only a few illustrative studies.

Emerging from the discipline of kinesics (Birdwhistell, 1970), Condon and his associates have reported a series of observations that could be viewed as relating to the proposition of innate givens; they are organized and conceptualize by the authors in terms of holism, levels, and hierarchies (Condon and Sander, 1974a; 1974b). After taking sound films of an adult interacting with another adult or with an infant, Condon conducted a frame-by-frame microanalysis of the film and recorded the organization of events within the duration of 1-2 seconds—the domain of microkinesics. These microanalyses revealed that when two persons are interacting, each will show organized configurations of body movements, gestures, and postures that accompany, in synchrony, the movements and speech of the other. Condon discovered that when examining bodily motion in segments of 1 to 2 seconds, the analysis of discrete elements (e.g., movements of the hands, eyes, etc.) failed to capture the complexity of body motion. Condon found that body motility was best defined by organized wholes whose parts bear a relation to each other and change in synchrony with sounds and other motions. By looking at body motions, then, through the lens of holism, Condon saw consistent, ordered, organized patterns that could be identified.

He demonstrated these organized patterns of motion at two microlevels, which he labeled "self-synchrony" and "interactional synchrony." Self-synchrony refers to the correspondence between one body movement of a person (e.g., head turns up) and another (right arm and hand pivots out) and between the person's body movements and changes in sound elements of his own speech. Here Condon found that the head ensemble (eyes, mouth, nose, brows, etc.) shows internal synchrony, as does the shoulder-arm-head ensemble, including fingers, and as does the leg-foot ensemble. Moreover, the pattern of movements of each ensemble reveals a consistent, synchronous relatedness to the pattern of movements of the others.

Interactional synchrony designates the correspondence between changes in the sounds of speech and body movements of one person and the body movements of another. Condon demonstrated interactional synchrony between the sounds of words an adult is speaking to normal infants (from 12 hours to 2 days old) and the infant's body movements (Condon and Sander, 1974a, 1974b). For example, to the "k" sound of "come," the infant's head consistently moves to the right and the left elbow extends slightly. Condon concluded that the organization of the normal neonate's motor behavior is entrained by (fitted or locked into) and synchronized with the organization of the adult's speech in the environment. Since this entrainment between organized infant motility and adult speech is observed in the first hours of life, and is not learned but inherently available, the infant's body harmony and synchrony with sounds in the environment could be included within the construct of psychological innate givens.

Condon proposed that the infant's inherent body synchrony contributes to the "bond" established between infant and caretaker and to the relationships and attachments that evolve with persons. He also proposed that the infant's inherent body synchrony relates to language acquisition. "If the infant from the beginning moves in precise patterned rhythms with organizations of the speech structure and sounds of his culture, then he participates developmentally through complex sociobiological entrainment processes in millions of body repetitions of linguistic forms long before he will use them in speaking." For Condon the first language is a body language, "a dance" between partners, and language acquisition is related to organismic assumptions rather than to the traditional atomistic ones.

Condon's microkinesic studies of normals provided him with a new window through which to observe clinical populations. For example, he found that autisticlike children as young as 8 days old, unlike normal infants, respond to the same sound with multiple body movements that are not only asymmetric but also dysynchronous to the sound (Condon, 1977). In other studies, adult schizophrenics showed self-dysynchronous movements both within each ensemble of the body and between ensembles (Condon and Brosin, 1971), and each of the personalities of a multiple personality showed unique, consistent patterned movements (Condon, Ogston, and Pacoe, 1969). In related work, Mahl (1968) has also studied at the macrolevel gestures and body movements observed during clinical interviews.

Infant behaviors, other than self- and interactional synchrony of body motility, have also been extensively investigated. In a series of studies systematically comparing stimulus elements such as size, form, pattern, and number defining the visual information presented infants, Fantz, Fagan, and Miranda (1975) showed that form and pattern perceptions are available at birth. These investigators compared institutionalized infants with home-reared infants and discussed age differences as well as individual differences as revealed by these innately given, organized form perceptions and as they relate to expected cognitive deficits.

When newborns (16 to 130 hours old) were presented with a small amount of ammonium hydroxide to the left or right of the midline near the nose, as a group they turned away from the odor more than toward it. As a result, Rieser, Yonas, and Wilkner (1976) concluded that the neonate is "innately sensitive to radical location of odors." Moreover, these authors bring attention to the marked consistent individual differences in this psychological given. Among the infants studied, the mean latency of head movement ranged from 1 to 21 seconds.

LaBarbera and Izard (1976), observing that infants 4 and 6 months old looked more at slides of joy expressions than either anger or neutral expressions, proposed that infants are capable of discriminating emotional expressions earlier in development than previous studies have implied.

Workers have observed infants as young as 1 month old coordinate auditory and visual stimuli as revealed by an infant's directing his gaze to look at what he hears; this is significant because the age proposed by Piaget was 3 months. Cohen (1974) relied on this prior work to study the infant's attentional responses to face-voice incongruity of mother and stranger. The visual behavior of 5-month-old infants was not disrupted by the incongruous situation of a stranger's voice coming from mother (via a speaker near her head) or mother's voice coming from a stranger. In contrast, the visual behavior of 8-month-old infants was disrupted. Four of the infants in this age group became so distressed that they could not complete the experiment, leading Cohen to suggest that by this age infants may have developed specific auditory-visual expectations that form the concept of mother. If we relate this study to the work of Condon (discussed earlier), we wonder whether by the age of 8 months the infant has participated in some critical number of synchronous interactions between mother's voice and infant's body movements to give organization to a concept of mother, causing the infant to react to violation of the face-voice match.

This study relates to advances being made in the infant's innately given response to strangers. Only a few years ago it was assumed that strangers per se elicited fear responses from infants (at the age when the infant discriminates between a familiar person and a stranger); yet more recent work shows that infants respond differentially to strangers as a function of physical characteristics and context. One study by Brooks and Lewis (1976) is particularly innovative and promising in suggesting future research of relevance to clinical application. In an earlier study Lewis had observed that infants exhibit fear to adults but not to child-strangers. To explore whether the difference was related to facial configuration or physical size, Brooks and Lewis presented infants aged 7 to 24 months with several approaching strangers (adult female, adult female midget, 5-year-old boy and girl the same height as the midget). The affect the infants displayed related to discriminations they made between adult and child strangers (i.e., the facial configuration seemed relevant). The infants smiled and moved toward the child strangers and frowned and moved away from the adult strangers. The visual gaze the infants displayed related to discriminations they made between large and small people. The infants averted their gaze from the adult stranger but did not from the approaching children and midget. Again recalling Condon's work, noted previously, future studies that employ the methods and concepts of microkinesics could make new discoveries about stranger anxiety if the role of synchrony-asynchrony between the infant's patterned motility and the stranger's voice and patterned motility is examined.

Other sources of data related to the concept of innate givens are studies of activity level in children (Willerman and Plomin, 1973) and in infants (e.g., Willerman, 1973), and studies of the concordance of spurts and lags in the, development of twins (Wilson, 1972). The recent construction of very sophisticated apparatus (Korner et al., 1974a, 19746; Sander, 1975) to monitor continuously the crying, noncrying, and subtle motility of neonates, their body postures and gestures, along with apparatus devised for the measurement of visual selectivity in infants (Fantz et ah, 1975) should produce new observations that add to our understanding of the organization of purposeful behaviors given at birth, and the relation between individual differences in these behaviors and the emergence of normal and deviant development.

Some researchers (e.g., Freedman, 1964) have not taken to the notion of psychological givens, probably because it is discordant with the prevailing view that socializing forces shape the child. But even in the socialization camp a shift appears to be taking place. Several years ago Bell (1968) proposed that the unidirectional interpretation of the direction of effects, offered by studies of socialization, cannot effectively account for the various findings reported. Fie pointed out evidence that supports congenital factors as significant contributors to the uniqueness of child behaviors (e.g., sensor-motor, assertiveness, person oriented) that in turn influence the behavior of parents. Similarly, in his review of studies of the effects of separation from parents, Yarrow (1965) pointed out that such congenital factors as sensory thresholds and temperament levels should be considered in assessing an infant’s reactions to separation from his caretaker, and the effects of this event. More recently, a number of studies conducted within the framework of socialization have brought attention to the role of the infant’s initial characteristics and responsivity in his development (e.g., Parke and Sarvin, 1975; Als and Lewis, 1975), and the prevailing dominance of situationism in American psychology has been criticized (Bowers, 1973).

After reviewing studies of twins, emotional responses in infancy, and cultural differences in child rearing, Freedman, Loring, and Martin (1967) cogently argued for the inclusion of constitutional-biological factors in personality study. These authors presented a biologically based model of personality development defining a series of evolving structures and adaptations, expressing their sentiment as follows: “One hundred years without Darwinism is enough!”

DIFFERENTIATION-INTEGRATION AND LEVELS OF ORGANIZATION

To explain formal similarities and differences in the *organization* of some behavioral response observed in children of different ages and in pathological groups, workers have employed the proposition that development defines a transition from global and diffuse to differentiated and hierarchically integrated levels of psychological organization. Moreover, some workers have taken the similarity between responses of a patient and those of a younger normal child to signify the patient’s developmental immaturity or deviation. This approach has been employed as an analytical tool to classify patient populations, to study enduring individual differences in the functioning of psychopathological groups, to aid in conceptualizing and understanding psychiatric symptoms or patient populations, and to conceptualize age changes observed in, for example, children's understanding of illness and their representation of imagined objects. This section reviews studies illustrating these applications.

One line of investigation had its roots at Clark University, where Friedman devised a rating scale to assess the level of differentiation-integration (therefore the level of presumed perceptual maturity) revealed by Rorschach responses. The response "a pile of rocks" to Card I is rated as global-undifferentiated and is taken to be an index of a genetically immature perceptual organization, whereas "two kids dancing around a pole," in response to the same card, suggests a high degree of organization and integration of discrete areas of the blot and, accordingly, perceptual maturity. Hemmendinger (1960) has discussed Friedman's Rorschach genetic scoring system and studies demonstrating that more seriously impaired clinical groups (e.g., hebephrenics, brain damaged) and younger normals show a preponderance of genetically lower responses, whereas the less severely impaired (e.g., paranoids) and older normals produce a preponderance of mature responses.

The success of this initial work stimulated and influenced other applications. Becker (1959) introduced the Rorschach genetic scoring system and the concept of levels of organization into the study of the process-reactive distinction applied to schizophrenics. Questioning attempts to account for the two types of schizophrenia in terms of organic versus psychological etiologies, Becker suggested that it may be useful to think of a continuum reflecting the level of organization reached by a given personality in its growth toward maturity. According to this construct, the process syndrome suggests a lack of personality differentiation (e.g., narrow interests, dependent behaviors), whereas the reactive indicates a higher level of differentiation (e.g., varied interests). To test this proposal, Becker used the Rorschach genetic scoring system and found that reactive schizophrenics produced more differentiated responses than did process schizophrenics, whose performance was characterized by percepts that were similar in organization and structures to those of young children, an observation made by others, as well (e.g., Judson and Katahn, 1964; Zimet and Fine, 1959).

The same approach has shown that mothers of schizophrenic children produce more immature percepts to the Rorschach than mothers of normals (Winder and Kantor, 1958). Goldman (1962) has compared various research findings obtained with adult schizophrenics and children to illustrate the developmental immaturity of the former.

Van De Castle (1965) reported a "perceptual maturity scale" more easily administered and objectively scored than the Rorschach genetic scale; this instrument, in which the patient indicates his preference for designs presented, is as effective as the Rorschach in distinguishing normal children and adults, delinquents and schizophrenics.

The concept of differentiation-integration helped Podell and Phillips (1959) to organize meaningfully the performance of their subjects on a wide range of perceptual and conceptual tests (e.g., Porteus mazes, embedded figures, card sorting, word fluency, Wechsler scales, Stroop Interference Test) in terms of seven levels. These converged with Rorschach responses, which were also arrayed in order of increasing differentiation, providing the investigators with a tool to study various pathological groups developmentally.

Comalli (1970) employed the concept of differentiation-integration to organize and explain the observations made of subjects ranging in age from 6 to 90 years, when dealing with tasks tapping various perceptual domains: visual illusion (e.g., Muller-Lyer, Titchener circles), spatial orientation (perception of the vertical with and without body tilt), part-whole differentiation (Rod and Frame Test, Embedded Figure Test), perceptual closure (e.g., Dotted-Outline Test), and speed of recognition (tachistoscopic presentations). In general Comalli showed the performance between children and the aged to be more similar than that between young adults, and workers were asked to be more cognizant of shifts from differentiation to dedifferentiation that occur in perceptual behavior over the life span.

Workers interested in comparisons between the test performance of pathological groups and children, or between different age groups, should consider the caution (e.g., Bibace and Gruen, 1967; Buss and Lang, 1965) that although formal similarities between the perceptual organizations of adults and children can be identified, the qualitative differences are critical in understanding the totality of functioning (the proposition of holism), be it normal or pathological.

The importance of maintaining a holistic position is illustrated by the findings of Smith and Phillips (1959). Administering the Rorschach and the Vineland Social Maturity Scale to normal children, they obtained the following results: with 11 and 12 year olds, the higher the social maturity, the less the number of developmentally immature responses; with 13 to 15 year olds, there was a slight tendency toward an inverse relation; and with 16 and 18 year olds, social maturity was associated with a greater number of a particular type of developmentally primitive responses (e.g., contaminations, confabulations) but also with a greater number of responses reflecting perceptual integration. Thus in late adolescence primitive thought, expressed within integrated wholes, is associated with social adequacy, pointing to the importance of taking into account as much of the total psychological context as possible and suggesting the inadvisability of using, alone, the similarity observed between the perceptual organizations of children and those of older pathological groups.

To search for a theoretical basis for conventional psychiatric categories, Phillips and Rabinovitch (1958) systematically examined presenting symptoms of large numbers of hospitalized patients and identified three categories: (1) avoidance of others (e.g., withdrawn, feels suspicious, hallucinates); (2) self-indulgence and turning against others (e.g., threatens assault, emotional outbursts, irresponsible behavior); and (3) self-depreciation and turning against the self (e.g., suicidal ideas, depression, compulsions). By introducing developmental theory, they conceptualized the social role orientations of these symptom categories in terms of the differentiation principle: the "avoidance of others" category represents a genetically early period in which the boundaries between the self and the world are relatively diffuse; the self-indulgence category is seen as a subsequent period of self-centeredness in which separation of self and world has occurred but with little recognition of the rights of others; and the self-depreciation category symbolizes the most advanced developmental level in which self-identity is maintained and social standards are internalized (as revealed in self-punitive symptoms).

The value of this classification was subsequently illustrated in a series of studies by Zigler and Phillips (e.g., 1960, 1961, 1962). These workers related the developmental level represented by symptoms to biographical categories reflecting social adequacy (e.g., work history, heterosexuality, education) and to types of illness. As a result, they were able to offer several interpretations and propositions concerning psychopathology that, although derived from the study of adult patients, may have considerable general heuristic value. They suggest, for example, (1) that symptom processes are differentially related to the adaptive adequacy of the individual and his role orientation in society, and (2) that manifest symptoms and congruent levels of adaptive adequacy reflect the level of psychological development an individual has achieved and define a developmental continuum of stages applicable to all psychopathology.

A comparison of this attempt to construct a developmentally conceptualized classification with that of Patterson (1964) may be helpful in evaluating the value of the differentiation principle in arriving at concepts of symptoms and behavior. Criticizing conventional psychiatric classifications of children's disorders as inadequate, Patterson devised a checklist, based on children's presenting problems, to guide his observations at psychiatric clinics when children first meet with the psychologist for an appointment and depart. Observations recorded included: no smile when greeted, unkempt, cries during interview, likes to read, puts finger in mouth. No conceptual rationale is offered for the inclusion of these behaviors rather than others, nor for the five pathological groups (hyperactive, withdrawn, immature, aggressive, and anxious) defined by a factor analysis of the observations made. When relating the findings of Phillips and his associates to Patterson's, a developmental continuum is suggested ranging from withdrawn-immature child symptoms, signifying a low genetic status, to hyperactive-aggressive, and to anxious, as developmentally advanced, respectively. The determination of whether ordering symptoms and behaviors this way facilitates the study of treatment of choice, prognosis, or adaptive adequacy of children, must wait, of course, for evidence. Some, however, is already available in the typologies for child disorders reported that make some use of the concept of levels of differentiation (Borowitz and Hirsch, 1968; Fish, 1965). Perhaps a view of symptomatology in children that is organized around differentiation and levels may help offset the impact of "deviant" nosological labels on children (Hobbs, 1975; see also Chapter 3).

Shapiro's (1965) creative formulation of "neurotic styles" was also influenced by the concepts of differentiated levels and innate givens. He proposed that the innately given psychobiological equipment of the newborn (e.g., sensory threshold, activity level) represents an "initial organizing configuration" that from birth actively organizes internal tensions and external stimuli, thereby leading to the evolution of styles of experiencing, emoting, acting, thinking, and perceiving. Shapiro artfully describes psychopathological forms of these styles observed in adult patients. It is tempting to speculate that the temperament styles studies by Chess (see above) may be the forerunners of neurotic styles in adult life as defined by Shapiro.

Although primarily involving normal infants and children, a number of studies and reviews of perception and learning also illustrate the heuristic value of the concept differentiated levels. To interpret developmental changes exhibited by infants in their visual selectivity and preference for various stimuli, Fantz, Fagan, and Miranda (1975) proposed a developmental hierarchy of levels in the relative potency of different stimuli for influencing visual attention: from pattern definitions to pattern quality to pattern configurations to pattern subtlety to novelty. Their careful studies included institutionalized infants and infants with Down's syndrome, as well as normals.

The concept of continuous-discontinuous development and differentiation proved useful in a review of studies of complex perceptual activities of infants (e.g., the infant's reactions to an expanding shadow, the infant's differentiated response to a graspable ball versus a ball whose size precluded holding; Pick, 1976).

In three studies Whitemann (1970) explored the development of conceptions of psychological casualty by administering several tasks to emotionally disturbed children (aged 5 to 11 years) living in an institution: a story test that exemplified different mechanisms of defense (e.g., displacement, projection, denial), Piagetian stories that assess objective versus subjective responsibility, and Piagetian conservation tasks. In relating and interpreting these procedures, along with measures of intelligence, Whiteman employed the concept of differentiated levels in concluding, for example, that with age there is a decline in animistic thinking, an increase in psychological causality, and an increase in complexity of understanding the point of the stories.

A few years ago the view of cognition as defining a series of developmental levels stimulated a number of studies concerning the concept of future time perspective, which still has something to offer clinicians. In this research the organization an individual imposes on his perspective of time was related to his developmental status and also to the formation of functions concerned with delaying gratification, controlling impulses, and anticipating alternative routes toward goals.

Farnham-Diggory (1966) compared psychotic, brain-damaged, and normal children in terms of their time perspective, postponement of gratification, and future self. To assess time perspective, the child was asked, for example, to pretend to be looking ahead into the future and to locate on a printed line where "two weeks ahead would be,". . . "one day," ". . . five years," and so on. Both psychotic and brain-damaged children showed that they experienced the near present (e.g., three hours) as longer and the more distant future (e.g., five years) as shorter. In another aspect of the study the psychotic children who chose immediate lesser gratification (have a small candy bar now) over delayed greater gratification (have a large candy bar next week) showed a severely impaired (shortened) future time perspective. To assess the experience of future self, the children were asked, for example, "What do you expect to do tomorrow?" ". . . next week," and so on. In reply, the nonnormals made more reference to proximal places (e.g., home) and to a few, childlike activities (e.g., play), interpreted as indicating a less differentiated sense of the future.

The significance of this study is elaborated if it is related to two others. Lessing (1968) correlated measures of future time perspective in normal 10 to 16 year olds with various personality and demographic variables. Whenever a significant relationship was found, extended and differentiated future time perspective was always associated with more favorable psychosocial attributes (e.g., intelligence, academic success, good adjustment). Moreover, unrealistic, childish fantasies concerning the distant future decreased with increase in age.

Klineberg (1967), using propositions from psychoanalysis and Piaget, postulated that in childhood, the greater the sense of frustration and unhappiness, the more likely it is that images of the distant future will be used to project wish-fulfilling fantasies. In adolescence, however, when society requires future-oriented planning and ego-identity consolidation, maladjustment would be associated with a more restricted future outlook. Asking emotionally disturbed boys and normals (aged 10 to 16 years) to list events that might happen to them in the course of their lives, and to specify their probable age at each event, Klineberg found that the emotionally disturbed 10 to 12 year olds showed an extended future time perspective elaborated with wish-fulfilling fantasies, whereas the disturbed 13 to 16 year olds showed a more restricted outlook on the future. These results are supported by Stein and Sarbin and Kulick's (1968) work with institutionalized delinquent boys.

Taken together, the results of these studies suggest that normal children show a progressively increasing, more differentiated concern with distant events, that severely disturbed children (e.g., psychotics) show an undifferentiated present-oriented perspective of the future, and that less disturbed children (e.g., neurotics) show phase-specific relations, with exaggerated extensions characterizing future time perspective in childhood and exaggerated restrictions characterizing future time perspective in adolescence.

Over a long series of studies Fisher and Cleveland (e.g., 1958; Fisher and Fisher, 1959, Fisher and Cleveland, 1968) have formulated a framework and a set of procedures relating to self (body)-world differentiation. Of these, the "barrier score," a measure of body-image boundaries, has received increasing attention in studies of child psychopathology. The barrier score, obtained from Rorschach responses, has been demonstrated to signify the degree to which the individual represents, and experiences, the boundaries of his body as definite and delineated from his environment or as inarticulate and fused with his environment. A count is made of the number of Rorschach responses that describe containing, decorative, or protective qualities to the boundaries (e.g., "knight in armor," "animal with striped fur"). The higher the barrier score, the greater the definiteness of body-image boundaries. This Rorschach index has been shown, for example, to increase from psychotics to neurotics to normals and has been studied in normal development.

In one study (Fisher, 1966) a group of elementary school children, referred because of extreme lack of control, had significantly lower barrier scores. In similar work Megargee (1965) found that juvenile delinquents confined for incorrigibility and assault showed significantly lower barrier scores than nondelinquents.

The study by Overton and Jackson (1973) illustrates another approach to the concept of differentiation of functions and self-world relations. Children aged 3, 4, 6, and 8 years were asked to pretend to be using various common objects in action sequences appropriate to the objects. The youngest children had difficulty performing the actions. With an increase in age, the children performed the actions, but their gestural representations of the objects made use of a body part as the object. With a further increase in age the children made less use of a body part to represent the object's use. The oldest children represented the objects symbolically, differentiating their bodies from the objects and their uses.

Workers with primary interest in clinical populations or symptoms have also introduced the principle of differentiation into their work to facilitate the organization of observations and to increase their understanding of the phenomenon in question.

Noting the high incidence of enuresis in persistent delinquents, Michaels (1955, 1964) and his co-workers found in a series of studies that enuresis occurred more often in combination with other symptoms (e.g., temper tantrums, nail biting) than in isolation, raising the question of a unique deviant organization possibly underlying these several behaviors. To explore this possibility, Michaels interrelated several observations of delinquents (concerning, e.g., medical-physical factors, mood, EEG tracings) and relevant published studies (e.g., naval disciplinary cases revealing a significantly high incidence of enuresis beyond the age of 5 years). On the basis of his analysis, he concluded that enuretic delinquents show a unique psychological organization that suggests ill-balanced integration across several levels—biological, neurological, and psychological (e.g., low sensitivity to stimuli, yet greater diffuseness of responses; paucity of fantasy life). For Michaels, the delinquent's inability to control his bladder as a child relates to the same psychological organization that underlies his urgency as an adolescent to discharge tension explosively.

Guyette (1965) introduced the differentiation principle to shed further light on the problem-solving effectiveness of mental retardates. She successfully devised a test procedure to distinguish retardates whose cognitive organization was characterized primarily by the process of differentiation without integration (stimuli were articulated into parts but not combined) from those whose cognitive organization was characterized by both processes (differentiation and integration), and she demonstrated the relevance of this distinction for diagnosis and treatment. In exploring whether normal and abnormal developmental outcomes could be predicted from prenatal, perinatal, and postnatal events, other investigators (Smith et al., 1972) found that accuracy of prediction could be improved if the early events were organized in terms of sequential levels.

The heuristic value of the differentiation levels concept is also illustrated by the following research: Shore's (1965) evaluation of the effectiveness of a therapeutic program for delinquents, Mack's (1965) analysis of children's nightmares, Webster's (1963) study of the emotional development of retarded children, McKinney's (1972) study of the relation between the complexity level of the task and the cognitive level of retarded children who were being trained, Campbell's (1975) work on the development of children's concepts of illness, Baker, Rierdan, and Wapner's (1974) investigation of age changes in size-value phenomena, Gollin's (1970) review of discrimination learning, and

Abies' (1972) examination of the wishes of latency children.

MULTIPLE MODES AND STAGES OF DEVELOPMENT

The proposition that in ontogenesis differentiating modes and modalities define an ideal sequence of stages, each stage distinguished by a unique organization of the mode in question, has stimulated studies concerning sensory, psychosexual, and psychosocial stages and the modalities of action, fantasy, and thought.

In an early study, Schopler (1966) investigated Schachtel's proposition that the modes of perceiving by which the individual objectifies his environment and shapes his experiences define an ontogenetic hierarchy ranging from the dominance of "autocentric" modes (i.e., olfactory, gustatory, tactile) to the dominance of "allocentric" ones (i.e., auditory, visual), the former resulting in global, inarticulate experiences early in development, and the latter in detailed and objectified ones. Asking whether schizophrenic and braindamaged children (5 to 10 years old) would show stages of receptor preferences developmentally earlier than those of controls, Schopler administered cleverly devised tests that forced a choice between the visual and tactual modes (e.g., the child could either look at colored slides of animals or place his hand on a vibrating box). He observed the time each subject remained engaged with the mode selected and found that schizophrenics preferred the tactual mode and normals the visual, with retardates falling between. O'Connor and Hermelin (1965) also studied sensory dominance in autistic and retarded children, and the consequences of the dominance of a genetically early mode (tactile) for training retardates has been discussed (Hill, McCullum, and Scheau, 1967).

More recently the same modes of perceiving have been used by Barsch (1971) in his concept of the "processing mode-hierarchy." Barsch proposed that six modes are developmentally ordered as information-processing systems (gustatory, olfactory, tactual, kinesthetic, auditory, and visual); that the first three represent a concrete, immediate relation to the environment and the second three an abstract, distant relation; that the infant becomes progressively less immediate and more distant as the visual mode increasingly dominates; and that experiences with each mode in development contribute to the organization and adaptive success of the next. Barsch also discussed the issue of the relation between the processing mode-hierarchy of parent or teacher and that of the child, and implications for the child's educational performance when the unique mode-hierarchy of the child matches or is mismatched with the requirements of the classroom.

From a review of studies investigating the relations among sensory modalities, Bissell (Bissell et al., 1971) concluded that there is evidence of a developmental progression from the dominance of the kinesthetic mode to the dominance of the visual and verbal (thinking) modes, respectively. She also noted that within this stage progression individuals tend to maintain a preference or dominance of one mode (i.e., consistent individual differences). At the age of 3 to 4 years, her review showed, children spend more time physically manipulating information: yet by the age of 7 years there is a shift, with children approaching and managing information more by the visual mode. Her review also suggested that coordination and integration of kinesthetic, tactual, and visual modes increase with age. For example, at the age of 5 years, a child is likely to judge a kinesthetically presented diamond to be the same shape as a visually presented rectangle, whereas between the ages of 8 and 11 years, children make fewer errors when an integration of modes is required.

The relative lack of intermodal integration before the age of 5 years has been the subject of investigation. For example, Rose and her colleagues (Rose et al., 1972) presented a model and two comparison objects (one identical to the model) to 3 year olds in four conditions in which model and responses would be engaged in all possible combinations of modes (visual-visual, tactual-tactual, visual-tactual, and tactual-visual) and in various time spans (simultaneously, successively, and with a 15-second delay). They found that the difficulty of children younger than 5 years old in storing tactual information is probably one major reason for poor crossmodality learning and that imposing a delay between the experiencing of the stimulus and the responses hampered all conditions.

The concept of hierarchy of modes (kinesthetic, tactual, visual, and verbal) for processing information relates to the concept proposed by Santostefano (1970) of action, fantasy, and language as hierarchical modes for expressing drives and affects. In a series of laboratory studies Santostefano (1970) and his colleague Eichler (1971) demonstrated that when given the option to express aggression in action, fantasy, or language behaviors, children from 5 to 8 years old show a dominance of action; by the age of 8 to 9 years fantasy expression dominates, and by 12-13 years they show a dominance of language expression. Moreover these workers have also demonstrated that each mode undergoes change with age and development (i.e., differentiation of behavioral expression and increased delay). With the action mode, for example, when normal 6-year-old children are asked to perform three prescribed actions in any sequence they prefer, they tear a sheet of paper first; their second choice is to crumple a sheet of paper, and last they take a third sheet and cut it in half along a line with a pair of scissors. With age there is a gradual shift in this sequence, and the 12 to 13 year old will first cut a sheet of paper, then crumple another, and last tear a third. This change in action sequence suggests that with development comes an increase in delay and indirectness in expressions of aggression in the action mode. The same developmental changes were observed within the fantasy and language modes. This multimodal approach to studying aggression and other drives has been employed in studies of delinquents (Santostefano and Wilson, 1968), of braindamaged and orphaned children (Santostefano, 1965), and of the effects on aggressive behavior of experiencing physical aggression versus witnessing violence on film (Blaisdell, 1972; Santostefano, 1977). The approach has also been used to organize the behaviors of a child observed over the course of 4 years of psychoanalytic treatment (Santostefano, 1977) and to consider alternative ways of interviewing children (Santostefano, 1962).

From these various studies Santostefano (1970, 1977) formulated a developmental stage model of modes concerned with the expression of drives and affects. Three basic propositions of the model are as follows: (1) action, fantasy, and language modes represent alternative means for expressing the same motive; (2) at an early stage in development, the individual shows direct, immediate, unsocialized behavior expressions *within* a mode and at later stages exhibits detoured, delayed, socially approved expressions; (3) action, fantasy, and language modes are not equally available for motive expression at all stages of development—rather, a developmental principle governs the interrelations *among* modes such that the child progresses from a stage characterized by action expressions of motives to stages characterized by fantasy, then language behaviors, respectively. The model also considers possible temporary regressive or progressive shifts within and among modes as a function of organismic and situational factors, as well as the concept that the ego ideals internalized by the child constitute a key factor in the development or derailment of these modes.

Stoops (1974) reviewed 55 studies reported in the literature to 1974 that compared two or more modes of aggressive behavior (action, fantasy, and language), employing a wide variety of assessment techniques. He concluded that 35 of these studies offered clear support for Santostefano's model of hierarchical modes, 9 offered inconclusive support, and 11 provided findings contradictory to those produced by the model.

Other workers have also used a mode-hierarchy concept to investigate drive expressions. Studies by Gourevitch and Feffer (1962) with normal children and adults were based on Maslow's concept of a motivational hierarchy (concrete, directly engaged, goal-objects characterizing early stages of development, and more abstract, delayed, and distant goals typifying later stages). Studies by Phillips and Zigler (1964; Hill and Zigler, 1964) proposed a bimodal hierarchy of action and thought, with the former representing unmodulated, physical responses to external stimuli and the latter indirect, symbolic, or verbal behaviors characteristic of maturity.

Shore and Massimo (1967) reported a study involving treated antisocial delinquents and nontreated controls. They interpreted their findings as supporting the proposition that verbal modes, in substituting for action, play a role in the evolution of control over overt aggression.

A number of other studies have brought attention to the relationship among the action, fantasy, and language modes from additional vantage points. For example, Davids (1972) observed the influence of male and female models playing aggressively with toys on the aggressive behavior of institutionalized, emotionally disturbed boys. They found that the male model increased the aggressive action behaviors of the boys, while decreasing both aggressive and nonaggressive verbal behaviors. Wolff and Wolff (1972) found highly significant inverse relationships between gross and fine body activity and quantity of verbal output and sophistication of language. Growing interest in the role played by action behavior in stimulating imagery production of children at different ages also brings attention to the relation between the action and fantasy modes and is illustrated by the work of Wolff and Levin (1972; Levin et al., 1975) and Jackson (1974).

The psychoanalytic theory of psychosexual stages (oral, anal, phallic, genital) has not served as a guide very often in studies using systematic laboratory methods and statistical analysis (Miller, 1969). Although using normal subjects, two studies of psychosexual stages were selected for this literature review because the ingenious methods and systematic analyses employed could be of value to the clinician. Rosenwald et al. (1966) asked adolescents to feel a cutout that was immersed in water in one condition and in crankcase oil and flour ("fecal material") in another; then the subjects were to match the cutout with one of several shapes displayed. Differences in performance (speed and success) were viewed as reflecting the adequacy with which the subject managed anal conflicts and prevented associated anxiety from interfering with intellectual activity. Subjects were also administered questionnaires assessing anal character traits (e.g., I am a punctual person) and anal anxiety (e.g., I get very upset when I waste time). Rosenwald found that subjects who performed more poorly in the oil condition (versus the water condition) reported higher anal anxiety, and those who matched quickly and accurately in both conditions reported the presence of anal traits but low anal anxiety; these findings were taken as supporting several psychoanalytic propositions concerning fixation at the anal stage.

In one aspect of a study using a large group of normal children (aged 5 to 16 years) to investigate the concepts of castration anxiety and oedipal conflict, Friedman (1952) administered incomplete fables (e.g., about a dog "with a beautiful large tail he admired and enjoyed wagging"), and the child was asked to describe what happened. The age differences observed in story completions (e.g., "the tail was cut off') were interpreted by Friedman as supporting predictions of higher castration anxiety during the oedipal and prepubertal stages versus latency.

The concept of hierarchically ordered stages, cogently discussed by Kohlberg (1969) and Wohlwill (1973), has also been used to guide studies of and conceptualize various domains of behavior. Kohlberg's well-known six-stage model of moral development has been effective in organizing observations of normal, delinquent, and emotionally disturbed children (Kohlberg and Turiel, 1971); it has also be related to Erikson's ego stages and has been extended recently to include moral stages that conceptualize normal development through adulthood and old age (Kohlberg, 1973).

Empirical evidence for Erikson's (1959) eight ego stages (each defining a crisis that the maturing ego masters before moving to the next phase) was reported by Boyd (1964). Assessing children and adults (systematically rated interviews and responses to TAT-like pictures), he found, for example, that younger children revealed more concern with initiative and guilt (the third stage), whereas adolescents were concerned about identity and role diffusion (the eighth stage). A number of other investigations of normal adolescents, using various assessments of personal adjustment, have focused in particular on the stage of ego identity (e.g., Block, 1961; Gruen, 1960; Marcia, 1967). Munley (1975) studied the relation between vocational choices and the success with which the first six Eriksonian stages were negotiated. In a promising formulation relating an elaboration of Piaget's concept of egocentrism and Erikson's stages, Elkind (1967a, 1967b, 1976) proposed the concept of "imaginary audience" (the adolescent believes that others are admiring or critical of him as he is of himself) and the concept of "personal fable" (the adolescent experiences his beliefs and feelings as unique). These concepts have been found useful in Elkind's psychotherapeutic treatment of adolescents.

The concept of "developmental lines" proposed by Anna Freud (1965), in which normal and deviant development are seen in terms of coordinated sets of stages (e.g., from irresponsibility to responsibility; from egocentricity to companionship), has received some empirical support from Wolman (1967). The concept of developmental lines appears to have influenced Loevinger's (1976) proposed 10 stages of ego development and the formulation of "descriptive developmental diagnosis" suggested by Blanck and Blanck (1974).

In a review of studies of retarded children (Kessler, 1970), the utility of the stage concept of development is illustrated by several of the investigations discussed. The heuristic value of the concept of stages is also demonstrated by the recent work of several authors, for example: White's (1965) view that response tendencies are organized according to a temporal hierarchy; Reed's (1971) study showing that the seeming hodgepodge of explanations children give can be ordered meaningfully into developmental stages; Selman's (1975) research into the development of children's conceptions of peer relationships; Fowler's (1971) conceptualization of baselines and competence in early development; Arieti's (1970) studies of the role played by cognition in the development of inner reality; and Royce's (1973) multifactor model of individuality. Analysis of the life histories of behavior-disordered children, delinquents, alcoholics, schizophrenics, and drug addicts embraces not only the concept of individual differences but also the aspect of the stage concept that defines experiences in one stage as influencing success and failure in the next (Roff, Robins, and Pollack, 1972). These workers considered the pathology of patients not simply as consequences of earlier events but also as defining vulnerability with regard to the emergence of deviant developmental trends in subsequent stages.

THE PROCESS OF ADAPTATION

In considering the process of adaptation, the biodevelopmental point of view proposed that the individual and environment yield to and influence each other, in a continuous, more or less coordinated process of give and take. The individual actively copes with, assimilates, and accommodates to, but also influences, stimulation directed from the environment; the environment defines expectations, sets limits, and provides stimulation for the individual, while also coordinating its activity with the person's needs and changing competence. A number of studies have been conducted explicitly employing this view of adaptation as a guide. Those selected for the review are grouped for convenience in terms of the particular element of the adaptive process emphasized; thus we have studies of styles of adaptation suggested by the coping efforts of children, the reciprocal influences exerted by the individual and environment on each other, and temporary changes that occur within the adapting individual as he coordinates himself with brief changes in environmental circumstances.

Styles of Adaptation. Studies of styles of adaptation have focused on the enduring behavioral patterns exhibited by children when managing various environmental stresses. The content of these patterns usually involves a complex configuration of various modes and qualities of behavior such as assertive, delayed, and avoidance behaviors; passivity; expressions of joy, sadness, or fear; verbalizations; and mechanisms of defense.

Lois Murphy (1962) has evolved the concept of "coping styles" to organize numerous richly detailed, longitudinal observations made of essentially normal children dealing with various stresses, demands, new opportunities, and social situations (e.g., psychiatric, pediatric, and psychological examinations; trips to the zoo; parties; and automobile rides to and from the clinic). Coping styles designate means by which a child comes to terms with stresses and makes use of opportunities, and the unique organization suggested by various modes and modalities employed by the child in these adaptive efforts. For example, to ward off the mounting stress represented by a continuous stream of psychological test demands, one child reverses roles and asks if he can have a turn at asking a question of the examiner; another escapes cognitively in interrupting the testing to talk about an incident that occurred at school; and a third escapes physically by walking around the room restlessly. Murphy also documented progressive shifts in coping styles employed by the same child over time. For example, at 2 years of age, one little girl was terrified by thunder and passing jet planes; at 3 years she was able to seek out her older sister and accept comfort. Later the child reported to her parents that her younger brother was afraid of thunder, and she reassured the brother, "It's just noise and it won't hurt you." This sequence suggested to Murphy an evolving series of coping resources from overt expression of fearful affect and helplessness, to seeking comfort actively, to internalizing the image of the supportive person while projecting fear onto the younger brother. Murphy reported an update of these studies (Murphy and Moriarty, 1976) which included observations made through latency and adolescence, and discussions of the stability and plasticity of each coping style, the concept of normal vulnerability, and the responses of children to expectable and unusual stresses.

Other workers, some influenced directly by Murphy's methods and concepts, have described coping styles employed by different clinical groups in the face of various stresses: by retardates to deal with separation from mother (Kessler, Ablon, and Smith, 1968); by hemophilic children (Mattson and Gross, 1966); by parents of children with leukemia (Chodoff, Friedman, and Hamburg, 1964) to deal with the psychological stress of a fatal illness; by adolescents to deal with the stressful transition from high school to college (Coelho, Hamburg, and Murphy, 1963); by parents to deal with delinquency in their children (Hurwitz and Kaplan, 1962); and by kindergarten children who coped with the crisis of losing social and nonsocial support (Viney and Clarke, 1974).

The variable of future time perspective (discussed earlier) has also been proposed as a coping mechanism. Smart (1968), finding that alcoholics versus social drinkers show incoherent and shortened perspective of future time (characteristic of young children), proposed that a shortened time perspective represents a coping mechanism developed by the habitual drinker to manage the several negative consequences the future holds in store as a result of the alcoholism (e.g., loss of job). Similarly, observing shorter time orientation in institutionalized delinquents, Stein and his colleagues (1968) suggested that the cognitive activity concerned with organizing a longer perspective of future time may serve as a coping mechanism operating to bind tension, delay impulses, and anticipate more appropriate plans for the future.

Reciprocal Influences of Individual and Environment. Deutsch's (1965) study illustrates the value of the developmental view in examining questions of the environment's influence on development. Noting the limitations in defining social class in terms of a single variable, he included in his method subjects representing various levels of developmental maturity (children of different age levels); a microanalysis of the environment (e.g., family structure, communication patterns, economic circumstances, child-rearing practices), and a developmentally conceptualized microanalysis of the language mode (e.g., measures of language were employed representing a hierarchy of complexity ranging from labeling through relation to categorizing). Deutsch's goal was to identify patterns of environmental influences that relate to patterns of cognitive and linguistic behaviors at various developmental stages. One of his observations, the "cumulative deficits phenomenon," appears to have promise in explaining environmental influences in the development of deviant behavior. Although the economically disadvantaged first graders showed a significant language deficit, this difference became more marked in successive grades. Deutsch concluded that the persistent influences of the disadvantaged environment result in a cumulative slowup in the intrinsic development of the child's language mode. Not only is the older child expected by the school to employ higher levels of language, such as categorizing and relating, but the lower level of language, concerned with labeling, must be used in more complex and differentiated ways. Thus with each passing year the child's language functioning becomes more poorly matched with the changing (toward increasing complexity) requirements of the school environment.

This study points to the proposition emphasized by Hartmann (1958) that society plays a role in defining what is pathological or developmentally mature. The children Deutsch observed showed a language deficit in terms of environmental expectations located outside the geography of the immediate family. Would it have been found that the same children were meeting quite adequately language standards defined within their respective family settings?

The extensive study reported by Hertzig and her associates (1968) relates directly to Hartmann's question in demonstrating that behavior of lower-class children, frequently interpreted by school personnel as reflecting disinterest and lack of curiosity, may be quite adaptive and adequate in the home culture of the individuals. Hertzig compared behaviors and verbalizations produced in response to each item of the Stanford-Binet by 3 year olds of Puerto Rican working-class families. Although the IQs obtained were comparable for the two groups, marked stylistic differences were observed. For example, middle-class children tended to use verbalizations in both work responses (test item was engaged) and nonwork responses (test item was avoided). Puerto Rican children used gestures and silent unresponsiveness. Middle-class children made work responses with equal frequency when confronted with either verbal or performance test demands, whereas Puerto Rican children made work responses more frequently to the latter. Hertzig also pointed out that although these stylistic differences were observed in response to specific test demands, the Puerto Rican children engaged the examiner in frequent verbal exchanges before, during, and after the testing. Taking these observations together, she concluded that the Puerto Rican children had language capacity, but they differed from middle-class children in not using language as a response to demands for cognitive performance. Because variables offered by others to explain deficits were ruled out (e.g., broken home, poor mothering, IQ differences, language barrier), Hertzig and her associates formulated an alternative hypothesis based on detailed observations of the family lives of their subjects: that the style of the Puerto Rican child, though adequately fitting the affective-language style of his home, is not adapted to the requirements of the usual school situation (verbal behavior in response to work demands) and therefore could lead to performance judged as inferior in school. On the other hand, the style of the middle-class child, adaptive at home, is also consonant with school expectations.

Minuchin's(e.g., 1964,1967a, 1967b) therapeutic techniques to rehabilitate the verbal and affective communicating styles of lower-class, multiproblem families and their children relate to the observations of Deutsch regarding a cumulative language deficit and to those of Hertzig with respect to a nonverbal style, in suggesting ways of helping children from lower-class social cultures to develop adaptive capacities that suit requirements of environments outside the home.

Maternal separation and institutional care, as environmental influences in the formation of child psychopathology, have also received attention, and reviews of this work are available (Ainsworth, 1962; Yarrow, 1961). The classic study by Provence and Lipton (1962) is sketched here, primarily because the observations were organized and interpreted in terms of biodevelopmental principles concerning the fit constructed by the organism and the environment. Over a 2-year period, Provence and Lipton compared institutionalized infants with infants reared in family settings by means of naturalistic observations, developmental tests, and interviews with parents and institution attendants. Observations reported of the feeding situation provide illustrations of the consequences associated with the failure of the environment to coordinate itself with the infant's developmental changes. In contrast to home-reared babies, the institution infants were not encouraged to be active at feeding time, and although maturationally ready at various points for a larger world and a more complicated interchange with the environment, they were presented with narrowly constricted stimulation, poorly suiting their maturating equipment. This asynchrony between caretaker's level and timing of stimulation and the infant's changing psychological organization was associated with the observation that as early as 6 months of age the institutional infant showed a high degree of passivity and a low degree of exploration and curiosity (e.g., toys were not grasped and actively manipulated, as observed with family-reared children), even though the earliest grasping behaviors of the institutional infants had been observed to be normal months earlier.

Maternal separation and institutional care as environmental influences negotiated by caretaker and child, and as issues in the formation of psychopathology, are also the focus of more recent studies. For example, Grunebaum et al., (1975) took a developmental perspective of mother and child as individuals within an interactional system in their study of the effects on child and parent when the parent is hospitalized because of mental illness. In applying this point of view, they innovated a program that admits both parent and child into the caretaking institution. Cornell and Gottfried (1976) have provided a critical review of the literature dealing with the effects of various psychological interventions on the subsequent development of premature infants.

Research conducted over a 40-year period into parent-child interactions as influences in the development of psychopathology has been reviewed by Frank (1965). Organizing his survey in terms of major psychopathologies considered and methods of data collection employed, he concluded that no factors in parent-child interaction of various psychopathological groups could be identified as unique to them. In attempting to explain this failure of research, Frank pointed out that studies tend not to take into account the totality and complexity of the behavior selected for study (i.e., the holistic approach), that traditional methods employed (questionnaire, interview, direct observation, history) present significant limitations (e.g., parent-child relations change over time; life conditions are poorly recalled), and that traditional diagnostic categories may not provide the grouping to which some life experience is appropriately related.

Although some disagreed with aspects of Frank's conclusions (Zuckerman, 1966) or responded with a methodological examination of research approaches to family etiology (Fontana, 1966), the weaknesses in past research as outlined by Frank in 1965 still serve to raise the question: Would biodevelopmental principles concerning adaptation help clarify further the role of early family experiences in the formation of psychopathology? Several lines of investigation suggest an affirmative reply.

Applying a holistic approach (e.g., ratings, home visits, office interviews) to assess a wide spectrum of situational variables and coping and defensive behavior, and staying alert to the reciprocal, changing influences individual and environment exert on each other (e.g., changes in interaction variables were assessed longitudinally from infancy to adulthood), Weinstock (1967) was able to identify complex life experience-defense configurations. For example, the use of isolation as a defense was found to be related to a shift from a warm, friendly mother-son relation in infancy to a strained, tense mother-son relation in adolescence, accompanied by rejection of the son by the father. Moreover, Weinstock observed that if an adolescent is exposed to considerable family conflict after a reasonable childhood, the defenses and coping mechanisms he organizes to handle the conflict equip him to deal much better during adulthood with external and internal conflicts of his own.

The studies by Kogan also respond to weaknesses identified by Frank in parent-child interaction research (Kogan and Gordon, 1975; Kogan, Tyler, and Turner, 1974; Kogan, 1972; Kogan and Wimberger, 1971). Kogan has focused on identifying and analyzing the pattern or configuration of interaction unique to a given mother-child pair, and observing changes in this unique pattern both longitudinally and in response to different situations and intervening experiences. She has especially underscored the need to consider the complex configuration of behaviors that take place between mother and child over time, rather than some discrete unit of behavior. Her approach then is shaped by biodevelopmental concepts of individual differences, holism, reciprocal influences in adaptation, and the emergence of new interactional patterns from earlier ones. Kogan has successfully identified stable patterns of interaction and factors that relate to changes in these patterns in observing normal, cerebral palsied, and disturbed children interact with their mothers, as well as in observing mothers interact individually with two of their children.

Studies concerned with the role of communication in the formation of pathology in children have also emphasized that child and family influence each other (e.g., Lennard, Baulieu, and Embrey, 1965; Stabenau, Tupin, Werner, and Collin, 1965). In this area the early work of Singer and Wynne (1966, 1963) should be noted because it broke new ground. They proposed that personality development is affected, from birth on, to a large extent by the infant's capacity to engage and become oriented to the caretaker and by the caretaker's ability to engage the infant's attention and orient him to the aspects of speech, perception, and thinking that will be important in his expectable life experiences. If this sharing of attentional processes by parent and child is poorly coordinated, the first ego organizations are impaired, resulting subsequently in psychopathology. To test their framework, Singer and Wynne were successful, for example, in distinguishing (blind) test protocols of the parents of schizophrenics, neurotic-withdrawn, and neurotic-aggressive children. The protocols were examined with rating scales evaluating the degree of differentiation and organization suggested by the percepts, thought processes, and verbalizations elicited by Rorschach stimuli.

In related work Reiss (1971) conducted a series of studies to investigate the relation between family interactions and the individual thinking of members (i.e., the individual's cognitive and perceptual organizations of his personal universe of experience). Using observations of families whose members included normals, schizophrenics, or individuals with character disorders, Reiss proposed three types of families. Parenthetically, the three types could be viewed as representing three levels of differentiation of family-environment relations.

1. *Environment Sensitive.* The family perceives the environment as orderly, capable of being understood and mastered; through his own explanations of the environment, the individual serves to clarify the patterning in the environment for other family members.

2. *Distance Sensitive.* The family sees the environment as split into unrelated parts, one for each member; each member acts to preserve the uniqueness of his universe and regards actions of others as irrelevant.

3. *Consensus Sensitive.* The family sees the environment as chaotic, each member joining others in various interpersonal maneuvers for mutual protection.

The observations and conceptualizations by Louis Sander of mother-infant interaction deserve special attention, both because they hold considerable promise generally for clinicians and because Sander's model is employed as a guide in managing transference and resistance when conducting cognitive control therapy—the topic of Parts IV and V of this book. In the early phases of his work Sander (1962, 1964, 1966, 1970) collected detailed observations during the first three years of the infant's life, including well-baby clinic visits, developmental testing, play interviews, and home visits. To guide future observations and to organize data collected in terms of specifying the role played by mother-infant interactions in personality formation, Sander creatively formulated a model proposing that mother and child participate continuously in an evolving series of mutual adaptations. Nine stages are identified in this series, each concerning a particular developmental issue around which mother and child "negotiate a fit"; that is, mother accommodates to, yields to, and resists the child's more differentiated and integrated functioning, and the child accommodates to, yields to, and resists the mother's changing responses and expectations. Three of the issues and their proposed time tables supported by Sander's data are illustrative; (*a*) 1 to 3 months, the first issue of initial regulation; to what degree, in the interaction between mother and child, will the cues of the infant be met by a specific and appropriate response from the mother? (*b*) 7 to 9 months, the issue of initiative; to what extent will the initiative of the infant be successful in establishing social contact with mother, especially in the form of a reciprocal interchange with her? (*c*) 14 to 20 months, the fifth issue of self-assertion; with the advent of locomotion, to what extent does the child establish and determine his own behavior, often in the face of maternal opposition, and in what areas? (The nine stages or issues are discussed in more detail in Chapters 11 and 12.)

For Sander these several issues specify the interactive process by which the give and take between mother and child structures and organizes the infant's early ego functions, from which emerge developmentally higher, more complex structures and functions, concerned with reciprocation, regulation, adaptation, identity, communication, and information processing.

When Sander found that the success with which mother and infant negotiated the first issue (initial regulation in the first three months of life) correlated highly with outcome ratings of subsequent issues negotiated during the next two years, he concluded that the organizing and regulating processes that characterized mother-infant interaction during the first weeks deserved more detailed study. To this end, he conducted a series of studies in which the criticality of the degree of synchrony between intrinsic rhythms in infant behavior and regulations in caretaker behavior was assumed. He demonstrated significant differences in crying and distress behaviors of infants who were reared during the first days of life by multiple caretakers (nurses), a single caretaker (nurse), or biological mother, and who experienced a change in caretakers at the tenth day of life (Burns, Sander, et al., 1972). And he observed during the first days of life a relation between the sleep patterns, degree of day-night differentiation, and body activity of the infant and caretaker behaviors (Sander et al., 1970; Sander et al., 1972). For the reader interested in pursuing this promising work in detail, Sander has elaborated his concepts and observations in more recent publications (1975, 1976).

Sander also extended his observations of mother-infant interaction in the first days of life to the level of microkinesics (see previous section on innate givens) in collaboration with Condon (Condon and Sander, 1974). They demonstrated that the human neonate moves in precise and sustained synchronous organizations with the articulated structure of the adult speech as early as the first day of life. As a result, Condon and Sander proposed that this "complex and ongoing dance" of the neonate with human speech requires a view of development and adaptation that defines the infant as participating from birth in multiple forms of interactional organizations, rather than as an isolate. In a review of studies of mother-infant interaction (including some that used microkinetic analyses), Ashton (1976) underscored conclusions that connect with Sander's work: that one of the most important aspects in a child's development is learning to interdigitate his self-generated timing systems with those of the environment, and that the integration of child environment timing systems is vital for the emergence of a well-adapted individual.

MOBILITY OF LEVELS OF FUNCTIONING IN ADAPTATION

The studies discussed in this section bring attention to the aspect of biodevelopmental view of adaptation involving the individual's intrinsic capacity to shift (more or less briefly) from one level of organization to another within a mode, or from one mode of functioning to another, to coordinate himself adaptively with a relatively brief change in the environment. Labeled differently by biodevelopmental theories (fixedness-mobility, Werner, 1957; regression in the service of the ego, Kris, 1952; perceptual activity, Fla veil, 1963), this proposition essentially is employed in the study of the conditions under which the individual shifts from a given level of functioning to one more primitive or advanced.

Although this concept has stimulated some research among workers studying normal cognitive functioning (e.g., Haronian and Sugarman, 1967), it has not been investigated in the laboratory to any great extent by those interested in psychopathology who, nonetheless, have given it considerable theoretical and clinical attention. To explore the concept of regression in the service of the ego, Wild (1965) administered word association and object sort tests to professional art students, school teachers, and adult psychotics (in good contact), in a precondition and in two experimental conditions. The subject was read *(a)* a character sketch of a conventional "regulated" person, and (*b*) a sketch of an "unregulated" person who has fanciful thoughts; the subject was asked to respond to each test case as if he were the person described. Analysis showed that with both tests, art students produced more original and pathological responses following the "unregulated" instructions and more adaptively original responses following the "regulated" instructions findings interpreted as a greater capacity to shift in the service of the ego on the part of art students.

Silverman (1959) conducted a series of studies designated to test the psychoanalytic proposition that aggressive tension is associated with regression in ego functioning (i.e., thinking dominated by primary process, illogical, unrealistic properties). He administered the Rorschach to schizophrenics and normals before and after they were shown by tachistoscope pictures of aggressive, sexual, and neutral stimuli. Evaluating changes in Rorschach responses with a detailed, systematic scale, he found evidence for the proposition. A number of the studies reviewed by Janis and Leventhal (1968) designed to investigate human reaction to stress related to the concept of mobility of functions in adaptation ; also in this category are Murphy and Moriarty's (1976) studies of the plasticity of children's coping styles in response to shortterm unexpectable and unusual stresses (e.g., the assassination of President Kennedy).

Critical Periods. With the concept of critical periods, the biodevelopmental framework brings together propositions concerning adaptation and short- and long-range forces. At various periods or stages in the process of differentiation, it is proposed behavioral organizations require, and are ready to deal with and assimilate, particular classes of stimulation. Certain experiences and stimuli are viewed as representing critical nutriment for the behavioral organization in question and as necessary for its further growth; and if these are not made available by the active efforts of the individual or the environment, the behavioral system assumes a deviant line of development. Though related to the concept of stages of development, then, the concept of critical periods emphasizes the extent to which stimulation introduced by the environment is timed appropriately to coincide with the individual's developmental status and needs.

Although studies of animals have been designed specifically to investigate the concept of critical periods (e.g., Hess, 1959; Scott, 1962: Sluckin, 1965; Mussen, 1970, vols. 1 and 2), studies with humans, especially work having clinical relevance, have introduced the concept primarily to account for observations already made. For example, in comparing children obese both in childhood and adolescence, Stunkard and Burt (1964) concluded that disturbances in body image associated with obesity originate during a relatively short period of time in early adolescence when derogatory communications by peers and parents are incorporated by the obese child.

Reviewing studies of the effects of separation from parents during early childhood, Yarrow (1965) proposed that the data could be interpreted within the framework of critical periods. Findings point to the period of time between 6 months and 2 years of age when, if separated from parents, the infant is observed subsequently to develop more serious personality disturbances. Along the same line, Menlove (1965), finding a higher incidence of aggressive symptoms (e.g., fire setting, temper tantrums) in children adopted before the age of 6 months versus those adopted after this age, stressed the need to study the optimum time for placement in new foster homes in terms of the critical period concept.

Attention has also been brought to the concept of critical periods by a number of others: Marks and Gelder (1966) in a study of ages of onset of phobias, Davis (1967) in research on the families of mentally retarded children, Becker (1964) in his review of studies of the effects of parental restrictions on child development, and Weinstock (1967) in his investigation of the role of family conflict in the development of ego defenses and coping mechanisms. Watson (1965) made central use of the critical periods hypothesis in organizing his text of child development, and he discussed observations reported in clinical practice and studies of infants and children that relate to the issue of the critical timing of stimulation. Beckwith and her colleagues (Beckwith et al., 1976), in systematically recording the effects of mother-infant transactions at 1, 3, and 8 months and relating these exchanges to formal measures of the infant's developmental quotient and sensorimotor functioning, reported that different behavioral exchanges between infant and caregiver seemed to be important at different age levels.

Before leaving this discussion of studies of adaptation, it is interesting to note that although Hartmann's (1939) classic monograph on ego psychology and the problem of adaptation led psychoanalytic workers to give major attention to the influence exerted by individual and environment on each other and stimulated psychoanalysts to study mother-child interaction (e.g., Lax, 1972), the mainstream of psychology in the United States is still influenced by situationism and behaviorism—that is, the view that human behavior is largely due to the situation in which it occurs and to the influence of social-environmental forces. Recently Bowers (1973) creatively evaluated the metaphysical and methodological assumptions of situationism in psychology and argued over and over again that environments are as much determined and shaped by the individual as the individual is by the environment, a position also cogently discussed by Mischel (1973). Although there is still a strong hold on the view that behavioral disturbances in children are largely under the control of the immediate social environment (e.g., Patterson, 1971), a shift can be identified in a number of reports from the camp of socialization which acknowledge the role of the individual in shaping his environment (Kay, 1975; Als and Lewis, 1975; Parke and Sarvin, 1975; Stern, 1973; Hanf and Kling, 1974).

Survey of Research in Cognitive Styles and Cognitive Controls

At this point we turn to a discussion of studies that also relate to the propositions of the biodevelopmental framework but address behavior conceptualized as cognitive styles and cognitive controls, as well. These studies are segregated here for convenience because the focus of this book is the diagnosis and treatment of cognitive controls in children. Several introductory comments are necessary.

First, studies of cognitive styles and cognitive controls are considered here without distinguishing between the two concepts and the methods used to assess them. The reader is encouraged to become familiar with the methodological and theoretical differences between styles and controls and with the major issues raised by cognitive control research (Chapter 4) before examining these studies. In the review to follow, the terms “cognitive control” and “styles” are used synonymously.

Second, the research reviewed here represents only a selected sample of work in the area. Since my own studies of cognitive controls and those of others are discussed in detail or referred to in Chapters 4, 5, 6, 7, 9, and 18, I was hard put to determine what should be included in this survey. It seemed pointless to repeat here a litany of the many studies conducted in the field of cognitive styles and controls when these studies are already presented in excellent comprehensive and historical reviews and critiques (Saarni and Kogan, 1976; Kogan, 1976; Kogan, 1973; Wolitzky and Wachtel, 1973; Kagan and Kogan, 1970; Klein, 1970; Gardner and Moriarty, 1968). Therefore I decided to include, for the most part, studies that would bring attention to several issues:

1. Except for studies by workers in the Witkin camp who have investigated the style of field-dependence-independence, relatively little attention has been paid to the development of cognitive styles and controls. In the cognitive control camp, even in an early publication (Gardner, 1964) that explicitly addresses the development of cognitive structures, and in a report (Gardner and Moriarty, 1968) of a study of cognitive controls and personality development in preadolescence, little consideration is

given to the process of cognitive control development in terms of cognitive organizations undergoing differentiation-integration and forming hierarchically ordered stages. In Chapter 7, on the basis of a number of formal observations, I propose a developmental course conceptualized for each cognitive control. To anticipate that discussion, then, I made a point of including in this review work providing data that relate to the developmental course of cognitive controls proposed here and to the course of cognitive styles suggested by others. Before considering each cognitive control, a brief description of its developmental course is provided. Chapter 7 can be referred to for a more detailed description.

2. A number of infant and child studies seem to me to bear on the concept of cognitive controls and styles, even though the work was not designed and conducted to explore the concept. I have selected several of these studies to illustrate the possibility of obtaining data supporting the concept of cognitive styles and controls from studies not reported in the usual literature reviews.

The infant studies have interested me in particular. I believe they provide exciting clues to the origins of cognitive controls and suggestions for the conduct of studies of origins. It is my impression from the infant research reviews I have examined that investigators of infant perception have not organized their observations in terms of several different types of individualized cognitive organization or style. In this connection I found it significant that in a review of individual variations in cognitive processes prepared by two workers (Kagan and Kogan, 1970) who have been very active in both infant and cognitive style research, the authors discussed infant research and cognitive style research without connecting the two. That is, they tended to organize various infant studies as exploring different aspects of “attention” instead of clustering studies according to whether one or another of the styles conceptualized in children had been explored (e.g., scanning, managing distractions, holding images in memory, body tempo). Another review of infant research (Pick, 1975) also assumes that many studies are related to the attentional process in infants when one wonders whether it may be of value to cluster the studies in terms of component processes of attention (i.e., cognitive controls and styles). I try to illustrate the possible value in viewing infant studies from this vantage point in the discussion of the infant studies selected. I also hope to point out how organizing infant studies from the perspective of cognitive styles and controls may help not only to bring a conceptual scheme to the many and various observations now clustered under the single broad notion of “infant attention,” but also to suggest future studies of the origins of cognitive styles and controls in infancy and how these organizations relate to future developments, adaptations, and psychopathology. Last I have included a few studies of cognitive styles or controls that have not received particular attention in available reviews.

The discussion of the studies selected for this review is organized around the major themes of the book as a whole. First, we consider studies that relate to the cognitive controls defined by Klein and by me, for which methods are presented in Chapter 10 (body ego-tempo regulation, focal attention, field articulation, leveling-sharpening equivalance range), and studies that relate to the cognitive styles defined by Witkin (field dependence-independence or global articulated) and Kagan (impulsive-reflective). Then we treat studies that relate cognitive controls and styles to psychopathology, motivation, and adaptation. To anticipate Parts IV and V, which are devoted to a treatment technique developed to restructure cognitive controls in children with learning disabilities and ego dysfunctions, we discuss work related to the treatment of cognitive controls and styles and to cognitive styles and education.

STUDIES OF COGNITIVE CONTROLS AND STYLES

As Chapter 4 points out in detail, the concept of cognitive style and control concerns the unique, enduring cognitive organizations that characterize an individual as he copes with, adjusts to, approaches, selects, avoids, and organizes information in the environment (internal and external). These styles or controls are viewed as information-processing strategies that distinguish one child from another, change slowly during childhood in the direction of increasing differentiation and integration, and define levels of organization in the course of development. The concept of cognitive controls and styles, then, blends together several biodevelopmental considerations: individual differences in the organization of cognitive responses to information, and differentiation and hierarchic integration of these responses—a process in the course of development that defines stages and cognition in adaptation. Three camps of investigation are responsible for most of the research in this *area.* One was initiated by George Klein, another by Herman Witkin, and the third by Jerome Kagan. Of the several cognitive controls that have been investigated by the followers of George Klein, focal attention, field articulation, leveling-sharpening, and equivalence range have received the most attention. Following Klein's model, I have added the control of body ego-tempo regulation (Chapters 4 and 10). Witkin and his followers have studied the cognitive style they have labeled field-dependence or global-articulate, and Kagan and his followers favor the style they call impulsive-reflective.

The Cognitive Control of Body Schema-Tempo Regulation. The several cognitive controls defined by Klein emerged from studies of adult populations, and Klein did not include a cognitive control concept that concerned representation of the body. As I conducted studies of cognitive control functioning in children, observations suggested to me the need to formulate a cognitive control that concerned body ego and the conceptual value of a hierarchy of cognitive controls embracing the widest possible range of cognitive behaviors—from body percepts to conceptual thought.

The proposed cognitive control principle, body ego-motility (Chapter 4), defines a hierarchy of perceptions and schemes that represent information perceived by the body and used in regulating body tempos. The developmentally immature end of this continuum is defined by an individual who constructs and is guided by global schema representing information perceived by the body when the body is in static or dynamic postures; when the body is in motion, this individual shows little differentiation of tempos. The developmentally mature end of the continuum is defined by an individual who constructs highly differentiated and integrated schemata representing body information and differentiates body tempos. I recently devised the Body Schema-Tempo Regulation Test to assess this cognitive control (Chapter 10). It is important to emphasize, as we proceed with our discussion, that the concept of body schema under consideration here concerns psychological-cognitive behavior, not physiological, anatomical behavior as such. Although body and sensorimotor perceptions play a major role in the theories of Werner and Piaget (see above), the concept proposed here of a cognitive control of body schema-motility derives in particular from the psychoanalytic concept of body ego.

As early as 1923, Freud stressed the importance of the role of body percepts in the formation of the ego. This emphasis is represented by his well-known comment, "The ego is first and foremost a body ego; it is not merely a surface entity, but it is itself the projection of a surface . . ." (Freud, 1923, p. 26). The translator of Freud's writings appended a clarification of this statement by Freud that serves our topic. What Freud meant, the translator tells us, is that "the ego ultimately derived from bodily sensations; chiefly from those springing from the surface of the body. It (the ego) may thus be regarded as a *mental* projection of the surface of the body . . ." (italics mine). From the start then, Freud emphasized the role of the body in development in terms of its cognitive representation, and ego development, in this conception, proceeded in terms of the child's learning to perceive and integrate sensations from the body surface and using these sensations as a basis for discriminating between the outer world and his own body.

A summary of this process of development, as it was conceptualized from Freud's first writings in subsequent psychoanalytic works, is provided by Fenichel (1945).

> In the development of reality the *conception* of one's own body plays a very special role. At first there is only the perception of tension, that is, of an "inside something." Later, with the awareness that an object exists to quiet this tension we have an "outside something." One's own body is both at the same time. Due to the simultaneous occurrence of both outer tactile and inner sensory data, one's own body becomes something apart from the rest of the world, and thus the discerning of self from non-self is made possible. *The sum of the mental representations of the body and its organs,* the *so-called body image,* constitutes the *idea* of I and is of basic importance for the further formation of the ego. The body image *does not coincide with the objective body* . . . (pp 35-36; italics mine).

The concept body ego or body image does not seem to have captured the interest of researchers in psychology as a major domain of inquiry. Indeed, subject indices of several handbooks of personality theory and research, socialization theory and research, and child psychology research do not include the terms body ego, body image, or body concept (Hoffman and Hoffman, 1964; Caldwell and Ricciuti, 1973; Horowitz, 1975; Hetherington, 1975; Goslin, 1969; Borgatta and Lambert, 1968; Mussen, Vols. 1 and 2, 1970). Only the second volume of *The Review of Child Development Research* (Hoffman and Hoffman, 1966) lists in its subject index the topic "body size" (e.g., in studies of adolescence, parental size, cultural differences, and intelligence). The approach usually taken by psychological researchers to the topic of body image is illustrated by one study (Staffieri, 1967) investigating the relation between body build and popularity in children.

In contrast, clinical investigators have sustained interest since Freud's first formulation in studying body image. A survey of the field (Fisher and Cleveland, 1968) indicates that the bulk of the work has been done in the fields of neurology, psychiatry, and psychoanalysis. Of the work done, we note here only research that has exerted significant influence.

Perhaps one of the earliest behaviorally and psychodynamically oriented investigators to systematically study body image phenomena was Schilder (1935), who examined schizophrenics and patients with organic brain pathology. Of Schilder's many hypotheses and speculations, his notion of "key representations" is particularly relevant to our discussion. With this concept Schilder seems to be attempting to establish a connection between cognition and cognitive representations and the control of one's body.

> . . . By the term "key representations" I mean that we are able by specifically arbitrarily chosen representations to change the function of the intestines (or other parts) which are otherwise beyond our reach. We cannot decide to increase our pulse rate, but we can imagine ourselves in a frightening position and can thereby provoke a change in the pulse rate. In every individual a continual process of experimenting with key representations goes on, thus gaining indirect influence on the inner parts of the body . . . (pp. 183-184).

The pivotal work of Schilder with schizophrenic adults was followed by the ground-breakings studies of body image with schizophrenic children by Bender (e.g., Bender and Keeler, 1952). The subsequent studies of various workers concerned with the role of body experience (body percept, body concept, body image) resulted in a symposium held at the Seventeenth International Congress of Psychiatry in 1963, the proceedings of which were published (Wapner et al., 1965).

It was perhaps Fisher and Cleveland (1968) who provided the most comprehensive, systematic series of studies of the body image concept. Taking the responses a person gives to Rorschack inkblots, these investigations abstracted a "barrier score" and a "penetration score." These scores serve as indications of the extent to which an individual's functioning is guided by a body image that has definite and delineated boundaries. The barrier-penetration index has been studied in psychosomatic, neurotic, and psychotic disorders, and in normals, selfsteering behavior, and group behavior. From their first publication in 1958 to the revision of this major work 10 years later (Fisher and Cleveland, 1968), more than 25 dissertations and 100 studies have largely supported the hypothesis of the importance of body image dimensions in perceptual processes, affective attitudes, and patterns of physiological activation. For example, one worker elaborated and extended Fisher's use of the Rorschach to interpret body boundaries and body image (Schafer, 1960); another reported changes in the body boundary-penetration scores of children with age (Liebetrau, 1974).

In spite of Fisher's view of body image as an active ego-cognitive process implicated in many behaviors, and Schilder's earlier view of body image as actively controlling one's experiences, clinical investigators still tend to study and interpret the concept as defining a static trait. They seem to stop their observations and inquiry once they have demonstrated that some experience or condition has affected a person's body image. For example, one study pointed out that the body image of obese children (inferred from drawings) is more global and less differentiated (Nathan, 1973); another revealed that the three-dimensional human figures constructed by institutionalized children with spina bifida showed more distorted body images than did the figures constructed by similarly afflicted children reared at home (Weininger et al., 1972). Furthermore, a discussion of the role of physical defects (e.g., cleft palate) in the etiology of mental disorders in children indicated that physical defects contribute to disordered body images

(Schecter, 1972), and it has been demonstrated (Schonfeld, 1966) that adolescents who reveal disturbances in body image tend to come from families that stress the importance of body size, appearance, growing up, and so on. In other work Simmel (1966) found that the earlier in life a leg is amputated, the less likely it is that a phantom limb will occur. On the other side of the coin, more experimentally oriented workers have tended to focus on precision of perceiving stimulation applied to the body (Pick and Pick, 1970) and the relation between finger localization and movement and body schemata (Lefford et al., 1974).

Although findings such as these are helpful in teaching us about body image, the biodevelopmental framework we are using as our guide requires that body image be viewed not as a static trait but as a concept of cognitive activity having dynamic, adaptive, developmental, and organizational properties. As such, we are encouraged to stay close to the views suggested by Freud, Schilder, and Fisher. That is, if the phenomena embraced by the concept "body image" are viewed as cognitive controls, we become interested in a series of interrelated questions. (1) What is the unique *cognitive organization* of a person's body image? (2) What life experiences contribute to this organization and to changes in it? (3) What course does this organization follow in normal development, and what circumstances and factors contribute to a deviant course ? (4) Flow does the body image serve in regulating, pacing, selecting, and avoiding (i.e., controlling) information in the process of adaptation? Workers in the field of cognitive style research have not applied this view to body image, nor have have they placed central importance on body image, although Witkin (e.g., 1969) has given the matter attention in his discussion of the articulation of a body concept in the development of the global-differentiated cognitive style. Moreover, as we see shortly, Kagan's concept of reflective-impulsive does not concern body behaviors as such but cognitive behavior.

Of the more recent publications concerned with body image, I have found those by Shontz (1969, 1974) to have particular relevance for viewing body image as a cognitive control. Shontz proposed describing body image in terms of the functions it serves and the levels at which it operates. The functions served are sensory register (the body selects, records, and integrates data); instrument for action (the body facilitates some activity and limits others in virtually all behavior); source of drives; a stimulus to the self (proprioceptive cues reveal the position of one's arm, even in a dark room); a stimulus to others (appearance identifies age, sex, race, attractiveness, and arouses social expectation); a private world; and an expressive instrument (gestures, positions, facial movements communicate or conceal inner states).

Shontz defined four levels at which the body image operates, and he views these levels as hierarchically ordered and following a developmental course from those tied to immediate sensations to those least dependent on sensory input. The levels are as follows: (1) body schemata (frameworks for localizing stimuli on the body surface and for orienting body parts in relation to each other); (2) body self (emerges from schemata; experiences that happen to the self are differentiated from those that do not; child learns difference between up and down, front and behind, here and there etc.); (3) body fantasy (fantasies, metaphors, and symbolic representations of the body); (4) body concept (formal knowledge of the body is expressed through conventional signs such as words and names assigned to body parts). Disorders of body image that could occur at each level and guidelines for behavioral treatment of each are also considered by Shontz. In terms of behavioral treatments of body image, the reader may wish to refer to Kestenberg (1973, 1971, 1967), who has given considerable attention to body and body movements in the psychoanalytic treatment of children.

Shontz' model is useful in discussing the cognitive control of body-ego motility I propose and the method devised to assess it, Body Schema Tempo Regulation Test (Chapter 10). This method attempts to assess the perceptions a child can or cannot make and the unique schemata and symbols the child constructs to represent body positions, motility, and tempos. Applying the developmental framework, observations are gathered at several levels involving the total body, parts of the body, and representations of the body: the child experiences positions of the total body, then large and small parts of the body, then touches ambiguous objects; and the child moves his or her total body across a room at various tempos, moves a doll representing the body across a table, and moves a pencil (a more distant representation of the body) across a sheet of paper.

As mentioned elsewhere, this procedure was developed very recently; thus a formal scoring system and data gathered with normal and pathological groups of children are only now being developed and processed. In this work we plan to benefit from Shontz' model of levels of body image functioning when we examine the perceptions and schemata the child reveals while experiencing the body in several postures. We also plan to benefit from child research reports that provide "basic" data related to body image. The study by Kuczaj and Maratsos (1975) is an example. Using a variety of tasks to assess children's understanding of front, back, and side, they found that correct use of the term "front" begins with reference to the self, then spreads to objects with fronts, whereas the notion of side is acquired well after the notions of front and back. These observations fit the biodevelopmental principles of self-world differentiation discussed earlier.

The heuristic value of viewing the body image as an active cognitive control is illustrated if we apply our discussion to the observation by Wessel and La Camera (1967) that adolescents show a high incidence of body complaints and symptoms that usually do not relate to objective physical findings. If these body perceptions (complaints) are viewed as aspects of the adolescents body image, we can ask several questions. Are there differences among the body schemes or representations (complaints) reported by adolescents? What adaptive purpose do these schemata (complaints) serve? Does the cognitive schema (perception and mental representation of bodily pain or distress) serve to control and organize the flood of aggressive and sexual drive tensions characteristic of adolescence? How do these cognitive schemes (perceptions of specific body distress) serve to select some and avoid other information? Parenthetically, the studies of microkinesics by Condon, which we considered in the earlier section on innate givens, certainly support Freud's early speculation that the first ego is a body ego, opening a new window into one origin of body image and the role of body ego in subsequent cognitive development.

Focal Attention. The cognitive control principle of focal attention concerns the manner in which an individual directs attention at a stimulus field and scans it. As discussed in the following chapters, this process appears to consist of two component processes: passive versus active scanning, and narrow versus broad, extensive scanning. The developmentally immature end of this continuum is defined by an individual who directs attention passively (i.e., scans or makes contact with only a few elements of the informational field) and narrowly (limits attention to a small segment of the field). The developmentally mature end is represented by an individual who directs attention actively and broadly. Moreover, as noted especially in Parts IV and VI, passive scanning also consists of tracking a moving target or piece of information with one's visual attention. The information moves, and attention passively follows. In contrast, active scanning is demonstrated by the active surveyal of many elements of a stationary target; that is, visual attention is active in reaching out, exploring, and registering the elements of a display of information.

A number of observations of infant attentional behavior in my opinion relate to the process of focal attention as conceptualized here. I mention only a few illustrative findings. The interested reader is referred to several detailed reviews of infant research now available (Cohen and Salapatek, Vols. 1 and 2, 1975; Pick, Frankel, and Hess, 1975; Kessen, Haith and Salapatek, 1970), which I use as my sources of information.

First, we have the issue of passively tracking information with one's visual attention versus actively examining stationary information. Several studies have shown that from the first weeks of life there is a gradual shift from infants preferring (looking more at) moving targets to infants looking more at stationary targets. Perhaps the study by Fantz and Nevis is the most compelling, since infants were tested weekly in the first half-year of life. The investigators found that from 2 to 6 weeks of age, infants looked longer at moving stimuli; preference for stationary stimuli gradually rose to a peak at about 14 weeks, then declined until there was no particular preference for either stationary or moving information at about 23 weeks. These results, interpreted from the concept of focal attention, suggest an intrinsic developmental progression during the first six months of life from passively attending to moving information to actively examining stationary information, with the component control principle appropriately negotiated by the sixth month.

Another source of data about the process of focal attention comes from the many studies demonstrating a progressively increasing preference for more complex information over the first months of life. For example, infants were shown pairs of black and white checkerboard displays varying in number of squares. The 3-week-old infants looked longer at the 2 x 2 checkerboard (lowest complexity) than at the 8 x 8 (intermediate) complexity, and longer at the 8 x 8 than the 24 x 24. The 8-week-old infants showed significantly different preferences. They looked longer at the 8 x 8 board than at the 24 x 24 and least at the 2 x 2. The 14-week-old infants exhibited preferences in the following order: 24 x 24, 8 x 8, 2 x 2. If we assume that the number of checkers relates to the breadth and extensiveness of scanning elicited, these results suggest a progression from narrow to broad scanning over the first four months.

The most direct evidence of the progression from narrow-passive to broad-active scanning comes from studies in which eye movements of infants were recorded on film. One set of older infants (aged 8 to 10 weeks) looked more at particular elements of a geometric display (e.g., the apex of a triangle), passed their gaze over several elements, several times; *in addition,* they scanned a greater amount of the contour of the shape than did younger infants (aged 1 to 2 months). In short, the older infants showed more broad and active attention deployment. The same age differences were noted in another study that recorded eye movements of infants while they looked at mother's face.

Of particular significance in terms of our early discussions, a number of investigators are beginning to notice consistent individual differences in the attentional behavior of infants, as well as group or age trends. Within one group, for example, although all infants concentrated on at least one feature of a geometric display (usually the apex), some also looked at several features. Are these individual differences in attention deployment, which are observable during the first weeks of life, the behavioral base out of which unique differences in cognitive controls develop by the age of 3 to 4 years? (See Chapter 7.)

Eye movements were also filmed in one study of school age children while they responded to the Matching Familiar Figures Test (Wagner and Cimiotti, 1975). The children were grouped according to their tendency to be impulsive versus reflective, and eye movements were recorded during the first 4 seconds of their encounter with each test item. The two groups showed very different visual scanning patterns. The reflective children systematically compared each variant (picture) with the others and with the standard (picture). The impulsives looked primarily at the variants in the center of the test card and consequently tended to select one from that area. Again from our view the latter group revealed narrow-passive scanning and the former more broad and active. We consider further the impulsive-reflective cognitive style proposed by Kagan in a subsequent section, as well as in Chapter 6. The data just reviewed, and other findings to be noted, suggest that several cognitive principles are embedded within the reflective-impulsive style, at least as measured by the Matching Familiar Figures Test, and it may be heuristically valuable to segregate these component processes for study.

Crosby (1972) employed a continuous performance test of attention to study attention in mentally retarded children. Although the study was not conducted within the framework of cognitive controls, it is noted because the method used closely resembles a method employed in several of my studies (Chapters 5, 6; Appendix A). Reviews of studies of attention in children are available (Lewis, 1975; Pick et al., 1975; Hagen and Hale, 1973; Hagen and Kail, 1975), as is a useful theoretical discussion of conceptions of broad and narrow attention (Wachtel, 1967).

Field Articulation. The cognitive control principle of field articulation concerns the manner in which a person deals with a stimulus field containing information defined as relevant and nonrelevant in terms of the requirements of the task. The hallmark of this control is *selective* deployment of attention; the emphasis in its process therefore calls for attention to be withdrawn and withheld from irrelevant information and directed at and sustained on relevant information. At the developmentally immature end of this continuum is the individual who devotes attention to both relevant and nonrelevant information and whose performance with central information is disrupted accordingly. The developmentally mature end is defined by the individual who withdraws attention from irrelevant information while simultaneously sustaining attention to relevant information. As discussed in detail in Chapters 4 and 9, the conceptualization of this control principle includes the element of "intention," conscious or unconscious. That is, when operating in terms of this principle, the cognitive activity of the individual is guided by his or her intention to deal selectively with the information that is defined by the individual as relevant, given factors such as the person's adaptative aim and the demands and circumstances of the situation at hand. The tasks administered to assess this principle usually define for the individual some information that is relevant and some that is irrelevant to the task, and the individual is requested to attend only to the relevant material.

It is difficult to impute a cognitive state of "intention" to neonates, since one cannot readily define a task for the infant in terms of its containing relevant and nonrelevant information. yet it may be useful to establish whether observations of infants have been made that appear to relate to this principle. One of the reviews of infant research cited earlier (Pick et al., 1975) discussed studies that used a display similar to a procedure frequently employed to assess the field articulation principle in children (Embedded Figures Test). The infants were presented with geometric shapes next to each other and also with one embedded in another. In one report older infants (aged 8 to 10 months) tended to view more the internal figures than did younger infants (aged 1 to 2 months). On the basis of such findings, these reviewers concluded that with development, the infant seems to acquire more "flexibility in scanning," which enables him "to select more and different features in the environment." A similar conclusion is drawn by Kessen, Haith, and Salapatek (1970) as a result of their review of infant studies.

> Psychologists have generally considered selective increasing of attention (e.g., positive conditioning) to be the basic mechanism of selective attention. The mother's face is selected out of a myriad of visual stimuli and increased in salience because of its importance in the biological economy of the child. Recent research moreover has challenged the notion that nonsignificant stimuli which occur regularly are simply unattended; instead, it is argued that the organism actively ignores or filters stimuli which are of no use to him. Thus the emerging picture is one of an infant who gives priority to novel events. If they are significant, he continues to attend; if not he habituates (pp. 340).

The study by Cohen (1974) discussed earlier, in which infants were presented with face-voice incongruity of mother and stranger, also may be viewed from the angle of field articulation. Recall that infants 5 and 8 months old were presented systematically with pairs of face-voice combinations: mother's face plus a stranger's voice (coming from a speaker placed near mother's mouth), mother's face and her own voice, and the face of a stranger, with her own voice and with mother's voice. The infant had to move his head in a 90° arc to orient and attend to one or the other face-voice combination. Cohen observed that the 8-month-old infants showed considerable stress when presented with mother's face, plus a stranger's voice coming from it, but the 5 month olds were not disrupted. So great was the disruption experienced by the 8 month olds that four of them could not complete the experiment. These findings permitted Cohen to suggest, in keeping with her reason for conducting the experiment, that by 8 months the infant discriminates face-voice incongruities and coordinates auditory and visual stimulation. However it seems to me that viewed from the vantage point of this discussion, we could speculate that *given* this capacity to discriminate face-voice incongruity, the 8-month-old infant intends to experience his mother's voice when he sees her face. When the infant perceives a stranger's voice coming from mother's face, the voice is irrelevant to this intention. Cohen's findings suggest to me that her 8-month-old infants not only attended to the nonrelevant voice but gave it considerable attention, and that this nonrelevant information was so disruptive (given the infants' intention of expecting mother with her own voice) that they could not complete the task of continuing to look at her. It is interesting to speculate whether at some later age the infant can "withhold attention" from the stranger's voice, recognized as nonrelevant or as not belonging to the mother, and sustain attention on the mother's face. At this later age we would then see the emergence of selective attention deployment as applied to the stimulus of the primary caretaker.

Pick (Pick et al., 1975) noted, after reviewing several studies, that when children are presented with tasks that define both relevant and nonrelevant information, they show increasing attentional selectivity with age. Although not conducted as investigations of cognitive styles or controls, various studies support this developmental progression in the management of relevant and nonrelevant information. For example, when children (6, 9, and 12 years old) and adults were asked to sort cards that contained relevant and irrelevant dimensions, the irrelevant information interfered with the speed with which the cards were sorted, but the magnitude of the interference decreased with age (Strutt et al., 1975). Another study used learning of peripheral information as an index of nonrelevant (Hawkins, 1973). Children from grades 3, 5, 7, and 9 viewed one of two television films (adult and child) and were tested on their noticing details relevant and nonrelevant to the plot. With age, children showed less attention to nonrelevant information. One secondary finding is of special interest to us. The adolescents gave more attention to nonrelevant details when viewing the child film, about which they expressed much less interest. As future chapters point out, this observation suggests that when engaging the less interesting child film, the adolescents regressed cognitively to an earlier level of field articulation (attending to nonrelevant information) in comparison to their management of details when engaging an adult film.

Other studies are noted here, partly because they employed in their methods a measure of field articulation (the Fruit Distraction Test) devised by me and discussed at length in several chapters. Denny (1974) compared good and poor readers (grades 2 to 5) on several cognitive style dimensions: conceptual style (sorting tasks), cognitive tempo (Matching Familiar Figures Test), and field articulation (Fruit Distraction Test), and found that the Fruit Distraction Test discriminated poor and good readers best. Investigations relating cognitive controls and reading disability are also discussed in Chapters 6. Two studies have found that hyperactive children with behavior problems showed greater distractibility with the Fruit Distraction Test (Campbell et al., 1971; Cohen et al., 1972).

Geva (1976) reasoned that the experience of growing up in a bilingual home could be viewed as requiring the child to shift flexibly in managing relevant and nonrelevant information—now one language is relevant, now the other —with the result that bilingualism accelerates the development of field articulation. That is, children reared in bilingual homes would withhold attention more than would controls from information irrelevant at the moment.

Although her sample was small, and adequately matched controls were not available, the study deserves attention because the results should stimulate further questions and observations. Her subjects were first and fifth grade children living in the United States in homes where Hebrew and English were spoken; they attended both an English-speaking school and a second school at which only Hebrew was spoken.

The Fruit Distraction Test was administered twice, in Hebrew and in English. In the first test the child was asked to name the colors during each test condition in Hebrew, and in the second, to name them in English (Chapter 10). Order of administration was counterbalanced. Time and error scores (interference scores) were compared with unilingual children. When the children managed the test in Hebrew, the interference scores were the same as those of unilingual children (i.e., the bilingual children were disrupted to the same degree by the peripheral irrelevant pictures on Card III and by the contradictory colors on Card IV). When the children managed the test in English, their scores suggested that they were less distracted by irrelevant, contradictory information than were the unilingual children, and this finding lends some support to Geva's notion that growing up in a bilingual home accentuates the cognitive control of withholding attention flexibly from irrelevant information. The age differences Geva observed agreed with the developmental trend reported in a number of studies discussed in Chapter 7. The fifth graders were less disrupted by nonrelevant, peripheral, and contradictory information than were the first graders.

Leveling-Sharpening. The leveling-sharpening cognitive control principle concerns the manner in which an individual manages information that remains stable and changes over time. The developmentally early end of this continuum is defined by an individual who constructs global, unstable images of information and fuses present with past information so that information loses its discreteness. At the developmentally mature end, the representative individual constructs articulate, stable images of information, differentiates present from past information, and maintains the discreteness of information.

The phenomenon of habituation has been proposed as a useful tool for the study of memory in infants (Kessen, Haith, and Salapatek, 1970; Cohen and Gelber, 1975). If an infant responds differently to a particular stimulus on the first display and on the tenth display, it is assumed that the infant "remembered" the stimulus. Habituation has been measured in various ways, including changes in evoked EEG potential, the amount of attention an infant gave to a stimulus, and the amount of excitement an infant showed in the face of a stimulus. These behaviors are taken to indicate that the infant experiences a mismatch between schema or expectation based on past encounters with a stimulus on the one hand, and with present stimulation on the other. That infants habituate faster with increasing age over the first 18 months of life suggests that with age, more articulate, differentiated cognitive schemata or images of information are constructed. Moreover, results obtained in recent years suggest that infants give evidence of remembering information by 2 months of age, although one researcher found evidence of memory in infants as young as 3 days old, and others have reported individual differences. Cohen and Gelber (1975) provide an excellent discussion of memory in infants, review relevant studies, and critique the various models of infant memory that have been proposed.

A study by Salapatek (1975) deserves our attention because a method was used with infants that closely parallels the Leveling-Sharpening House Test (Chapter 10) proposed in this book as a measure of the leveling-sharpening principle. Salapatek cited an earlier investigator who observed that infants 2 months old (and older) “expected” an object to continue to exist for at least 5 seconds after it had been removed; that is, the infants showed “surprise” when the object was slowly occluded. Salapatek designed a study to take this issue a step further. He constructed pairs of stimuli. The first member of a pair was presented for 15 seconds. Then the stimulus was slowly covered, and the second member of the pair was presented for 15 seconds. The second member of each pair represented a transformation of the first. Either an internal element was deleted (e.g., a square within a square was presented first, followed by the larger, center square only) or an external element of the first display was deleted (e.g., a square within a square was followed by the smaller inner square only). Some pairs contained no changes from the first to the second. These stimuli were presented to infants from 8 to 11 weeks old. Salapatek expected that if an infant noticed the alteration or transformation of a particular feature from the first to the second member of a pair, the infant would show more eye fixations in the area of the deleted feature as compared with control trials in which both members of a pair were the same. Analysis of videotaped eye fixations yielded negative results. Salapatek suggested that infants at 2 months of age may be incapable of registering and differentiating the subtle changes introduced in the information used, or, his measure of eye fixation may have masked quick glances at the locus of deletion immediately following presentation of the second stimulus. Although the experiment produced negative results, the method holds considerable promise as a tool to investigate in infants, and preverbal children, behaviors related to the leveling-sharpening principle. Instead of verbally reporting the change detected, as required by the Leveling-Sharpening House Test, the infant “visually” reports the change detected as revealed by the location on the stimulus at which his visual attention is directed.

A study by Fagan (1976) demonstrating that 7-month-old infants can discriminate among photos of faces could be related to the leveling-sharpening principle. Because the stimuli were varied photos of different faces, poses of the same face, and various characteristics defining adult male and female faces, there is a suggestion that these 7-month-old infants constructed a fairly differentiated schema of a given face, as revealed by their distinguishing it from others.

Studies exploring leveling-sharpening functioning in children are described in the next chapters. The reviews cited earlier discuss others, although it seems that fewer studies have been reported with the leveling-sharpening cognitive control than with the other controls.

Equivalence Range. The cognitive control principle of equivalence range, also referred to as conceptual differentiation (Gardner and Schoen, 1962), concerns the manner in which an individual relates, categorizes, and conceptualizes information. The developmentally early end of this continuum is defined by an individual who imposes few, narrow categories on information and assigns to these categories concepts that are concrete and bound to the physical properties of the stimuli, or unrealistic and illogical. The developmentally later end is defined by one who imposes many broad categories on information; the concepts assigned to these categories are abstract and realistic in terms of the major physical and functional properties of the stimuli.

Because the methods and task requirements used in assessing categorizing behaviors relate to fairly complex, developmentally advanced cognitive processes, most studies discussed in published reviews have involved children of school age or adults. However one study (Nelsen, 1973) involved children 19 to 22 months old. The resulting observations suggested that these children categorized objects before they could name the category, that they were guided by the functions of the objects in categorizing, and that the functions they formulated at first were simple, then more complex and abstract. This study relates to one aspect of the scoring system proposed in Chapter 10 to evaluate the sorting (categorizing) behavior of children. I have observed that children, especially from various clinical populations, frequently group objects together in a way that strongly suggests some conceptual basis, whether functional (e.g., a screwdriver and a hammer are grouped together) or concrete (e.g., two corks are grouped together), yet they verbalize no concept. As a result, the scoring system was developed to take into account grouping or categorizing for which the child is unable to provide a distinguishing label (e.g., “they’re things”).

Studies of children from the age of 3 years and older have supported the developmental continuum just defined in showing an ontogenetic shift from equivalences based on more concrete, immediately given perceptual, situational, and functional attributes of objects to equivalences based on more abstract, verbal-conceptual categories. For example, assessing the free classification behaviors of subjects from 3 to 19 years old, Kendler and Helland (1974) found that categories characteristic of adult behavior increased with age and classifications that did not define a category decreased. Moreover, incomplete categories increased from 3 to 6 years, then decreased to 19 years.

There have been reports of studies of behaviors other than object sorting that also relate to the issue of developmental changes in styles of categorizing. Nelsen (1974) asked 4 to 5 year olds and 7 to 8 year olds to say all the things they could think of after hearing the examiner name each of nine categories (e.g., flower, vegetable, tool). The results indicated that with age there was an increase in the number of responses given; moreover, the responses showed increasing articulation and hierarchical expansion of the category named. Bignier (1974) asked children who ranged in age from kindergarten to eighth grade to describe their sibs, what they liked and did not like about them, and so on. With age, there was an increase in the number of constructs used by the children in their descriptions and a shift from concrete to abstract descriptions.

Kogan’s (1974) study of the categorizing and conceptualizing styles of younger and older adults is noted here because the results suggested the same developmental progression in adulthood proposed here for childhood; in addition, Kogan used a system devised by Jerome Kagan to score the Object Sort Test (Chapter 10). The interested reader not familiar with Kagan’s scoring system is encouraged to compare it with the system presented in Chapter 10, to determine which approach best suits the clinical or research needs at hand. In brief, with Kagan’s system each group of objects formed by the person is designated as one of three types: (1) Categorical-inferential (e.g., fork, spoon, knife, where each item is an example of the concept "kitchen utensil"), (2) analytic-descriptive, when the objects are viewed as sharing some property that has been articulated (e.g., the objects are all round or red), (3) relational-thematic, where the objects are viewed in some functional relationship (e.g., the match lights the pipe).

Applying this scoring system to the groupings of men and women 21 and 71 years old, Kogan found that the younger adults produced significantly more groups of the categorical and analytic types, and older adults of the relational type. In an earlier study Kagan (1963) showed that in the preadolescent age range relational sorts decline, whereas analytic sorts increase with age.

If we examine Kagan's three categories in terms of the scoring system proposed in Chapter 10, we can see that the two coincide. The categorical type is essentially the same as the level in my scale that receives a score of 7. The relational type is essentially the same as the level in my scale that receives a score of 6, and the analytic type is the same as the level that receives a score of 5. The possible advantages to the system described in Chapter 10 are as follows: *(a)* the types of sorts are weighted to reflect a developmental ordering, and four other types are considered that represent earlier levels than relational, analytic, and categorical-for example, groupings formed in terms of identities are given a low (developmentally) score, and a distinction is made between a functional relation connecting two or more objects (e.g., "this match lights the pipe") and one defining a higher broader functional domain (e.g., "these are to fix things"); (*b*) the scoring system proposed here takes into account categories accompanied by verbalization and those that are not, and various atypical or illogical groupings produced sometimes by normals but especially by pathological groups.

In any case if we translate Kogan's findings and Kagan's earlier results into the scoring system proposed here, we see that through preadolescence and into young adulthood more abstract categories are produced, followed by a regressive shift toward more concrete and functional categories with old age.

Reflective-Impulsive or Conceptual Tempo. As discussed in greater detail in Chapter 4, many studies have been stimulated by the reflective-impulsive cognitive style defined by Jerome Kagan (e.g., Kagan and Kogan, 1970; Kagan, 1971) and by the Matching Familiar Figures (MFF) Test used to assess it. This style conceptualizes the degree to which a child delays a response in the course of searching for a correct alternative. As measured by the MFF, the child compares a drawing of a familiar object (e.g., teddy bear) with five variants one object that is identical to the standard, and picks the item that is just like the standard. Speed of responding and accuracy are recorded. Numerous studies have suggested that the disposition to respond in either a reflective or an impulsive fashion generalizes across many tasks and is stable over time. Studies continue to support this generalization with normal children. For example, reflective children scored higher on a test of creativity (Fugua et al., 1975) and revealed more efficient hypothesis-testing strategies when dealing with problem-solving tasks (McKinney, 1973; 1977). However the concept and measure did not distinguish emotionally disturbed children in one study (Stein et al., 1975). In other research that compared ages, reflective children showed improvement with age in processing task information, but children designated as impulsive showed deficits at ages 7 and 11 and efficiency at age 9 (i.e., an inverted-U trend).

Including possible personality considerations within the concept reflective-impulsive, Kagan proposed initially that the reflective child was more anxious about making mistakes than about taking time to choose a picture, whereas the impulsive child was more anxious about going slowly than about making mistakes. In a second proposal Kagan postulated a single dynamic—anxiety over errors. Impulsive children were influenced by low anxiety over errors and reflective children by high anxiety. Saarni and Kogan (1976) later stated that neither hypothesis appeared to fit results obtained to date. And some results suggest that the style may not be linked to making mistakes at all but to the "wish to escape from a threatening test situation." In a discussion of MFF test results viewed through the lens of cognitive control concepts, I propose in Chapter 6 that the process conceptualized as reflective-impulsive may implicate a number of component cognitive control principles, including especially delay of physical motility. Moreover, if anxiety is considered a related issue, we may need to go beyond anxiety over making errors, and even beyond anxiety over escaping from a test situation. It may be necessary to gather data about anxiety related to bodily harm (castration anxiety) and to the fear of losing control over one's aggressive impulses.

Two fairly recent studies point to the need to go beyond the hypothesis of general or error-related anxiety. Kopfstein (1973) asked fourth grade children, classified as reflective or impulsive by means of the MFF, to manage a risk-taking task that included a panel of switches, some designated as "safe" and some as "danger." No relation was found between cognitive style and risk taking. Impulsive children took more risks with one measure and fewer with another. Bush and Dweck (1975) administered to four groups of fourth graders (classified as reflective or impulsive and high or low anxious) speed tasks of increasing complexity. Contrary to prediction, the high-anxious reflectives performed as well as the low-anxious reflectives, who were expected to show the best performance.

Field Dependence-Independence or Global-Articulate Cognitive Style. Perhaps the one best known cognitive style in the field of psychology and the one that has stimulated the largest number of studies, field dependence-independence, was first described by Herman Witkin. Since the work of Witkin and his followers is discussed in some detail in Chapter 4 and elsewhere in the book, we note only a few highlights here. After conducting numerous studies, Witkin formulated a cognitive style that essentially defines the degree of differentiation a person imposes cognitively on the task or display of information before him. At one extreme of the global-articulate style are individuals who consistently organize and experience information in global and diffuse terms. At the other extreme, individuals consistently experience and organize information in delineated, structured terms; parts of the field are differentiated from the background and context, and their discreteness is maintained. The well-known Rod and Frame Test (RFT) and the Embedded Figures Test (EFT) are the procedures most widely used to assess this style. In addition to the literature reviews cited at the start of this section, reviews devoted explicitly to work with the field-dependence independence style are available (Witkin et al., 1973a; Witkin and Goodenough, 1976a; 19766; Coates, 1974; Witkin et al., 1962), as well as extensive bibliographies (Witkin et al., 1973a). As with the reflective-impulsive style, the field dependence-independence (or global-articulated) style has been shown to be implicated in various task situations and personality dispositions. For example, individuals designated as operating in terms of a global (field-dependent) style have been rated as more emotionally dependent and as relying on others for a definition of their own feelings and attitudes; they solve the Wechsler Block Design poorly and show a diffuse sense of identity in comparison to persons classified as operating in terms of an articulate (field-independent) cognitive style. The field dependence-independence dimension has also been studied in terms of age differences and psychopathology.

A number of reviewers (e.g., Kagan and Kogan, 1970) have criticized many of the studies conducted with this style because they have implied that field independence is valued more—is clearly a “better” cognitive style—than field dependence. In this connection, explored in detail in Chapter 4, it should be noted that Witkin has acknowledged that field independence is not necessarily the superior style and that numerous social contexts exist in which the field-dependent person may excel (Witkin et al., 1973a). My colleagues and I have attempted, to demonstrate the possibilities of exploring when and whether one control or style is adaptive (better) in one context and maladaptive in another (Chapter 9).

Another point made in Chapter 4, where the concepts of cognitive style and control are critiqued, is that the multidimensional model of cognitive controls has more heuristic value than the unidimensional model of cognitive style. In this connection, after analyzing the RFT and EFT performance of a large number of hospitalized mentally disturbed patients, Vardy (1972) challenged the unidimensional approach of field dependence-independence because it could not account for the variations in cognitive style observed, concluding that a model that embraces many different cognitive style processes would be more appropriate.

In subsequent chapters I emphasize the need to distinguish between intellectual abilities and cognitive controls and propose that cognitive controls are unique strategies implicated in processing information contained in all tasks that make up intelligence scales. Examining the results of a number of studies, which included the EFT and intelligence tests, Wachtel (19726) noted the high correlation typically recorded among these measures. Because of this relationship between tests of field dependence-independence and intelligence, Wachtel proposed that the RFT and EFT provide measures of ability rather than of cognitive strategies and discussed the need to distinguish between abilities and cognitive strategies, which are supposed to be the domain of cognitive styles. The reader is referred to the findings of a number of studies reported in Chapters 5 and 6, indicating that since the methods proposed in this book to assess cognitive controls do not correlate with measures of intelligence or of academic achievement, they appear to be assessing cognitive strategies rather than intellectual abilities.

COGNITIVE STYLES AND CONTROLS AND PSYCHOPATHOLOGY

Investigators working with the concept of cognitive controls perhaps have maintained the greatest degree of interest in the relation between cognitive control functioning and psychopathology (see Wolitzky and Wachtel, 1973, for a review of a number of studies). For example, Holzman, who has investigated cognitive controls since they were first formulated by Klein more than two decades ago, recently published a study that reflects this continued interest (Ottenson and Holzman, 1976). This work is discussed briefly here because it is not likely to be included in reviews available and because it bears directly on a number of studies conducted by me (Chapter 5) that concern the construct validity of cognitive controls as revealed by factor analytic findings. Holzman set out to explore whether cognitive control principles could be isolated in the cognitive functioning of young adult psychiatric patients and whether the organizations of these controls would resemble those of adults who were not patients. He employed a number of test procedures, each designed to assess a particular control (e.g., the Stroop Interference Test, the RFT, and the EFT, to assess the field articulation principle; the Size Estimation Test to assess focal attention; the Schematizing-Square Test to assess the leveling-sharpening principle, as well as the WAIS). The test scores were factor analyzed to explore the role of psychiatric diagnosis in the formation of controls as defined by factors. The main results were as follows: (1) the factors obtained from both normals and patients defined cognitive control principles and were essentially of the same configuration; (2) there was no difference between the factors defined by psychotic versus nonpsychotic patients; there was no difference between the factors defined by schizophrenics versus psychotic patients. As a result, Holzman concluded that the same cognitive control dimensions that define the unique cognitive functioning of nonclinical adults also define the unique functioning of psychiatric patients, that no distinctive pattern distinguishes the cognitive controls of normals versus hospitalized psychotics and schizophrenics, that cognitive control consistencies endure in spite of serious psychopathology, and that cognitive control tests tap intraindividual stylistic dimensions, not cognitive dysfunctions in psychopathology.

In reviewing this study by Holzman with adults, the reader is reminded (or alerted) to the seven factor analytic studies conducted with children and reported in Chapter 5. Taken together, these agree with several of Holzman's conclusions. The same cognitive control principles that defined the stylistic qualities of nonclinical children also defined the stylistic qualities of several clinical populations: brain-damaged children living in a residential school, orphaned children living in an orphanage but attending public school, and children hospitalized because of psychiatric disorders (primarily impulse tension-discharge disorders). As with Holzman's adult population, these child populations suggested that cognitive control consistencies endure in spite of various psychopathologies. Unlike Holzman's findings, however, the results of the factor analytic studies with children suggested subtle differences in the organizations of one or another control that were unique either to a clinical group or to younger child psychiatric patients versus adolescent patients. These differences in the patterning of cognitive controls observed are considered in Chapter 5 and are related to various issues concerning cognitive adaptation to psychopathology.

Witkin has also maintained an interest in the relation between cognitive styles and psychopathology from the first phases of his work (e.g., Witkin, 1965). Witkin has noted that psychopathology tends to be associated with both extremes of the differentiation style continuum and that individuals located at either extreme show very different forms of pathology when they break down. For example, a global, undifferentiated cognitive style, as measured by Witkin's three tests, is associated with children presenting severe identity problems, asthma, poor impulse control, and ineffective coping, whereas the pathology observed when more differentiated personalities break down includes rigid controls, emotional withdrawal, excessive intellectualizing, and restricted interpersonal relations (Dyk and Witkin, 1965). Along a similar vein, Voth (1962, 1963) has developed the interesting concept of "ego close-ego distant," which suggests some relation to Witkin's global-differentiated style. Voth has reported findings that indicate that extreme ego positions are associated with psychopathology. Witkin and his colleagues (Witkin et al., 1971) also investigated cognitive patterning in the blind, describing interesting possibilities for auditory tests of field articulation.

The attention brought by investigators over the past two decades to the relation between cognitive styles and controls and psychopathology has stimulated a new field, or at least a new point of view, which could be termed "cognitive psychopathology." Here the broad interest is to relate the general insights of cognitive functioning and development and the specific insights of cognitive controls and styles to psychopathology. The more ambitious goal is to reformulate psychopathology as one views it through the lens of cognitive functioning rather than through the lens of motivational functioning. A number of publications reflect this growing interest.

One text (Giora, 1975), entitled *Psychopathology: A Cognitive View,* deserves praise for pioneering effort. However I believe its contribution is a limited one for several reasons: psychopathology is examined from the view of aspects of cognition only, and the text fails to make use of available knowledge concerning consistent cognitive organizations; too much time is devoted criticizing Freud's energy model, a theoretical emphasis he himself modified in his last writings and an aspect of psychoanalytic theory that has been relinquished even by psychoanalysts and psychoanalytically oriented theoreticians and clinicians (Rapaport, 1960; Holt, 1967; Ross, 1973; Schwartz, 1973; Klein, 1970; Holt, 1976).

Other examples of growing interest in a cognitive approach to psychopathology and personality are available in experimental work. Kreitler and Kreitler (1972) explored the cognitive determinants of defensive behavior. Another study administered a cognitive control measure (Stroop Interference Test) without external conditions and then again while a recording was played of an exceedingly hostile mother berating her son. This method was used to classify subjects as functioning in terms of an "open adaptive style" versus a "closed adaptive style." This style was then related to assessments of mother-child interaction and to assessments of the degree to which the subject withdrew after experiencing experimentally induced failure (Heilburn, 1972). Other studies have investigated hyperactivity and the effects of medication in terms of cognitive style (Campbell et al., 1971; Cohen et al., 1972), and still others have approached adjustment to pubescence by way of cognition (Dreyer, 1971). This interest in viewing psychopathology through the lens of cognition can also be seen within the Piagetians, a group not particularly noted for their interest in psychopathology. Examples are Koocher's (1974) study of emerging selfhood and cognitive development, and Elkind's (1976) creative formulations relating the concepts of egocentricism and mechanisms of defense. One publication

(Modgil, 1974) is unique in that it reviews Piagetian research conducted with various clinical groups.

COGNITIVE STYLES AND CONTROLS AND ADAPTATION

As discussed in the first section of this review, there is considerable evidence from the field of infant research to support the view that the neonate actively approaches, selects, avoids, filters, and paces stimulation. Among the many studies conducted in this area, some provide data about changes in the infant's organized responses as he relates to and copes with changing environments (Pick, Frankel, and Hess, 1975). For example, changes have been recorded in the heart rates of babies from 1 to 9 months of age as they notice the sudden dropoff of terrestrial support. Other studies have reported that babies from 2 to 11 weeks old show such defensive behaviors as pulling back the head and shutting the eyelids when they attend to an impending collision, whether represented by an expanding shadow or by real objects. Are these the earliest forms of cognitive behaviors that serve adaptation and out of which adaptive strategies in cognitive controls emerge?

Nearly two decades ago in the monograph that became the seminal influence in the area of cognitive control research, Klein and his colleagues noted that "The essential question we have posed concerns the individual's style of (cognitive) adaptation—his mode of coming to terms with the world . . (Gardner et al., 1959). Thus the first formulation of cognitive controls gave a central role to cognition as serving the individual in his efforts to manage, regulate, adapt to, and learn from changing environments, needs, motives, and tensions. This focus on the role of cognition in adaptation is the hallmark of the concept of cognitive controls and distinguishes it from the concepts of cognitive style (those by Witkin and Kagan) that have not stressed adaptive considerations (Chapter 4 gives a more detailed discussion of this difference).

Although adaptation is emphasized in cognitive control theory, the available literature contains few studies designed to investigate how cognitive controls serve the individual in adapting to changing environments (Wachtel, 1972; Wolitzky and Wachtel, 1973). Writers have pointed to the failure of researchers to analyze the range of life experiences in which a particular cognitive style or control is expected to exert an influence and the nature of that influence (Mischel, 1968); and they have pointed to the need for a careful analysis and scaling of situations in terms of the probability that a given cognitive control or style will be involved (Wolitzky and Wachtel, 1973).

Wachtel (1972a) effectively discussed the issues involved in considering the role of cognitive style and controls in adaptation. He pointed out that until recently, most of the vast literature in cognitive styles and controls has been concerned with mapping out individual consistencies in cognitive functioning—that is, to demonstrate that it is possible to characterize individuals in terms, for example, of whether they typically approach the environment by scanning broadly and actively or by scanning passively and only at limited segments. But research must take the next step. It must move out of the examiner's office and observe a person's cognitive controls responding to changing environments, to be able to investigate how cognitive controls organize the vast influx of internal and external stimulation that takes place as environments are modified. Regarding the management of internal stimulation, Wachtel pointed out that the approach of cognitive styles goes beyond the view that needs “distort” perception and cognition. The effects of needs and drives are seen as mediated by cognitive structures that guarantee that the individual will maintain contact with environmental cues useful to his adaptation at the moment. Studies by Wild (1965), Silverman (1964), and Berger and Israel are examples of attempts to respond to Wachtel’s discussion and to observe cognitive controls serving adaptation. I have also attempted to emphasize the study of cognition serving adaptation. Chapter 9 describes changes in cognitive controls in response to the environments of parachute jumping dentistry, and imminent surgery.

The need to study cognition in terms of ecological contexts is also being emphasized by others who have conducted their work outside the camp of cognitive styles. Gillis (1971) made a particularly effective plea for including ecological considerations in cognitive research. He noted that schizophrenics presented with an array of cues tend to deal with the task at hand by focusing on only one of the cues. But, he pointed out, this strategy is not necessarily maladaptive. In tasks for which only one cue is relevant, schizophrenics would function adequately. The single-cue approach is inappropriate for tasks and situations in which a range of cues must be effectively registered and integrated. On the basis of considerations such as these, Gillis proposed viewing cognitive disorder or impairment in terms of the individual’s style *and* the task structure, suggesting that classes of patients cannot be said to exhibit a cognitive deficiency except in reference to specific task characteristics. Therefore given the single-cue approach of schizophrenics, they would do better than nonschizophrenics with tasks in which much of the information is irrelevant or misleading.

In this connection the reader is referred to my studies discussed in Chapters 5 and 6, where the narrow “single-track” scanning observed among brain-damaged children *facilitated* their handling Card III of the Fruit Distraction Test. This task requires that the child focus attention on a picture of single, colored fruit and ignore peripheral, irrelevant pictures of objects. The same narrow scanning style contributed to *difficulty* experienced by brain-damaged children with Card IV of the Fruit Distraction Test. This card requires the child to focus attention on a picture of a single colored fruit, cognitively suppress the color that is displayed, and name the color that should be there. In other words, when the task presented irrelevancies that were geographically “outside” the main stimulus, the narrow scanning of the impaired child paid off. When the task presented irrelevancies that were contained within the narrow geography of the main stimulus, the narrow scanning of the brain-impaired child interfered with task performance. Following Gillis, these studies suggested that the narrow focal attention style of brain-damaged children was adaptive in one task context and maladaptive in another.

In recent discussions of issues in child development research, Parke (1976) reminds us of Baldwin’s charge of a decade ago that child researchers were guilty of building a “mythology of childhood” in which behaviors noted in the laboratory were assumed to take place in more naturalistic settings. Parke suggested that investigators relax the sharp dichotomy between laboratory versus naturalistic settings and consider a range of settings in which observations could be made as representing “a continuum of naturalness.” In this way data could be bridged, plank by plank, from the laboratory or office to various settings in the child’s environment. Whenever possible, I have attempted to conduct my studies of cognitive controls in the spirit proposed by Parke. The reader may notice in the following chapters that observations of cognitive control functioning were gathered at airports, hospitals, dentists’ offices, and schools, as well as in the treatment room.

COGNITIVE CONTROLS AND STYLES AND MOTIVATION

Thus far we have considered cognitive controls and styles in terms of developmental progressions, psychopathology, and adaptation. It now seems appropriate to ask the question: What concept of motivation best fits into and elaborates the concept of cognitive controls and styles, allowing cognition to assume a central, dynamic position within the developing person? Where should we turn for an answer to this question? We could consult formal models that have been proposed to relate motivation and cognition (e.g., Day and Berlyne, 1971; Zimbardo, 1969). Or we could go to recent discussions concerning the interplay between cognition and motivation in infancy and early childhood (Decarie, 1965); Yarrow and Pedersen, 1976; Cicchetti and Sroufe, 1976). And we have available recent revisions and new directions in the psychoanalytic theory of motivation. I believe that the later source holds the most promise for joining cognition and motivation. Revisions recently introduced into the psychoanalytic theory of motivation supply an approach for weaving together, as fibers of the same fabric, issues concerning individual differences in cognitive organization and style, cognitive development both normal and pathological, and cognition in adaptation.

Because the issue of motivation in cognition is central to the material presented throughout the book we pause here to consider the matter in detail. Some of the material in the discussion to follow is also included in Chapter 18 and is included here for the convenience of the reader. However, additional historical material is presented along with research findings, which were selected because they are particularly related to the topic of cognition and motivation and to findings of some of my own studies presented in subsequent chapters.

For decades, psychoanalytically oriented workers have ascribed to the position that an understanding of normal and pathological human behavior places at the center two basic drives and the motivation that derives from them; that is, sexuality, in the broader sense in which the word is employed in psychoanalytic theory, and aggression. These drives are characterized by the need for tension reduction “by their urgency, their intimate connection with various kinds of bodily behavior, both in terms of one’s body and the bodies of other people, and by the rather bizarre quality of their mode of function when viewed in the light of ordinary conscious motivation” (Gill, 1959). Freud’s famous metaphor of drive as galloping horse, with the ego as the rider struggling to maintain control and direction, has persisted in the view maintained of motivation by many psychoanalytic workers.

> [The ego] in its relation to the id . . . is like a man on horseback, who has to hold in check the superior strength of the horse. . . . Often a rider, if he is not to be parted from his horse, is obliged to guide it where it wants to go; so in the same way the ego constantly carries into action the wishes of the id as if they were its own (Freud, 1923, p. 25).

As we see shortly, the influence of this metaphor has led many to misunderstand the core of Freud's view of motivation and still obscures new directions in the psychoanalytic view of motivation proposed in the past few years. These new directions tackle the perplexing problem of the relation between motivation and ego-cognitive functioning.

After Hartmann first elaborated nearly 40 years ago the concepts of adaptation, primary ego apparatus, and primary and secondary ego autonomy (Hartmann, 1939); ego psychologists busied themselves during the 1940s and 1950s with studies of the influence of motivation and drive on perception and cognition (Wolitzky and Wachtel, 1973) on the one hand, and, on the other, with "control" cognition can exert on motivation (Klein, 1954). As these observations of the interplay between cognition and motivation grew, it became necessary to revise the central and exclusive position given to primary drives by the psychoanalytic theory of motivation. For example, in discussing the state of psychoanalytic theory in the late 1950s, Gill (1959) noted that "while formally all behavior was reduced to primitive drive motivation, now behavior is considered determined not only by motivational factors but by other (structural) factors too which enter into the casual determination of behavior . . ." (p. 2). By "structural factors" Gill was referring to the observation that organizations of cognitive functions activate and direct behavior, that is, have motivating properties. For example, an individual purposefully seeks out and attends to a field of information containing 10 parts rather than 6. In this connection Gill also pointed out that "in the actual perceiving, thinking, remembering, or concept formations drive factors play no role" (p. 2).

Gill's recommendation that motivational theory be revised in the light of observations by ego-cognitive psychology was repeated by Rapaport (1960a) a year later in his classic critique of the psychoanalytic theory of motivation. Several particular points made by Rapaport in this comprehensive work are critical to the focus of the present discussion. First, Rapaport reminded his readers of a now familiar stage in the historical development of the psychoanalytic theory of motivation. When Freud learned that many of the *ideas* that patients presented as memories of traumatic experiences were in fact fantasies expressing wishes, he was faced with the problem of explaining the origin of these fantasies. To account for the phenomena, he introduced the concept of instinctual drives. With this move Freud gave up the view that environmental factors determine behavior in a major way and ushered in the importance of intrapsychic factors as causes of behavior. However I believe that Rapaport's perspective on Freud's development of a theory of motivation has been lost sight of. Rapaport noted that whenever Freud gave systematic attention to the theory of instinctual drive, he emphasized the concept and phenomena of *psychical representation* (i.e., thought or cognitions).

> An instinct appears to be a concept on the frontier between the mental and the somatic, as the psychical representative of the stimuli originating from within the organism and reaching the mind, as a measure of the demand made upon the mind for work in consequence of its connection with body . . . (Freud, 1915, pp. 121-122).

Given this emphasis by Freud, Rapaport pointed out that researchers who take states of hunger and thirst, or other metabolic needs, as paradigms of instinctual drives are in error because in these cases drives are treated as somatic conditions rather than as *mental representations of somatic conditions.*

Rapaport attempted to clarify why the concept of instinctual drive has remained fuzzy in the minds of psychiatrists, psychologists, and even psychoanalysts, who tend to equate this concept with powerful biological drives that dominate thinking, rather than with the notion of mental representation. One reason for the misunderstanding, Rapaport believed, was circumstantial—namely, that Freud introduced the concept of instinctual drive in *Three Essays on the Theory of Sexuality*, and the issue of the development of sexual drives and their dominant role in the formation of pathology was the facet of this work that attracted the most attention. This focus and context obscured the concept of instinctual drive as involving mental representation and caused readers to fuse the concept of instinctual drive with considerations of sexuality as powerful forces in mental illness.

Rapaport acknowledged that although Freud failed to provide a sufficiently explicit presentation of the concept of instinctual drive, he did make clear that the determinant of behavior is mental representation or cognitive activity. I would like to add that three years after writing his famous rider-horse metaphor, Freud also made clear that *he had changed his mind* about the ego (cognition) being a weak victim of powerful drives!

> At this point it is relevant to ask how I can reconcile this acknowledgment of the might of the ego with the description of its position which I gave in *The Ego and the Id.* In that book I drew the picture of the dependent relationship to the id and to the superego and revealed how powerless and apprehensive it was in regard to both and with what an effort it maintains its show of superiority. This view has been widely echoed in psychoanalytic literature. Many writers have laid much stress on the weakness of the ego in relation to the id and of our rational elements in the face of the daemonic forces within us; and they display a strong tendency to make what I have said into a cornerstone of a psychoanalytic Weltanschaung. Yet surely the psychoanalyst.. . should, of all people, be restrained from adopting such an extreme and onesided view . . . (Freud, 1926, p. 95).

Freud delivered this gentle scolding in the context of a discussion about the power and control the ego (cognition) exerts in dealing both with the environment and with the representations of drive. “Just as the ego controls the path to action in regard to the external world, so it controls access to consciousness ... it exercises power in both directions, acting in the one manner upon the instinctual impulse itself and in the other upon the representative of that impulse” (Freud, 1915). Comments such as these anticipated the concept of the cognitive control of information and emotion that emerged years later from psychoanalytic research. This research, conducted since the 1940s, and the reforms it led to in instinct theory (Rapaport, 1960) and ego theory, (Klein, 1970) opened a new door into the field of motivation.

George Klein (1970) and Robert Holt (1976) recently stepped through this door providing new, exciting formulations of motivation, which, I believe, hold promise of radically revising motivational theory, research methods, and clinical technique. Freud changed his mind about the ego’s being the passive rider of a powerful, dominating horse. Are psychologists and psychiatrists able to do likewise and modify their view of psychoanalytic theory, a view that very likely is related to psychoanalytic writings published before 1950? Perhaps the psychoanalytic model of motivation proposed by Klein, and extended by Holt, may help the reader to consider whether these new conceptual directions offer a way for merging cognition and motivation. After a brief sketch of the conceptual revisions, we discuss selected research findings that relate to the model and illustrate the new directions suggested.

GEORGE KLEIN'S MODEL: A REFORMULATION OF THE PSYCHOANALYTIC THEORY OF MOTIVATION

From his extensive research with personality, motives, and cognition, spanning better than 20 years, Klein proposed a model of motivation that places cognition and wish in the center of motivation and drive, on the one hand, and, on the other, places drive in the center of cognition. He tells us there is no such state of affairs as "cognition and motivation"; rather, cognition *is* motivation. In so doing he attempts to formulate a theory of motivation that benefits from knowledge gathered about ego-cognitive functioning in the past three decades and returns us to Freud's position-mental representations and cognitive activity and the intrapsychic causes of behavior.

I believe that anyone interested in the topic of motivation and cognition should read the following selected remarks by Klein several times because they call for the formation of a new lens through which the issue of cognition and motivation should be examined. When looking through this lens, it may be helpful if the cognitive psychologist, who does not usually attend to motivational issues, notices whether he can see a set of intersecting rectangles as forming the galloping horse of motivation described by Freud. For the psychodynamic clinician, who does not usually attend to cognitive issues, it may be helpful to look for the galloping horse of motivation as forming a set of intersecting rectangles. Each person must always keep in mind that for Klein, though the horse and rectangles *both* exist, they are the *same.*

> I propose to discuss motivation in terms of properties of the behavioral unit of ideation, affect, and action, and not in terms of "drive." To discuss drive as if it were a distinctive entity that "interacts" with thought creates all sorts of mischief. It is only as structured affective-cognitive-motor events that drives are knowable as motivations and definable at all. Inasmuch as motivation involves knowledge, it is cognitive. It lends significance and meaning to what we see and do (assimilation, in Piaget's terms), or it causes us to revise what we think we know (accommodation). Conversely, insofar as cognition has direction, it is motivated. A motive has consequences, and consequences involve ideational residues of actions, of affects, and of thoughts—all cognitive matters. Therefore, what is motivating about behavior and what is knowledgeful about motivation are one and the same. Motives in cognition are not motives "interacting" with cognition; to the extent that a thought records a directed relation of knower to object, to event, to self, and to other, it *is* a unit of motivation.
>
> Although we must be sure not to forget the insights into motivation that psychoanalytic theory has given us, it seems timely to talk more about the ideational units in which drives are represented and less about purely energic or quantitative considerations that are by now customary in discussions of drives ... (p. 360).
>
> Motivation implies directions and intensity of activity. They are its core attributes. Motivation is not a matter of external stimulation or internal stimulation alone. To motivate behavior, rather than to simply arouse the organism, external stimuli must first become meaningful; the same is true of internal stimuli, or "drive." If drive is indeed unoriented, internally generated stimulation, it too becomes motivational only when it is cognitively represented, as in a wish, . . . memories. . . . Without such a mediating process, external and internal stimulation have activating but not directional effects (p. 364).

Klein brings the concept of the representation of motivation in wishes and memories closer to the center of cognition by proposing that the locus of motivation exists within the structure of “a train of thought” (Klein’s “cognitive unit of motivation”). A train of thought defines a closed feedback loop beginning with the initial wish or desire and ending with the final experience of gratification ; that is, from thought to action back to thought. The entire train of thought or cognitive unit of motivation includes “a temporally extended series of events linked to stimulation by exteroceptors and visceroceptors, to motor activity by affective and effector processes, and to one another by facilitative and inhibitive signals in a patterned sequence” (p. 364).

A cognitive unit of motivation begins in what Klein calls a “primary region of imbalance” (PRI), a concept he formulated relying on the writings of Donald O. Hebb and Floyd Allport. The PRI is conceptualized as existing in one brain region where excitation initiates the sequence of thoughts, affects, and action, and the components of each, interconnected and organized over time, form a train of thought. As this train of thought, affects, and actions rolls out, it remains oriented toward the initial imbalance and excitation; thus its course follows a loop starting from and returning to the imbalance of excitation. Eventually some set of thoughts, affects, and actions provides sufficient feedback to the area of imbalance to cancel or switch it off, completing that cognitive unit of motivation.

Klein stresses that the final actions, affects and thoughts of a unit of cognitive motivation are seen as *balancing* rather than as reducing tension.[8] By conceptualizing behaviors as achieving a balance in tension, rather than a reduction, Klein believes that he provides for an important property of motivation that is usually overlooked in tension-reduction models, namely, the “aesthetic” component of motivation. Klein gives several illustrations; for example, a person is hungry for ice cream, but he does not simply want ice cream—he may want a particular flavor, and ice cream in a soda.

From the perspective of his model, Klein would say that the person experiences tension from a PRI which activates a series of actions, affects, and thoughts, all interrelated over time, as a chain, and oriented toward the intention of engaging a particular stimulus—a strawberry ice cream soda. We can imagine this chain: it is Sunday night; the person is relaxing and reading; he then notices and admires a magazine picture of ice cream; he begins to talk with a friend about his mood for ice cream and his special liking for the flavor of strawberry; he recalls that when he was a child his family maintained the ritual of eating ice cream sodas on Sunday night; pictures of ice cream flash across his mind during this conversation; he eats several soda crackers, reads further in the magazine, becomes restless ; finally he gets in his car and drives to a neighborhood ice cream parlor, where he orders and consumes a strawberry ice cream soda. When the strawberry ice cream soda is finally engaged, the initial state of tension imbalance is brought to some level of balance sufficient to switch off the intention for particular cognitive-affective experiences (e.g., involving ice cream and childhood experiences related to important persons and the flavor of strawberry, etc.) and permits another region of imbalance and another cognitive intention to be experienced along with the new related train of actions, affects, and thoughts.

Other examples provided by Klein would be analyzed in similar fashion. A person may want to eat, but he may want a particular food or to eat in a particular restaurant. A man who feels the imbalance of sexual attraction may be lonely for a particular woman; just any woman will not do.

Within his model of cognition-motivation, Klein defines the quality of “intention” by stating that the many components of thought, affect, and action remain oriented toward, and interconnected as a loop around, the region of imbalance. The resulting behaviors occur in a self-closing loop, until experience and cognitive feedback turn off the imbalance, thus defining the quality of “direction.” The quality of “intensity” is given by the number, persistence, and repetition of thoughts, affects, and actions that do not bring relief to the region of imbalance.

ROBERT HOLT’S (1976) ELABORATION OF KLEIN’S MODEL

The examples Klein gives to illustrate his model suggest that although he has joined cognition and drive, in placing cognitive activity and mental representation in the center of motivation, he remains oriented toward consummating drives and biological needs as the referents for motivation. What we need is a model that more clearly embraces both cognitive activity involving consummating drives and cognitive activity involving information unrelated to drives, as Gill’s earlier statements proposed. Robert Holt recently provided a creative critique, elaboration, and extension of Klein’s model that meets this need.

Holt points out that Klein’s concept of a PRI is “an unfortunately vague metaphor implying something very much like the old drive—notion of need-generated excitations and tensions that must be discharged” (p. 182). Holt proposes that the concept “imbalance” be replaced by the concept of “perceptive-evaluative mismatch.” Holt acknowledges that his concept “hardly (provides) a gain in euphony,” but he hopes that it is conducive to explicitness.

The concept of “mismatch” concerns a process that compares and determines whether three sources of information fit together or lack fittedness to some degree: (1) the perception (input) of some information, event, or person; (2) a memory (centrally generated pattern) of related information and experiences; and (3) value judgments attached to both the perception and the memory.

In terms of behavior, this concept means that an individual evaluates and compares existing and potential stimulation and determines to what extent they coincide, as well as the degree to which they differ in value. When large discrepancies exist between potential and existing information and between the value of each, there exists a mismatch that motivates. If present stimulation is less valued than what might be, a wish for the more valued one develops in fantasy. If present stimulation is more valued than what might be, it is experienced as a threat; and a fear of the potential stimulation develops in fantasy.

In both cases the mismatch can be corrected by changing reality. In the first case, the individual obtains the valued stimulation; thus what he now engages is what he wanted. In the second case the individual avoids the potential stimulation, which is threatening; this means that he continues to engage and value the existing stimulation. In both instances the degree of mismatch is resolved, a fittedness achieved, and the motivational unit is no longer influential in directing behavior. The process of comparing and matching existing with potential information can take place consciously, preconsciously, or unconsciously. Rather than viewing a cognitively represented wish as initiated by some unspecified kind of imbalance that in turn motivates behavior, Holt regards a wish as being initiated by "a cognitive-affective state something like dissatisfaction which arouses anticipation of pleasure and/or unpleasure."

In addition to freeing Klein's model from a vague implication of anatomical imbalance, Holt's conceptual elaborations take into account the match or mismatch between cognitive organizations and information that are both related and unrelated to biological needs. His elaborations also weave cognitive functions, affects, and adaptation as fibers of the same fabric. To illustrate, let us consider two vignettes that involve children dealing with information in the classroom. I have chosen these examples intentionally to provide a contrast with the earlier, more familiar example, of an adult who is experiencing an urge for a strawberry ice cream soda. The behaviors of the children do not involve consummating behaviors related to biological needs but rather, the "consummating of stimulus nutriment," if you will, provided by the pattern, complexity, and tempo of information.[9]

One child stopped stacking blocks and stated that he wanted to assemble something, but not any puzzle would do. A puzzle of 10 pieces was placed before the child, and he pushed it away. In his motivational stage of imbalance for a particular stimulus nutriment, he was simultaneously angry, agitated, and excited in anticipation. He restlessly searched through many materials in the classroom until he found a puzzle of five pieces. He assembled the puzzle with pleasure. Motivational balance achieved for the moment, he then went on to another activity.

Another child wanted to look at a picture book of trains. He refused a book distinguished by two features—the pictures of train engines and boxcars were arranged on the pages at various angles and without attention to proportion and perspective, and many pictures were located on each page. The child insisted on a book he preferred, which contained fewer pictures on each page, and the pictures of train engines and boxcars were arranged in rows and drawn in proportion and with attention to perspective. When the book was located, the child sat by his teacher and looked at each page, with obvious interest, involvement, and pleasure. When each picture had been examined, he got up and soon pursued another activity.

The first child actively and aggressively avoided the 10 piece puzzle and behaved purposefully (was motivated) until a puzzle containing five pieces was located. From the standpoint of Holt's concepts, the level of complexity of stimulation preferred by this child, as represented by a five piece puzzle, was a function of the developmental status of his cognitive organization. Accordingly the existing stimulation (a 10 piece puzzle) was valued less than the wished for (potential) information (a puzzle of fewer pieces). A state of mismatch existed associated with threat and unpleasure. The existing stimulation was avoided, while the potential information was sought after and located. At this point the mismatch was resolved and the motivational unit was no longer influential. By continuing to engage less complex information (five piece puzzles) that matches his cognitive organization, and in avoiding more complex information, this child does not have the opportunity to differentiate and develop his cognitive organization further. His cognition remains fixated. This example characterizes the child in cognitive control therapy described in Part IV who struggles to avoid potentially more complex information. The same analysis could be imposed on the behavior of the second child, who preferred picture book stimulation that was less complex and more orderly.

From these examples we can imagine a child characterizing a more normal state of affairs. This child's cognitive organization results in his perceiving a 10 piece puzzle as *less* valued, and he "becomes motivated to find and engage more complex stimulation (a 15 piece puzzle), which is valued more. When the latter is engaged, the child's cognitive organization assimilates the information and experience and in turn differentiates and becomes preadapted to valuing and pursuing even more complex information.

How does the normal child obtain the attitude that places high value on seeking and engaging increasingly more complex stimulation and on approaching and processing this information? Holt's model includes a concept that helps us address this question and makes contact with the rationale of cognitive control therapy. Holt proposes that an individual's concepts of his affects and responses are in terms of values displayed by others, especially by adults important to him. That is, the ego ideals the child has internalized influence his attitudes toward information and learning.

Applied to our interest in cognitive control therapy, discussed in Part IV, Holt's model has suggested to us an exciting approach to the study of the process by which a cognitively disabled individual develops pleasure in learning and engaging information for the sake of the activity itself. Throughout the process of cognitive therapy, the therapist displays love of learning, perseverance when confronted with information, excitement in the face of increased complexity. The patient at first imitates the therapist as an ego ideal. Then as resistances are resolved, the patient identifies with the therapist and internalizes a representation of the therapist. This representation now serves as a concept of value that is employed in comparing when and whether a perception of existing information matches or is mismatched with a memory of what is potentially available. The hypothesis would be that the patient, who has internalized an ego ideal that represents excitement in the face of complex information and pleasure in learning, would experience as *less* valued, existing information that is as complex or less complex than the organization of *existing cognitive functions.* Accordingly, the patient would change the environment and seek more complex information. If the patient has internalized an ego ideal that does not represent pleasure in learning, the perception of existing information that is more complex than current cognitive functions would be evaluated as dangerous and threatening. This person would flee from or fight against complex information and would favor more simple demands.

Last, Holt suggests other important modifications in Klein's model. Klein's model is limited to a negative feedback system. Yet much behavior in everyday life does not have an episodic character. Individuals spend much time in long-term activity with no logical stopping points. Holt suggests, "We have to add the conception of *positive* feedback systems which do not involve any 'discharge' or even 'switching off.' Rather our theory must recognize that as long as a pattern of behavior yields a balance of gratification over negative affects it will continue (in the face of intrusions and interruptions)" (p. 184). Of special importance to me is Holt's suggestion that we also need to adopt a developmental conception of Klein's model: "Klein's model presupposes a mature person; of course, we must eventually be able to model motivation at all levels of personal development and account for the ways in which growth takes place" (p. 185).

Studies of Motivation as Cognition. From this discussion of attempts to reformulate the psychoanalytic view of motivation as cognition, I would like to describe three studies, one conducted with children, and two with adults. These investigations were not designed to study the models proposed by Klein and Holt, whose proposals were published only recently and have not yet stimulated formal experiments. I selected the three studies from several available, because they illustrate possible new research directions suggested by Klein and Holt.

In one study Mischel and Baker (1975) pointed out that given the importance of the "reinforcement" concept in contemporary psychology, it is surprising that so little is known about how mental representations of rewards affect a person's pursuit of them. To explore this issue, they allowed 4-year-old children to choose between receiving marshmallows or pretzels as rewards. After the child had expressed his preference, he was given another choice: he could wait until the experimenter returned to receive two pieces of the preferred reward; or during the experimenter's absence the child could choose not to wait any longer and could signal by ringing a bell. If he rang the bell to summon the experimenter, however, he would receive only one piece of the reward. The rewards (two pieces on one side of a dish and one piece on the other) remained before the child throughout the delay period.

Before the start of the delay period, the children were assigned to one of four experimental conditions, each of which instructed the child to engage in fantasy about the reward while waiting.

1. *The Consume Relevant Group.* Children were asked to imagine the consummatory qualities of the food desired (e.g., "When you look at the marshmallows, think how chewy, sweet, and fun they are to eat." Or, "When you look at the pretzels, think how crunchy they are and about the toasty taste in your mouth.").

2. *The Consume Irrelevant Group.* The children were to imagine the same qualities, but about the food for which each child was *not* waiting (i.e., the children who wanted a pretzel thought about tasting delicious marshmallows).

3. *The Transform Relevant Group.* The instructions were to imagine and think about nonconsummatory qualities of the food the child wanted and associations to it (e.g., "When you look at the marshmallows, think how white and puffy they are, like clouds, and think how white and round they are, like moons." Or, "When you look at the pretzels, think how long and brown they are, like logs and trees.").

4. *The Transform Irrelevant Group.* These children were requested to imagine and think about the same

nonconsummatory qualities and associations but in response to the food that was *not* being awaited.

A fifth (control) group was not instructed what to think about while waiting. All groups were trained in and given an opportunity to practice fantasizing.

What is the effect on delay of gratification if a child imagines the consummatory qualities of objects? Mischel and Baker found that children who fantasied how tasty pretzels were while they were waiting for marshmallows (or vice versa) delayed the longest (Consummatory Irrelevant Group), whereas children who fantasied about the tastiness of the food for which they were waiting delayed the least (Consummatory Relevant Group). How is delay of gratification affected if a child thinks about the nonconsummatory qualities of objects? Members of the Transform Relevant Group, who thought about fluffy clouds and white moons while they were waiting for marshmallows (or thought about logs and tree trunks while waiting for pretzels), delayed much longer than children who engaged in the same associations but about an object for which they were *not* waiting. Therefore thinking about the delicious qualities of some object while you are waiting to eat a different one, and thinking about associations to an object you are waiting to eat, are both powerful intrinsic rewards associated with a high degree of delay. Thinking about the delicious qualities of the object you are waiting to eat and thinking about associations to an object you are not waiting to eat are intrinsic forces associated with little delay and quick discharge in action.

Mischel and Baker have supplied findings that are valuable in themselves. I believe their contribution is outstanding, however, because it opens a new window into the study of how mental representations of rewards influence a person's behavior. From Klein's model discussed earlier, we would say that a child in each of the experimental conditions of this study experienced a different "train of thought," or cognitive-motivational unit, beginning with the instructions to fantasize about the reward and ending with the child's ringing a bell to call in the examiner and receive something to eat. These results beckon us to probe deeper into the "trains of thought" experienced by each of the four groups, to learn more about cognitive activity as motivation and as control of behavior. Topics that deserve additional study include the organization of the fantasies experienced by each group of children, the sequencing of the fantasies, and the connections made between the fantasies and experiences the child had, especially with ego ideals.

Schachter's (1964) classic experiments conducted with adults also connect meaningfully with the models of Holt and Klein and suggest research directions. Schachter began his presentation with a review of early findings, especially those by Cannon, which challenged the view that visceral changes are the source of emotional feelings. Schachter then proposed that "cognition determines whether a state of physiological arousal will be labeled 'anger,' 'joy,' or whatever." To pursue this proposal he conducted several experiments exploring two broad hypotheses; we consider here only aspects of his extensive report and discussion. (1) Given a state of physiological arousal for which an individual has no immediate explanation, the person will experience this state in terms of the cognitions available to him; the *same* state could be experienced as "joy" or "fury" depending on the cognitive aspects of the situation. (2)

Given a state of arousal for which an individual has a completely appropriate explanation (e.g., "I feel this way because I have received an injection of adrenalin"), the person is unlikely to label his feelings in terms of alternative cognitions made available.

Subjects gave their permission to be injected with "a vitamin compound" in a study of the effects of visual skills. Some subjects received epinephrine and others a placebo. The former were given one of three types of explanation before the injection: *informed*: "Your hands will start to shake, your heart will start to pound, and your face may get warm and flushed"; *ignorant*: no explanation of side effects given; *misinformed*: "Your feet will feel numb; you will have an itching sensation."

In addition, two emotion-inducing cognitions were introduced experimentally— euphoria and anger. With the first, after the subject had been injected with either epinephrine or placebo, a stooge [supposedly also a subject] entered the room and behaved euphorically (e.g., doodled on paper, crumpled paper, and tried fancy "basketball shots" into the wastebasket). With the anger condition, the stooge became increasingly querulous and finally in a rage tore up a questionnaire the subjects had been asked to fill out.

Schachter recorded two measures of each subject's emotional state: first observations made through a one-way mirror assessed the extent to which the subject joined with the stooge's pattern of behavior and acted in euphoric or angry ways; in addition, the subject indicated his mood on a questionnaire completed immediately after the experience. Schachter's data permitted the analysis of four conditions (informed, ignorant, misinformed, placebo) and two emotional states (euphoria and anger). In general, the two emotional states defined cognitively by the stooge's behavior were the overriding effects. Differences in the experiences reported by the subjects were due more to the emotion-inducing cognition provided by the stooge than to the "informed" instructions. Schachter also learned that subjects were more susceptible to the stooge's mood when they had no explanation of their own bodily states than when they had one. In summary then, the same physiological state was experienced as either anger or euphoria, depending on the cognitive state of the subject, and this affect was attenuated only slightly by the instructions given the subject about the side effects of the drug.

Let us now turn to Klein's (1970) "thirst study," first published in 1954 (Klein, 1954), which is a classic in cognitive control research. This study deserves our attention for two reasons. It led to the formulation of a cognitive control termed at first "constricted-flexible" and later "field articulation," the label used in this book. More important, several findings by Klein relate to certain studies I conducted (reported in subsequent chapters) to explore cognitive controls in development, motivation, and adaptation. Some familiarity with the studies and hypotheses described in Chapters 6, 7, and 9 will assist the reader in following this discussion.

Klein administered the Stroop Word Interference Test to 100 young male adults. The three parts of this test ask the person to (1) name as rapidly as possible the colors of rows of randomized strips of color (red, yellow, blue, green); (2) read as rapidly as possible rows of randomized names of colors printed in black letters (red, yellow, blue, green); (3) name as rapidly as possible the color of the ink of the color-names when the color of the ink disagreed with the word-name of the color (e.g., the word "red" is printed in blue ink—the subject is to say "blue"). Differences in speed of naming colors between the third trial and the first two provide an index of the degree to which the subject is disturbed by the contradictory information (i.e., the word "red" printed in blue ink).

On the basis of the relation between performance with the Stroop and other tests, following an experimental condition that induced thirst (described below), Klein conceived of some individuals as functioning in terms of a "constricted" cognitive style; that is, they were disrupted by irrelevant information. Other individuals were said to be functioning in terms of a "flexible" cognitive style; that is, they withheld attention from nonrelevant information and were not disrupted in handling the main task. Our discussion of Klein's study focuses on selected findings and relates them to results obtained by me to anticipate studies and hypotheses considered in subsequent chapters.

From the 100 subjects, Klein selected 20 who showed "high interference" and 20 who showed "low interference" on the Stroop test. Half of each group was served a thirst-inducing meal (spaghetti with hot spicy sauce). Following this experimental condition, one of the procedures Klein administered consisted of a picture of a strawberry ice cream soda surrounded by numbers and letters. This stimulus was exposed briefly a number of times. Following each exposure the subject placed a dot on a sheet of gridded paper at the spot where he had perceived a peripheral object. Klein found that low-interference subjects (flexible cognitive control or high in field articulation) made more fixations in the periphery and were more accurate in locating peripheral numbers and letters compared to their nonthirsty counterparts, as well as compared to high-interference subjects. If we pause and examine this finding from the view of cognitive controls conceptualized since this early study, we realize that Klein is reporting that the low-interference subjects scanned broadly and actively. They located more numbers and letters in the periphery surrounding the picture of the ice cream soda. High-interference subjects scanned narrowly and passively, designating fewer numbers and letters, and these were located more toward the center or near the ice cream soda.

This finding relates first to the hierarchy of cognitive controls presented in Chapter 8. There I propose that in development, body regulation gives rise to focal attention, from which emerge field articulation, leveling-sharpening, and equivalence, in that order. The point here is that a person who has developed to the advanced level of field articulation (flexibility ignoring irrelevant information) will show a more advanced level of focal attention (broad-active scanning), which is integrated by field articulation. And a person who has developed only to an early level of field articulation (e.g., attends to relevant and nonrelevant information) will show immature functioning at the developmentally earlier cognitive control of focal attention (i.e., narrow-passive scanning). Klein's observations fit this hierarchical scheme.

In another aspect of his study, Klein administered a modification of the Stroop test that consisted of thirst-related and non-thirst-related words printed in different colors. The subject was asked to name the colors rapidly and ignore the content of the words. Klein found that the subjects characterized by the constricted control (low field articulation), who had been disrupted most by the color-word mismatch in the usual Stroop test, remembered *more* thirst-related words. If we examine this finding through the lens of the recent Klein-Holt model of motivation and in relation to the hypothesis of "inner versus outer" orientation of cognitive controls (Chapters 7 and 9), we gain new insights suggesting further study. It seems to me that the state of being thirsty can be said to have created a cognitive imbalance, mobilizing cognition actively to serve this imbalance. Klein's finding suggests that the person with low field articulation (constricted control) sought "cognitive nutriment" in thirst-related words. That is, to switch off the cognitive imbalance related to being thirsty, this person registered and held in memory more thirst-related words during the "thirst" version of the Stroop. But this cognitive activity is inappropriate to the task requirement. Now if we introduce the hypothesis I propose in Chapter 8, we could add that the field articulation control of these subjects is "inner oriented." That is, the field articulation control provides little distance or freedom from inner needs or tension; thus the person's cognition is busy registering stimuli that are central to the imbalance but not central to the task at hand. Whereas the field articulation control of subjects who did not remember many thirst-related words (subjects who withheld attention from irrelevant information) is "outer oriented"; that is, the control provides distance and freedom from inner needs and imbalances and articulates information relevant to the task.

To elaborate the point further, let us return to the study by Cohen discussed previously, in which the children who thought about fluffy clouds rather than marshmallows alone waited longer. Engaging a stimulus cognitively (images of fluffy white clouds) that is *distant* from but also connected to properties of the primary object the child is waiting to receive (marshmallows are white and fluffy) supplies an "outer orientation," provides distance from the wanted stimulus, and permits the child to sustain the task and wait. Future studies could explore whether individual differences in being able to "fix" cognitively on clouds, and therefore wait for a marshmallow, are associated with differences in cognitive controls such as narrow versus broad scanning and attending to relevant and nonrelevant information versus selectively attending.

During the past three decades cognitive psychologists have accumulated a wealth of information about their "sun," cognition, and have ignored or given only fleeting attention to the "moon" of drive, affects, and motivation. At the same time psychodynamic clinicians have gathered much information, since the observations of Freud, about their "sun"—drives and motivation—while paying scant attention to the "moon" of cognition. We have reached a point in observation and theory at which motivation and cognition appear to be in a state of eclipse. As we peer at this phenomenon, the model of Klein and Holt suggests that we should not debate whether cognition or drive is the sun and the other the moon, or which sphere is eclipsing the other, or whether and how they may interrelate. Their model suggests that such a debate is meaningless, since there is only one sphere. Since Freud first proposed the concept of instinct, and the metaphor of powerful drives as a wild horse with ego-cognition an uneasy rider, we are now in the position to consider, from much observation and conceptualizing, that there *is no horse with a rider.* Rather, there is one active, galloping, adapting organism with cognitive activity and regulated motion woven into a complex network and forming the skin and muscles. This unitary, holistic view of cognition-motivation presents us with an exciting challenge to investigate new domains of behavior and to reformulate and elaborate clinical technique, a challenge some have already accepted (e.g., Arieti, 1970; Beck, 1976).

COGNITIVE CONTROLS AND STYLES: EDUCATION AND THERAPY

Research with cognitive controls and styles has produced convincing evidence that the cognitive activity of individuals can be viewed as representing unique strategies that approach, avoid, select, and manage information in many, if not all, situations. As this research presses on, writers have begun to address the possible roles that cognitive controls and styles can play in education. This is not surprising, since cognitive controls and styles are conceptualized as the substrate of learning—the means by which an individual learns, the process by which he attains some academic outcome. Although the concept of cognitive styles and controls has penetrated the educational scene to only a minor extent (Kogan, 1971), a number of promising directions have been suggested, and cognitive developmentalists and educators may find it fruitful to follow these in partnership.

First the findings of cognitive style research encourage educators to replace their view of cognition as a single, global "something" related to thinking with a view of cognition as multiple functions and styles, each with a unique process, and each organized to respond to particular tasks and contextual demands (Kogan, 1971). Furthermore, the model of cognitive styles and controls reminds educators that new cognitive structures cannot be superimposed on existing structures. Rather, to promote cognitive growth, existing cognitive structures must be implicated in the task presented and must be active in contributing to the emergence of a new structure.

Viewing cognition as a set of strategies each organized to deal with a particular level of task requirement, and each a foundation out of which new strategies emerge, leads in turn to a number of other considerations for educational practice. For example, what is the degree of match or mismatch between the cognitive style characteristic of a given grade and the organizational level of the subject matter presented? On the basis of research findings, several writers have pointed out the need for some degree of cognitive conflict or mismatch between existing structure and informational demand, to bring about new differentiation in the structure, hence cognitive restructuring (Gyr and Willey, 1971; Steiner, 1974; Kuhn, 1972). If the mismatch is too great or too slight, little cognitive restructuring or growth will take place. Considerations such as these point to the need for educators to evaluate more formally the cognitive task requirements within a given grade and to determine whether the stepwise increase in curriculum complexity is too steep or not steep enough to promote growth, given the status of cognitive styles characteristic of that age level. One study (Robinson and Gray, 1974) explored how cognitive styles differentially related to learning tasks required of fifth graders and concluded that it is important to determine the relation between a particular style and a learning variable before assigning children to different instructional programs.

If we give attention to the degree of match between the unique cognitive styles of a child and the unique demands of an academic program, should we also wonder about the degree of match between the cognitive styles of the teacher and those of the child? Could conflict between cognitive styles of teacher and student affect the efficiency of communication and reciprocation between them, therefore the child's learning? Kogan (1971) proposes this as a topic for study. And one investigation (Shows, 1975) suggests that the match and mismatch of cognitive styles of two persons facilitates or impedes communication between them.

Another implication for education, when cognition is viewed as multiple styles or strategies, concerns the child who shows difficulty in learning. During the past 15 years there has been much interest in the child of normal intelligence who does not learn normally in the classroom. In a review of studies of children with learning disabilities, Torgensen (1975) emphasized the need to specify the processes (styles?) that underlie learning and reading disabilities. The same need has been underscored for children considered to be "dyslexic" (Critchley, 1971; Stanley and Flail, 1973). These suggestions converge with cognitive control theory proposed in this book, indicating that we should look beyond the symptom (poor reading or number work) and probe the cognitive processes that lie beneath.

Slaughter (1971) is direct in suggesting that cognitive style theory and research be used to identify children with special needs in terms of cognitive style deficits, and prescribe for these children remedial activities that specifically address the deficits. One attempt has been reported to select children on the basis of specific cognitive deficits and to organize classroom experiences (Sapir, 1971). Chapter 9 describes several studies that attempted to identify kindergarten children with special needs by means of cognitive control assessments and to follow the relation between cognitive control functioning at the age of 5 years and classroom performance in subsequent grades. Chapter 18 also describes several studies that were aimed at exploring the effects of remedial activities (cognitive control therapy) prescribed in terms of these cognitive control assessments. To stimulate the reader in evaluating the possible usefulness of approaching learning disabilities from the view of cognitive style and controls, I encourage the review of a longitudinal study of learning disorders in children (Owen et al., 1971) and a longitudinal study of changes in mental performance (McCall et al., 1973). It would also be helpful to think through whether and how cognitive style and control measures would have penetrated the problem under study in ways that Wechsler scales, drawings, and the Bender test could not.

In addition to raising considerations for educational practice, research and theory in cognitive styles and controls has just begun to stimulate interest in the issue of "treating" or "restructuring" derailed cognition, that is, in innovating treatment methods that promote the growth and realign the developmental course of cognitive functioning. Although there has been some interest in "training" the style of field dependence-independence (e.g., Elliott and McMichael, 1963), more interest appears to have been expressed in providing some form of therapeutic activity for children who are designated, based on Kogan's MFF test, as being dominated by the impulsive style (e.g., Nelson, 1968, Albert, 1970; Ridberg et al., 1971; Egeland, 1974; McKinney, 1975). Even workers in the Piagetian camp have heeded cognitive training (e.g., Goulet, 1970; Kohnstamm, 1970; Inhelder et.al., 1974), and certainly a great deal of attention has been given to translating Piagetian theory into educational method (e.g., Furth and Wacks, 1974; reviewed by Selman, 1975; Lavatelli, 1970).

Workers in the area of cognitive controls have been conspicuous in their failure to stress the role of cognitive controls in education or as a guide for treating cognitive disabilities. Psychoanalysts and psychoanalytically oriented workers have certainly maintained a longstanding involvement in education and in learning disabilities. Although this literature falls outside our scope, the reader may find particularly useful several superb essays (Cohler, 1972a, *1912b;* Ekstein and Motto, 1969) on psychoanalysis and education. I am referring here to the explicit application of cognitive control concepts and methods in education generally and in the treatment of cognitive disorders in particular. Parts IV to VI of this book are devoted to the rationale and technique of a treatment method termed “cognitive control therapy,” which derives directly from experimental observations discussed in Parts I to III and takes psychoanalytic ego psychology and the biodevelopmental model as its conceptual scaffold. Studies conducted by me with cognitive control therapy and by others with other forms of cognitively oriented psychotherapy are discussed in Chapter 18.

CONCLUDING REMARKS

The studies reviewed indicate that biodevelopmental propositions have guided the investigation of various phenomena of importance to clinicians: (*a*) unusual sensitivity to stimulation, activity, and sleep patterns; physical anomalies; and the synchrony between body postures and sound observed in infants; (*b*) similarities and differences in the organization of perceptual-cognitive behavior of emotionally disturbed individuals and normal children of younger ages; (*c*) distortions of time perspective and body boundaries in neurotic, psychotic, and brain-damaged children; (*d)* childhood symptoms and pathological populations viewed as representing different levels of development; (*e*) deviations in functioning (e.g., drive expressions, sensory preferences) from an ideal developmental sequence defined by the dominance of particular modes and modalities; *(J)* coping strategies employed by children in various stressful and stimulating situations; (g) enduring conditions in the child and/or environment that disrupt the coordinated give and take between them, leading to deviant development; (*h*) relatively brief regressive or progressive shifts in the individual’s psychological organization, viewed as representing attempts to maintain an adjustment in the face of changing environments; (i) cognitive styles and controls defined as unique, consistent cognitive organizations that are suited to particular tasks, differentiate in development, underlie many learning situations, and serve adaptation and motivation.

The results of these studies also suggest the value of organizing clinical work in developmental terms. To illustrate, let us imagine a clinician facing distraught and exhausted parents who present their 8-year-old "‘hyperactive, compulsive, and aggressive boy” and his poor school history since kindergarten. As the clinician proceeds to gather diagnostic data on which to base a treatment plan, a number of guiding questions are raised by the biodevelopmental framework. For example, did the boy reveal as an infant a particular temperament, an unusual sensitivity, or a unique rhythm and pattern of body movement in response to sounds? (All these factors could have played a role in the formation of the child's symptoms and current coping style.) What were the reactions of the parents to the infant's unique tempos and response styles ? How did patient and mother negotiate in the first year of life the issues of initial adaptation, focalization, and initiative? Do the patient's sleep-awake cycle, body rhythms, and so on, provide some evidence of the success of these negotiations? Exactly what behaviors are the parents using to justify their complaint that the boy is hyperactive? Is the child fixed at an immature level of the action stage? Is he failing to show evidence of shifting to the fantasy stage as he approaches age 9 years? Are these behaviors in fact out of phase with action behaviors that are acceptable in his community and school, or are they in phase with the school's expectations but out of phase with the family's expectation? Therefore, what is the point of conflict between the boy's modes and expressive style and those of the family?

Is there evidence of brain damage? Regardless of whether such evidence exists, is there evidence of lagging or stage-inappropriate cognitive styles or controls? If there is, is the child's hyperactivity an attempt to manage the continuous stress he experiences because the information he is presented at school is significantly mismatched with the developmental status and organization of his cognitive styles? If there is no evidence of a conflict between cognitive styles and information, is the boy's hyperactivity an aspect or phase of the expression of an internal (neurotic) conflict between wishes and prohibitions?

What is the treatment of choice ? Should the treatment emphasize cognitive restructuring or working through of anxiety, guilt, and inner conflict? Does the patient have available the cognitive functions and organizations required by the process of psychotherapy (e.g., ability to direct attention at relevant behavior, to relate present behavior with memories of past behavior)?

To what extent can the interactional style between parents and child be modified ? What major influence and requirement does the mother (and father) seem to be exerting on the child, and the child on the parents, in their mutual give and take? Are there cognitive style and coping style differences between the patient and his sibs ? What do these differences suggest in terms of the patient's development, uniqueness, fittedness in the family, and so on? These questions should serve to illustrate the many various considerations suggested by the biodevelopmental framework in analyzing our hypothetical clinical case.

In Chapter 1, after considering the plight of the clinician who is looking for new, developmentally based techniques, we recommended that a clinically useful and relevant conceptual framework be constructed first. Because the framework outlined in this chapter appears to have heuristic power, as demonstrated both by the many studies we reviewed and by applications of these propositions in practice, it is suggested that this biodevelopmental framework be accepted as satisfying the recommendation.

In my own clinical work and research studies, which have been guided by the biodevelopmental framework, I have followed several lines in an effort to innovate diagnostic and treatment methods. One concerns cognitive controls, another the regulation and expression of motives, and a third is parent-child interaction. This book is devoted to one of these lines of work, namely, diagnosis and treatment of cognitive controls. Specifically, I wondered whether we could increase our understanding of the role played by cognition in development (emotional and intellectual), as well as our understanding of forms of psychopathology such as learning disabilities and hyperactivity, if we took an approach from the developmental view of cognitive controls. I wondered whether additional diagnostic and treating procedures could be devised that would give the clinician new tools in his work with various learning and ego dysfunctions.

The diagnostic procedures (and treatment method) ultimately devised are embedded in the biodevelopmental framework. Before describing them, therefore, it might be useful to make a detour in the next chapter to discuss diagnosis. The clinical activity of diagnosis, even when engaged in by clinical child psychologists, is not typically conducted from the viewpoint of development, but rather from the antithetical viewpoint of nosology. To facilitate the evaluation of the developmentally formulated diagnostic and treatment methods described in this book, the reader is invited at this point to go beyond nosology and to consider diagnosis from the viewpoint of development.

Notes

[3] For this chapter, an earlier publication (Santostefano and Baker, 1972) was revised. New topics were added (e.g., cognition and motivation) as well as selected research reports published from 1970 to 1976.

[4] Although deviation from some ideal course was most emphasized by Freud, also considered by Werner, and more or less ignored by Piaget, investigators using the latter two positions show growing interest in psychopathology (e.g., Feffer, 1967; Goldschmid, 1968; Strauss, 1967; Wapner, 1964; Comalli, 1970; Modgil, 1974).

[5] This section borrows from Wolff's (1960) formulation and from Rapaport (1960), Klein (1970), and Holt (1976).

[6] This discussion is stimulated especially by and borrows from the writings of Hartmann (1958) and the works of Sander (1962, 1964).

[7] The reader may be interested in contrasting this proposal with Kagan’s (1966) suggestion that body build plays a role in cognitive impulsivity versus delay in terms of the social reactions elicited by the child’s body build.

[8] Here is one major difference between Klein’s model and those of others, such as Berlyne, which have also attempted to integrate cognition and drive but emphasize tension reduction in motivation.

[9] A detailed discussion of the concept of nutriment provided by information, as information, and the need for such nutriment by cognitive structures, falls outside the scope of this chapter. The interested reader is referred to Rapaport (1960), who discusses both the psychoanalytic and Piagetian views of this concept.

3

DIAGNOSIS AND THE BIODEVELOPMENTAL FRAMEWORK: BEYOND NOSOLOGY[10]

Nosology, or the classification of disease, has a long history as a diagnostic model valuable to clinicians and researchers (Rees, 1961). Classifications of psychopathology have helped them bring order to the morass of behaviors presented by patients, to communicate with one or other about their patients, to select appropriate treatments, to predict dispositions, and to plan investigations that might further our understanding. Some writers (e.g., Grinker and Nunnaly, 1965) feel that classification systems also are helpful in giving clinicians confidence in the decisions they make about patients.

Yet many of us who regularly attend child diagnostic conferences have walked away at times dissatisfied with classification systems, though recognizing their merits. We have left these conferences with misgivings because of debates, for example, over the seeming lack of relationship between a child's neurotic inhibition, diagnosed from his interaction with an interviewer, and the same child's aggressive-impulsive personality, diagnosed from psychological tests. Misgivings stem from other sources as well, including debates over the distinguishing features of minimal brain dysfunction versus an impulse disorder, disagreements over the "correct diagnosis" of a child whose behavior appeared very different to teacher, mother, and clinician, and the realization that particular data gathered by play interview, history, and testing had not offered much help in recommending for a patient, for example, psychotherapy, afterschool activity program, a big brother arrangement, or tutoring.

We may also leave a conference dissatisfied because once again the "spotlight" phenomenon dominated the deliberations of the diagnosticians. Over the years, a number of childhood behaviors or symptoms that have captured the attention of clinicians often provoke considerable excited interest and are taken as sufficient data for selecting some diagnostic category—for example, rocking and head banging, fire setting, mutilating property or animals, sleeping with a parent, behavioral rituals, and obsessions with order and neatness. Although clinical experience has taught us that there is good reason to give these behaviors special attention, the problem arises when a spotlight is held on the behavior noted (e.g., at the age of 4 years the patient tried to set fire to mother's wastebasket) while all other data from tests, interview, and history are gradually organized around this single behavior. Or stating the process in another way, the presumed meaning of the behavior spotlighted gradually influences during the conference the way in which all other data are organized and conceptualized.

The growing dissatisfaction with classification systems is related, in part, to the increasing familiarity of clinicians with observations, findings, and concepts that are developmentally based, such as those considered in

Chapter 2. These findings, which are also exerting more and more influence on clinicians, have emphasized that children represent rapidly changing psychological organizations in contrast with adults who, although passing through sequential life phases, change more slowly (Murphy, 1965). They also emphasize the significance of individual differences, the view that what the child does is as important as what is done to him, and the view that the psychosocial world with which the child interacts and negotiates is as important as his intrapsychic world.

Because of the increasing influence of developmental considerations, clinicians are beginning to feel that the diagnostic model of nosology, if applied alone, is inadequate in work with children. Unfortunately this dissatisfaction often leads clinicians to behave in a way that masks the basic issues and blocks possible solutions. For example, a diagnostic conference may point to the incompleteness of the data gathered and may insist on more detailed observations of particular behavioral traits, to "pin down" a given diagnosis. Or the conference may challenge the validity and worth of psychological tests, with psychologists frequently agreeing that tests are hardly worth the trouble. Or the conference may become a ritual involving a few, fixed formulations and decisions that are made for many and various patients almost independently of the diagnostic data gathered. The ritual sometimes has evolved from a local authority figure who dictates which trait clusters define a category, as well as the diagnostic rules and categories to be used. This has contributed to the phenomenon of provincial diagnosis (Shakow, 1965). For example, one setting may report "seeing" more atypical children, or minimally brain-damaged children, or tension-discharge disorders, than another. Or one setting may emphasize one behavioral trait in conceptualizing a diagnostic category, while another setting views a different trait in the cluster as more relevant.

The aim of this chapter is to illustrate the need for a clinician to be free of the obstacles presented by a nosological model, if he is to construct new diagnostic and treatment techniques and concepts especially relevant in work with children. The clinician concerned with diagnosing and assisting child psychopathology must reach beyond the model of nosology and view diagnosis through a very different lens, that of development.

NOSOLOGY: AN INADEQUATE HERITAGE FOR DIAGNOSING CHILDREN

To prepare the groundwork for a discussion of the developmental point of view as a diagnostic model, we should first discuss the model of nosology in diagnosis. Two major comprehensive publications have appeared recently concerning the classification of psychopathology. Each was stimulated by, and grew out of, dissatisfactions among clinicians and researchers with traditional diagnostic systems. The publication by the Group for the Advancement of Psychiatry (GAP) (1966) addressed itself to the need for a more adequate and clinically useful classification to deal with psychopathological disorders unique to children and adolescents. The other work, the proceedings of multidisciplinary conference (Katz, Cole, and Barton, 1965) sponsored by the National Institutes of Health (NIH), tackled specifically the methodological, statistical, and research problems facing social scientists interested in classifying psychopathology.

The classification proposed by GAP represents an obviously major and significant advance over previous classifications of childhood psychopathology and over classifications borrowed from adult systems and applied to children with various modifications. The GAP classification integrates, for the first time, aspects of developmental, psychosocial, and psychosomatic concepts, to define psychopathology observed in children and adolescents; it also considers various healthy, adaptive responses. Yet if examined through the methodological lens provided by the NIH conference, the GAP classification, in spite of its real merits, seems also to present inherent limitations.

From the NIH conference report we learn that a system for diagnosing behavior should serve both practical and heuristic goals. In terms of practicality, the system should guide our observations to psychologically relevant, behavioral variables, assist us in evaluating their significance, aid us in selecting technical interventions indicated, and suggest prognostic probabilities. To be valuable heuristically, a system should contribute to our theoretical understanding of behavior and should stimulate and suggest new diagnostic approaches and treatment techniques.

Although the GAP classification certainly makes a substantial contribution, assisting child clinicians and researchers in their task of observing and categorizing relevant child behavior, it falls short in terms of its heuristic value. For example, variables such as process and change, which are particularly significant in work with children, are lost sight of in the midst of the necessary details of behavioral signs that qualify a child for membership in one or another diagnostic category. More important, new diagnostic and treatment strategies that might yield direct information about developmental principles are not readily suggested.

The reason for this shortcoming of the GAP classification system, or of any other set of diagnostic categories, lies in the conceptual properties and status of the nosology model on which classification systems rely. As the study of classification of diseases and of distinctions between them, nosology has as its core and hallmark the concepts of traits, which are qualitatively different, and of categories, which are mutually exclusive. It may be helpful if we describe briefly the main considerations and steps prescribed by the model of nosology when it is applied to psychopathology. (1) Behavioral traits exhibited by many and various patients are described in as much detail as possible, (2) these descriptions are then clustered, each cluster forming and defining a category in terms of some index of similarity, (3) the clusters are to be formed of traits, which are qualitatively different, and of categories, which are mutually exclusive, and (4) once these categories are formed, methods are devised to identify patients who display traits that qualify them for membership in one or another group. Essentially, then, the model of nosology permits us to extract and condense information about the myriad behaviors of persons into a form that groups together persons who are maximally similar in some set of behavioral characteristics deemed to be important for clinical practice by experience and theory.

Several of the conceptual elements of the nosological model, which impart its power in ordering and condensing observations, are at the same time responsible for the limitations it presents to the diagnosis of child psychopathology. In nosology, behavioral traits are conceptualized as qualitatively different and relatively stable, or at best, slow to change. Accordingly, the categories these traits define are viewed as mutually exclusive and as more or less static. For example, behavioral traits that signify minimal brain dysfunction as the diagnostic category of choice (e.g., short attention span, hyperactive) are different from those that signify a psychoneurosis (e.g., fear and anxiety reactions to cars, compulsion to wash), and each of these makes use of traits that are different from those signifying a psychosis (e.g., inability to relate to others, aloofness, preoccupation with inanimate objects). Usually assignment of a patient to a category, such as psychoneurosis, is permanent.

As the NIH conference report indicates, workers attempting to construct classification systems expend considerable energy searching for trait combinations that define “clean,” or nonoverlapping, categories. They also search for categories that can be used without requiring change across many populations and over time. The concept of clean, stable categories leads us to another related major element of the nosological model. Individual differences, as meaningful psychological phenomena, are subordinated, if not ignored. The main interest is in constructing a concise, stable picture of the typical patient whose behavioral traits represent the mode of a category. There is little or no interest in the possible significance of the many degrees of variability patients may show along some dimension. Thus, for example, the model of nosology would not bring to our attention the observation that Rorschach images of psychotic patients, though similar in content, differed in terms of degree of organization (see Chapter 2); yet these differences, brought into focus by the principle of differentiation, have important implications for diagnosis and prognosis.

In the model of nosology, the issue of what is relevant behavior for a given system of categories is determined largely by the criteria of frequency and of association. Over many clinical contacts and investigations, workers note that some trait is observed frequently in patients who present a particular history, respond favorably or unfavorably to some treatment intervention, or show a good or poor prognosis. From the viewpoint of nosology, for example, traits such as impulsivity and hyperactivity are observed more often than not in association with a history of possible brain dysfunction. These traits are, therefore, selected as relevant for assignment to that category. Jellinek (1939) long ago questioned, however, whether the relevance of some behavior can be determined primarily by frequency or association. It can be observed, he points out, that wood pencils painted yellow have a significantly greater incidence than pencils of any other finish. Yet this is not necessarily proof that the color yellow is essential to the function of pencils.

In their summary remarks of the NIH conference on classification, Katz and Cole (1965, p. 563) note that even with the assistance of advances in statistics, the problem still remains of determining whether qualitatively discrete groups or categories exist within a larger population: “Does a particular system reflect the true stage of affairs? Are the mental disorders really made up of these particular configurations of symptoms and characteristics?” They also remind us that once variables have been identified and methods for measuring them developed, these variables may not relate in ways that result in discrete classes or types of people. Katz and Cole move close to the biodevelopmental model when they note that the task of the psychopathologist may be to discover the underlying organizations of these variables. Presenting to the same conference, Kelly (1965) takes the position that categories are obstacles to theoretical development. He contends that helpful as they may be for practical purposes, categories prove themselves to be almost completely sterile in suggesting new theoretical and applied directions.

If a number of empirical and theoretical contributions delivered at the NIH conference point to significant limitations of the nosological model and, if, as Shakow (1965) says, there has been dissatisfaction with nosological classifications of psychopathology for the past half-century, one wonders why nosology persists as the dominant (perhaps the only) model in diagnosis. Why is it that when we think of diagnosis, it is difficult not to think of types such as hysterical neurosis, childhood psychosis, or overly inhibited personality disorder? Katz and Cole (1965) supply two possible explanations. First, science regards classification as one of the primary prerequisites in the advancement of knowledge. Classification systems are essential in organizing available information and in communicating what has been learned. Second, and perhaps most important for the field of psychopathology, the disciplines of personality, psychiatry, and clinical psychology have given heavy support to the typology model. The descriptive orientation of Kraepelin and the dynamic orientation of Freud relied heavily on theoretical formulations that hold that qualitatively distinct types of mental disorders exist and are identified in terms of patterned characteristics.

But as we have seen in our earlier discussion of the biodevelopmental propositions, psychoanalytic theory has undergone considerable growth and revision in the past 25 years, with its emphasis on development, adaptation, and levels of psychic structuring (e.g., Gill. 1959; Hartmann, 1958; Holt, 1960, Rapaport and Gill, 1959; Rapaport, 1960). However, this shift has not yet been paralleled by corresponding changes in models and methods employed in diagnosis. To illustrate the obstacles the nosological model places before the clinician and the potential value in using an organismic-developmental model instead, let us examine one area of importance to clinicians—the relation between childhood symptoms and diagnosis and adult pathology and diagnosis.

In recent years a number of follow-up studies relating childhood symptoms or histories to adult outcome have reported discouraging results insofar as little or no relationship was observed. For example, Roff and his colleagues (1966) examined the child clinic and military records of 10,000 males and noted that in some cases the adult outcome (adequacy of adjustment to military service, psychiatric diagnosis) was predictable on the basis of the behavior observed in childhood (especially if noted during adolescence), but in others the connection was difficult or impossible to make. Similarly, Robins (1966) interviewed a large number of adult patients, representing various diagnoses, who had been seen 30 years earlier in child guidance clinics; this writer observed that for the majority of diagnostic categories, the behaviors involved in adulthood bore little correspondence to the types of symptom behavior these individuals had manifested as children. In a related study, Renaud and Estess (1961) found evidence in the histories of symptom-free adults of events considered traditionally to result in adult psychopathology, and they noted that among other possibilities, such findings may challenge theories linking the development of emotional illness to early experience.

The biodevelopmental framework helps with these inconsistencies and controversies in first pointing out that follow-up studies, in searching for some degree of isomorphism between child and adult behaviors, are asking inappropriate questions of their data according to developmental propositions concerned with the relation between early and later forms of behavior. Since the biodevelopmental framework assumes that with development, a unit of behavior undergoes transformation and reorganization so that early forms are subordinated and integrated into later, more complex, emerging forms, one would *not* expect the content of an adult symptom to resemble its counterpart in childhood. Moreover, we have also considered the assumption that a unit of behavior is determined and defined by the context of which it is a part; thus two materially different symptoms could represent the same meaning if embedded in the same behavioral organization, such as aggression and its regulation.

Investigators following children longitudinally from the vantage point of these assumptions (e.g., Escalona and Heider, 1959; Chess and Birch, 1967; Murphy, 1962) have emphasized that although alterations of behavior from infancy throughout childhood can be noted, and no single behavior remains the same over time, the underlying continuity of the child's behavioral styles and patterns of adaptation is observable. It was by means of these propositions as guides that Michaels (1964) was able to gather relevant data and meaningfully express the concept of a relationship between two dramatically different behaviors (i.e., enuresis in early childhood and explosive delinquent behavior during adolescence), and Gomberg (1968) was able to relate poorly controlled, overt aggression observed in latency with alcoholism in adulthood.

The biodevelopmental framework, therefore, is of potential help to workers interested in this problem area because it offers propositions that caution us in collecting and interpreting our data, to look not for isomorphism between child and adult behaviors but for common organizational features suggested by the behaviors, which allow us to formulate a theoretically meaningful and clinically useful connection between them.

In addition to suggesting propositions to guide the relating of two materially different behaviors, the biodevelopmental framework also offers concepts that can be of use in conceptualizing the process that could account for the emergence of symptomatic behaviors in an adult that appear to be radically different from his childhood symptoms. Let us illustrate by examining briefly one of the clinical cases (the case of Daniel) reported in rich detail by Roff et al. (1966, pp. 13-24). In discussing this case, only a few of the details provided in the original report are considered to illustrate the point.

Daniel, we learn, was brought to the clinic at age 5 because he was unusually resistant; he fought and struggled with mother, and he could not mingle easily with peers. At the age of 21 he was rejected from military service with the diagnosis of schizoid personality, an outcome seemingly discordant with early childhood. This boy, who was reported by mother and observed by the psychiatrist to be hyperactive, destructive, provocative, and defiant probably would qualify for membership in the GAP diagnostic category of “tension-discharge personality disorder.” Yet 16 years later he was given a diagnosis that presumed an emotionally cold, flat, and socially guarded young adult. How could we understand this seeming lack of agreement between a diagnostic category that fits childhood behavior and the category used to conceptualize adult behavior? To approach this question, the biodevelopmental framework would first note especially that in spite of the opposing classifications, the same ego structures are involved in the behaviors that dominate each diagnosis used. At the age of 5 years, ego-personality structures concerned with participating emotionally and reciprocating with others (especially mother) and with the regulation of aggression and independence were already assuming a deviant course of development. Moreover, between 5 and 21 years these structures became severely modified from expressing opposition and destructiveness toward persons and things, to expressing emotional withdrawal and coldness. Since Daniel’s child and adult symptomatic behaviors both involve structures concerned with regulation of aggression and the negotiation of independence and reciprocating interpersonally, the biodevelopmental framework would require (borrowing a leaf from Sander, 1962—see discussion of this work in Chapter 2) that we ask questions about particular aspects of Daniel’s interaction with his mother during the second and third years of his life. As we have considered earlier, behavioral actions at this time define the developmental stage during which the child is presumed to first test and establish, in numerous negotiations with mother, his independence, assertiveness, and style of emotional responsivity. Specifically, we would ask when Daniel showed greater and more complex locomotion and aggressivity during his second and third years, to what extent and by what means mother protected him from excessive stimulation, to what extent Daniel established and determined his behavior in the face of mother’s limit setting, and to what extent mother extended her interacting to include developmentally higher levels of behavior such as speech and symbolic play, as she attempted to deal and negotiate with his aggression and independence in arriving at a mutually defined set of opportunities and limits.

Roff’s excellent case description supplies samples of behaviors required by these propositions and considerations. When Daniel was 20 months of age, mother, a tense, dominant person, located a large number of adult relatives in a room to surprise Daniel on Christmas morning. When he toddled in to see the tree and his gifts, he became very frightened, cried, and would not touch his gifts, and thereafter he always reacted “strangely” to any surprise event. In the months that followed, as Daniel showed more curiosity and independence, mother increased her restrictions and controls. She trained him not to touch any of her belongings; later, when she found him playing with matches, she ran a lighted match through his fingers. When the boy pulled the dog’s tail, mother pulled Daniel’s hair; when he kicked the door, mother kicked him. And when he began running out into the street, she arranged for a truck to pass near him.

If these data are organized in terms of the considerations noted earlier, we would conclude that mother failed to protect Daniel from stimulation he was not equipped to handle. As he became more mobile and as he attempted to negotiate the issue of establishing independence of his behavior and the regulation of his aggression, mother severely limited and restricted his assertiveness with primitive (and very likely traumatizing) behaviors. Moreover, she failed to handle the task, expected of her in ideal development, of gradually including and coordinating in her responses to his aggression and independence more advanced modes such as speech and play.

By the time Daniel reached the age of 5, then, he and mother had failed to negotiate successfully a pattern of aggressivity and independence appropriate for Daniel's style of functioning, an issue that should have been settled in its basic components by this age. Thus when mother and Daniel appeared at the clinic, they were still struggling around this issue. This is suggested because Daniel employed inappropriately primitive and destructive means for expressing his aggression and independence (e.g., in the clinic, he provocatively threatened to damage many objects and was almost successful in destroying the psychiatrist's desk blotter). That they were still struggling to resolve the issues of aggression and independence is also evidenced by the appearance of mother at the clinic when she perceived that her (primitive, restricting) behaviors were not curbing Daniel to her requirements and expectations.

Roff's report does not go beyond Daniel's fifth year, except to state the outcome (that he was rejected for military service at the age of 21 with a diagnosis of schizoid personality). However we are given a few details that enable us to conjecture that mother negotiated with Daniel throughout his childhood with the same severe restrictions and prohibitions. For example, mother discontinued her clinic visits after the third session; the social worker felt that this was because mother could not be in "full command of the clinic situation." The biodevelopmental position could conjecture that before the age of 21, probably before adolescence, Daniel gave up the struggle, arriving at a negotiated settlement with mother (and subsequently with his extended environment) in which he assumed an emotionally withdrawn, guarded mode of interacting with others and severely restricted his aggression.

The concept of negotiation, and the concept of structures undergoing change in content while maintaining the same form, provides a way of understanding how the unique give and take between Daniel and his mother, concerned specifically with his expressions of independence and aggression, gradually led Daniel from violently opposing limits and excessive stimulation imposed (behavior that could fit the category of tension-discharge disorder) to surrendering, accommodating, restricting responsivity and withdrawing (behavior that could fit the category of schizoid personality). Two seemingly different configurations of behavior, occurring at different points in time, are tied together by the concept of negotiating aggression and independence-closeness with other persons and by the concept that such negotiations modify the structures as they undergo development. In terms of the question posed at the start concerning the dilemma of different diagnoses being assigned to the same individual, we can see how data about the negotiation of an issue during latency coupled with those obtained during the critical period when a child is 2 and 3 years old, would aid the clinician in studying the process that antecedes the formation and modification of ego structures involved in emotional reciprocation and regulation of aggression, which are unique to the adult schizoid personality.

It is noteworthy that studies reporting disagreements between diagnoses made in childhood and in adulthood have not stimulated workers to turn to the other models for help in clarifying the problem or in challenging those who take the lack of agreement as supporting the conclusion that early experiences do not influence later personality development. Rather, workers in the field of psychopathology have modeled themselves after the marked advances in the development of classification in general medicine during the past two decades in striving for more refined, clear-cut subdivisions and subcategories of abnormal behavior (Hamilton, 1965). In one sense the GAP system for children represents such an attempt. The committee that formulated the proposed classification notes in its introduction that although the classification of adult psychiatric disorders offered by the 1961 revision of the Standard Nomenclature of Diseases and Operations has drawn from twentieth century dynamic psychology, a number of behavior clusters observed in children do not fall within the categories available. Accordingly, in addition to the adult category of personality disorder they include, for example, a new, more refined category of developmental deviations made up of eight subtypes. But notwithstanding the contribution made by the refinements, the GAP system soon suffers from the same weaknesses and limitations that plague any classification system. Once the GAP system places a patient into a diagnostic category, be it developmental deviation, compulsive neurosis, or personality disorder, a set of behavioral traits quickly moves to the foreground in the thinking of clinicians, assuming relevance and importance. Other behavioral traits are ignored or pushed into the background. At the same time the GAP system must ensure that the category selected is stable and "correct." But the committee that formulated this diagnostic system for children shows the difficulties inherent in a nosologically based approach to diagnosis. For example, in introducing the refinement of the category developmental deviations, they note that when disorders such as cyclothymic personality occur in childhood, they are probably best listed under developmental deviation in affective development, rather than as a separate personality disorder. However, they go on to say, "If cyclothymic personalities appear to be entities, they could be placed in the category *Other personality disorder*" (p. 239). Similarly they consider that sexual deviations could be placed in *personality disorder, other',* but since sexually deviant behavior is common in childhood, it could be appropriate to place this behavior in the category of developmental deviation. The GAP report continues in this vein, dictated by the nosology model, and the principles at the core of normal and deviant development are lost sight of or fail to exert a major influence in the thinking that goes into diagnostic deliberation—namely, principles of individual differences, of changes in structure and epigenesis, of stages in development, and of the adaptive process between child and environment.

Given the case illustration and our discussion to this point, the limitations of the model of nosology become apparent, especially if the main concern is child behavior and psychopathology and its relation to subsequent development, be it in later childhood or adulthood. As an alternative to refining and redefining categories, one could employ another model, that of development. Let us consider diagnosis under this condition.

THE BIODEVELOPMENTAL FRAMEWORK AS A DIAGNOSTIC MODEL

If the biodevelopmental framework outlined in Chapter 2 is considered as a diagnostic model, organismic-environmental propositions and variables, which are not given central consideration by the model of nosology, emerge as psychologically relevant. These propositions represent a guide in terms of which diagnostic observations could be gathered and around which they might be organized to provide information especially helpful in clinical work with children. They have the conceptual status of what Kelly (1965) has referred to as “universal reference axes” and are clearly distinguishable from the concepts of stable traits and mutually exclusive categories that are prescribed as the relevant variables by the nosological model. Moreover, whichever organismic-environmental variables are derived and conceptualized, the biodevelopmental framework prescribed that each should receive consideration in the diagnostic study of all individuals, whether they are viewed as normal or pathological, whether they are members of one diagnostic category or another, and whether they are preschoolers or adolescents. In the biodevelopmental model there is no behavioral variable or trait exclusively reserved for a particular patient or age group.

The following are organismic-environmental propositions and questions suggested by the biodevelopmental framework that could be employed as guides in a diagnostic study of any individual. These are proposed here as illustrations, and the list is not intended to be inclusive.

1. *Sensory, motor, perceptual, and cognitive regulators of stimulation should be assessed.* Does the patient show information-processing functions expected for his age and stage of development? Does he show consistent individual differences in his style of managing stimulations representing variations that are significantly atypical in terms of organismic-developmental expectations? For example, a 5 year old shows hypersensitivity to tactile stimulation from textures found in the typical home; a 10 year old directs equal amounts of attention to relevant and incidental stimulation found in a typical classroom. Are these information-processing structures responsible for psychological disequilibrium and anxiety in the face of information and stimulation, and does the anxiety lead to the emergence of defensive-coping strategies that limit growth (e.g., marked cognitive passivity in the face of average and expectable stimulation)? Is the child’s environment out of phase with his threshold variations by confronting him with stimulation whose tempo, intensity, and quality do not permit him to relinquish his growth-inhibiting coping strategy (e.g., cognitive passivity persists to adolescence)?

2. *Behavioral modes and modalities* (e.g., action, fantasy, and language behaviors) *for expressing drives and motives should be assessed in terms of age and stage expectations.* Does a child make major use of a mode too advanced for his age (e.g., a 5 year old makes little or no use of physical, aggressive contact with objects and relies predominantly on fantasy)? Does a child make use of a mode viewed as immature for his stage (e.g., an 11 year old makes predominant use of the action mode to express aggression and relies little on fantasy or language)?

3. *The status of short-term forces, such as competence, curiosity, and industry, should be assessed, as well as the developmental status of long-range forces*. Are short-range forces operating sufficiently independently in terms of age and stage expectations? Have they become fused with long-range forces? For example, relationships of short-range forces may have become fused with those of long-range forces, with the result that learning academic content and winning a game have acquired affective and intellectual properties associated with destroying objects.

4. *The process of negotiation (give and take) between a child and his parent should be assessed.* How do child and caretaker influence each other, and how does each obtain gratification of needs from the other? In

give-and-take situations, does each respect the developmental status of the other? Is the interacting coordinated in terms of age and stage expectations, or is it asynchronous? How does this mutual-adaptive process experienced by caretaker and child contribute to the psychological growth and difficulties of each? For example, when the child experiments with asserting himself, mother responds with aggression and anxiety; when the mother makes bids for affection from the child, the child withdraws.

5. *The mobility of psychological structures should be assessed.* Does the patient show the capacity to shift to functioning at a higher (progression) or lower (regression) level, to coordinate himself with changing limitations and opportunities brought by changing environments? Does the child shift from the level of cognitive functioning that is appropriate and adaptive for his average expectable environment (home and community) to another level that better fits the complexity and adaptive requirements of the classroom? Does the child shift from the level of regulating aggression in his average and expectable environment (restricted, attenuated in a middle-class home) to the vigorous action level expected and defined by the playground environment as adaptive?

THE NEED FOR ALTERNATIVE DIAGNOSTIC PROCEDURES

If we turn from these diagnostic propositions and questions, suggested when the biodevelopmental framework is employed as a diagnostic model, to the data needed to answer them, it becomes apparent that new diagnostic methods are essential. For the most part, psychological interviewing and testing techniques have been constructed, and the data they produce have been analyzed, from the viewpoint of nosology, regardless of the category in which the behaviors cluster.

Traditionally psychologists have made judgments about a patient's diagnosis using a few general types of assessment techniques; questionnaires, intelligence scales, perceptual motor tests, and projective devices. Some work with these instruments has focused on developing and refining scoring systems to permit the clinician to make a statistically based contribution that supports or refutes the applicability of a diagnostic category. Perhaps this is best illustrated by the segment of the MMPI literature that has been concerned with discovering patterns of test items that distinguish one type of emotional disorder from another. Other work with traditional tests has been influenced more by a psychodynamic, clinical orientation and has focused on the significance for diagnosis of the behavioral process observed as a patient responds to the demands of various test items. Here the best illustration perhaps is Schafer's (1954) discussion of the thinking process, style of expression, and fantasy content (as observed with the Rorschach) that distinguish a patient assigned to the category of hysteria, for example, from a patient assigned to the obsessive-compulsive group.

Whether a diagnostician is more biased in favor of the "sign approach" and the need for statistical support, or in favor of the psychodynamic approach and the need for theoretical-clinical support, it seems that he tends to use many of the same traditional questionnaire and projective procedures, and to employ them in the same way. In texts concerned with diagnostic assessment, whether the author's interest is children (Copel, 1967), the psychoanalytic point of view (Allison, Blatt, and Zimet, 1968), learning theory (Thompson, 1968), or familiarizing nonpsychological professionals with psychological testing (Kahn and Giffen, 1960), the techniques of the Rorschach, the Wechsler tests, the apperception tests, and various questionnaires are usually included for consideration, and the main general issue guiding each presentation is the role of these tests in assigning a patient to one or another diagnostic category. When developmental considerations are given more attention in diagnostic testing with children than assigning patients to a category, the techniques considered are the traditional intelligence, projective, and perceptual motor scales (McKinney, 1972). One possible conclusion from these observations is that when workers with various interests and theoretical persuasions deal with the issue of diagnosis, with nosology as a guide, they have not been stimulated to formulate and suggest variables and techniques beyond the traditional ones. Systems of more refined classifications have been offered, such as that by GAP, in response to the limitations of nosology, yet the diagnostic methods used in practice have not changed in response to new advances in ego psychology and in development.[11]

Perhaps this is the most significant limitation of the nosological model—that it has not stimulated the construction of diagnostic tools, strategies, and variables that would facilitate the search for new information concerning psychopathology, its functioning, development, and remediation. As the NIH conference report on diagnosis indicates, the nosological model by definition emphasizes the search for assessment techniques and for statistics that increase success in measuring component, stable traits and in forming clear-cut categories. As the chapters to follow point out, when workers begin to include, along with the issue of diagnostic categories, issues such as understanding the relationship between verbal behavior in response to traditional tests and overt behavior observed in real life, and when these are approached from the vantage points of nosology and traditional assessment techniques, the problems for the diagnostician are substantial.

If the developmental point of view available to us is used as a diagnostic model, are we freed from the limitations of the nosological model? Are parameters and techniques suggested that would organize the search for new diagnostic information and aid in devising alternative treatments more suited than is psychotherapy for the needs children bring to the present-day classroom? The answer to these questions, implied by the goal of this book, is in the affirmative. We are now able to state this goal more specifically with the preceding critique of nosology before us.

The aim of the book is to illustrate that the developmental point of view can be employed as a diagnostic model, and that this model suggests new parameters to guide observations and new assessment strategies. The biodevelopmental model provides the diagnostician with new lenses by virtue of its emphasis on levels and stages of psychological organization rather than stable traits, and the process and change an individual undergoes rather than his qualification for membership in a diagnostic category.

As the reader reviews the diagnostic models and procedures and the treatment innovations they suggest, he is asked to consider whether these innovations suggest that a developmental diagnostic model is a beginning remedy that might prevent child clinicians from developing what Kelly (1965) has called “hardening of the categories,” a disability that has plagued clinicians and investigators concerned with adult psychopathology. The diagnostic models and techniques are proposed in the spirit of providing a new direction for gathering observations which should put development in the center of diagnostic work with children.

Notes

[10] This chapter is based on an earlier publication by the author "Beyond nosology: Diagnosis from the viewpoint of development," in R. E. Rie (Ed.), *Perspectives in child psychopathology,* New York: Aldine-Atherton, 1971, pp. 130-177, and appears with the permission of the publisher.

[11] Exceptions can be found in recent writings suggesting that tests of cognitive style and tests based on Piaget's model are useful in practice, but these suggestions have not yet won sufficient attention (Janis, Mahl, Kagan, and Holt, 1969).

Part 3

DIAGNOSTIC METHODS AND A DEVELOPMENTAL MODEL FOR ASSESSING COGNITIVE DISABILITIES IN CHILDREN

4

THE CONCEPT OF COGNITIVE CONTROLS[12]

Beginning with Healy's form board, clinical child psychologists have made use of psychological tests of intellectual, perceptual, and visual motor functioning to diagnose a child's cognitive functioning and difficulties. The tests commonly used in practice, however, have been devised and applied more or less independently of theories and research in cognitive development, which have received major attention in the past three decades. In the opinion of Benjamin (1961), the field of cognitive research has been a stepchild in clinical practice, perhaps because of its reputation as "undynamic." What would represent a "dynamic" theory of cognition? If we answer this question from the viewpoints of the biodevelopmental framework and developmental diagnosis discussed in Chapters 2 and 3, a conceptual model should include statements concerning hierarchical stages and levels of cognitive functioning, the role of innate givens and experiences in individual differences, the mobility of levels of cognitive functioning as represented in regressive and progressive shifts that occur as a function of changing environments, and the role cognition plays in adaptation. Although Piaget's theory (Flavell, 1963) articulates stages of cognitive development, and Werner's (1957) emphasizes that early forms of cognitive functioning may be observable in chronologically older individuals, neither one gives much attention to the motivational aspects of cognition, to the interplay between cognition and affects, and to the role of cognition in adaptation.

The concept of cognitive controls, which derived from psychoanalytic ego psychology (Gardner et al., 1959), seemed to me to offer the most promising starting point for a dynamic model of cognition because it permitted simultaneous emphasis on stages, affect, mobility, and adaptation in cognitive functioning. The concept of cognitive controls emerged in the 1940s, along with the related concept of cognitive styles, when investigators shifted their attention from "formal aspects" of perception toward "functional aspects." That is, investigators turned away from viewing cognition in terms of universal laws and the stimulus properties that give rise to perceptual experiences, and began to examine cognition in terms of stable individual differences that serve an individual's adjustments to changing environments. This shift in research focus, from the stimulus to the perceiver, was heralded as the "new look" in perception and cognition (Bruner and Postman, 1948).

The bulk of work that gave rise to the notion of cognitive styles and controls is contained in two camps of investigation. The first, represented by the research of Herman Witkin and Jerome Kagan and their followers, has made use of the concept of "cognitive style." The second is represented by the research of George Klein and his followers, who formulated the concept of "cognitive control." The studies conducted by these two forces have made the labels "cognitive style" and "cognitive control" a part of the vocabulary heard today in most psychological households.

However the clinician or clinical investigator who attempts to assimilate and integrate the various research efforts may run into considerable difficulty and may find himself puzzled, if not confused (Wallach, 1962). Part of this confusion occurs because the terms “cognitive style” and “cognitive control” are often used interchangeably. The unique and similar elements of each have been lost sight of, or at best, have not been given appropriate recognition in the literature. For example, two relatively recent writings on the subject, though developing excellent discussions of issues and reviews of studies, do not make methodological and conceptual distinctions between cognitive style and cognitive control (Wolitzky and Wachtel, 1973; Saarni and Kogan, 1976). Yet critical differences concerning research tactics and theoretical bias distinguish these two lines of investigation. These differences hold important implications for the contribution each can make to a model of cognitive development and to the diagnosis and treatment of cognitive disabilities.

Accordingly, two interrelated goals have been selected for this chapter. First, the framework of cognitive controls, as developed by Klein and his colleagues, is distinguished from the framework of cognitive style, as exemplified in the work of Witkin and Kagan. Following this, issues are discussed that emerge from comparing the two concepts. These issues are used to introduce attempts by my associates and me to devise and validate tests of cognitive controls for children and to develop a treatment method guided by cognitive control theory. This work is detailed in the remaining chapters, to illustrate that the cognitive control framework, in particular, can be of considerable assistance to clinicians in their efforts to understand further the development, diagnosis, and remediation of deviant cognitive functioning and the role of cognition in adaptation.

COGNITIVE CONTROLS VERSUS COGNITIVE STYLES[13]

Cognitive Styles

Witkin came upon the notion of stable individual styles of cognitive functioning from empirical findings he had gathered without the explicit use of personality or cognitive theory. His first studies, using the now well-known “tilting room” and “rod and frame" experimental situations, were designed to search for universal laws that would describe whether kinesthetic or visual cues were critical in the perception of the upright (Witkin, 1959). While conducting these studies, however, Witkin became impressed by the consistency with which some individuals were influenced by perceptual cues in their perceptions of the upright, whereas others relied on kinesthetic cues. Accordingly, he shifted his focus to a study of these individual consistencies.

At first the differences observed in the tilting room situation suggested to Witkin and his colleagues that a “postural versus a visual” cognitive principle or style characterized and accounted for the functioning of their subjects. However when subsequent studies produced consistent individual differences with procedures that do not implicate kinesthetic cues (i.e., the Rod and Frame Test and the Embedded Figures Test), these workers reformulated the originally proposed cognitive style in terms of a principle of "field dependence-independence" (Faterson, 1962; Witkin, 1959).

Individuals whose style of cognitive functioning was field dependence tended to submit passively to influence of the prevailing background and had difficulty keeping an item separate from its surroundings, whereas "field-independent" individuals tended to overcome the context in which information was embedded.

Using this concept as their main vantage point, Witkin and his group embarked on a strategy of research designed to explore the number and varieties of psychological behaviors and variables in which the style of field dependence-independence could be shown to play a part. Accordingly, they correlated measures of the field dependence-independence style with performances observed in a wide variety of test situations and with variables represented by life histories and clinical populations.

As they extended the range of variables to which field dependence-independence was related, they again found it necessary to reformulate the cognitive style construct used to account for the individual differences observed. Witkin then proposed a "global versus articulate" style, which defines a continuum.

> At one extreme there is a consistent tendency for an experience to be global and diffuse; the organization of the field as a whole dictates the manner in which its parts are experienced. At the other extreme there is a tendency for experience to be delineated and structured; parts of the field are experienced as discrete and the field as a whole organized (Witkin, 1965, p. 319).

This global-articulate cognitive style has been shown to be associated with or implicated in many and various behaviors. For example, individuals identified by criterion tests as operating in terms of a global cognitive style have been rated as more emotionally dependent on others and as relying on others for a definition of their own feelings and attitudes; they tend to look at the face of an examiner while taking a test, to dream more often about the laboratory situation in which they are located, to forget dreams more often, to produce inarticulate human figure drawings, to solve WISC block design problems poorly, to give global, poorly organized responses to ink blots, to show a diffuse sense of identity and an unclear role in the family, and if they have a twin, to experience the self as an integral part of the twinship, rather than as individuated.

Witkin and his followers have also given some attention to the relation between the global-articulate style and mechanisms of defense and psychopathology. Studies have demonstrated that field-dependent (global) individuals are more likely to show a tendency to repress and deny, whereas field-independent (articulate) individuals tend to intellectualize and isolate. Moreover, other work suggests that psychological disorders are associated with either extreme of the global-articulate style. Types of psychopathology found to be more typical of cognitively global individuals include identity problems, dependency, passivity, ulcers, obesity, alcoholism, and hysterical disorders. Psychopathology observed as being linked more closely with a cognitive-articulate style includes delusions, aggressiveness, obsessive-compulsive disorders, directing aggression outward, and overideation.

It seems then that as work progressed from Witkin's initial study, the research strategies employed diverged more and more broadly, embracing more and more variables that could be related to a single style concept. In turn, the concept used also became increasingly broad, to be able to explain the observations.

Taken together, the work by Witkin and his followers seems to view the global-articulate style as a fundamental, pervasive tendency in personal functioning that can be identified in many situations and in many personality and cognitive variables. (For reviews of research with the cognitive style concept, see Wolitzky and Wachtel, 1973; Saarni and Kogan, 1976.)

Following a path very similar to that of Witkin's, Kagan and his associates proposed a construct that was not the product of a theoretical conception of cognition but came about as a result of "accidental discoveries and experimental work" (Kagan, Moss, and Sigel, 1963, p. 74). Beginning with a task that required subjects to group pictures of human figures in any manner desired, Kagan found that some individuals characteristically analyzed and differentiated the test stimuli and applied labels to subelements of the whole; this behavior was conceived of as an "analytic" cognitive attitude or style. Others tended to perceive and order the stimulus field as a relatively undifferentiated body of information-behavior thought to reveal a "non-analytic" cognitive style.

To gain insight into the process underlying these cognitive attitudes, Kagan also employed the strategy of correlating performance with the picture sorting task with performances observed in a wide variety of test situations. Over many studies, cognitive consistencies gradually emerged. For example, individuals who showed an analytic style when dealing with the criterion test were rated as not dependent on their families, as better able to describe their feelings, and as striving for social recognition; these also achieved higher IQ's, were persistent in the face of problem situations, produced more distinct images in response to the Rorschach ink blots, and resisted the effects of distracting stimuli.

To account for the several relationships appearing between the criterion measure and these test situations, Kagan proposed a cognitive style conceptualized as articulate, active, cognitive behavior versus global and passive, a dimension conceptually identical to that suggested by Witkin.

Kagan has also proposed "conceptual tempo" or "reflection-impulsivity" as a cognitive style, which in earlier work he viewed as a possible antecedent of the analytic-nonanalytic style (see Saarni and Kogan, 1976, for a review). This style is an index of the extent to which a child delays a response in the course of searching for a correct alternative. The procedure used to assess reflection-impulsivity is the Matching Familiar Figures Test, previously described, where speed of responding and accuracy of choice are recorded for each test item and represent the two measures used in assessing this style. Studies have shown, for example, that reflective children use more effective strategies in solving problems, use feedback in a systematic manner, and are better at inductive reasoning, when compared with impulsive children. As studies of this style have been conducted, however, it has been questioned whether the impulsive-reflective dimension is a cohesive style or a combination of skill or accuracy and motoric-cognitive delay.

Kagan has also attempted to relate the conceptual tempo style to personality considerations in proposing the dynamics of this style. Initially Kagan conceptualized differences in tempo in terms of the presumed source of anxiety of reflective and impulsive children. The reflective child was seen as being more anxious about making a mistake than about taking his time to choose a picture, and the impulsive child was believed to be more anxious about going slowly than about making errors. Later Kagan modified this position and proposed a single dynamic, namely, anxiety over errors. Impulsive children were influenced by low anxiety over errors and reflective children by high anxiety. Thus far neither dynamic appears to fit the results obtained, and we have already noted that some work suggests that the role of anxiety in this style may not be linked with making mistakes at all but “the wish to escape from a threatening test situation” (Saarni and Kogan, 1976).

A comparison of the research by Witkin and Kagan and their colleagues reveals similarities along several dimensions.

1. The work was initiated and carried out without making major use of a theoretical framework in which cognition lies within a scheme of personality functioning. Except for statements by Witkin (1965, p. 317) that his concern has been “with the adaptive function of cognitive processes in the psychological economy of the individual,” and Kagan’s (1966a, 1966*b)* proposal that the impulsive-reflective style serves or interferes with a child’s efforts to deal with classroom demands, these workers have not explicated their theoretical views of the role played by cognitive styles in adaptation and personality functioning. Moreover, they have developed their concepts, designed studies, and interpreted their data without the consistent use of a single, comprehensive theory of personality.

2. The research strategy used by Witkin and Kagan began with tests as criterion measures of a single principle conceptualized as a cognitive style. The performance of subjects with these tests was related to various independent situations to explore which of these significantly correlated with measures of the style. As the cluster of correlations between criterion task and situations grew, a single common denominator was formulated in broader and broader terms that could explain consistencies observed in a growing number of varied cognitive behaviors and population variables.

3. Wallach (1962) has noted that each of these workers settled on a common denominator that defines an “analytical versus global” dimension or cognitive style. I emphasize that this style has the conceptual properties of a trait (see Chapter 3). That is, the global-analytical style describes a quality of cognitive behavior that remains fixed or invariant for a given individual over a large number of situational demands and life-history variables. Furthermore, the global-analytic style represents a continuum of increasing differentiation. The basic principle of differentiation, however, can be used as a way of viewing any and all behavior, a position illustrated by the work of Werner (1957,1961; Werner and Kaplan, 1963) and Wapner (1964) and lucidly discussed by Kaplan (1959). By correlating their measures of cognitive style to the widest possible range of situations, and by searching for the most parsimonious explanation for the commonality observed, Witkin and Kagan have demonstrated the

heuristic value of accounting for many diverse cognitive behaviors by the concept of differentiation. Wallach (1962) has suggested that such an approach offers limited explanatory power. I agree, particularly if the goal is to explicate the role played by cognition as an individual makes unique use of information to adapt to, learn from, and master his environment, with the goal of promoting his development.

Cognitive Controls

With this brief critique of cognitive styles before us, and the research strategy associated with it, let us consider the concept of cognitive controls. Klein and his co-workers also entered this field of inquiry after being impressed by stable individual differences in cognitive behavior that did not appear to be accounted for adequately by concepts then in vogue. Klein showed his theoretical bias for individual differences, and for understanding persons rather than perceptual stimuli, in the title of one of his first papers on the subject: "Where is the perceiver in perceptual theory?" (Klein and Schlesinger, 1949). In this early study Klein asked war refugees, for example, to estimate the sizes of disks on which were placed various symbols, including a swastika. He found that the presence of these symbols, presumed to arouse emotions, regularly disrupted the size-estimating accuracy of some subjects but not others. To account for these individual differences, Klein became interested in locating laws of perceivers rather than of stimuli, thus paralleling the interest of Witkin and Kagan.

To formulate these laws, however, Klein made explicit use of psychoanalytic theory. He believed that this theoretical position, reflecting long-standing interest in enduring structural organizations of mental functioning, enabled him to conceptualize and study cognition within a framework that included man's preemptory behaviors, associated with impulses, as well as adaptive behaviors associated with mastery and curiosity.

In his first formulation of individual cognitive consistencies, Klein relied directly on the psychoanalytic proposition that an individual represents a self-regulative, dynamic system of ego mechanisms of defense that attempt to bring impulses into harmony with environmental limitations and opportunities and to organize the experiences of an individual, giving them a unique, consistent stamp (i.e., personality character). In addition, Klein relied on Hartmann's (1958) theoretical advances concerning adaptation and the "conflict-free" sphere of the ego. Hartmann had proposed that functions of the ego such as perception, comprehension of objects, thinking, and recall, are instruments the individual uses to deal with his environment and that develop outside conflict. Hartmann also proposed that at each stage of development, the environment, with its stimulation, never completely matches the individual's cognitive equipment. From encounters between cognition and the environment, therefore, ego-regulating or control mechanisms emerge that serve to select, ward off, or rearrange stimulation to create a "fit" between the individual's cognitive apparatus and his environment. This fit is presumed to foster adaptation and further psychological growth.

From this theoretical bias, Klein emphasized questions and research strategies very different from those of

Witkin and Kagan. He wondered what purpose these cognitive consistencies serve, the circumstances under which they are operative, and how many distinct control mechanisms these individual differences define (Klein, 1949, p. 39).

To answer these questions, Klein postulated that stable individual differences in cognitive functioning represent ego "cognitive controls" or regulators, operating in the conflict-free sphere, to manage information.[14] This management serves to coordinate the individual with environmental demands and opportunities and with internal impulses and motives. A parallel can be seen between this concept and that of the psychoanalytic concept of ego mechanisms of defense. Though analogous to defenses, cognitive controls serve adaptive aims rather than conflictual aims.

From this first formulation, the concept of cognitive controls has been developed and refined during the past 20 years and includes at this time a complex set of propositions and hypotheses (e.g., Klein, 1951, 1954, 1958, 1970; Gardner et al., 1959, Gardner, 1964, Gardner and Moriarty 1969; Wolitzky and Wachtel, 1973). Here only the main ones are outlined, to underscore differences between this approach and that of cognitive styles, and to present work done by me as one illustration of the new directions suggested by the cognitive control framework for diagnosing and treating cognitive disabilities.

In most general terms, cognitive controls have the status of intervening variables that define principles by which motoric behavior, perception, memory, and other basic qualitative forms of cognitive functioning are organized as an individual coordinates himself with his environment. Specifically, cognitive controls are defined as mechanisms or principles that (1) govern and determine the amount and organization of information that becomes available to an individual perceiver, (2) are activated by specified classes and contexts of stimuli that cause the individual to experience some intention to use and adapt to the information, (3) vary in the extent to which they operate in the cognitive functioning of the individuals, (4) evolve partly as a function of maturation and life experiences and become independent (autonomous) from their origin of development, (5) mediate the influence of personality and motivation in the individual's cognitive encounters with the environment, and (6) become enduring aspects of an individual's cognitive functioning and adaptive style, thus giving shape to his subsequent cognitive experiences.

The assumption that a cognitive control is triggered *both* by the content of information displayed and by the adaptive intentions of the individual facing the information should be emphasized because of its central role in this model. For example, an individual may satisfy his adaptive intention on one occasion by surveying information and noticing the presence or absence of some element—a process representing one cognitive control principle. On another occasion he may satisfy his adaptive intention by comparing present information with a memory image of information previously experienced—a process representing another principle.

Though recognizing that the simplest appearing behavior very likely involves more than one cognitive control, Klein and his colleagues set out primarily to identify specific cognitive controls that can be observed operating in the functioning of individuals, to demonstrate their stability, and to clarify the process and activating stimuli unique to each. Thus far five cognitive controls have been identified and have withstood the test of numerous laboratory experiments over the past 20 years: “leveling-sharpening,” “scanning” (also referred to as focusing or focal attention), “field articulation” (also referred to as constricted-flexible and related to field dependence-independence), “equivalance range” (later referred to as conceptual differentiation), and “tolerance for unrealistic experiences.” Well over 1000 published studies and unpublished dissertations have appeared since Klein’s first report in 1949. A review of this work is outside the focus of this book, but the reader is referred to Wolitzky and Wachtel (1973) for a superb review of a representative sample of studies organized around methodological issues. Here let us consider a brief definition of each of these principles. Following this, we discuss issues and problems that emerge from our comparative study of the concepts of cognitive style and cognitive control.

The Cognitive Control Principles

FOCAL ATTENTION

The cognitive behavior observed when an individual is free to scan a stimulus field involves the focal attention principle. The scanning results in registering the properties of available information. This continuum is represented by individuals who, at one end, direct their attention actively and freely to all parts of the field, and, at the other end, by individuals who are more passive in directing attention, deploying their attention to relatively narrow aspects of the field.

FIELD ARTICULATION

The field articulation control combines the earlier concept identified and described by Klein as the “constricted-flexible” principle and is related to the style defined by Witkin as “field dependence-independence.’’

Field articulation concerns the manner in which a person deals with a stimulus field containing information defined as relevant and irrelevant with respect to the adaptive requirements of the situation. When dealing with a task, some individuals selectively withhold attention from irrelevant information and are not disrupted or inappropriately influenced by it. Other individuals direct significant attention to both relevant and irrelevant stimuli, and their performance with the central task is disrupted accordingly.

LEVELING-SHARPENING

This principle concerns the manner in which an individual perceives and makes adaptive use of information that remains stable and also changes over time. Some individuals tend to assimilate or merge new information with memories of earlier experiences; therefore they construct relatively undifferentiated memory images of ongoing experiences. Others tend to maintain discrete impressions and memories of information over time and to differentiate present information from memory images of past information, thus elements do not lose their individuality over time.

EQUIVALENCE RANGE

Distinctive cognitive behavior is observed when an individual deals with an array of information that he intends to group or categorize in terms of some relationship or concept. The equivalence range principle draws on the breadth and number of categories used by individuals to relate objects and their properties. Some individuals use a few categories when grouping or relating information and use concrete standards for judging similarity and belongingness. Others use broad categories and abstract standards, and they are less concerned with subtle differences between information units. The essential difference between individuals at opposite poles of this dimension lies in the degree to which they are impelled to act on or ignore an awareness of differences revealed by the properties of objects, and the extent to which these differences are subordinated in the services of constructing a commonality that relates the objects.

TOLERANCE FOR UNREALISTIC EXPERIENCES

The fifth cognitive control dimension concerns the extent to which an individual departs from a strict reality orientation and accepts perceptual experiences he knows to be unreal. Some individuals are very stimulus bound when approaching information, and they relate cognitively primarily to the information at hand. Other persons are less stimulus bound, distance themselves cognitively from the information given, and accept and relate to information that is not given (e.g., imaginal elaborations, illusions).

In considering these several controls, it should be noted that the ends of each continuum are not conceived as being qualitatively different but as bracketing a series of organizations of cognitive behavior concerned with managing particular classes of information. The difference, for example, between a leveler and a sharpener is one of degree, not of kind.

In numerous studies of these cognitive control principles, several general findings have emerged (see Wolitzky and Wachtel, 1973; Klein, 1970). The performance of individuals with tests of cognitive controls is generally reliable and stable over time. Some relations have been established between particular cognitive controls and mechanisms of defense. And each cognitive control has been linked with performance in related criterion situations.

The latter should receive particular attention. Rather than relating a given cognitive control to as many other tests and population and situation variables as possible, investigators in this camp have focused on establishing the unique process of each cognitive control by relating each *selectively* to criterion task situations that appear to require in some dominant way the operation of that control. For example, performance with a test of leveling-sharpening (the principle concerned with modes of organizing and maintaining a sequence of information over time) has been related to accuracy of recall in measures of serial learning and in the recall of a childhood story. Performance with a test of tolerance for unrealistic experiences (degree of stimulus boundedness) has been related to the number of experienced reversals of a reversible figure and to the extent to which one accepts an imaginative and relaxed approach when participating in the Rorschach test. The constricted-flexible or field articulation dimension (the manner in which an individual deals with a field containing relevant and irrelevant information) has been related to the extent to which an individual integrates contradictory elements in a series of ambiguous tasks and denies or accepts dissonance-arousing ideas. Performance with measures of the equivalence range principle (the manner in which information is categorized) has been related to judgments of the degree of similarity of the brightness of light patches, of various shapes, and of synonyms substituted in a sentence. The scanning or focal attention principle (breadth and extent of scanning) has been related to performance with various size estimations and visual illusion tasks.

In addition to the focus on establishing the cognitive process unique to each cognitive control principle, a number of studies have also addressed the question of how different cognitive controls relate to different mechanisms of defense. In brief, studies to date suggest a link between the cognitive process conceptualized by the leveling-sharpening principle and that conceptualized by the mechanism of repression and between the focal attention principle (scanning) and the mechanism of isolation. Moreover, investigators also gave attention almost from the start to the relation between cognitive controls and motivation and drives, since the concept of cognitive controls assumes that these ego structures regulate the impact of needs and motives as well as the effect of informational demands that are both related and unrelated to motivation. For example, one study found that individuals who were either very disrupted or not disrupted by irrelevant information (i.e., individuals representing the extremes of the constricted-flexible continuum) tended to show an exaggeration of their particular typical cognitive control when in a state of high thirst, whether they were dealing with information related or unrelated to their need state. Another study exposed pictures of neutral, sexual, and aggressive content and simultaneously recorded eye movement behavior as a measure of the focal attention (scanning) principle. The investigators found positive correlations between the degree of isolation of affects and the degree of looking around.

The concept of cognitive controls formulated by Klein and the lines of investigation stimulated by it suggest several unique characteristics.

1. The stable individual differences observed by Klein were conceived within the theoretical framework of psychoanalytic ego psychology and the psychoanalytic concern with the adaptive significance of perception. Consistent individual differences in cognitive functioning were seen as ego structures or organizations that impose constraints on motivation and environmental forces as an individual negotiates a fit between the unique makeup and demands of the information before him and the adaptive intentions under which he is operating.

2. The research strategy used by Klein and his followers began with different tests, each of which was accepted as a criterion measure of one or another cognitive control. Studies focused primarily on establishing the stability of each control principle, clarifying the cognitive process unique to each control, and exploring life situations (cognitive tasks and problems) whose solution uniquely related to and

required one or the other cognitive control.

3. Some studies have also addressed the relation between cognitive controls and other systems of ego-personality functioning such as mechanisms of defense and motivation. Although much more work needs to be done to clarify the relations between cognitive controls and defenses and motivation, nonetheless the studies in this camp emphasize that the concept of cognitive controls can describe behavioral-cognitive structures that play a role in adaptation.

4. Together, the search for multiple, uniquely different, stable cognitive controls and the notion that these controls participate in the regulation of the impact of needs, motives, and information as an individual negotiates an "adaptive fit" between cognitive organization, motives, and environmental demands, suggest that the construct of cognitive controls has the conceptual properties of a psychological structure that is stable and slow to change over long periods of time, on the one hand, and highly mobile or plastic over short periods of time, on the other. I believe that accounting for many diverse cognitive behaviors in terms of several cognitive principles that are seen as both stable and mobile offers considerable explanatory power.

CRITIQUE OF COGNITIVE STYLE AND COGNITIVE CONTROL

Investigators using the concepts of cognitive style and cognitive control have attempted to demonstrate in the laboratory that in each case consistent individual differences can be observed as individuals deal with various cognitive tasks. Beyond this similarity, several critical differences should seem apparent from our overview of both camps of research.

1. The cognitive control model has been concerned with identifying and differentiating multiple cognitive dimensions of individual differences, whereas the cognitive style model operates within a single, broad cognitive dimension.

2. The cognitive control model has aimed at clarifying the process unique to each cognitive control and the specific situational requirements that activate each control. The cognitive style model has searched for the process underlying a single cognitive principle and for the many and various situations in which the same principle can be shown to operate.

3. The cognitive control model has been developed exclusively and persistently within the assumptions and propositions of psychoanalytic theory, especially its branch of ego psychology. The cognitive style model has been developed, relatively speaking, without the consistent use of a single comprehensive personality theory as its referent.

4. The distinguishing goal of the cognitive control framework is to demonstrate how cognitive mechanisms serve the individual in his efforts to manage, regulate, and adapt to environmental information and to the impact of needs and motives. The distinguishing goal of the cognitive style model appears to be to demonstrate that a consistent style of cognitive functioning can be identified as fundamental to many psychological functions and situations.

5. The cognitive control model proposes that several cognitive controls could form a unique configuration representing the cognitive style of an individual. This use of the term "style" by cognitive control

researchers may have contributed to the confusion in the field between the concepts of cognitive control and cognitive style. For Klein, a cognitive style is a configuration of a number of controls or principles, whereas for Witkin and Kagan it represents a single cognitive dimension.

These several differences are, of course, interrelated. In my opinion the choice of Klein and his followers to approach their observation of consistent individual differences in cognitive functioning from the bias of psychoanalytic theory is the main reason for their search for more than one cognitive disposition, for the process unique to each, and for the environmental contexts and personality structures that are uniquely linked to one or another control. Psychoanalytic theory emphasizes the notions of multiple structures, process, and environmental context. Moreover, Klein and his followers included in their thinking issues of change in cognitive control organization in response to need states and experiences, because of the emphasis placed by psychoanalytic theory on the notions of regression and progression of functions.

Because Witkin and Kagan and their followers have not made consistent use of one personality theory, it could be argued, they did not prescribe and differentially select which criterion variables they expected to relate to individual differences in cognitive functioning. Rather, they followed a correlation model, and a theory of parsimony, familiar in psychological research. They searched for all possible relations. The more correlations found, the broader the concept had to become to embrace all the relations. The broader the concept became, the more it took on the properties of a trait, indicating a pervasive, fixed attribute observable in almost all psychological contexts and variables.

The relative lack of influence by personality theory in cognitive style work, I believe, also is responsible for Witkin and Kagan's remaining focused more on correlations observed and less on clarifying the process and meaning of the cognitive principle in question and of the test requirement used to assess the principle. For example, only recently is attention being given to the process of the Matching Familiar Figures Test, which is used to provide a measure of the impulsive-reflective dimension (see Saarni and Kogan, 1976). Various, sometimes conflicting results have underscored the finding that this test, and therefore the style conceptualized as impulsive-reflective, elicits a process that contains both an element of motoric delay and an element of cognitive-perceptual accuracy in matching the figure selected with the standard. To illustrate the importance of the process analysis of tests used to assess some cognitive consistency, let us consider the MFF test from the viewpoint of the cognitive control model. The process of the MFF test could include (1) a component of motoric delay—the time the child takes to reach out and touch one of the cards, (2) a component of scanning—that is, the manner in which the child scans the response cards: whether he scans primarily only three of the cards (narrowly) or extensively sweeps his gaze over all six cards, and (3) a component of leveling-sharpening—the manner in which the child maintains a memory image of the standard picture as he surveys the six response pictures. Very subtle details distinguish one picture from another, and each from the standard picture. Therefore a child who maintains a highly differentiated memory image of the standard picture as he surveys the response pictures, and articulates the response picture being examined from the memory image of the standard, is likely to notice more quickly whether the response picture differs from or is identical to the standard.

The point is that the response process elicited by the MFF test appears to contain several components. Accordingly, observations made with this test may obscure the uniqueness of each of these part-process as cognitive principles (i.e., motor delay, scanning, and memory organization).

Work with the impulsive-reflective dimension also serves to illustrate limitations that occur when one's interest in cognitive differences is not embedded consistently in a comprehensive personality theory. We mentioned earlier that Kagan initially expressed the dynamics of conceptual tempo in terms of the reflective child's anxiety about making errors and the impulsive child's anxiety about going slowly. Fie reformulated this dynamic in proposing that the former have low anxiety and the latter high anxiety over making errors. Block et al. (1974), in an effort to validate the reflection-impulsivity construct using teachers' ratings, suggested that impulsive children are generally fearful, and their rapid response latencies appear to stem from the wish to escape threatening, testlike situations. From the view of psychoanalytic theory, hypotheses still remain concerning, for example, whether these children's fear is related to the threat of losing control over their mounting aggression or to imagined physical punishment, such as castration. Data gathered in terms of such hypotheses would clarify whether the habitual tendency to respond to a cognitive task with a rapid motor action serves to manage, for example, aggressive tensions that typically become aroused in the face of frustration, or stress represented by a cognitive task.

Examining this critique of the cognitive style model and the cognitive control model from the viewpoint of the biodevelopmental framework, proposed previously as the most valuable heuristically for clinicians, the cognitive control model appears to hold more promise than does the cognitive style model as a guide for evolving a dynamic theory of cognition and for constructing new methods and concepts to aid in the diagnosis and treatment of cognitive disabilities. The cognitive control model provides a multidimensional view of individual differences in cognitive behavior, a feature also proposed by Wallach (1962) as desirable. Moreover, the cognitive control model allows the investigator to see individual differences as both stable and mobile regulating structures that are related to other personality systems, and it articulates the role cognition serves throughout development in coordinating an individual with changing environments.

On the basis of these several considerations, I selected the cognitive control model to guide test construction, to innovate therapeutic technique, and to plan research that could be employed by the clinician in helping children with cognitive disabilities. First, however, we should consider a number of issues and problems reflected in the work with cognitive controls produced to date. I have attempted to take some of these issues into consideration in planning my own work and in influencing the work of colleagues and students.

ISSUES AND NEEDS IN COGNITIVE CONTROL RESEARCH

The model of cognitive controls and the research it has stimulated suggest considerable promise as a guide for new techniques of use to clinicians, yet a number of methodological and theoretical issues remain unresolved and deserve our attention. In reviewing these issues, as well as suggesting the need for further work, I rely on discussions by Wolitzky and Wachtel (1973) and by Saarni and Kogan (1976), although I assume responsibility for the interpretation given to the views of these writers and for the additional considerations suggested here.

Let us begin with a review of a scheme used by Saarni and Kogan (1976) in their examination of research with cognitive styles. These writers do not distinguish between styles and controls, as we have, but cluster all the work done as related to the concept of styles. Nonetheless, their scheme is very helpful in bringing to our attention a number of issues concerning test construction and test process. Their scheme, originally proposed by Kogan (1973), distinguishes three classes of style. These three types are conceived as points on a continuum, ranging from those primarily determined by an individual's ability to those established mainly by an individual's preference. The tests used with studies of Type I cognitive styles elicit a process that makes dominant the *ability* of the individual to do well on the criterion task. Kogan suggests as an example the Rod and Frame Test, which provides a measure of field dependence-independence. Field independence is reflected if the individual is accurate in lining the rod in an upright position. To use the term "style" here is not appropriate, according to Kogan, because "style" connotes a consistent behavioral preference or tendency rather than the presence or absence of some specific ability. With studies of Type II cognitive styles, the use and interpretation of tests leads to the implicit or explicit view that one form of test performance is superior to another form of performance on the same test. Kogan suggests, as an example, the tripartite conceptualization style proposed by Kagan, Moss, and Siegel (1963). In this style the classification strategies "categorical-inferential" and "relational-thematic" are considered to be inferior to the strategy interpreted as "analytic-descriptive." Wolitzky and Wachtel (1973) suggest that the field-independence style may also serve as an example. They point out that research with the Rod and Frame Test implies that the field-independent person has richer resources for coping with life than does the field-dependent person. The term "style," then, is also inappropriate with a cognitive task that implies a value judgment in the performance assessed.

Type III cognitive styles, according to Kogan, qualify more as styles because the test used emphasizes, by its process, the preference, tendency, or orientation of the individual in managing the task demands. Neither accuracy, skill, nor value judgments about the performance is stressed. The equivalence range principle, and the Object Sort Test that furnishes a measure of it, could serve as an example. Here the individual is free to cluster common objects in whatever way he chooses, being instructed only to place together the ones that belong together for some reason. With this test, the individual is presumed to reveal the categories he prefers to impose on information.

Applied to our interest in cognitive controls, Kogan's scheme seems to bring special attention to methodological issues. It cautions us against using tests that primarily assess skills as measures of cognitive controls. It also cautions us against imputing a value judgment to the performance observed. It reminds us that ideally a test of cognitive controls should be constructed to maximize the freedom an individual has to express his preferred mode of cognitive functioning. For example, if related to the Rod and Frame Test, this procedure should be modified to permit a "free choice" in organizing information in terms of irrelevant and relevant information.

These methodological issues converge with several of those outlined by Wolitzky and Wachtel (1973) after they reviewed work with cognitive controls. These writers note the need for investigators to specify and clarify the psychometric properties of a particular test of cognitive control: exactly what does it measure? For example, they point to the finding of some workers that a person's being critical and careful accounts for considerable variance on the Schematizing Test (discussed below), used as a measure of the leveling-sharpening principle. Yet these attributes are not a central part of the leveling-sharpening cognitive control process. At the same time, the test in question is used as the only measure of the leveling-sharpening cognitive control by many investigators. The converse is also noted by Wolitzky and Wachtel—that is, certain investigators use different tests in studies of the same cognitive control without the benefit of correlational or factor analytic evidence that they share the same response process. Last, Wolitzky and Wachtel join Saarni and Kogan in observing that some cognitive control tests seem to deal more with stylistic preferences and others with skill or ability. These considerations point to a set of interrelated issues and methodological needs.

1. The Issues of the Definition of Cognitive Controls, Test Construction, and Validation

The definition of each cognitive control should be formulated in terms that are as clear and operational as possible. Klein has provided reasonably clear operational definitions (Gardner et ah, 1959) which were presented earlier. Each test procedure should be constructed so that the response process elicited appears to match closely the process of the cognitive control as conceptualized (face validity). This requires a careful examination of the psychometric properties of the test, of the materials used, and of the instructions given to provide a set, or "adaptive intention," to the patient. The "adaptive intention" invited by the test instructions, as well as the task itself, should stimulate the individual to reveal his tendency, preference, or strategy in managing information (i.e., cognitive control) and should minimize the impression that skill or accuracy is being assessed. The careful review by Wolitzky and Wachtel of the available tests of cognitive controls indicates that more work needs to be done in creating a closer fit between test methods and operational definitions of cognitive controls.

Given these preliminary steps, it follows that one desirable research strategy would be to administer several tests of several cognitive controls to individuals (rather than a single test of one control) and to conduct a series of correlational studies, preferably factor analytic studies, using the same tests. Replicating factor analytic structures with tests of several cognitive controls would provide much needed evidence of whether the tests (response processes) devised fit the conceptualized cognitive control processes. Such replication would also help us learn whether cognitive controls are relatively independent, stable cognitive strategies or preferences (not skills or abilities), and whether the construct of cognitive controls is a valid, heuristically valuable way of understanding cognitive functioning. Wolitzky and Wachtel call attention to the paucity of factor analytic studies of cognitive controls and note that those conducted suffer from the small number of subjects and nonrepresentative samples used.

Before leaving this topic, a word is necessary regarding the issue of tests that measure skill versus tests that measure preference in cognitive control research. Though 1 ascribe to the need to be alert to this problem in test construction, I also hold the opinion that there are sharp limits to how much we can do about it. It seems to me that every test-task potentially represents to any patient, or subject, both an element of skill and an element of preference. The makeup of a test cannot guarantee that a person will experience the task as “a test of his skill” or as “a situation where I can do this any way I want.” It is true that asking a young child to add 4 + 2 is likely to be experienced by him as a test of ability. However, clinical experience shows that even when approaching a task as related to ability as this one is, a child does reveal strategies or preferences in this response process. He may start by locating the larger number in one hand first and then adding the smaller number with fingers from the other hand, or vice versa. Similarly, when asked to group objects that belong together for some reason “any way you want,” a child may experience this task as a test of ability, including in his response process, in addition to the number of groups formed and the number of objects placed in each, concerns about “getting this right” and about some object that could not be located “so I got it wrong.”

With these opinions in mind, I take some issue with Saarni and Kogan in selecting the Rod and Frame Test as more a measure of ability than of preference. In the Rod and Frame Test, the individual is asked to place the rod “so it’s straight up and down.” Although this could be viewed as a test of ability, it seems to me that the request also affords a means of providing for the individual an opportunity to express his tendency or preference. With this particular procedure, the person’s tendency or orientation is revealed in the extent to which he gives attention to and is influenced by the position of the frame surrounding the rod. In my opinion, the individual is as free in this task to withhold attention (or not) from the frame as he is with the Object Sort Test to construct many or few groups with the materials displayed. Whether the Rod and Frame Test is or is not a measure of ability, it seems to me, is related to whether the individual is so caught up with the task of aligning the rod as a test of his skill that this set dominates the “freedom” to reveal a tendency regarding the management of irrelevant information, an element that is also a part of the task and situation. As in all test situations (see Chapter 3), the diagnostician must judge with cognitive control tests whether the particular individual is coping with a test primarily in terms of the cognitive intention and process as defined by the task and instructions, or in terms of some other self-introduced cognitive intention and process. Clinicians know that most children experience the set described by the test instructions, but some do not.

The construction of “pure” preference tests as opposed to skill tests should not be the ideal of the clinical researcher who has a limited amount of time to devote to devising tasks that appear to elicit preferences. A realistic goal for the clinical investigator to pursue, in connection with the issue of skill test versus preference test, is to specify cognitive control concepts operationally, to examine carefully whether the test constructed meets the definition, and to gather factor analytic support for both. The method of factor analysis, and factor analytic support for cognitive control concepts and tests, are considered in detail in the next chapter.

2. The Issues of Age Differences, Mobility in Cognitive Control Functioning, and Value Judgments About Cognitive Controls

Both Wolizky and Wachtel (1973) and Saarni and Kogan (1976) have identified as a problem the tendency for researchers to imply that one cognitive control (or style) is superior to another. In my opinion, this problem appears to arise mostly in research with cognitive styles because as correlations pile up across many variables and populations, clusters of correlated traits viewed as "good" and those viewed as "bad" begin to form. Two such clusters involving qualities correlated with field dependence and field independence were described earlier. In addition, Saarni and Kogan (1976, p 2.) reflect the view that if a particular cognitive style is characteristic of younger persons, therefore is interpreted as "immature," this characterization implies that the style is less desirable.

In considering this issue, we should first recognize that if a particular cognitive style is seen as superior or inferior because of the traits or age levels with which it correlates, this judgment is totally in the mind of the viewer or investigator. One cannot take the stand, for example, that the impulsive style is inferior to the reflective style (perhaps because, on the face of it, impulsivity is not valued behavior in middle-class America); and one cannot assert that field dependence is an inferior cognitive style because it correlates with passivity and dependency. To justify such an opinion, further information would be needed about the requirements of situations. Is it possible that a field-dependent style or an impulsive style might be adaptive in coping with particular environments or task situations?

Although the problem of valuing one or another cognitive tendency has not been underscored in cognitive control research, workers in this framework are nonetheless vulnerable to the same pitfall. On numerous occasions I have been asked by friendly foes, "Are the good guys Sharpeners and Flexibles, and the bad guys Levelers and Constricters ?"

An approach to this problem is suggested if we combine the notions of ages and stages of cognitive controls with the psychoanalytic concepts of mobility of structures (regression and progression of functions) and environment and adaptation. Let us assume that the problems outlined above under Issue 1 have been successfully handled, and we have available valid and reliable tests of several cognitive controls. In keeping with the biodevelopmental theory, we should then set out to define, within each control, stages of functioning that characterize various developmental levels. Let us further assume, for the sake of discussion, that age studies show that younger children tend to be levelers (i.e., they form global memory images and fuse present information with past), whereas with an increase in age, children exhibit more behavior characterized by sharpening (i.e., they form more articulate memory images and differentiate present information from past). From the viewpoint of the biodevelopmental framework, these findings would suggest that functioning cognitively according to the leveling principle could be viewed as “immature”; *but the judgment of immaturity is made in terms of ideal development, not in terms of adaptive value.*

Having established the developmental sequence or stages of leveling-sharpening functioning, the next consideration would be to determine whether *changes in certain environmental conditions and internal motivational states* are associated with a reorganization of the leveling-sharpening control (mobility of function). Theoretically, reorganization or shift in functioning could occur in the direction of stages typical of persons developmentally younger than the individual in question (regression) or toward stages typical of persons developmentally older (progression).

Having established the developmental stages of leveling-sharpening functioning and the conditions that are associated with regressive and progressive shifts, one last step is necessary before taking a stand about the adaptive value of one stage of leveling-sharpening over another. We cannot presume a priori that all regressive shifts are undesirable. Observations made through the psychoanalytic concept of “regression in the service of an ego” attest to the potential value of functioning at an “immature” level. Additional data must be gathered to discover when a regressive shift toward a tendency to level information is maladaptive and when is it adaptive. By way of example, let us suppose that we observe when individuals are about to undergo surgery, the leveling-sharpening cognitive control reorganizes regressively, and in the context of imminent surgery, relative to the stage that is operative when the individuals are not in the hospital, patients tend to function cognitively in terms of leveling information. If these patients are then judged to be less anxious and aggressive than controls, and to be more cooperative on the ward, we would illustrate that a developmentally early or immature stage of cognitive control is more adaptive than a developmentally higher stage. The same methodology would be followed to study when progressive shifts, or more mature stages of a cognitive control, are adaptive and under what conditions are they maladaptive. The problem of value judgments made of cognitive controls, then, ceases to cause us difficulty if research is conducted to establish developmental levels of each cognitive control and to determine whether and under what conditions regressive and progressive shifts are observed.

The issue of age and developmental levels of cognitive control functioning points to the need for such studies with cognitive controls. Despite a few studies (e.g., Gardner and Moriarty, 1968), there has been little work exploring age and stage differences in cognitive controls. Most of the work with cognitive control tests has been done with adult subjects. In sharp contrast, research with tests of cognitive styles, especially with field dependence-independence, has made major use of children as subjects and has focused on age differences. With regard to the concept of mobility of cognitive control functioning and adaptation, relatively little related work has been done (see review papers cited). This issue is in need of considerable attention by investigators because the concept of mobility of cognitive controls is at the heart of cognitive control theory. Studies in this area would do much to elaborate a dynamic theory of cognition of use to clinicians.

The critical need for age studies of cognitive control functioning relates to the issue of using the same test procedure over a large age span. As Saarni and Kogan note, studies have used different tests of cognitive functioning at different ages. Modifying the task from one age group to another may change the construct in some fundamental way because relations between tests are not known. The preferred situation then is to devise tests of cognitive controls that could be suitable with very young children as well as older subjects.

In summary, the view of cognitive controls as serving the management of changing environments is one of the hallmarks of cognitive control theory. This concept requires that we consider cognitive controls as mobile functions. The issue of mobility, in turn, brings our attention to the need to clarify, specify, and distinguish the critical psychological variables that characterize many different environmental situations. Alongside our analysis of the uniqueness of a situation and its impact on cognition and motivation is the need to study changes (both in degree and direction) that occur in cognitive controls in relation to environmental shifts. Although Klein gave the concept of cognitive controls interacting with environments a central place in his model, workers have paid little empirical attention to this issue.

3. The Issue of the Relations Among Cognitive Controls and Predictions Based on Multidimensional Assessments

I agree with Wolitzky and Wachtel that there is a special need to study and conceptualize the relations among cognitive controls. Are focal attention, field articulation, leveling-sharpening, and equivalence range totally independent cognitive control processes? Is there some principle that could interrelate these several controls conceptually, helping investigators to raise questions about cognition and adaptation, to design studies and organize observations, and to develop remedial techniques for cognitive dysfunction? Moreover, of the hundreds of studies using the cognitive control concept, most have included only measures of a single control. Surprisingly few have studied simultaneously the relations between several controls and other personality and cognitive variables.

4. The Issue of the Relation Between Cognitive Control and Intellectual Abilities

Since we conceive of cognitive controls as fundamental cognitive strategies that underlie many and varied intellectual abilities and skills, there is need for further work in these areas. The relationship between cognitive controls and intellectual abilities is not clear, given the work to date, nor is it clear how such a relationship should be conceptualized (Wolitzky and Wachtel, 1973). Are cognitive controls and intellectual abilities simply different labels for the same behavior, or are they, in fact, different forms or levels of cognitive functioning? One source of difficulty relates to the first issue discussed previously, namely, the need to specify the process elicited by the cognitive control test and the operational definition of the concept to which it relates. But this need applies equally to tests of intellectual abilities. If we are to pursue the goal of studying the relations between cognitive controls as information-processing strategies and intellectual abilities, much care should be taken to distinguish conceptually between controls and abilities and to employ test methods that elicit a response process closely tied to the definitions of each.

Without such care, our search for this relationship becomes confused and derailed.

One example of the pitfalls in this area is provided by a study (Gardner, Jackson, and Messick, 1960) designed to explore the relations between cognitive controls and intellectual abilities. A battery of tests assessing several cognitive controls and several intellectual abilities was administered to college females. To illustrate our point, let us examine more closely two of the tests. The Embedded Figures Test (EFT) was used as a measure of the field articulation cognitive control, in keeping with the view of many investigators. The Concealed Figures Test (CFT) was used as a measure of "flexibility of closure," a variable that is part of an intellectual abilities test and had been accepted as such by the investigators. Yet both tests are variations of the original Goltschaldt figures test. Unless one can distinguish conceptually, and in terms of task process, between the "cognitive control field articulation" and the "ability flexibility of closure," the argument can be made that the EFT and the CFT are simply alternate forms measuring the same dimensions. This contention is made because in this study these two tests yielded the highest correlation in the matrix of 8 cognitive control scores and 16 ability scores. It is this type of correlational finding that led the investigators to conclude that cognitive controls and intellectual abilities can be conceptualized within a single set of principles of personality organization. But perhaps the investigators should refrain from making this conclusion until the following questions, offered as illustrations, are answered. Are the EFT and CFT procedures both measures of the same cognitive control process, or is one (or both) a measure of an intellectual ability? What are the differences between intellectual abilities and cognitive controls? In terms of the issue being articulated here, the relations between cognitive controls and intellectual abilities cannot be effectively explored without first attempting to discriminate conceptually and methodologically between cognitive controls and intellectual ability.

As an orienting guide I find Kogan's tripartite scheme, already discussed, helpful with this issue. I consider to be a test of ability procedure that presents a task that emphasizes skill or ability in its process and minimizes the freedom with which an individual can impose his cognitive tendency, orientation, or style on the information. Examples include the Digit Span or Information sub tests on the Wechsler scales and the California Tests of Mental Maturity scales measuring reasoning by opposites and similarities. Similarly, I accept as a measure of a cognitive control a test that maximizes in its process the freedom of an individual to impose his cognitive organization on the task.

As discussed earlier, however, most clinicians observe in practice that every test procedure, even the most highly skill related, frequently reveals some stylistic quality of cognitive functioning. For example, if a child says "uh" before each digit repeated in the Wechsler Digit Span Subtest and also says "uh" before each response to questions on the Information subtest, the clinician may conclude that with these skill procedures the child is revealing the tendency to employ delay (in the form of vocalizing "uh") when in the process of exercising his ability to remember numbers and factual information. On the other hand, some tests offered as measures of abilities seem to reflect in the process required the condition that the individual has a fair degree of freedom to employ some cognitive attitude in confronting the information and task at hand. For example, the perceptual Speed Test of the Primary Mental Abilities

Test seems to require a process that relates closely to the operational definition of the leveling-sharpening principle. In this test the child examines a silhouetted unfamiliar figure, then searches through a row of figures, only one of which is exactly like the standard. From the view of process analysis, the child must hold the image of the standard in mind as he looks over the responses. The more differentiated and articulate the child's mental image of the standard, the more quickly he is going to choose the reference picture that matches. One could guess that if the mental image of the standard is global, the child will need to look back and forth many times between the standard picture and the responses before selecting one. Although this test does not meet one requirement of the conceptualized leveling-sharpening requirement—namely, that the process include the management of information *sequenced over time*—an appreciable aspect of the task response seems to relate to the leveling-sharpening process in that the child must construct a memory image of the standard, hold it in memory, and relate it to each of several response possibilities, all over some seconds.

Clinicians and investigators then should be cautious in accepting a test as a measure of a control (or style) or as a measure of an intellectual ability without a careful process analysis. Only when sufficient attention is given to the concept and process unique to controls, and to those of intellectual abilities, can progress be made in increasing our understanding of these two psychological dimensions.

5. The Issues of Assessing Cognitive Style Defined as a Configuration of Several Cognitive Controls

As our test methods and conceptual understanding of each cognitive control improve, there is a need for investigators and clinicians to relate configurations of cognitive controls (which in Klein's model defines a cognitive style) to various population and criterion variables. The discussion thus far makes it apparent that the usual research strategy has been to relate one or two measures of a single cognitive control to other variables. This is especially true of the work in the Witkin-Kagan camp, and indeed, both camps of investigation have emphasized exploration of whether, for example, obsessive-compulsive patients and alcoholics are field dependent or independent, and whether repressors, as measured by the Rorschach, are levelers or sharpeners. This work is a necessary part of the task of articulating the concepts and methodology relating to each control. However, when sufficient gains have been made, workers should relate several cognitive controls to some issue. In terms of the interest of this book, for example, measures of several cognitive controls, not just one, should be used in studies predicting which children are likely to develop a learning disability. Ideally all controls should be examined in each clinical population, to advance our understanding of the role these structures play in overall psychological functioning.

This issue brings our attention to the question of the relations among cognitive controls. Are these dispositions simply separate ego-cognitive strategies, or can they be related and understood in terms of some organizing principle? An emphasis on studies employing measures of several controls should help us with this question.

6. The Issue of Conscious Intentionality Involved in Cognitive Control Functioning

Wolitzky and Wachtel (l973, p. 848) raise our sixth issue in their critique of cognitive controls. Cognitive control tasks appear to them to vary in the degree to which conscious intentionality is involved. They suggest that in sorting objects into groups in compliance with the demands of the Object Sort Test, the individual “makes active deliberate, voluntary decisions.” On the other hand, in examining two circles to judge which is larger, “the number of (visual) fixations ... appears to be less directly under S’s conscious control.” The issue of the role of conscious intentionality in cognitive control is an important one because of the centrality of the notion that cognitive controls become operative as an individual engages information guided by an adaptive intention, that is, the intention to negotiate a fit between informational demands, his needs and motives, and the environmental context.

I do not agree with Wolitzky and Wachtel, who phrase the issue in terms of task requirements varying in conscious intentionality. I believe that a more fruitful approach would make use of two interrelated working hypotheses. First, it is hypothesized that the individual *is conscious of his intention to cope with the information and the task as presented and defined.* In this sense then, one assumes that an individual is as conscious of his dealing with the task of grouping objects as he is of his dealing with the task of comparing the sizes of two circles. The related hypothesis is that the individual *is not conscious of the cognitive orientation or strategy he is employing in meeting the task.* That is, the individual is not aware that he is employing and habitually employs “narrow concrete categories” as a strategy in categorizing information ; and the individual is not aware that he scans passively or narrowly when looking at the circles and when surveying any field of information. These hypotheses are useful in studies of mobility of cognitive controls. For example, we would observe whether an individual is aware that he has shifted from a tendency to sharpen information (while at home) to a tendency to level information while in the hospital waiting to undergo surgery. These hypotheses are also helpful in devising therapeutic techniques to rehabilitate deficient cognitive controls. The question here is whether an individual can be helped in becoming aware of his habitual tendency to approach particular information with a cognitive control tendency that is inefficient or growth restricting.

If we apply this issue to test construction, I would suggest that workers not invest too much energy in trying to devise cognitive control tests that do or do not vary in conscious intentionality. Rather, we should make the tentative statement, on theoretical grounds, that the cognitive control process is unconscious, as with the process of ego mechanisms of defense, unless an effort is made to teach an individual about his unique cognitive control functioning. This would parallel the therapist’s efforts to teach a patient about his unique mechanisms of defense.

7. The Issue of Relating Cognitive Functioning as Conceptualized by Cognitive Control Theory with the Conceptualizations of Piaget

In discussing the issues raised by cognitive controls, we are obligated finally to take a few moments to relate the concept of cognitive controls to that of Piaget’s model, which is now perhaps the prevailing view of cognitive functioning in children.

The concept of cognitive controls presents a view of cognitive functioning very different from the model of Piaget. In brief, Piaget's model proposes the concept of cognitive schemata as a structure of intelligence that is responsible for the content of cognitive behaviors observed when a child deals with a task.

The changes cognitive schemata undergo in the course of development are viewed as defining several hierarchically ordered stages. In the first sensorimotor stage the child comprehends and classifies information by means of motor actions performed on the objects and allowed by them (e.g., the child tosses a ball). In the intuitive stage that follows, earlier motor actions performed on objects are internalized, and the child now comprehends information representationally without sensorimotor contact (e.g., the child comprehends that "a ball is to bounce"). In the next concrete stage these representational processes are regrouped, and this results in comprehension of information in terms of the mental conservation of the material's properties (weight, quantity, volume, etc.). In the formal stage, the last level of the hierarchy, the child deals with information hypothetically. That is, the information contained by objects does not need to be physically present, as in the case of the first three stages.

One major difference between the concept of cognitive controls and Piaget's concept of schemata is that cognitive controls are viewed as organizing principles that operate in the management of all cognitive tasks at all stages of development. In contrast, a particular schema is viewed as operating at one stage or with one task, and not in another stage. For example, consider a 2 year old who reaches out and squeezes a rubber ball placed before him. From the Piagetian view, schemata, as motor actions, are operating in this response. From the perspective of cognitive control theory, one would say that several cognitive controls are operating in this response. The child regulates body motility in reaching out for the ball and in squeezing it (body ego-tempo regulation control). At the same time the child has scanned his environment (focal attention principle) and has selectively directed his attention at the ball rather than at other objects (field articulation principle). In the Piagetian view, the 2 year old's response of squeezing a ball implicates one main schema (sensorimotor actions). From the cognitive controls standpoint, the same cognitive response is seen as implicating several cognitive controls.

To illustrate further, let us suppose that a ball is placed before a 4 year old and the examiner asks, "What is this? What is a ball?" The child replies, "You can bounce it." Again from the perspective of cognitive control theory, one would interpret the cognitive process involved by saying that the child regulated body motility in keeping his body relatively still while attending to the ball and to the question. One would also say that the child scanned his environment (focal attention principle), then selectively directed his attention at the ball and withheld his attention from other objects in the room (field articulation principle). The child also related his perception of the ball in view, and of the question asked about it, to memory images of balls encountered in the past (leveling-sharpening principle). And the child categorized the ball in terms of one of its physical properties (equivalence range principle). To a Piagetian, the child's response would be seen as organized by a schema of internalized actions belonging to the concrete stage.

Another major difference between the concept of cognitive controls and Piaget's concept of schemata is that the former emphasizes individual differences observed in the functioning of each cognitive control principle. For example, cognitive control theory would distinguish between one child who runs about the room, then touches the ball several times before picking it up, and another child who sits in a chair, reaches out once, and grasps the ball. Similarly, the difference would be noted between the child who looks at and comments about several objects in the room before selectively attending to the ball, and the child who withholds attention from surrounding objects and attends selectively to the ball. These cognitive differences are minimized or ignored in the Piagetian view, which sees a child primarily in terms of whether the cognitive behavior observed belongs to a particular stage of intellectual development.

Chapter 5 gives further consideration to a comparison of the concept of cognitive controls and Piaget's view of intellectual operations, in a discussion of a factor analytic study of cognitive control measures and Piagetian tasks. Here we emphasize that the concept of cognitive controls represents a way of viewing cognitive functioning in children that differs not only from the view of cognitive style but also from that of Piaget.

Assessing Cognitive Controls in the Functioning in Children

With this critique of the concept of cognitive controls and methodological issues and problems suggested by research reported to date, let us introduce the work reported in this book. This research attempts to use the cognitive control model in developing new diagnostic and treatment technology of use to clinicians in their practice with cognitive dysfunction and learning disabilities presented by children.

Benefiting from the groundwork laid by Klein and his colleagues, which distinguished the operational definitions and unique processes of several cognitive controls in the functioning of adults, I addressed first the task of exploring whether cognitive controls, as defined and observed with adults, could be shown to characterize the cognitive functioning of children. I began by administering to young children several of the test procedures used by Klein and his associates. These first informal efforts suggested that the tests were not suitable for children, especially those belonging to clinical populations known to have difficulty taking psychological tests. For example, as discussed below, children found the Schematizing Squares Test (comparing 150 squares) a tiring task; in addition, they became very anxious when reading the printed words of the Stroop, and these emotional reactions appeared to obscure the cognitive control preferences we were trying to assess. Besides noting these clinical reactions, I also became impressed, in keeping with the methodological critique already discussed, by the need to work further with matching the demands, instructions, and process of a given cognitive control test with the cognitive control process reflected in its definition. Another problem presented itself. In administering procedures to children of different ages, it became clear that some tests suitable for 10 year olds were not suitable for 5 year olds. For example, most 10 year olds attending a clinic could read the printed words required by the Stroop test, but most 5 year olds could not handle this task.

As a result of these preliminary experiences and considerations, I decided to construct new test procedures as necessary for each cognitive control that would (1) satisfy the operational definitions of cognitive controls (proposed by Klein) in the task, process, and instructions presented; (2) be suitable for children between the approximate ages of 3 years and adolescence, especially children in clinics and hospitals; (3) require relatively simple material that would facilitate use by clinicians in the typical office; and (4) permit the assessing of several cognitive controls within 1 to 2 hours of diagnostic time with a child.

Five test procedures, each assessing a cognitive control, were developed over the course of several years to meet these conditions. These tests and details of their administration, scoring, and interpretation, are presented in detail in Chapter 10. At this point the tests are described briefly, primarily to relate their construction and development to the methodological issues noted earlier, and also to aid the reader in reviewing research done with them (Chapters 5 to 9).

In reviewing each test that I developed for children, reference is made to related tests used by Klein and his associates with adults. Wolitzky and Wachtel (1973) have presented a more detailed description of the latter and an excellent review of their historical development.

SUMMARY OF METHODS FOR ASSESSING COGNITIVE CONTROLS IN CHILDREN

Focal Attention

As noted earlier, an individual's preferred way of sampling or registering a field of information reflects the functioning of the cognitive control of focal attention characteristic of that person. Some individuals sample limited aspects of the field passively and others sample more extensive aspects of the field. Originally termed "focusing," this principle was later reformulated by Gardner as "scanning." I prefer the term "focal attention," which also embraces "breadth of scanning," because of its more elaborate propositions (formulated by Schachtel, 1954) that link earliest scanning and attention deployment to the emergence of psychological reality.

The main procedure used by Klein and his associates required the individual to adjust a variable circle of light to match the size of a standard disk. On the basis of a number of studies relying on Piaget's concept of centration and assessment method, overestimation of the standard disk was assumed to be a function of relative centration on the standard and was taken to indicate limited or narrow scanning. Accurate estimations of the size of the disk were assumed to be an indication of broad scanning.

Accordingly, to measure focal attention in children, I initially constructed a size estimation task that presented a series of pairs of circles printed on cards in illusion and nonillusion conditions (see Figure 1 for examples of two stimuli; Santostefano, 1963). This procedure, referred to here as the Circles Test, was modeled after Piaget's (1942) work, which formed the basis of Klein's procedure. Using circles printed on cards seemed to be desirable because it eliminated the need for special laboratory apparatus.

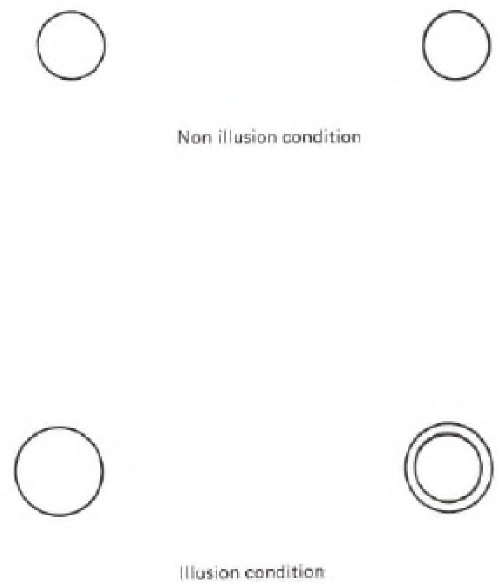


Figure 1. Circles Test.

Figure 1. Circles Test

In the Circles Test, the child is asked to point to the larger circle, with each card in the nonillusion condition, or to indicate that the circles look the same. With each card presented in the illusion condition, the child is asked to compare the single circle with the inside circle of the illusion pair and to point to the larger one or to indicate that the two circles are the same size (see Appendix B for a detailed description of materials and scoring). Following the work of Klein and his associates, in particular Gardner and Long (e.g., 1962a, 19626), it was assumed that children who direct their attention to limited aspects of the field overestimate the size of the circle receiving the greatest attention. On the other hand, children who distribute their attention extensively and equally between the circles make more accurate size estimations. Thus children would be assessed as functioning with a high degree of focal attention (i.e., active and extensive exploration) if they were more accurate in identifying the relative size of two circles and experienced a stronger illusion. By the same logic, children would be assessed as functioning with a low degree of focal attention (narrow, passive scanning) if they made many errors and experienced a weak illusion.

The Circles Test was used with some effectiveness as a measure of the focal attention control in a number of age, population, and factor analytic studies, discussed in the next chapter. As we gained experience with the test, however, we became influenced by the findings of others (see Wolitzky and Wachtel, 1973) that related direct measures of eye movements with size estimation performance, and we began to question whether size estimation was the task most appropriate to elicit the process conceived in terms of focal attention control. Given the operational definition of focal attention, it seemed that a task and method that allowed free visual inspection of a field of information would have greater face validity. The Circles Test and other size estimation tasks used by other workers limit to some extent the child's scanning to the two figures presented.

Clearly the most direct assessment of a child's performance for inspecting a visual field would be to record eye movements directly as the child scanned a large field of information. The eye movements measured would indicate whether the child sampled extensive or limited aspects of the field. However the head-mounted eye cameras available to measure eye movements were not compatible with our goal of relying on relatively simple, inexpensive test material, easily accessible to the clinician. Moreover, my limited experience in observing children with apparatus used to measure eye movements suggested that many clinic children would find this procedure stressful.

Given the foregoing considerations, I constructed the Scattered Scanning Test (SST), aimed at assessing focal attention control with a method that allowed freer inspection of a field of information than did the Circles Test. The SST has been used in our more recent work (reviewed in the next chapter) and is described in detail in Chapter 10. Essentially the SST asks the child to scan a display of relatively meaningless bits of information (geometric shapes), randomly scattered over a sheet of paper, and to mark certain ones (circles or crosses). It is assumed that location of the shapes marked will reveal the manner (narrow or broad) in which the child scans.

With the SST the child is first trained to mark only circles and crosses located among other shapes. Then for the test trial, a sheet of paper (8½ x 11 inches), containing a larger number of geometric shapes, is placed before the child. The child is asked to "look around" and mark with a pencil as many circles and crosses as possible until the examiner says stop. (Time limit is 30 seconds.) As the child performs, the examiner records on a separate test form the sequence of shapes marked by the child. Two scores are derived: (1) the number of correct and incorrect shapes marked within the time limit; (2) the total distance traversed (in centimeters), defined by connecting the shapes marked by the child. The child whose markings are spread over the surface of the page, giving a large distance score, is assumed to be characterized by active and extensive scanning (Figure *2 A).* The child who marks a few shapes clustered together is said to be a passive and narrow scanner (Figure 2 *B).*

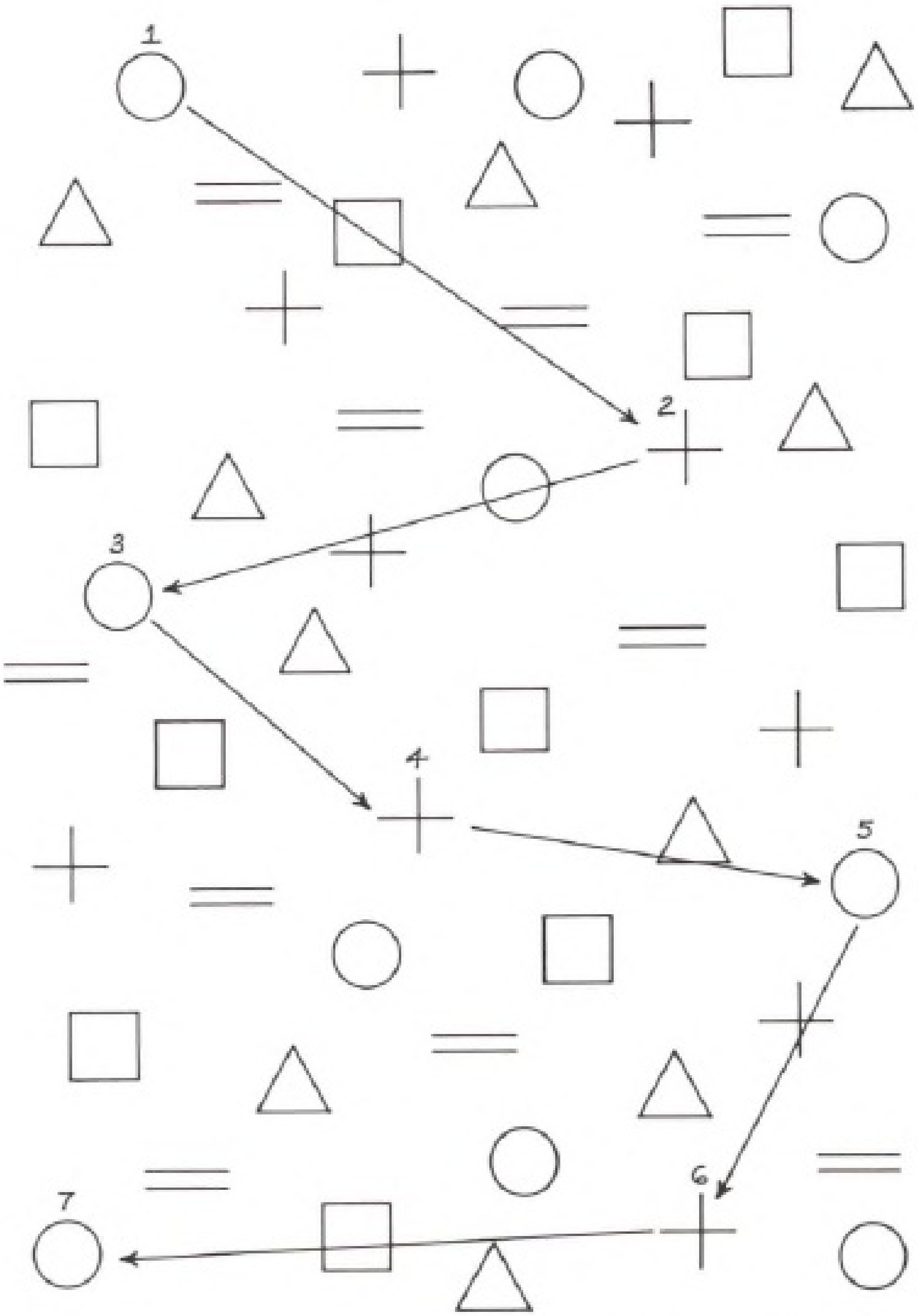


Figure 2A. Scattered Scanning Test (circles and crosses)

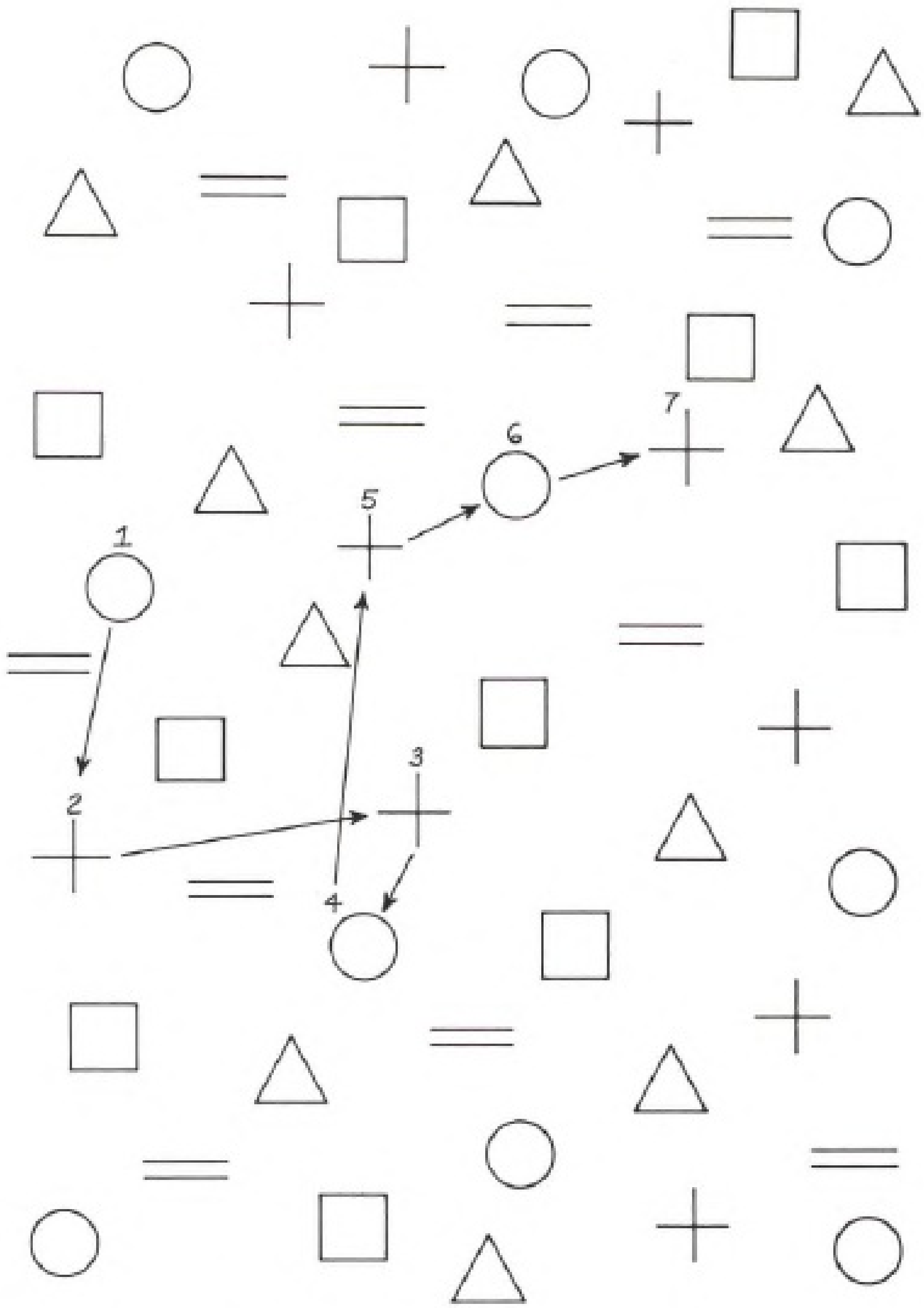


Figure 2B Scattered Scanning Test (circles and crosses)

To take into account a child's characteristic motor tempo in marking geometric shapes, we used the same simple shapes employed in the SST to administer the Motor Tempo Test (Figure 3). Here the child is asked to mark each of the shapes in succession, in one trial "in your regular way," and in another "as fast as you can." The time taken to mark these shapes is used to qualify the two main scores of the SST. Essentially, total distance in centimeters and total numbers of correct responses are multiplied by time to mark all the shapes in the Motor Tempo Test (see Chapter 10). In this way an attempt is made to isolate the part of the response process concerned with breadth and activity of visual scanning.

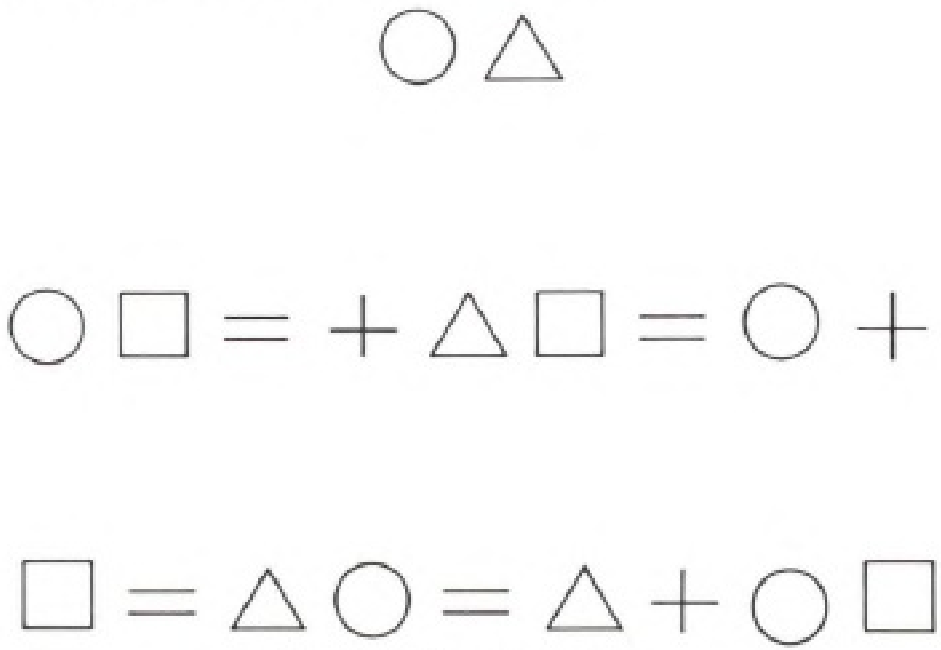


Figure 3. Motor Tempo Test.

Some children under the age of 5 show difficulty in marking both circles and crosses. Therefore the free inspection intended to dominate the process of this test is contaminated by lack of competence in marking two types of shape. In these cases a simpler version is used in which the child has to mark only squares from among a scatter of different shapes. For children older than 9 years, the SST form used is 16 x 23 inches (i.e., 4 times the area used for younger subjects). The child's task remains the same: to look around and mark circles and crosses. Our experience indicated that the larger field of information was necessary with children in the second half of latency and in adolescence, for whom the 8½ x 11 inch field was too narrow to provide the freedom in scanning intended. It should be noted that the same task and response process is maintained with each test form, permitting us to study focal attention over a wide age range without changing the procedure.

On the face of it, the SST, its task, and the process elicited seem to fit more closely the operational definition of focal attention (extent of visual scanning when freely inspecting a field of information) than does the Circles Test. Results with the SST in studies of age and population differences are considered in the next chapters.

Field Articulation

The field articulation cognitive control concerns the manner in which an individual manages interference from compelling stimuli that are irrelevant to the central task at hand, which the individual intends to perform. Some individuals selectively withhold attention from irrelevant information; therefore it does not interfere as they process the relevant information. Others give attention to both relevant and irrelevant information and accordingly are disrupted in managing the central task with the relevant information.

It is worth repeating here that Klein (1954) originally used the term "constricted-flexible" to refer to the extent to which an individual tended to be susceptible to interference from irrelevant information. Individuals who showed high interference from irrelevant information were labeled "constricted," and those who showed low interference were called "flexible. " Gardner (1959) later used the term "field articulation" for the same process, to emphasize that with this control the field of information is articulated into relevant and irrelevant parts and attended to selectively. Also, as noted earlier, this concept (and its operational definition) fits that defined by Witkin as field dependence-independence.

The method typically used by cognitive control researchers to assess field articulation is the Color-Word Test, also referred to as the Stroop Word Interference Test (Jaensch et al., 1929; Stroop, 1935; see Jensen and Rohwer, 1966, for a review of studies with this test). The Stroop test consists of three cards. One presents rows of red, yellow, blue and green patches, randomly arrayed, and the individual is to name the colors as quickly as possible. Another card presents rows of words, "red," "yellow," "blue," and "green," printed in black ink and randomly arrayed; the individual is to read these, too, as quickly as possible. The third card is critical for workers who use this test to measure field articulation. Here rows of the same color names are printed in incongruent colors. For example, the word "red" is printed in blue, green, and yellow ink at various points on the card, but never in red ink. The instructions to this card determine that the Stroop test could be used as a measure of field articulation. The instructions are presumed to create an intention in the individual that is seen, along with the task demands, as giving the subject freedom to reveal whether he tends to direct attention selectively at relevant information or to attend also to compelling but irrelevant information. With this third card of the Stroop test, the individual is instructed to *ignore* the printed word (e.g., "red") and to call aloud the name of the color in which it is painted (e.g., blue) as quickly as possible. Individuals said to be characterized by the "constricted" cognitive control are those who take longer to name the colors on Card 3, in the face of interference by incongruous words, than the color patches on Card 1. Those who take about the same amount of time for both tasks are seen as characterized by the flexible cognitive control. It is assumed that the instructions for Card 3 define the colors as relevant information and the printed words as irrelevant, since the person is asked to ignore the latter and to attend only to the colors of the ink. The printed word is seen as compelling "irrelevant" information because of the overlearned tendency to read words. Thus in terms of cognitive control theory, the process of the Stroop test provides the individual with a task situation in which he reveals his tendency to deploy attention in the face of relevant and irrelevant information.

Because of the relative success of cognitive control researchers with the Stroop test, I employed it in informal studies with children as part of the diagnostic workup. These preliminary experiments showed that clinic children, especially those who were having difficulty with school work, tended to become quite restless, anxious, or angry when taking the Stroop test. Many of these children mentioned that they could not read or did not like to read. Therefore it was decided to construct a test modeled after the Stroop that did not make use of printed words, yet still presented a task through which a child could reveal his tendency to give attention or withhold attention from compelling irrelevant information.

The test constructed was originally called the Color-Fruit Test and later renamed the Fruit Distraction Test. The test consists of four cards, each 10 x 14 ½ inches (Figures 4 to 7). Before each card is administered, the child is coached with practice cards to ensure that he readily knows the primary colors, the names of the common fruits (apple, banana, grapes) and the one vegetable (lettuce) used, and the color typical of each. Card I consists of 50 rectangles randomly arrayed in rows and colored red, yellow, blue, and green. (Note that Figure 4 presents the color name of the color of each rectangle.) The child is asked to name the colors as rapidly as possible. Card II contains 50 drawings of apples, bananas, bunches of grapes, and heads of lettuce, colored red, yellow, blue, and green, respectively. These colors are arrayed in an order identical with Card I. Again the child is asked to name the colors as rapidly as possible. Card III contains the same colored fruit arranged identically to the second card. However, in addition, immediately surrounding each piece, are achromatic line drawings of various common objects. These drawings are considered to be intrusive information and irrelevant to the central task, since the child is asked to try to ignore them, to try to pay attention only to the colors, and to name the colors as rapidly as possible. Card IV presents the same fruit but colored incorrectly, and without the peripheral drawings of Card III; thus on the last card a banana is colored red, blue, or green but never yellow; an apple is yellow, blue, or green but never red, and so on. The child is asked to name as rapidly as possible, the colors that “should be there.” Time and naming errors are recorded for each trial. Children who handle the third and fourth cards as quickly as the first, and with few errors, are viewed as representing the end of the field articulation continuum that involves selectively withholding attention from information that is irrelevant (peripheral pictures on Card III and incorrect colors on Card IV) with respect to the main task at hand. Children who take more time with the second and third cards than the first, and who make many errors, are presumed to be directing attention to the irrelevant information as well as relevant.

Yellow	Green	Blue	Blue	Red
Yellow	Yellow	Blue	Green	Green
Red	Green	Yellow	Red	Blue
Yellow	Yellow	Red	Green	Green
Yellow	Red	Blue	Yellow	Green
Red	Green	Yellow	Blue	Green
Blue	Red	Yellow	Green	Blue
Red	Red	Green	Blue	Green
Red	Yellow	Red	Blue	Red
Blue	Blue	Yellow	Blue	Red

Figure 4. Fruit Distraction Test, Card I.

Comparing the Fruit Distraction Test with the Stroop, it can be seen that the first card of each is essentially the same, requiring the naming of color patches. The fourth card of each is also essentially the same in that an incongruity is presented between the “relevant” and “irrelevant.” Card II of the Fruit Distraction Test was initially constructed to provide a trial during which the child must deal with each color as linked with a specific fruit or vegetable and to serve as a control card (along with Card I) for the interference cards (II and III). In addition to accommodating this purpose, however, Card II appears to contain compelling irrelevant information for some clinical groups (see Chapters 5 through 9). Some children are disrupted by the presence of the pictures of the fruit, as revealed by the difference in performance between handling Cards I and II.

Card III of the Fruit Distraction Test has no counterpart in the Stroop test. Since the field articulation principle concerns the management of irrelevant information, it seemed desirable to construct a test in which the irrelevant information was presented both as “geographically peripheral” to the relevant information and as contextually embedded and incongruous, as with the fruit-color combinations of Card IV and the word-color combinations of Card 3 of the Stroop.

Figure 5. Fruit Distraction Test. Card II.

A few comments about the content of the peripheral, irrelevant distractions used are indicated. An inspection of Card III (Figure 6) shows that there are six peripheral food-related objects and six non-food-related objects. Each appears four times throughout the card and only once alongside a given fruit. I felt it could serve future research if the peripheral information included incorporated compelling need-related qualities. In part because the test was constructed for young children, I decided to include pictures in the first construction of the test that would be associated with the oral stage or with the succorance need. My aim was to construct several "Card Ills," each with peripheral objects that related to a particular psychosexual stage or need (e.g. phallic-aggressive, anal, genital-sexual). Because it seemed important to use the same procedure in various studies, however, distraction cards other than Card III with its oral-related objects have not yet been developed sufficiently. This is a line of work I plan to pursue as sufficient standardizing data are gathered for Card III, because manipulating different types of need-related object as peripheral irrelevant information should be very helpful in studies exploring the relation between the cognitive control of field articulation and the regulation of needs and affects.

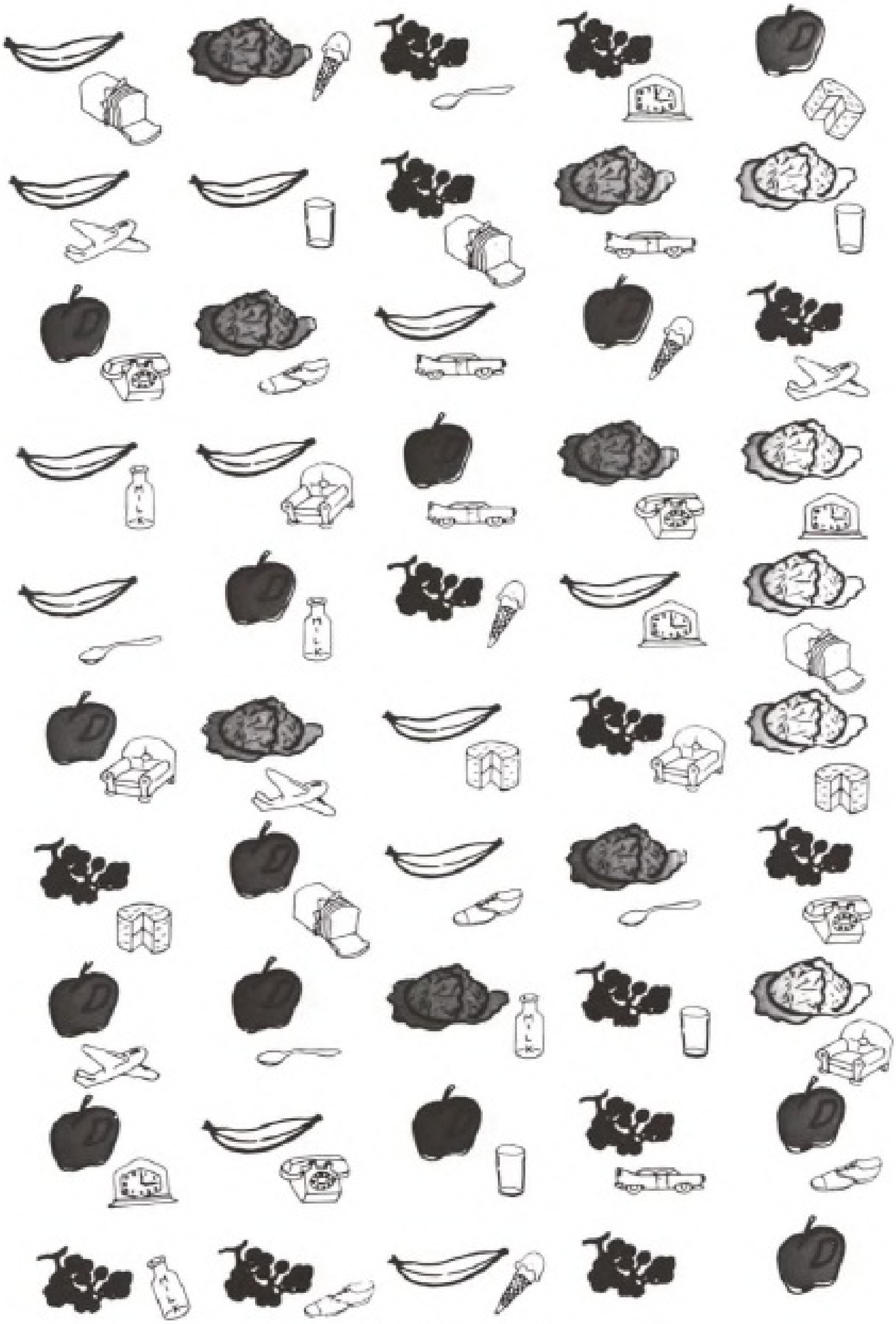


Figure 6. Fruit Distraction Test, Card III.

The Fruit Distraction Test has been used with children as young as 3 years and with adolescents. Usually with children older than 10 or 11 years, Card III does not represent a sufficiently compelling distraction; thus the child does not have the opportunity to reveal how he tends to manage irrelevant information. Card IV appears to be effective through adolescence, however. In any case we have followed the practice of using both the Fruit Distraction Test and Stroop where indicated with children after the age of 10 years.

The Stroop test appears to have one deficiency in its makeup. The sequence of the colors in Card I (color patches) is not the same as the sequence of printed words of Card 2. The sequence of the ink colors in Card 3 is also different. In other words, the individual does not say the same thing, in the same order, with each card, the overt response differs from card to card. The Fruit Distraction Test was constructed to avoid this. It seemed better methodologically to have the child speak aloud the same sequence of names with each card. Thus with each card the child says, "red, green, blue, red" in managing the first row, and so on. The issue is that in Card I these words are being spoken in response to color patches, in Card II in response to colors shaped in the form of fruits, in Card III in response to fruit surrounded by peripheral pictures, and in Card IV in response to colors that contradict the color name to be spoken. In comparing performance with the four cards, then, the child's [correct] overt response with each is the same, but the information processed differs in terms of the extent and form of compelling irrelevant information present.

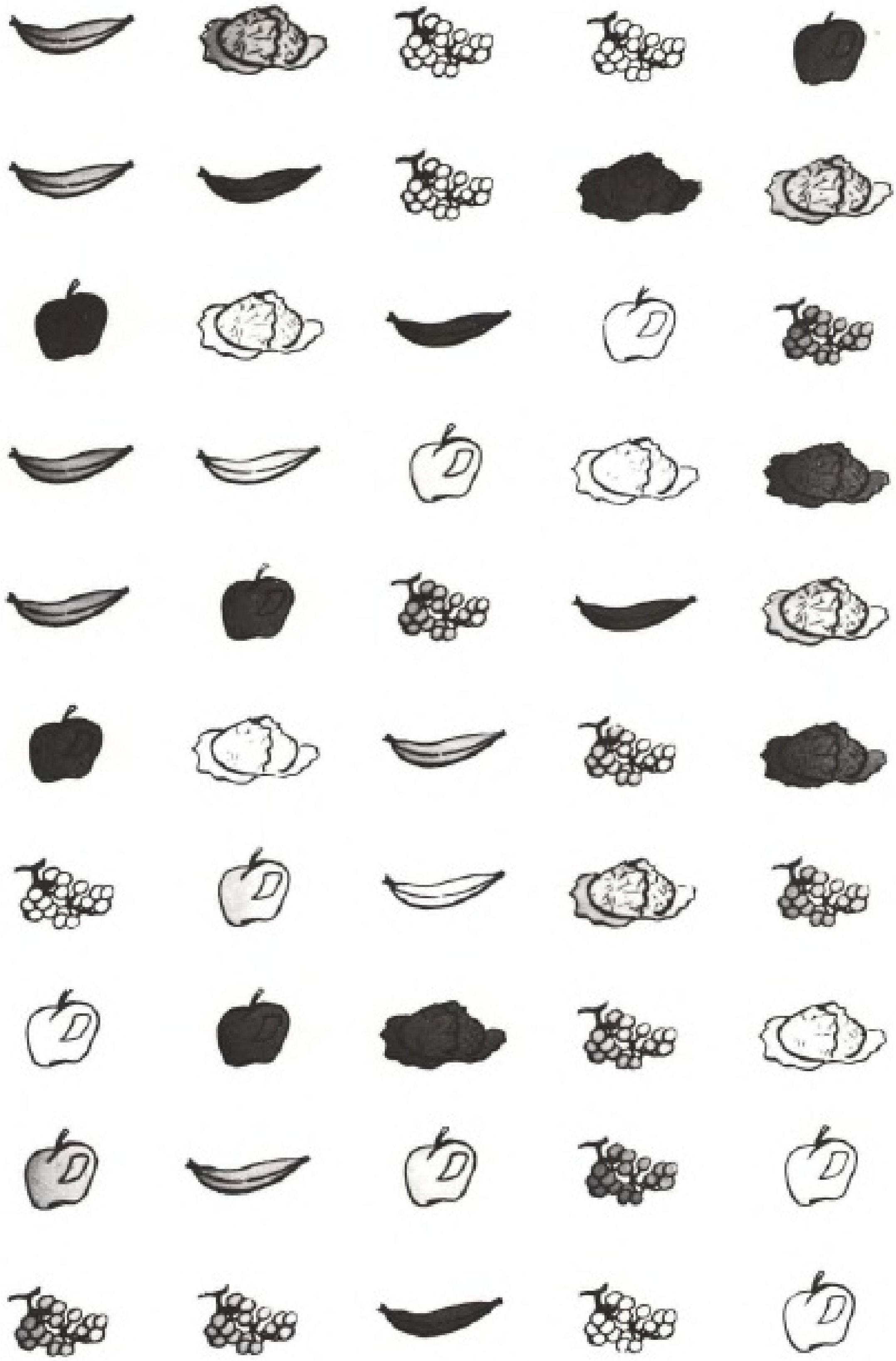


Figure 7. Fruit Distraction Test Card IV.

An examination of the Fruit Distraction Test and the process it elicits seems to fit the operational definition of the field articulation cognitive control. The task requires the child to name colors aloud as quickly as possible, but it is assumed that the test materials are constructed to provide the child with the opportunity or freedom to withhold attention from compelling irrelevant information, as he is naming colors, or to respond to that information.

Leveling-Sharpening

As noted earlier, the leveling-sharpening principle concerns the manner in which an individual organizes memory images of information and relates these images to present information. At the leveling end of the continuum are individuals who do not notice subtle changes in information because global images that are constructed of past information are fused with present information. At the sharpening end are individuals who readily detect subtle changes in information because they tend to construct differentiated memory images that are articulated from present information. The Schematizing Squares Test is the principal task that has been used by cognitive control researchers to assess this control. The test consists of 150 squares, shown in sets of 5. In each set the smallest square is omitted and the next largest one added, making for a gradual increase in size as the series of presentations progresses. The individual is asked to judge the size of each square. If the individual's size estimations keep pace with the gradual increase in size, it is assumed that differentiated images of the squares are constructed and that these are related in an articulate way with the present square. If the size estimated by the individual is smaller than the present square, it is assumed that global memory images are formed of past squares and assimilated to the present.

When administering this procedure, I observed that young children and clinic child patients usually experience the test as tedious and boring because of the many size estimations required. These children frequently find it difficult to keep their attention on the task and to remain motivated; thus one is evaluating the management of fatigue more than the manner in which a child assimilates or differentiates memory images of ongoing information with present information.

It seemed necessary then to devise a parallel test more suitable for children. The first test constructed, called the Leveling-Sharpening Circles Test, consisted of 60 circles that gradually increased in size (see Appendix B). The circles were presented by a memory drum, and the child pushed a button each time the circle displayed was judged to be larger than the previous circles. It was assumed that the smaller number of size estimations required by this task, and the use of a primary shape (circles), would make the task more suitable for children than the Schematizing Squares Test.

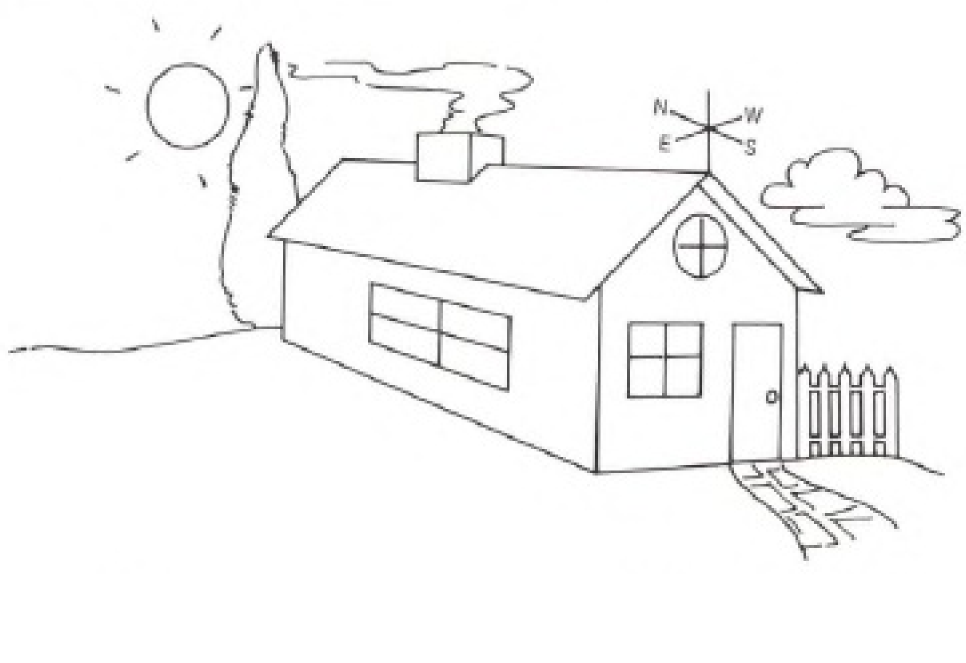
Moreover, it occurred to me that it would also be useful to explore a test procedure that presented a picture of a familiar object that gradually changed over time, rather than a geometric shape. A configuration of information represented by a picture of a familiar object would address more directly the operational definition of leveling and sharpening—that is, the degree to which one tends to construct and maintain differentiated memory images.

Information in the form of some familiar object might also facilitate a child's remaining involved in the task as defined. Accordingly, a second test was constructed, called the Leveling-Sharpening Wagon Test (see Appendix B). A simple line drawing of a child's wagon was presented by means of a memory drum. In successive displays one or another detail was omitted from the picture (e.g., a part of the handle, a wheel). The child was asked to look at each picture and to press a button each time the wagon "looked different or changed." When the child pressed the button, the drum stopped and the examiner inquired about the perceived change.

Studies (e.g., Santostefano, 1964) of the Leveling-Sharpening Circles and Wagon tests suggested that the use of a picture of a familiar object was more effective with children than a picture of a geometric shape. Moreover, some data indicated that changes introduced, in the form of elements added to and subtracted from the wagon, were equally effective in providing a measure of the leveling-sharpening process. These two tests were used in several studies described in the next chapter. However the Wagon Test revealed two shortcomings. For older children the picture of the wagon seemed too simple a configuration of information to remember. Therefore, one did not obtain as good an assessment of the manner in which memory images are constructed. Also the need for a memory drum could make the method awkward for typical clinical practice.

As a result of these initial experiences, I decided to vary the Wagon Test to present a more complex configuration of information to be held in memory and to be used without a memory drum. The test constructed, the Leveling-Sharpening House Test, has been used in our more recent work as a measure of the leveling-sharpening control.

Figure 8. Leveling-Sharpening House Test and list of details that drop out.



Card #	Details	Card #	Details

4	Doorknob	31	Part of fence
7	Bottom rail of fence	34	Lines in round window
10	Sun rays	37	Smoke
13	Right hill line	40	Round window
16	Top of weathervane	43	Roof line
19	Left hill line	46	Weathervane
22	Weathervane directions	49	Vertical lines in windows
25	Horizontal line in large window	52	Stones in path
28	Horizontal line in small window	55	Tree
		58	Path

The House Test consists of 60 two-dimensional line drawings of a house, each printed on a card (Figure 8). The cards are presented to the child one at a time, in 5-second displays. From card to card, elements of the drawing are omitted accumulatively, each picture after the fourth representing some combination of omissions. The child is asked to examine each card as carefully as possible and to tell the examiner to stop the display whenever "the picture changes or looks different." If the child asks that the presentation be stopped, the examiner conducts an inquiry to establish what about the picture looks different. Then the response is recorded and the display is continued until all 60 pictures have been presented. In terms of the leveling-sharpening cognitive principle, children who detect changes early in the series, report many changes, and report changes immediately upon, or soon after, a change is first introduced, are said to be maintaining stable differentiated images in memory over time and keeping present information articulated from past information (sharpening). By the same token, children who detect few changes, and only long after the changes are introduced, are said to be maintaining global, fluid images in memory over time and fusing present information with past (leveling). The reader is referred to Chapter 10 for a detailed discussion of the test material and instructions for administration, scoring, and interpretation.

The Leveling-Sharpening House Test has proved to be effective with children ranging in age from 3 years through adolescence. It has also been effective with adults. An examination of this task and the process it elicits appears to fit the operational definition of leveling-sharpening. Information (the picture of a house) is presented repeatedly and sequentially over time, and the guiding intention set by the instructions is to notice whether the information "changes or looks different." If a child examines a given display and reports some change, it is assumed that the configuration of information being examined (of the house scene) is being compared to a memory image of that house scene that has been constructed by the child over repeated examinations of past displays and has been maintained over a period of time.

Equivalence Range

The equivalence range control, also referred to as "conceptual differentiation," concerns the manner in which an individual categorizes information. When relating pieces of information as belonging together for some reason, some individuals show a preference for broad categories, and others for narrow categories.

The most commonly used procedure to assess the equivalence range cognitive control is the Object Sort Test. This procedure was first proposed by Goldstein and Sheerer, elaborated by David Rapaport, and used by Klein and his associates with adults as a measure of categorizing behavior (see Gardner, 1953; Gardner and Schoen, 1962). In this test 49 objects are placed on a table (Figure 9). The individual is asked to group the objects, placing together those that he feels belong together for some reason.

Examiner

	1	2	3	4	5	6	7	8	9	10	11
A	Red plate	Cork	Candy cigar	Toy spoon	Index card	Yellow poker chip	Nail	Key	Red cardboard circle	Toy dog (brown and white)	Real pliers
B	Real screwdriver	Wood block with nail	Apple (red plastic)	Toy clapper	Toy knife	Real pipe	Bicycle bell (silver)	Real knife	Cube of sugar	Key	Red ball
C	Real cigarette	Matches	Cork	Toy screw-driver	Nail	Soda cracker	Padlock	Eraser	Toy saw (yellow)	Red candle (small)	Toy cigarette (white candy)
D	Toy hammer (red handle)	Real fork	Cube of sugar	White candle (large)	Real cigar	Toy pliers	Toy fork	Bathtub stopper (white)	Real spoon	Red poker chip	Green cardboard circle
	Red cup					Child					Soda cracker

Figure 9. Display of materials presented to the child in the Object Sort Test II.

I have found the Object Sort Test effective with children from the ages of 3 years to adolescence. The instructions used with children emphasize that there are no right or wrong answers, that the child may form many or few groups, that he may place as many or few objects as he wishes in each group, that he should try to find a place for each object, and that some objects may be left out of groups. To evaluate a child's performance with the Object Sort Test, I evolved a scoring system (see Chapter 10 for details) that distinguishes between groups judged as "typical" or "atypical" in terms of the content of the group and the reason given by the child for congregating the objects. The system then distinguishes between levels of abstraction represented by the typical groups; it differs from that employed by cognitive control researchers with adults, who typically have used only the number of groups formed by the individual (Gardner et al., 1959).

Given the definition of the equivalence range control, children who form narrow groups in terms of the objects used and concepts applied to relate them (e.g., two keys are grouped because they are identical) represent one end of the equivalence range continuum, and children who construct broad groups (e.g., toy spoon, toy knife, and toy fork are grouped because they are "silverware you use in playing") represent the other end. Some reports have indicated that the preference for broad over narrow categorizing is independent of the level of abstraction employed (Gardner and Schoen, 1962) and independent of the capacity for inductive and deductive reasoning (Gardner et al., 1960). Studies reported in the next chapters address this issue in exploring the relation between breadth of categorization and level of abstraction in the cognitive functioning of children.

The task presented by the Object Sort Test, and response process elicited, appear to meet the operational definition of the equivalence range cognitive control. In surveying the many objects arrayed, the individual is free to cluster them in groups that are broad or narrow, concrete or abstract, thus revealing his characteristic way of categorizing information.

To this point we have considered procedures devised for children which assess four of the five cognitive controls defined by Klein and other investigators: focal attention, field articulation, leveling-sharpening, and equivalence range. I have not developed a children's procedure for the fifth cognitive control, namely, tolerance for unrealistic experiences. The main tasks used to assess this control are an apparent movement task and an aniseikonic lenses task (see Wolitzky and Wachtel, 1973). One reason for omitting a measure of this control in our work is that in early studies by us, measures of tolerance for unrealistic experiences did not appear to play a major role in defining cognitive control functioning in children. This issue is considered in the next chapter, which discusses factor analytic definitions of cognitive controls in children.

There is yet another reason for my not pursuing the development of child tests of tolerance for unrealistic experience. Our studies with children suggested that a domain of behavior that has not been emphasized in work with children may be important in analyzing observations made of cognitive control functioning of children. The domain of behavior involves the regulation of body motility and the cognitive representation of body boundaries. At this stage in the work, I have conceptualized these as one cognitive control, which is referred to as the principle of "body ego and tempo regulation." As this principle is studied further, however, data may suggest that the components of motoric regulation and body boundaries should be segregated conceptually. To assess this cognitive control principle, we have recently constructed a procedure called the test of body schema and tempo regulation (BSTR).

Our initial studies of this domain of behavior made use of a procedure that assessed fine motor delay. We placed before the child a sheet of paper on which was printed an S-shaped maze. In trial 1 the child is asked to draw a line in "his regular way" from the start to the end of the maze. The examiner records time taken to draw the line. In trial 2 the child is asked to draw the line again, but moving the pencil as slowly as possible without stopping forward movement or picking up the pencil. The time difference between trials 1 and 2 is taken as an index of motor delay.

As our work with cognitive control functioning in children progressed, it became clear that the degree of delay of both fine and gross motor activity was critically implicated in the development of cognitive controls. Moreover, the nature of the schemata or symbols a child constructed to represent fine and gross motor expressions also seemed important. Therefore, recently we elaborated our method to comprise the BSTR. In general, the test procedure provides data about (1) the schemata or symbols a child uses to represent his body when it is assuming postures, when it is moving in space, and when it is moving in response to touch perceptions; and (2) the degree of delay imposed when the body is moving through the space of a room, when an object is moved across the more restricted space of a table top, and when a pencil is moved across a sheet of paper.

In the first part, for example, the child is asked to stand, and to describe while maintaining this posture what he is reminded of as he articulates the body sensations. The child who describes a soldier standing at attention is viewed as having developed differentiated, developmentally advanced cognitive schemata of body ego sensations, as opposed to the child who is unable to name a referent, or who says simply “a pole.” The same procedure is followed using other positions involving the total body and parts of the body. To assess schemata representing touch perceptions, the child is asked to touch 10 ambiguous shapes administered under a cloth, so they cannot be seen, and to describe what each “could be” or “reminds you of.”

In the second part of the BSTR procedure, to assess body delay and the regulation of body tempo, the child is asked, for example, to walk on an S-shaped pathway across the room, to move a toy car on an S-shaped pathway across a table top, and to move a pencil across an S-shaped maze on a sheet of paper, each at regular tempo and again as slowly as possible. The associations gathered in response to body postures experienced, and the time differences observed in moving at “regular” and “slow” tempos are used to assess the developmental status of a child’s body schema and motor delay. A detailed manual of instructions for administering, scoring, and interpreting the BSTR is presented in Chapter 10.

In summary, as my colleagues and I observed and conceptualized the cognitive functioning of children within the cognitive control framework, we found that focal attention, field articulation, leveling-sharpening, and equivalence range—four of the cognitive controls formulated by Klein and his co-workers with adults—were relevant and we developed methods to assess these in children. One control principle, tolerance for unrealistic experiences, did not seem to be particularly relevant, and we did not pursue the development of a children’s test. We were obliged, however, to introduce a new control principle and a test method that emphasized body schemata and tempo regulation.

I do not take the position that the test procedures and the cognitive controls they assess represent all the dimensions that might be significant or meaningful in understanding the cognitive functioning of children and the role of cognition in adaptation. Indeed, in recent years a number of other cognitive principles have been proposed—for example, ego closeness-ego distance, simplicity-complexity, importing, augmenting-reducing, conceptual systems, automatizing, and tolerance for ambiguity (see Wolitzky and Wachtel, 1973). Further work with these principles may reveal that they have value in providing new techniques and concepts of use to the practitioner in diagnosing cognitive dysfunction. However I elected to limit myself at the start to the model and methods of cognitive controls as formulated by Klein, in the search for new technology of use in clinical work with children.

These test procedures I developed to assess each cognitive control principle have been used in a number of studies in an effort to validate them for clinical practice. Though oriented toward validating the tests, the studies were also designed to address a number of the issues and needs discussed in the preceding critique of the concept of cognitive controls. Factor analytic studies have been conducted to gather support for the validity of the construct of cognitive controls. Studies have related the children's tests of cognitive controls with other cognitive tests, intellectual skill tasks, and teacher ratings to explore whether the tests devised elicit the process conceptualized. Studies have also explored the reliability of these tests. The test performances of children at different ages have been observed longitudinally and in cross section, to explore the question of developmental levels in cognitive control functioning. The cognitive control functioning of individuals in different environments has been investigated to begin to explore the issue of the adaptive value of one level of cognitive control functioning versus another when cognition is viewed in interaction with the environment. Studies have also related performance on the cognitive control tests devised to intelligence scores, sex, and socioeconomic status. And assessments of several cognitive controls have been used, in combination, to predict the academic performance of children in future grades. Last, the studies conducted have suggested a developmental-adaptational model of cognitive controls that elaborates the conceptual model proposed by Klein and his coworkers. The model appears to be helpful to clinicians in conceptually relating cognition to adaptation, development, and affects, and in shaping questions that could guide the diagnosis of cognitive dysfunction and the design of future investigations.

These studies of the validity, reliability, and clinical application of the tests devised, and the developmental-adaptational model of cognitive controls, are presented in Chapters 5 to 9. The reader may examine the next chapters using only the foregoing description of the tests devised for children. At some point, however, the reader is encouraged to become acquainted with the detailed manuals for administering, scoring, and interpreting each of the tests presented in Chapter 10. The greater the reader's familiarity with the specific requirements of each test and with the unique cognitive process a child experiences when dealing with each test, the more meaningful will be the discussions of validity and reliability, the developmental-adaptational model of cognitive controls, and related clinical studies. Moreover, detailed knowledge of these diagnostic procedures and the cognitive behaviors they assess is very desirable in making optimal use of the discussion of the theory and technique of cognitive control therapy considered in Parts IV and V.

Notes

[12] This chapter elaborates an earlier publication (Santostefano, 1969) comparing the concepts of cognitive control and cognitive

style and attempts to respond to theoretical critiques recently published on this topic.

[13] The critique of these two schools relies on and is influenced by views expressed by Wallach (1962), Guthrie (1967), Wolitzky and Wachtel (1973), and Saarni and Kogan (1976). However, responsibility for the interpretation given these writers is mine.

[14] Klein (1951) first used the term perceptual and cognitive “attitude” to account for individual differences in cognitive test performance. This term was later replaced by the word “control” to emphasize the hypothesized regulative aspects of these behaviors.

CONSTRUCT VALIDITY OF COGNITIVE CONTROLS IN CHILDREN

When clinicians reflect on the concept of cognitive controls and the tests devised to assess them in children, they may wonder legitimately whether cognitive controls do in fact “exist,” or whether they are figments of the clinical investigator’s imagination. Unless these concepts are tied to cognitive behaviors observable in the clinician’s office, however, they can hardly provide a starting point for building a dynamic model of cognition that is useful in diagnosis and treatment.

The clinician’s skepticism might be formally expressed in the following questions. Is the concept of cognitive controls, as defined by Klein, valid when applied to the cognitive functioning of children? Are cognitive control principles independent cognitive processes (structures) that underlie (are basic to) cognitive activity of children involved in a wide range of cognitive tasks? That is, if we observe a child assemble blocks to copy a design, draw designs from memory, decide whether a geometric figure has been rotated in space, and place cutouts into a form board, is there a single cognitive process, or “cognitive control structure,” that can account for all these activities involved in the management and processing of information? And does this process satisfy one of the operational definitions of cognitive controls defined by Klein and ego psychologists?

These questions bring us to the issue of validity. Three types of validity are considered critical in behavioral research: content validity, criterion-related validity, and construct validity (American Psychological Association, 1974; Cronbach and Meehl, 1955). To establish content validity, it must be demonstrated that the content or task of a test samples specific behaviors about which conclusions are to be drawn. This could be accomplished by asking experienced workers to judge the extent to which the response elicited by a task relates to the definition of the psychological variable the test was designed to measure. Another way to determine whether the content of a test is validly related to the definition of the function it measures is to correlate the test measure with other tests already established as measures of the same behavior.

This leads us to the second type of validity. Criterion-related validity demonstrates whether the test behavior under study relates to other assessments considered to provide a more or less direct measure of the characteristic or behavior in question. There are two ways of relating the test being developed with other variables. In one approach the test score is correlated with another measure that is obtained at about the same time-demonstrating concurrent validity with a related criterion. Alternatively, the test score is correlated with another measure that is obtained at some time in the future—demonstrating predictive validity with a related criterion.

To establish construct validity, the third general type, special attention should be given to the construct or psychological principle the new test purports to measure. In this regard, clinicians need frequent reminders that constructs are not observable behaviors. Ego, superego, drives, cognition, and so on, are *not* behaviors in themselves; rather, they are constructs through which we can conceptualize some class of behaviors. In terms of our interest, for example, the cognitive control principle of focal attention is a construct, not behavior. As a construct, focal attention represents a domain of behaviors. After devising a test of the focal attention cognitive control, one is faced with the task of demonstrating that the behavior the test measures is in fact related to the behaviors conceptualized by the construct. That is, one must demonstrate that the test measure relates to the construct it purports to measure.

It can be seen that these types of validity are only conceptually independent. Each type serves to emphasize one issue important in validating a diagnostic test. In practice, data related to one type of validity often contribute to another. For example, a correlation obtained between a test of visual scanning and a teacher's rating of paying attention in the classroom would suggest that the content of the test elicits behaviors having to do with deploying attention (i.e., would lend support to the content validity of the test). The same correlation also provides information about the validity of the construct the test is supposed to measure; that is, a construct such as focal attention, which conceptualizes the directing of visual attention.

Of the three types of validity, the issues emphasized by construct validity should be considered first when a new concept involving a behavioral trait or quality is suggested. If an investigator proposes a construct that defines a new and different way of conceptualizing and viewing some domain of behavior, he is then obliged to demonstrate the validity of the proposed construct. This chapter is devoted to that task. The other types of validity are considered in the next chapters.

The concept of cognitive controls was proposed in our previous discussion as a new and different way of viewing and conceptualizing cognitive functioning in children. We noted that although Klein and his associates have reported considerable evidence supporting the validity of the concept of cognitive controls, this evidence derives almost entirely from observations of adults. Therefore the concept cannot be automatically accepted as theoretically and clinically valid when applied to children. We also noted earlier that work with children by Witkin and Kagan treated the cognitive functioning of children in terms of the related concept of cognitive style. As we have seen, however, the concepts of cognitive style and cognitive controls contain properties that differ in critical ways. Therefore it would not be appropriate to borrow cognitive style research to support the construct validity of the concept of cognitive controls. Last, we observed that research with Piagetian tasks and concepts take a very different look at cognitive functioning of children, and here, too, we find no support for the validity of the cognitive control concept. Let us turn, then, to the task of gathering support for the validity of the concept of cognitive controls, as applied to the cognitive functioning of children, and for the children's tests of cognitive controls that have been developed.

If a proposed concept represents some new way of viewing behavior, and the investigator searches for criterion behaviors to support his concept and the test developed to assess it, he may initially believe, as Cronbach and Meehl (1955) point out, that no adequate criterion exists. In some situations, the criterion may be no more valid than the test devised and the new concept it assesses. For example, suppose we want to explore whether detecting changes introduced in the series of pictures of the Leveling-Sharpening House Test is a measure of the leveling-sharpening construct (i.e., the construction of memory images of information changing over time). As one way of validating the construct, we could take a teacher's rating of this cognitive quality as the criterion against which to evaluate the test. But the teacher's rating may be no more valid than the child's performance with the test. Noticing that one child forgot to bring an assignment and another child confuses the names of his classmates, the teacher may rate both children as levelers (i.e., they construct global memory images of information). With still another child, the teacher may not have the opportunity to notice behaviors specifically tied to the microbehavior reflected in the child's test performance. Moreover, one teacher who is rating children may have one year's experience in the classroom and another teacher, 10 years. To add to the predicament, the investigator may feel that the teacher's cognitive control functioning—in this case, her tendency to level information—may influence the validity of her noticing and remembering whether and how a child remembers information. Teacher ratings of memory functioning, then, could be an inadequate criterion, initially, if one is interested in establishing validity for the construct of leveling-sharpening and for the test devised to reflect the behavior conceptualized.

Another way of validating the construct of leveling-sharpening would be to correlate the Leveling-Sharpening House Test results with those of other tests that appear to measure the leveling-sharpening construct. But here, too, the investigator trying to validate a new construct is faced with serious limitations. For example, the Picture Completion Subtest of the WISC requires the child to relate his perception of a pictured object with memory images of that object, to determine what detail is missing. On the face of it, this test and the response process it elicits seem to relate to the leveling-sharpening construct. However in studying the behavior specified by this construct, we are interested in information *sequenced* over time. With the Picture Completion Subtest, the information (a picture) is static. A correlation between the House Test and the Picture Completion Test, then, would not be the most effective test of the leveling-sharpening construct.

Given these considerations, the method of factor analysis is uniquely suited to the task of exploring the validity of a construct, especially if the construct is relatively new and cannot be related readily to other constructs and methods already validated. In the statistical method of factor analysis, a wide range of tests is administered to a number of individuals. Performance with each test is then correlated with the performances observed on all other tests, providing a correlation matrix. When the statistic of factor analysis is applied to this matrix of correlation coefficients, the tests are grouped into clusters. A test falls into a cluster because the basic process required by its task has much in common with the basic process required by each of the other tests in the cluster. Although the tests may contain very different contents and require different responses, they cluster because they share a process that is basic and dominant to each of them. The method of factor analysis should be familiar to the clinician because he applies it in practice routinely, especially with diagnostic testing. For example, suppose the same child repeats digits in the WISC Digit Span Subtest and detects parts missing from pictured objects in the Picture Completion Subtest. A clinician may notice the correlation and infer that the posited relation exists because both tasks implicate memory—the former of spoken digits and the latter of common objects. The statistic of factor analysis enables us to examine a larger array of behaviors than we can handle by inspection only.

With factor analysis, each test that falls into a cluster receives a "factor loading," which represents a correlation coefficient between the test and some unknown dimension or process implicated in the activity required by the test. The higher the magnitude of this factor loading, the more that particular test and its process define the process that is common to all the tests in that cluster. Traditionally, tests with factor loadings of about .40 or greater are accepted as making a meaningful contribution to the definition of the process common to the cluster.

To interpret each cluster or factor, then, one examines the process of each test in that cluster (taking into account the magnitude and direction of the loading or correlation coefficient assigned to each test), then infers the process common to all the tests in the cluster. After each factor is examined, the several processes inferred for each factor are taken together as accounting for all the psychological activity required by all the tests included in the analysis.

Accordingly, to explore whether cognitive controls, as initially defined and observed with adult subjects by Klein and his associates, could be shown to characterize the cognitive functioning of children, a series of factor analytic studies was conducted not only to establish support for the construct validity of the concept and procedures devised, but also for the heuristic value of conceptualizing stable, individual differences in the cognitive functioning of children in terms of the cognitive control model.

THE FIRST FACTOR ANALYTIC STUDY: THE PERFORMANCE OF PUBLIC SCHOOL CHILDREN WITH COGNITIVE CONTROL TESTS AND OTHER COGNITIVE TASKS

In the first study a battery of tests yielding 80 different measures of cognitive functioning was administered to 44 white children (23 boys and 21 girls) from middle- to lower-class backgrounds. The children attended a public elementary school, and their ages ranged from 7 to 12 years, with a mean of 10 years; WISC IQ scores ranged from 70 to 124, with a mean of 110. The children were evaluated as age appropriate with regard to visual acuity and color perception.

The scores obtained with the 80 procedures were intercorrelated. From an inspection of the correlation matrix, 27 of the measures showing the most relationship with other measures (therefore the most promise for defining dimensions underlying the children's performance with many tests), were selected for a factor analysis.

Table 1 lists the 27 tests (along with IQ and age) and the nature of the cognitive task presented by each.

Appendix B gives a detailed description of test materials, method of administration, and scoring for the tests named in Table 1 that are not a part of the basic battery of cognitive control tests described in Chapter 10. The reader is reminded that the Leveling-Sharpening Wagon Test and Leveling-Sharpening Circles Test are earlier versions of the Leveling-Sharpening Flouse Test. Moreover, the Scanning Circles Test, an early test of focal attention, was replaced by the Scattered Scanning Test (see Chapter 4, Assessing Cognitive Controls in Children).

Each of the procedures devised to assess the cognitive control of leveling-sharpening (tests 3 to 5), field articulation (tests 6 to 10), focal attention (tests 11 to 13), and fine motor delay (tests 20 to 22) correlated highly with many of the procedures comprising the original battery of 80. Other tests representing a variety of cognitive tasks also correlated to a high degree. The requirements of these tests included coordinating eyes and hands as wood cutouts are manipulated and located in particular sequences (tests 14 to 16), maintaining continuous attention in order to detect the appearance of information (tests 17 to 19), watching a stationary spot of light while in darkened room and recording the degree and apparent direction of movement of the spot of light (test 23: note that autokinetic illusion has been used as a measure of the cognitive control defined as tolerance of unrealistic experiences in Chapter 4), remembering the spatial orientation of geometric shapes (test 24), drawing geometric designs from memory (test 25), assembling colored blocks to form patterns (tests 26 and 27), completing with a pencil the contours of geometric designs from which line segments have been removed (test 28), and copying the pattern formed by marbles by locating marbles on a Chinese checker board (test 29).

Table 1. Cognitive Tasks Selected for the First, Second, and Third Factor Analytic Studies: Public School, Orphaned, and Brain-Damaged Children

Test		Task Requirement and Score
1.	(WISC IQ)	
2.	(Age)	
3.	Leveling-Sharpening Wagon A	Detect elements omitted from sequentially presented pictures of a wagon; speed of detection
4.	Leveling-Sharpening Wagon B	Detect elements added to sequentially presented pictures of a wagon; speed of detection
5.	Leveling-Sharpening Circles C	Detect changes in sizes of circles presented sequentially; speed of detection
6.	Fruit Distraction A	As quickly as possible, name colors of fruit correctly colored (Card II); subtract time to name colors of rectangles (Card I); that is, Cards II-I
7.	Fruit Distraction B	As quickly as possible, name colors of fruit incorrectly colored (Card IV); subtract time to name colors of rectangles (Card I); that is, Cards IV-I,
8.	Fruit Distraction C	As quickly as possible, name colors of fruit incorrectly colored (Card IV); subtract time to name colors of fruit correctly colored; (Card II); that is, Cards IV-II
9.	Fruit Distraction D	Name colors of fruit correctly colored but surrounded by pictures of objects (Card III); subtract time to name colors of fruit correctly colored (Card II); that is, Cards III-II
10.	Fruit Distraction E	Recall objects surrounding fruit; number recalled

11.	Circles A	Estimate relative size of two circles (standard = 9 mm); accuracy
12.	Circles B	Estimate relative size of two circles (standard = positive Delboeuf illusion, 9/12 mm); accuracy
13.	Circles C	Estimate relative size of two circles (standard = negative Delboeuf illusion, 9/45 mm); accuracy
14.	Stromberg A	Place 54 colored blocks as quickly as possible in recesses of same color, in a specified order that divides the field into narrow segments (trial 1); subtract time to repeat task, using another order that divides the field into broad segments (trial 2)
15.	Stromberg B	Place 54 colored blocks as quickly as possible in recesses of different colors, in a specified order that divides the field into broad segments (trial 3); subtract time for trial 1 (order divides field narrowly)
16.	Stromberg C	Place 54 colored blocks as quickly as possible in recesses of different colors, in a specified order that divides the field into broad segments (trial 2); subtract time for trial 1 (order divides field narrowly)
17.	Continuous Attention A	Detect appearance of square and cross among rows of geometric shapes continuously displayed on memory drum; number detected
18.	Continuous Attention B	Detect appearance of circle and star among rows of geometric shapes continuously displayed on memory drum; number detected
19.	Continuous Attention C	Detect appearance of letter "b" in rows of letters continuously displayed on memory drum; number detected
20.	Fine Motor Delay A	Move pencil along spiral pathway as slowly as possible; subtract time to move pencil along pathway at regular tempo
21.	Fine Motor Delay B	Move pencil along spiral pathway as slowly as possible, while emotionally toned words are heard; subtract time to move pencil along pathway at regular tempo without words
22.	Fine Motor Delay C	Move pencil along spiral pathway as slowly as possible, while emotionally toned words are heard; subtract time to move pencil along spiral pathway as slowly as possible without words
23.	Autokinetic Illusion	Observe stationary spot of light in darkened room; record on paper movement perceived (illusion); length of tracing (cm) recorded
24.	Memory for Spatial Orientations of Designs	View standard design, then four rotated responses; select one from memory matching standard; accuracy
25.	Benton Visual Retention	Draw geometric designs from memory; accuracy
26.	Exploded Block Design A	Arrange blocks apart so that if juxtaposed, would construct standard design displayed; accuracy
27.	Exploded Block Design B	Arrange blocks apart so that if juxtaposed, would contract standard design; time to complete task
28.	Incomplete Figures	Complete geometric designs partially formed by line segments; accuracy
29.	Marble Board	Locate marbles on board to construct standard design; accuracy

In factor analyzing the correlation matrix formed by these 29 procedures, we asked whether the factor clusters obtained would define dimensions of cognitive consistency paralleling those conceptualized as cognitive controls.

Using Tryon's (1955) technique, five centroid factors were extracted from the correlation matrix and these were rotated by the varimax method, by means of an electronic computer, to orthogonal simple structure. In general, three of the factors obtained suggested that the tests employed activated processes resembling the cognitive controls of focal attention, field articulation, and leveling-sharpening as conceptualized by Gardner and Klein. The remaining two factors suggested that motor delay in solving cognitive tasks is implicated in the operation of each of these cognitive controls.

Factor I suggests a cognitive dimension involving narrow or broad deployment of attention; thus it resembles the cognitive control of focal attention (scanning). With Stromberg Test A, trial 1, the subject takes each of 54 cutouts arrayed in 9 columns and 6 rows (over an area of 36 x 36 inches), one at a time, in a prescribed sequence (by columns from bottom to top) and places them in recesses in a prescribed sequence (by columns from bottom to top). With trial 2 the subject again takes the cutouts systematically by rows (from right to left) and places each one in a recess in a prescribed sequence (by rows from right to left). The sequences used in each trial divide the field of information into orderly, narrow segments. In addition to motor coordination, the task requires narrow systematic deployment of attention from cutout to cutout and from recess to recess. The negative sign of this loading indicates that the second trial was completed as quickly or more quickly than the first, which is interpreted as demonstrating that practice with trial 1 led to more narrow, systematic scanning.

Stromberg Test C compares performances on trials 3 and 1. For trial 3 the subject takes the cutouts as in trial 1 (by columns from bottom to top). But in placing each cutout he must scan more actively and broadly because the sequence and location of recesses divides the field into broad segments (from far right to far left, to the center of the form board), and because the color of the recess is different from the color of the cutout. The positive loading indicates that trial 3 is slower than trial 1, which suggests, in light of the total cluster of test responses, that managing a task that calls for more extensive, active scanning in the face of distraction is disrupted when approached with narrow attention deployment.

Factor I: Public School Children Focal Attention Cognitive Control: From narrow, passive scanning to broad, active scanning

Test*		Factor Loading	Meaning of High Score
14.	Stromberg A	-.75	Efficient performance when scanning ordered, narrowly segmented, compatible information
23.	Autokinetic Illusion	-.61	Little perceived movement (illusion); bound to stimulus
16.	Stromberg C	.58	Disrupted performance when scanning disordered, broadly segmented, contradictory information
13.	Circles C	-.49	When judging sizes of paired circles in illusion condition, weak negative illusion experienced; narrow, passive scanning

*Numbers correspond to listing of tests in Table 1.

Factor II: Public School Children

Field Articulation Cognitive Control: From directing attention indiscriminately at all information to directing attention selectively at relevant information

Test*	Factor Loading	Meaning of High Score

8.	Fruit Distraction C	–.78	Information containing irrelevant, distracting cues (fruit colored incorrectly) managed as fast as information containing no irrelevant cues (fruit colored correctly)
7.	Fruit Distraction B	–.75	Information containing irrelevant, distracting cues (fruit colored incorrectly) managed as fast as information containing no irrelevant cues (colored rectangles)
9.	Fruit Distraction D	–.62	Information accompanied by peripheral irrelevant distractions (fruit surrounded by pictures) managed as fast as information with no peripheral irrelevant information (fruit colored correctly)
11.	Circles A	–.53	Judging accurately absolute sizes of paired circles; extensive scanning

* Numbers correspond to listing of tests in Table 1.

The small degree of autokinetic illusion experienced (negative loading) can be interpreted on the basis of other work (Voth, 1962) as indicating tendencies not to embellish reality with one's own interpretations, to be bound to a stimulus, and to maintain an inactive position with respect to information. The loading contributed by Circles Test C indicates that a weak illusion is experienced, therefore low extensiveness of scanning.

The configuration of cognitive processes represented by Factor I seems to define a dimension that includes breadth of visual scanning, degree of stimulus boundedness, and extent to which stimuli are surveyed actively—processes that relate to the operational definition of the focal attention control.

Factor II seems clearly to relate to the operational definition of the cognitive control principle of field articulation. In each of the test procedures in this cluster, the child operates in the face of peripheral, contradictory, irrelevant information from which attention should be selectively withheld if the child is to achieve his intent of handling the central task he has been asked to manage.

The first three items, with their negative factor loadings, indicate the following: time taken to name colors that should be on incorrectly colored fruit (Test C and B) and to name colors of fruit correctly colored and surrounded by irrelevant pictures (Test D) equals or is faster than the time taken to name colors of fruit correctly colored (Tests C and D) or to name colored rectangles (Test B), both of which contain no irrelevant information. The direction of these loadings suggests that attention is withheld from peripheral, contradictory, and irrelevant information (incorrect colors and peripheral pictures) and selectively directed to information central to the task presented for solution (correct colors of fruit).

Circles Test A also appears in this factor. Here the child judges the absolute sizes of two circles, side by side; a low score indicates accurate estimations and is interpreted as showing active extensive scanning. That Circles A appears in this factor suggests that the process of focal attention (extensive, active scanning) plays a subordinate role in defining field articulation.

Three of the items forming the Factor III cluster clearly involve aspects of the operational definition of leveling-sharpening as conceptualized by Klein.

Factor III: Public School Children

Leveling-Sharpening Cognitive Control: From maintaining global, unstable memory images of information to maintaining articulate, stable memory images

Test*		Factor Loading	Meaning of High Score
10.	Fruit Distraction E	-.75	Small number of peripheral cues recalled; memory images undifferentiated
3.	Leveling-Sharpening Wagon A	.51	With changes in information presented over time, few are detected and detections are late; memory image of wagon undifferentiated
27.	Exploded Block Design B	.40	Much time taken to solve segregated block designs; separating part from whole, relevant from irrelevant at a low level
25.	Benton Visual Retention	-.37	Inaccurate drawings of designs from memory; memory images undifferentiated

*Numbers correspond to listing of tests in Table 1.

Fruit Distraction Test E measures the child's recall of pictures of objects displayed around the fruit, the colors of which are to be named as rapidly as possible. The negative loading indicates that few background objects are remembered incidentally; therefore an undifferentiated memory image was constructed of the total information displayed. The same issue is suggested by the loadings contributed by the Leveling-Sharpening Wagon Test A and the Benton Visual Retention Test. The positive loading of the Wagon Test indicates that only a few details omitted from pictures of a wagon presented sequentially were detected, and these long after the changes were first introduced. The interpretation of this performance is that the child formed diffuse memory images of the wagon scene, causing changes to go unnoticed. With the Benton test the child draws geometric shapes from memory after a 15-second delay. The negative direction of the loading indicates inaccurate drawings, suggesting that the memory image of the design was vaguely formed or quickly diffused over time.

With Block Design B, the subject must locate colored blocks 4 inches apart so that, if the blocks were juxtaposed, they would form the design displayed. The process implicated concerns differentiating part from whole, and relevant from irrelevant information (i.e., a field articulation process). The positive loading indicates that much time is needed to solve the designs; thus the indiscriminate deploying of attention is here associated with maintaining diffuse memory images.

Taken together, the major loadings of Factor III suggest an organization that satisfies the definition of the leveling-sharpening cognitive control. It is noted that a test involving the control of field articulation makes a minor contribution to this factor and the leveling-sharpening control it defines.

Factor IV appears to relate to a cognitive dimension that combines motor delay with maintaining differentiated images of past information, to facilitate the articulation of present information (leveling-sharpening).

In Fine Motor Delay Test A, the time a child takes to move a pencil along a spiral pathway as slowly as possible (but always maintaining forward movement) is compared with the time taken to move through the same pathway at his usual tempo. In the Fine Motor Delay Test B, the time the child takes to move a pencil along a pathway as slowly as possible, while the examiner speaks emotionally toned words, is also compared with the time taken to draw the line at one's usual tempo. The negative loadings contributed by both these tests indicate that the time taken by the child when requested to move slowly is similar to or less than that time taken during the normal tempo. This behavior suggests little delay of fine motor movement.

Factor IV: Public School Children

Leveling-Sharpening Cognitive Control: With delay of fine motor movement

Test*		Factor Loading	Meaning of High Score
20.	Fine Motor Delay A	-.93	Little delay in moving a pencil versus usual tempo; no stress present
21.	Fine Motor Delay B	-.83	Little delay in moving a pencil versus usual tempo; emotional stress present
3.	Leveling-Sharpening Wagon A	.60	With changes in information presented over time, few are detected and detections are late; memory image of wagon undifferentiated
5.	Leveling-Sharpening Circles C	.49	With changes in information presented over time, few are detected and detections are late; memory image of circle undifferentiated

*Numbers correspond to listing of tests in Table 1.

The high positive loadings contributed by Leveling-Sharpening Tests A and B indicate, respectively, that only a few elements omitted from the picture of a wagon (sequentially presented) were detected, detection was announced long after the changes were first introduced, and only few changes in the sizes of circles (also introduced sequentially) were detected, long after they first appeared.

When combined, these test behaviors define a dimension that associates the cognitive process of leveling (maintaining and undifferentiated, unstable memory images and assimilating present information with past) with a low degree of fine motor delay, and sharpening (maintaining differentiated, stable memory images) with a high degree of fine motor delay. This factor supports Klein's contention that the capacity for delay, and the associated capacity for anticipating, are critical variables distinguishing levelers and sharpeners.

Factor V: Public School Children

Focal Attention and Field Articulation Cognitive Controls: And the binding of stressful affects with fine motor delay

Test*		Factor Loading	Meaning of High Score
22.	Fine Motor Delay C	.79	Much delay in moving a pencil slowly while stress present versus moving pencil slowly with no stress present
27.	Exploded Block Design B	-.49	Quick solution of segregated block designs; separating parts from whole, relevant from irrelevant at a high level

12.	Circles B	.46	When judging sizes of paired circles in illusion condition, strong positive illusion experienced; broad, active scanning

* Numbers correspond to listing of tests in Table 1.

Factor V also involves motor delay but emphasizes the issue of motor delay during psychological stress or during a state of affective arousal. Two other cognitive controls are implicated in particular with this issue: focal attention and field articulation.

Fine Motor Delay Test C compares the time a child takes to move a pencil along a circular pathway as slowly as possible with the time taken to perform the same task while the examiner speaks emotionally toned words (e.g., mother, father, blood, bad). The child is told that while following the instructions (i.e., drawing a line through the pathway as slowly as possible), he will hear the examiner speak words, that the words have nothing to do with his tasks, and that it is not necessary to respond to the words. The positive loading of this test signifies that during the trial when words are spoken by the examiner—that is, under mild affective stress by stimulation irrelevant to the main task—motor delay is greater than the delay the child exercises with no stress present. One speculation is that the child employs greater motor delay in the service of managing stressful affects.

Block Design Test B (discussed in connection with Factor III) contributes a negative loading indicating that designs were solved quickly and suggesting that directing attention selectively at parts versus whole, at relevant versus irrelevant information (the field articulation principle), is represented. The positive loading of Circles Test B indicates that a strong positive Delboeuf illusion was experienced as the child scanned the pairs of circles to judge which was the larger. As noted earlier, experiencing a strong illusion is interpreted as indicating broad, active scanning and as representing the cognitive control of focal attention.

Taken together, the factor loadings indicate a principle that relates binding and isolating stressful affects (anxiety, anger, guilt) by means of greater delay of motility with extensiveness of scanning (focal attention) and with attention directed selectively (field articulation). This factor leads to the hypothesis that children who bind stressful affects with motor delay show broad scanning and selective deployment of attention.

In summary, then, the results of the first factor analysis indicated that the performance of public school children on a broad array of cognitive tasks is accounted for by three dimensions that resemble three of the cognitive controls originally formulated by Klein and his associates on the basis of the cognitive performance of adults: focal attention (Factor I), field articulation (Factor II), and leveling-sharpening (Factor III). Two other factors (Factors IV and V, respectively) linked fine motor delay with the leveling-sharpening, and suggested that the binding and isolation of stressful affects is especially linked to the cognitive processes of focal attention and field articulation. Moreover, the results suggest that two of the cognitive controls contribute to the definition of others, as follows: focal attention to the definition of field articulation, and field articulation to the definition of leveling-sharpening. The possible meaning of the process of one cognitive control implicated in the process of another is discussed in the concluding section.

Having obtained these findings, we asked ourselves whether children who represented atypical life experiences and organic conditions would perform with the same tests in ways demonstrating consistencies in cognitive functioning that could be interpreted in terms of the same cognitive control concepts. If atypical children did show the same consistencies, further support would be provided for the heuristic value of conceptualizing the cognitive functioning of all children in terms of cognitive control principles concerning the regulation of information contained in a wide variety of tasks.

THE SECOND AND THIRD FACTOR ANALYTIC STUDIES: THE PERFORMANCE OF ORPHANED AND BRAIN-DAMAGED CHILDREN WITH COGNITIVE CONTROL TESTS AND OTHER COGNITIVE TASKS

The first factor analytic study was replicated with two other populations of children. One population consisted of 19 boys and 19 girls living in an orphanage and attending nearby public schools. The age range was 6 to 13 years (mean age, 9 ½ years) and the IQ range was 80 to 122 (mean IQ, 104). The other population consisted of 44 brain-damaged children (32 boys and 12 girls) enrolled in a private, residential special-education center. The age range was 6 to 13 years (mean age, 11) and the IQ range was 46 to 108 (mean IQ, 72). The children were screened for adequate visual acuity and color perception and were administered the same initial battery of tests yielding 80 measures (except for the Leveling-Sharpening Wagon and Circles Tests, which were not available because of mechanical problems with the memory drum apparatus).

Factor I: Orphaned and Brain-Damaged Children

Focal Attention Cognitive Control: From narrow, passive scanning to broad, active scanning

Test	Factor Loading	Meaning of Score
Orphaned children		
Circles C	-.89	When judging sizes of paired circles in illusion condition, weak negative illusion experienced; narrow, passive scanning.
Stromberg C	.60	Disrupted performance when scanning broadly segmented, contradictory information
Fruit Distraction D	-.54	Information accompanied by peripheral irrelevant distractions (fruit surrounded by pictures) managed as fast as information with no peripheral irrelevant information (fruit colored correctly)
Brain-damaged children		
Circles C	-.64	When judging sizes of paired circles in illusion condition, weak negative illusion experienced; narrow, passive scanning
Attention A	.66	Many squares and crosses detected in window of memory drum; narrow, passive scanning
Fruit Distraction C	-.52	Information containing irrelevant distracting cues (fruit colored incorrectly) managed as fast as information containing no irrelevant cues (fruit colored correctly)

An inspection of the intercorrelation matrices revealed that the same 27 measures listed in Table 1 could be selected as representing the major relationships generated. Again the matrices were factor analyzed using Tryon's technique, and four factors were obtained that are strikingly similar to four of the factors produced by the performance of the public school children.

The performances of both orphaned and brain-damaged children yielded clusters that define a principle concerning narrow versus extensive scanning. The Factor I structure of orphaned children resembles most that of public school children, with its loadings in both the Circles C and Stromberg C.

It is interesting to note that with braindamaged children Attention Test A contributes to the definition of focal attention. Here the child must scan rows of geometric shapes that appear in the narrow (2 x 6 inches) viewer of a memory drum, pressing a button each time a square and a cross appear among the six shapes displayed. It seems that this apparatus, which concretely restricts and narrows the field of information to be scanned, reveals an aspect of the focal attention process unique to brain-damaged children. That is, when scanning and surveying information, these children are much more responsive to the physical, concrete boundaries that frame the breadth of information; and this finding converges with clinical experience.

With both groups, aspects of the Fruit Distraction Test interpreted as being related to the field articulation principle (selective directing of attention) play subordinate roles in this factor, which primarily concerns the process of narrow and passive versus broad and active scanning. A closer examination of this finding provides clues for further study concerning the use of this test with clinical groups and the process of focal attention in psychopathology.

With orphaned children, Fruit Distraction D appears in the definition of focal attention. This aspect of the test, it should be recalled, concerns naming colors of fruit surrounded by pictures of 12 (irrelevant) objects. Six of these objects are food related (e.g., ice cream cone) and six are not (e.g., chair). As discussed in Chapter 6, one study showed that the orphaned children took longer than did public school and brain-damaged children to name the colors of this card, and they recalled significantly more food objects during the inquiry following this trial. This finding suggests that information that is related to oral needs, and is defined by the test situation as irrelevant, is nonetheless given much attention by the orphaned children, and their performance with the central task is accordingly lowered. These results may help us to understand the meaning of the Fruit Distraction D appearing here. In terms of the direction of the correlations of each loading, the withholding of attention from peripheral need-related objects is associated with *narrow* scanning. Therefore, when dealing with this test, the narrow scanning of orphaned children is revealed in their not scanning beyond the confines of the pictures of the fruit (about 2 inches in size). It seems reasonable to conjecture that this part of the test could provide information concerning the defensive and adaptive role played by focal attention in the management of need-related information defined by the task as irrelevant.

With brain-damaged children, Fruit Distraction C is implicated here. It may be recalled that with this test the background (incorrect color) must be managed in order to name the color that should be there. With brain-damaged children, then, the handling of background, irrelevant information is especially implicated in scanning—the more narrow the scanning, the more the background is ignored. The difference between the factor produced by orphaned children and that of brain-damaged children is discussed in terms of the role played by subordinate tests in a later section concerning cognitive styles (i.e., a configuration of cognitive controls).

A field articulation factor was also generated by the performance of both clinical groups which is very much like that obtained from public school children, a finding indicating that the cognitive control concerned with the selective deployment of attention to relevant versus irrelevant information is also a basic cognitive strategy of these clinical groups. Again, of the two populations, the factor cluster of orphaned children is more like that of public school children, with a measure of focal attention (Stromberg C) making a subordinate contribution to this cluster, which primarily concerns field articulation.

Factor II: Orphaned and Brain-Damaged Children

Field Articulation Cognitive Control: From directing attention indiscriminately at all information to directing attention selectively at relevant information

Test	Factor Loading	Meaning of Score
Orphaned children		
Fruit Distraction D	.78	Information accompanied by peripheral, irrelevant distractions (fruit surrounded by pictures) managed slower than information with no peripheral, irrelevant information (fruit colored correctly)
Fruit Distraction A	.77	Naming colors of fruit (fruit colored correctly) managed slower than naming same colors in rectangles; shape of fruit as background distracting
Stromberg C	.65	Disrupted performance when scanning disordered, broadly segmented information Information containing irrelevant distracting cues (fruit colored incorrectly) managed slower than information containing no irrelevant cues (colored rectangles)
Fruit Distraction B	.62	
Attention B	.49	Many circles and stars detected in window of memory drum; narrow scanning and memory of previous shapes displayed do not interfere
Brain-damaged children		
Exploded Block Design B	.85	
Fruit Distraction B	.61	Much time taken to solve segregated block designs; separating part from whole, relevant from irrelevant at a low level Information containing irrelevant distracting cues (fruit colored incorrectly) managed slower than information containing no irrelevant cues (colored rectangles)
Fruit Distraction A	.40	Naming colors of fruit (fruit colored correctly) managed slower than naming same colors in rectangles; shape of fruit as background distracting
Fruit Distraction D	.38	Information accompanied by peripheral, irrelevant distractions (fruit surrounded by pictures) managed slower than information with no peripheral, irrelevant information (fruit colored correctly)

Although similar to the factor structure defined by the public school children, the factor clusters of both clinical groups also reveal elements of selective attention deployment that may be unique to psychopathology and suggest future study. First, the clusters of both groups contain a contribution from Fruit Distraction Subtest A. In this part of the Fruit Distraction Test, the time a child takes to name the colors presented in the form of rectangles (Card I) is compared with the time taken to name the same colors, arrayed in the same order, but now presented in the form of fruit (Card II). The direction of the factor loading indicates that both groups took significantly longer to name the colors in Card II versus those in Card I. The appearance here of this performance suggests that the form of the fruit (e.g., a picture of a red apple) is a piece of irrelevant information powerful enough to draw attention away from the red color, the information designated as relevant. With public school children, the peripheral pictures (Card III) and the incorrect colors (Card IV) were required as irrelevant information to pull attention from the names of colors. This finding suggests that the field articulation control is more vulnerable in these clinical groups, in that low-keyed, irrelevant information that does not command attention in normal children, does distract children representing psychopathological development.

In the cluster produced by the braindamaged children, the highest factor loading came from Block Design B, in which the child locates colored wooden cubes in recesses several inches apart and if correctly selected, the cubes will form the design on the card when pushed together. This particular test is unique in presenting relevant and irrelevant information in the form of part versus whole and figure versus ground relationships. For brain-damaged children, then, the operation of the field articulation cognitive control is uniquely activated by relevant-irrelevant informational fields that emphasize part-whole and figure-ground. This finding, too, agrees with clinical experience with brain-damaged individuals.

Although the Leveling-Sharpening Wagon and Circles Tests were not administered to the two clinical groups, it is noteworthy that their performance with other tests nonetheless produced factor clusters that define a principle concerning the maintaining of memory images of information over time.

The performance of orphaned children with all the tests administered reveals a common denominator described by Factor III, which has to do with remembering peripheral information displayed after the test card is removed (Fruit Distraction E) and remembering the spatial orientation of designs (Memory of Spatial Orientation of Designs). Attention Test B required that the child press a button each time a circle and star appeared among six shapes in the viewer. This trial was administered after the child handled the same task, except that he was to respond to the display if squares and crosses appeared in the viewer. Therefore, in addition to requiring scanning a row of shapes (focal attention) Test B, when examined in the context of this factor, concerns the extent to which memory of the previously experienced squares and crosses plays a role in responding to rows of geometric shapes. The direction of the loading here indicates that memory of the square and cross did not interfere with detecting circles and stars, suggesting the possibility that a differentiated memory image of the shapes had been formed and sustained over time. Like the public school children, the orphaned children showed that the cognitive controls of focal attention (Circles Test A) and field articulation (Fruit Distraction C) are implicated in a subordinate way in the construction of stable, differentiated memory images.

Factor III: Orphaned and Brain-Damaged Children

Leveling-Sharpening Cognitive Control: From maintaining global, unstable memory images of information to maintaining articulate, stable memory images

Test	Factor Loading	Meaning of Score
Orphaned children		
Fruit Distraction E	.75	High number of peripheral cues remembered; memory images differentiated
Fruit Distraction C	.59	Information containing irrelevant distracting cues (fruit colored incorrectly) managed slower than information containing no irrelevant cues (fruit colored correctly)
Attention B	.47	Many circles and stars detected in window of memory drum; memory of previously displayed squares and circles does not interfere; differentiated memory
Circles A	.42	Accurate judging of sizes of circles; broad scanning
Memory for Spatial Orientations of Designs	.32	Accurate memory of position of designs; differentiated memory
Brain-damage children		
Fruit Distraction E	.79	High number of peripheral cues remembered; memory images differentiated
Autokinetic Illusion	.69	Much perceived movement (illusion) not bound to stimulus; broad scanning
Circles A	.62	Accurate judging of size of pairs of circles; broad scanning

Factor III reveals that brain-damaged children also produced a dimension concerned with maintaining global versus articulated memory images of information (Fruit Distraction E) and that the focal attention control (Autokinetic Test and Circles Test A) is implicated in this cognitive process.

As Factor IV shows, a cluster was observed in the performance of both clinical groups that parallels the cluster defined by the public school children relating fine motor delay to the maintaining of stable memory images of changing information (leveling-sharpening cognitive control). However the cluster relating the binding of stressful affects with motor delay with focal attention and field articulation, observed in public school children, did not appear in these clinical groups.

Factor IV: Orphaned and Brain-Damaged Children

Leveling-Sharpening Cognitive Control: With delay of fine motor movement

Test	Factor Loading	Meaning of Score
Orphaned Children		
Fine Motor Delay B	.91	Much delay in moving a pencil versus usual tempo; emotional stress present

Fine Motor Delay A	.81	Much delay in moving a pencil versus usual tempo; no emotional stress present
Fine Motor Delay C	.32	More delay in moving a pencil slowly with emotional stress present versus moving a pencil slowly without emotional stress
Benton Visual Retention	.31	Designs drawn accurately from memory; differentiated memory
Brain-damaged Children		
Fine Motor Delay C		More delay in moving a pencil slowly with emotional stress present than in moving a pencil slowly without emotional stress
Fine Motor Delay B	.90	Much delay in moving a pencil versus usual tempo; emotional stress present
Fine Motor Delay A	.33	Much delay in moving a pencil versus usual tempo; no emotional stress present
Memory for Spatial Orientation of Designs	.31	Accurate memory of position of designs; differentiated memory

Last, an age and IQ factor was observed in each of the three factor analyses discussed thus far, providing information concerning the relationships between measures of cognitive controls and age and IQ. For convenience, these data are discussed in detail in Chapter 6, along with other studies relating cognitive control measures to age and IQ. Here we note only the general findings. Each population produced an age factor suggesting that cognitive controls change in organization with an increase in age from 6 to 13 years, the age range represented by the three groups. Each population also produced an IQ factor indicating (except for the factor produced by the brain-damaged subjects) that cognitive control measures and IQ measures do not correlate appreciably.

The findings of these three factor analytic studies, taken together, furnish strong support for the position that the cognitive functioning of both normal and pathological children, on a wide variety of tasks, seems to involve a few distinct cognitive dimensions that satisfy the operational definitions of cognitive controls as proposed by Klein. In other words, when attempting to solve a wide variety of cognitive tasks, children make use of a few basic ego strategies with which they manage, control, select, ward off, and manipulate information.

Following these first factor analytic studies, the tests of cognitive controls described earlier were developed further and modified as a result of experiences in a series of studies to make them more suitable for children and clinical practice (see discussion in Chapter 4). The following replacements were made: the Circle Test was replaced by the Scattered Scanning Test as a measure of the focal attention cognitive control, and the Leveling-Sharpening Wagon and Circles Tests were replaced by the Leveling-Sharpening House Test. Moreover, a developmentally conceptualized scoring system was constructed to evaluate the performance of children with the Object Sort Test, a measure of the equivalence range cognitive control. In addition, because studies and clinical observation continued to show the importance of motor delay in cognitive control functioning, the test of Body Schema-Tempo Regulation was devised to elaborate the assessment provided by the test of fine motor delay. These five procedures (Body Schema-Tempo Regulation Test, Scattered Scanning Test, Fruit Distraction Test, Leveling-Sharpening House Test, and Object Sort Test) became the basic battery of tests of cognitive controls for children in our work. Manuals of instructions, scoring, and interpretation for each of these tests are presented in Chapter 10. Again the reader should become familiar with these, to be able to make the most use of the discussion to follow.

To examine the construct validity of this basic battery of cognitive control tests for clinical practice, and to obtain further support for the concept of cognitive control principles, four additional factor analytic studies were conducted.

THE FOURTH FACTOR ANALYTIC STUDY: THE PERFORMANCE OF PUBLIC SCHOOL KINDERGARTEN CHILDREN WITH COGNITIVE CONTROL AND PERSONALITY TESTS AND TEACHER RATINGS

Five tests of cognitive controls (Fine Motor Delay, Scattered Scanning, Fruit Distraction, Leveling-Sharpening House, Object Sort 11), were administered to the total kindergarten population of a public school serving a middle-class community. There were 184 children, 98 boys and 86 girls with a mean age of 69.7 months. These children were also administered two fable completion tests, which measure fantasied anxiety associated with bodily harm, and a Structured Fantasy Test, which measures aggression expressed in fantasy (see Appendix B). In addition, the children were rated by their teachers on each of eight variables concerning academic skills and social-personal adjustment in the classroom situation. Table 2 lists the tests and teacher ratings and the measures derived from each. The 34 measures, plus age, were factor analyzed by the principal component method and rotated to simple structure. An examination of the factor structure obtained permits us to observe whether cognitive control principles are defined when tasks are included that do not primarily require cognitive solutions but assess some aspect of personality. That is, a factor analysis of both cognitive and personality tests would enable us to discover whether factor clusters appear that define cognitive controls even when the psychological performance being factor analyzed contains elements of both cognitive and personality functioning. From another point of view, including cognitive and personality tests, as well as ratings of classroom behavior, permits us to examine possible relationships between cognitive controls and the regulation of anxiety and aggression, on the one hand, and observed academic and social-classroom behavior on the other.

Test	Description
1. Fine Motor Delay I	Draw line on maze at typical tempo; time in seconds
2. Fine Motor Delay II-I	Draw line on maze as slowly as possible versus at typical tempo; time difference in seconds
3. Motor Tempo	Mark with pencil each of 16 shapes at typical tempo; time in seconds
4. Scattered Scanning A	Search out and rapidly mark circles and crosses randomized among many shapes; number marked in 30 seconds
5. Scattered Scanning B	Total distance in centimeters represented by connecting circles and crosses marked in 30 seconds
6. Scattered Scanning C	Mean distance in centimeters represented by connecting circles and crosses marked in 30 seconds
7. Fruit Distraction A	Name colors of fruit correctly colored (Card II) as quickly as possible; time in seconds
8. Fruit Distraction	As quickly as possible, name colors of fruit correctly colored surrounded by pictures of objects (Card

	B	III); subtract time to name fruit correctly colored (Card II); that is, Cards III-II
9.	Fruit Distraction C	As quickly as possible, name colors of fruit incorrectly colored (Card IV); subtract time to name fruit correctly colored (Card II); that is, Cards IV-II
10.	Fruit Distraction D	Number of errors made in naming colors of correctly colored fruit (Card II)
11.	Fruit Distraction E	Number of errors made in naming correctly colored fruit surrounded by peripheral distractions (Card III); subtract errors made in naming correctly colored fruit (Card II); error difference Cards III-II
12.	Fruit Distraction F	Number of errors made in naming incorrectly colored fruit (Card IV); subtract errors made in naming correctly colored fruit (Card II); error difference, Cards IV-II
13.	Fruit Distraction G	Number of peripheral pictures recalled after naming colors of fruit (Card III)
14.	Leveling-Sharpening House A	Number of display on which first change is detected in scene of house continually displayed (first stop score)
15.	Leveling-Sharpening House B	Number of correct changes detected in scene of house continually displayed
16.	Leveling-Sharpening House C	Ratio of number of changes detected, and immediacy of detection, to total number of changes contained in test
17.	Leveling-Sharpening House D	Number of incorrect changes perceived in information that is contained in house scene continually displayed (A changes)
18.	Leveling-Sharpening House E	Number of incorrect changes perceived involving information that is not contained in house scene continually displayed (B changes)
19.	Object Sort A	Total number of groups constructed with objects
20.	Object Sort B	Mean developmental score of concepts assigned to typical groups constructed
21.	Object Sort C	Total number of groups constructed assigned a miscellaneous score
22.	Object Sort D	Total number of groups constructed assigned a major atypical score
23.	Object Sort E	Total number of groups constructed assigned an additional atypical score
24.	Fable I of Castration Anxiety	Complete fable of monkey’s tail; developmental score assigned to injury depicted
25.	Fable II of Castration Anxiety	Complete fable of boy’s (girl’s) finger; developmental score assigned to injury depicted
26.	Structured Fantasy Test of Aggression	Select picture that completes story in series of pictures depicting aggression
27.	Rating, reading	Teacher rates reading skill
28.	Rating, mathematics	Teacher rates mathematics skill
29.	Rating, language	Teacher rates language skill
30.	Rating, forgetting	Teacher rates tendency to forget
31.	Rating, aggression	Teacher rates physical aggression
32.	Rating, attention	Teacher rates paying attention
33.	Rating, body activity	Teacher rates degree of body activity and restlessness

34.	Rating, routine	Teacher rates knowledge of classroom routine
35.	Age	Given in months

The factor analysis produced nine factors (Table 3). Factor I clearly describes the process of focal attention as measured by the Scattered Scanning Test (from narrow passive scanning to active broad scanning). The loadings indicate that children who scanned broadly across the page to mark circles and crosses, total distance traversed (Test B), and mean distance traversed (Test C), also scanned actively, registering and marking many circles and crosses (Test A). A rapid typical motor tempo is associated with active, broad scanning; this might be expected, since the Scattered Scanning Test requires that the subject used a pencil to mark geometric shapes rapidly. However the low loading of the Motor Tempo Test, relative to the other loadings, suggests that the Scattered Scanning Test primarily measures vigor and breadth of visual scanning, in spite of the motor component involved.

A field articulation principle is defined by Factor II, which concerns selectively withholding attention both from peripheral, irrelevant pictures (Test B) and from irrelevant incorrect colors (Test C), in order to name the colors of the fruit. In interpreting the appearance of teacher ratings of aggression and body activity in this factor, it should be noted that a high rating indicates developmentally advanced degrees of action aggression (i.e., little pushing and punching) and body activity (i.e., little restlessness). The signs of the loadings indicate that children who could not withhold attention from peripheral distractions and from incorrect colors were observed as somewhat less physically aggressive and restless. This finding suggests that at least with kindergarten children some expression of physical aggression and restlessness (the loading has a low magnitude) is associated with the cognitive control of withholding attention from distracting information and selectively deploying it to relevant cues.

Two factors were obtained, each defining the major components of the leveling-sharpening process (i.e., the degree of differentiation and the stability of memory images). One factor was obtained relating the control of leveling and sharpening to motor delay and the regulation of anxiety. Factor III concerns the degree of differentiation imposed on a memory image of information. The negative loading of Test B indicates that few changes were detected in the series of pictures displayed. The positive loading of Test C (high leveling-sharpening ratio) indicates that the changes were detected long after each had been introduced in the series of pictures. As discussed in Chapter 9, the assumption is made that if a clear, differentiated memory image of the house scene is constructed at the start, many changes in subsequent displays of the scene are detected, and detection occurs as soon as the changes are introduced. Conversely, if a global, diffuse memory image is constructed of the information contained in the first scene, in subsequent displays the present scene is fused with a global image of past scenes and changes go unnoticed, or changes are detected long after their introduction. This cluster of tests in Factor III is interpreted, as in the first factor analytic studies, as defining the degree of differentiation a child imposes on memory images constructed of information changing over time, and it satisfies one part of the operational definition of the principle of leveling-sharpening.

Factor IV concerns the stability or constancy of memory images, the second major aspect of the leveling-sharpening control process. The high loading of Test D indicates that many incorrect changes were perceived. For example, the child perceived the sun as shifting from the left side of the house to the right side, or perceived the tree as taller. Although both perceptions involve information contained in the scene displayed, these particular changes in fact do not occur. The high loading of Test E indicates that the child perceived changes in information not contained in the display. For example, the child perceived curtains omitted from the house windows (no curtains had been included in the scene), or perceived that "the horse" on the weather vane is missing (no horse had been presented). This type of perceived change (see Chapter 10) is viewed as the result of fabulizing information in memory and of constructing fluid, embellished memory images. Taken together, this cluster defines the stability or fluidity of memory images constructed and maintained over time and satisfies the second major part of the operational definition of the leveling-sharpening principle.

Factor V relates motor delay uniquely with leveling and sharpening, a relationship also observed in the first three factor analytic studies discussed earlier. Maintaining differentiated, stable images in memory over time, here represented in detecting and reporting early the first change perceived (Test A), is associated with a high degree of fine motor delay. In addition, this factor includes a measure of fantasied bodily harm (Fable Test II). The sign of the loading indicates that anxiety about being injured is regulated in fantasy by means of expressions that are indirect and more sublimated (e.g., the child imagines that the boy's finger was scratched vs, being cut off or smashed). Leveling or the maintaining of global, fluid memory images is associated in this finding with motoric impulsivity and primitive, fantasied expression of bodily harm, whereas sharpening or the maintaining of articulate, stable memory images goes with a high degree of motor delay and attenuated, fantasied expressions of bodily harm.

Table 3. Factors Obtained from the Cognitive Tasks, Personality Tests and Classroom Performance of 184 Public School Kindergarten Girls and Boys: Fourth Study

Factor	Test	Factor Loading
Factor I: Focal attention cognitive control (passive-narrow vs. active-broad scanning)	Scattered Scanning B	.96
	Scattered Scanning C	.76
	Scattered Scanning A	.73
	Motor Tempo	-.44
Factor II. Field articulation cognitive control (directing attention indiscriminately vs. selectively)	Fruit Distraction B	.79
	Fruit Distraction C	.78
	Rating, physical aggression	.44
	Rating, body activity	.34
Factor III: Leveling-sharpening cognitive control (maintaining global vs. differentiated memory images)	Leveling-Sharpening House C	.92
	Leveling-Sharpening House B	-.91
Factor IV: Leveling-sharpening cognitive control (maintaining unstable, fluid vs. stable,	Leveling-Sharpening	.97

constant memory images)	House D	
	Leveling-Sharpening House E	.97
Factor V: Leveling-sharpening cognitive control (related to motor delay and regulation of anxiety)	Leveling-Sharpening House A	-.69
	Motor Delay II-I	.54
	Fable II, boy's finger	.54
Factor VI: Equivalence range cognitive control (employing few vs. many categories to conceptualize information)	Object Sort C	.83
	Object Sort A	.56
Factor VII: Equivalence range cognitive control (employing concrete vs. abstract concepts to conceptualize information)	Object Sort E	-.80
	Object Sort B	.76
	Object Sort A	-.59
	Fruit Distraction G	-.31
Factor VIII: Equivalence range cognitive control (disordered conceptual thinking and regulation of anxiety and aggression)	Object Sort D	.72
	Fable I, monkey's tail	-.44
	Fruit Distraction G	.39
	Structured Fantasy Aggression	-.29
Factor IX: Teacher ratings and cognitive controls	Paying attention	.88
	Forgetting	.87
	Knowledge of routine	.87
	Reading	.78
	Mathematics	.78
	Language	.67
	Body activity	.66
	Physical aggression	.50
	Fruit Distraction A	-.53
	Fruit Distraction D	-.26
	Object Sort B	.26
	Scattered Scanning A	.24
	Fable I, monkey's tail	-.25
	Motor Tempo	-.23

Factors VI and VII contain clusters of tests, each one defining the two major aspects of the equivalence range cognitive control, which is related to the management of information in terms of concepts. The first pertains to the breadth of categories used, and the second the conceptual level of a given category. Factor VIII suggests that the regulation in fantasy of anxiety (regarding bodily harm) and of aggression is uniquely implicated in and related to the equivalence range control.

Factor VI circumscribes the aspect of the equivalence range control that concerns whether many or few categories are employed characteristically as the child manages information conceptually. Test C involves the total number of groupings employed by the child that are designated “miscellaneous” by the scoring system (see Chapter 10). Test A covers the total number of groupings constructed by the child that are designated “typical” by the scoring system. Taken together, such results indicate whether children use many or few appropriate or stimulus-related categories to account for the information they have placed into groups as belonging together.

Factor VII involves the developmental level of the concepts used to account for how the objects belong together: from those articulating concrete properties of the information (e.g., the hammer and pliers are both hard), to functional (e.g., the hammer and pliers fix this piece of wood), to more abstract (e.g, the hammer and pliers are tools). With Test B, the positive loading indicates developmentally high or abstract concepts. This is associated with the use of few atypical or illogical concepts (Test E provides a negative loading) and with a small number of groups used to categorize the information presented (the contribution of Test A is a negative loading). When all components are taken together, this factor relates the number of groupings used (narrow or broad categories) with the degree of abstraction of the concepts imposed on the groups to account for the objects clustered. This factor indicates that when managing information conceptually, the behavior of children ranges from imposing many narrow groups with concrete concepts to imposing few, broad groups with abstract concepts. The tendency to recall few peripheral irrelevant figures (Fruit Distraction G) appears here, suggesting that the field articulation control (especially that part of the process involving the subordinating of irrelevant peripheral information) is implicated in the developmental level of concepts employed.

Factor VIII primarily defines conceptual thinking that is illogical and disordered and relates this type of conceptual thinking to the regulation in fantasy of anxiety and aggression. Test D indicates that many groups were formed and were assigned by the child concepts that qualified for one of the atypical scores (see scoring manual in Chapter 10). Recalling many peripheral, irrelevant bits of information (Fruit Distraction G) is also associated with the use of illogical concepts. This finding supports the observation made in connection with Factor VII that subordinating irrelevant information is associated with constructing and using high level, logical concepts to link objects together. The negative loading of Fable I indicates that the child fantasied direct, primitive bodily injury in completing the story about the monkey (e.g., the monkey’s tail was chopped off; see Appendix B). The negative loading of the Structured Fantasy Aggression Test indicates that direct primitive aggression was imagined as the outcome to the picture stories (e.g., the boy smashed the windshield with his baseball bat; see Appendix B). Overall, this factor isolates the aspect of the equivalence range process that concerns unrealistic conceptualizing. It also suggests that the regulation of castration anxiety and of aggression toward others, such that it results in primitive expressions in fantasy, is associated with illogical, disordered conceptual thinking.

Factor IX represents primarily the teacher’s view of a child, because all teacher ratings cluster here. Of the several measures of cognitive controls, only one, Fruit Distraction A, appears with a substantial loading. In terms of the statistic of factor analysis, this result suggests the measures of cognitive controls remain independent and stable (they define other primary factors) as psychological principles even when the psychological space factor analyzed contains teacher ratings of classroom behavior and academic skills. From another point of view, although several cognitive control measures appear in this factor with very small loadings, these relationships offer beginning clues about the relation between teacher's observations and cognitive control functioning. The direction of the loadings indicates that if a child is rated as high in reading, language, and mathematical skills, and as paying attention, not forgetting, knowing classroom routine, and not being restless or aggressive, he is likely to manage information by means of active scanning (Scattered Scanning A), by means of deploying attention to relevant information (Fruit Distraction A and D), by typically employing a rapid tempo (Motor Tempo), and by utilizing high-level logical concepts, and is also likely to regulate anxiety in fantasy so that primitive expressions of anxiety are permitted. A more extensive study of the relation between specific cognitive controls and selected teacher's observations is discussed in the next chapter.

With the fourth factor analytic study, then, the same cognitive control principles emerged as with the first three studies, and, in addition, an equivalence range cognitive control principle was observed when the tests devised were factor analyzed along with personality measures and teacher ratings. Since the fourth study involved younger children (kindergarteners), these results support the stability of cognitive functioning in young and older children.

THE FIFTH FACTOR ANALYTIC STUDY: THE PERFORMANCE OF PUBLIC SCHOOL KINDERGARTEN CHILDREN WITH COGNITIVE CONTROL AND PERSONALITY TESTS AND TEACHER RATINGS

To study further the construct validity of cognitive controls, a fifth factor analytic study was conducted with a second group of 164 children (91 boys and 73 girls; mean age, 69 months) comprising the entire kindergarten population admitted the following year to the same suburban public school. As noted in Table 4, these children were administered the same battery of cognitive control tests and fantasy tests of castration anxiety and aggression, and they were rated by their teachers. In addition, they were administered two procedures (see Appendix B) aimed at the developmental assessment of aggression; one was expressed in the action mode (Test 19), the other in the language mode (Tests 23 to 29). They were also administered the Rorschach test, which was rated in terms of a developmental scoring system of aggression. Performance on these tests and teacher ratings were intercorrelated, and the matrix of correlations factor was analyzed by the principal component method.

Table 4. Cognitive Tasks, Personality Tests and Classroom Observations Selected for the Fifth Factor Analytic Study: 164 Public School Kindergarten Girls and Boys

Test		Description
1.	Motor Delay II-I	Draw line on maze as slowly as possible versus at typical tempo; time difference
2.	Motor Tempo	Mark with pencil each of 16 shapes at typical tempo; time in seconds
3.	Scattered Scanning A	Search out and rapidly mark circles and crosses randomized among many shapes; number marked in 30 seconds

4.	Scattered Scanning B	Total distance in centimeters represented by connecting circles and crosses marked within 30 seconds
5.	Scattered Scanning D	Ratio of Scattered Scanning A times Motor Tempo time; visual scanning with motor element removed from response
6.	Fruit Distraction A	Name colors of fruit correctly colored (Card II) as quickly as possible; time in seconds
7.	Fruit Distraction B	As quickly as possible, name colors of fruit correctly colored but surrounded by pictures of objects (Card III); subtract time to name fruit correctly colored (Card II); that is, Cards III-II
8.	Fruit Distraction C	As quickly as possible, name colors of fruit incorrectly colored (Card IV); subtract time to name fruit correctly colored (Card II); that is, Cards IV-II
9.	Fruit Distraction D	Number of errors made in naming colors of correctly colored fruit; Card II
10.	Leveling-Sharpening House A	Number of display on which first change is detected in scene of house continually displayed; first stop score
11.	Leveling-Sharpening House B	Number of correct changes detected in scene of house continually displayed
12.	Leveling-Sharpening House C	Ratio of number of changes detected and immediacy of detection to total number of changes contained in test
13.	Leveling-Sharpening House D	Number of incorrect changes perceived in information that is contained in house scene continually displayed (A changes)
14.	Object Sort A	Total number of groups constructed with objects
15.	Object Sort B	Mean developmental score of concepts assigned to typical groups constructed
16.	Object Sort D	Total number of groups constructed assigned a major atypical score
17.	Fable Test of Castration Anxiety I	Complete fable of monkey’s tail; developmental score assigned to injury depicted
18.	Structured Fantasy Test of Aggression	Select picture that completes story in series of pictures depicting aggression; degree of delay and indirectness in regulating aggression in fantasy mode
19.	Action Test of Aggression	Act aggressively on objects; degree of delay and indirectness in regulating aggression in action mode
20.	Unstructured Fantasy Test of Aggression	Construct story to TAT Card 18GF; developmental score assigned to aggression expressed
21.	Rorschach A	Total number of responses produced
22.	Rorschach B	Mean developmental score assigned to aggression represented by images
23.	Continuous Word Association, Mouth A	Number of words associated to stimulus “mouth” in 30 seconds; verbal fluency
24.	Continuous Word Association, Mouth B	Mean developmental score assigned to succorance represented by words associated to stimulus “mouth”; regulation of succorance in language mode
25.	Continuous Word Association, Knife A	Number of words associated to stimulus “knife” in 30 seconds; verbal fluency
26.	Continuous Word Association, Knife B	Mean developmental score assigned to aggression represented by words associated to stimulus “knife”; regulation of aggression in language mode
27.	Continuous Word Association, Tree A	Number of words associated to stimulus “tree” in 30 seconds; verbal fluency
28.	Continuous Word Association, Tree B	Mean developmental score assigned to succorance represented by words associated to stimulus “tree”; regulation of succorance in language mode (control response)
29.	Continuous Word Association, Tree C	Mean developmental score assigned to aggression represented by words associated to stimulus “tree”; regulation of aggression in language mode (control response)
30.	Rating, reading	Teacher rates reading skill

31.	Rating, mathematics	Teacher rates mathematics skill
32.	Rating, language	Teacher rates language skill
33.	Rating, attention	Teacher rates paying attention
34.	Rating, body activity	Teacher rates degree of body activity
35.	Rating, routine	Teacher rates knowledge of classroom routine

Seven factors were obtained (Table 5). Again, one cluster of tests defined a principle of passive and narrow versus active and broad scanning (i.e., focal attention, Factor I) and another cluster defined managing relevant and irrelevant information (i.e., field articulation, Factor II). Among kindergarten children, body activity again appears (although with a low magnitude) in a cluster defining field articulation, suggesting that some degree of body activity in the classroom is associated with the selective deployment of attention.

Table 5. Factors Obtained from the Cognitive Tasks, Personality Tests, and Rated Classroom Performance of 164 Kindergarten Boys and Girls: (Fifth Study)

Factor	Test	Factor Loading
Factor I: Focal attention cognitive control (passive-narrow vs. active-broad scanning)	Scattered Scanning B	.86
	Scattered Scanning A	.83
	Scattered Scanning D	.27
Factor II. Field articulation cognitive control (directing attention indiscriminately vs. selectively)	Fruit Distraction C	.85
Fruit Distraction B	.78	
Fruit Distraction A	.28	
Rating, body activity	.22	
Factor III: Leveling-sharpening cognitive control (maintaining global vs. differentiated memory images)	Leveling-Sharpening House C	.93
Leveling-Sharpening House B	-.90	
Leveling-Sharpening House A	.85	
Factor IV: Field articulation, leveling-sharpening, and equivalence range cognitive controls and the regulation of aggression in fantasy	Rorschach A	.56
Rorschach B	-.52	
Fruit Distraction A	.46	
Leveling-Sharpening D	.44	
Object Sort B	-.43	
Fruit Distraction D	.34	
Factor V: Equivalence range cognitive control (many narrow and illogical categories and primitive anxiety)	Object Sort A	.81
Object Sort D	.50	
Fable I, monkey's tail	-.45	
Factor VI: Equivalence range cognitive control and the regulation of affect in language and fantasy	Continuous Word Association, Succorance B	.67

Continuous Word Association, Aggression B	.64	
Fable I, monkey's tail	.48	
Object Sort Test B	.39	
Factor VII: Teacher ratings and cognitive controls	Rating, paying attention	.90
Rating, reading	.88	
Rating, knowledge of routine	.85	
Rating, mathematics	.84	
Rating, language	.84	
Rating, body activity	.61	
Fine Motor Delay	.39	
Fruit Distraction D	-.37	
Object Sort D	-.30	
Fruit Distraction A	-.27	
Scattered Scanning A	.23	

A leveling-sharpening cognitive control factor was also obtained (Factor III). Detecting the first change late in the series of pictures (Test A) is associated with detecting few changes (Test B loads negatively) and with a lag in detecting subsequent changes (Test C—the higher the ratio, the more the changes are detected late).

Factor IV relates the cognitive control principles of field articulation, leveling-sharpening, and equivalence range to Rorschach performance. The greater the number of Rorschach responses—that is, high imaginal productivity (Test A is positive), and the more primitive the aggression expressed in Rorschach imagery (Test B is negative)—the more errors are made in naming colors of fruit (Test D), in addition, the naming of colors of fruit is slower (Test A), more incorrect changes are perceived in the continuous display of pictures of the house scene (Test D), and the concepts used to categorize information are more concrete (Test B). As a whole, this cluster suggests that imaginal productivity with primitive aggressive fantasies is associated in kindergarten children with disordered cognitive control functioning involving attending to irrelevant information, maintaining unstable memory images, and thinking in concrete rather than abstract terms.

As with the first kindergarten population, the performance of these children produced a factor that primarily defines the equivalent range control and secondarily relates castration anxiety to the cognitive control of equivalence range (Factor V). The construction of many categories that are assigned an atypical score (thus reveal disordered, illogical conceptual thinking) is associated with expressions in fantasy of primitive, direct castration anxiety (e.g., the monkey's tail *was cut off).*

Factor VI defines mainly a process involving verbal fluency in the regulation of affects (aggression and succorance). It also relates conceptual thinking (equivalence range cognitive control) to the regulation of affects. The use of developmentally high (abstract) concepts to categorize information (Object Sort Test B) is here associated with the expression at developmentally high levels of succorant and aggressive feelings in spoken language (Continuous Word Association Succorance B and Aggression B; see Appendix B). For example, in response to the stimulus word “knife,” one child verbalized “chip,” “peel” rather than “stab,” “kill.” This use of abstract concepts is also associated with the expression in fantasy of developmentally higher, more sublimated images of castration anxiety (e.g., the child imagined that the hair on the monkey’s tail was trimmed). The new issue introduced here concerning the relation between regulation of affects and conceptual control of information is that the use of the language mode to express and regulate affects is associated with both developmentally higher, more sublimated fantasy expressions of anxiety, and high-level abstract conceptualizing. This issue is considered in more detail in the conclusion of this chapter.

The last factor obtained (Factor VII) is similar to that observed in the fourth factor analytic study and defines primarily the teachers’ observations of a child in the classroom. However the cluster also provides some clues about the relations between cognitive control functioning and classroom behavior. Although small in magnitude, the direction of the loadings of the cognitive control tests indicates that children who are rated as developmentally high in academic skills (reading, mathematics, language), and who are rated as paying attention, not being restless, and having good knowledge of classroom routine, show on test performance a high degree of fine motor delay and active scanning (focal attention), as well as rapid, selective deployment of attention (Fruit Distraction A) and few errors when deploying attention selectively (Fruit Distraction D)—both characteristics related to the process of field articulation. And when categorizing information, these children produce no or few groups that are assigned atypical scores (Object Sort D), and such negative results are indicative of a process related to the equivalence range cognitive control. The relation between specific cognitive controls and specific teacher ratings is considered further in a study described in the next chapter.

In summary, the fourth and fifth factor analytic studies involved kindergarten children and examined cognitive control tests along with projective and word association personality measures and teacher ratings of academic skills and social adjustment. The main factors to emerge from each study defined independent processes, each satisfying one of the definitions of cognitive controls: focal attention, field articulation, leveling-sharpening, and equivalence range. Moreover, the process unique to each control was clarified further, following the first three factor analyses conducted. In particular, both the leveling-sharpening process and the equivalence range process, were observed to consist of several distinct elements. Furthermore, the fourth and fifth studies supplied additional clues to the relation between cognitive controls and affects. These issues are discussed in the critique of all factor analytic studies that concludes this chapter.

THE SIXTH FACTOR ANALYTIC STUDY: THE PERFORMANCE OF PUBLIC SCHOOL FIRST GRADE CHILDREN WITH COGNITIVE CONTROL TESTS, PIAGETIAN TASKS, NEUROLOGICAL TESTS, AND ACHIEVEMENT TESTS

The next factor analytic study was conducted by Gunnoe (1975). This analysis is of particular interest because it included Piagetian tasks. Given the widespread interest in Piagetian tasks and the use of them by child development researchers and by some practitioners, especially those planning school curricula, it seems especially meaningful to explore the relations between measures provided by the basic battery of cognitive control tests and Piagetian tasks. In terms of our interest in the construct validity of cognitive controls, several questions are suggested in factor analyzing both cognitive control and Piagetian tasks. Do both types of test measure the same or different basic cognitive principles? If they measure different cognitive principles, does one or the other type of test dominate in defining the constructs (factors) that underlie the handling of all the tasks—those designed according to Piagetian concepts and those designed according to cognitive control concepts? If Piagetian tasks dominate in defining the psychological factors represented by the correlation matrix, the cognitive constructs and the psychological processes suggested by Piagetian tasks would be basic or fundamental, and the cognitive control tests would be tapping only some aspect of these processes. On the other hand, if the cognitive control tests dominate in defining the factors, the constructs and processes defined by them would be fundamental principles of cognitive functioning, and Piagetian tasks would be measuring some aspect of these basic processes. This issue can also be stated in the form of a question. Do cognitive control tests define basic cognitive processes on which one relies to handle Piagetian tasks, or do Piagetian tasks define basic cognitive processes on which one relies to handle the requirements of cognitive control tests?

Table 6. Cognitive Control, Piagetian, and Neurological Tasks; and Academic Maturity Scores Selected for the Sixth Factor Analytic Study of 43 Public School First Grade Boys and Girls (Gunnoe, 1975)

Test		Description
1.	Fine Motor Delay	Draw line on maze at typical tempo; time in seconds
2.	Fine Motor Delay II-I	Draw line on maze as slowly as possible versus at typical tempo; time difference in seconds
3.	Scattered Scanning A	Search out and rapidly mark circles and crosses randomized among many shapes; number marked in 30 seconds
4.	Scattered Scanning B	Total distance in centimeters represented by connecting circles and crosses marked in 30 seconds
5.	Scattered Scanning C	Mean distance in centimeters represented by connecting circles and crosses marked in 30 seconds
6.	Fruit Distraction A	Name colors of fruit correctly colored (Card II) as quickly as possible; time in seconds
7.	Fruit Distraction B	As quickly as possible, name colors of fruit correctly colored but surrounded by pictures of objects; (Card III); subtract time to name fruit correctly colored (Card II); that is, Cards III-II
8.	Fruit Distraction C	As quickly as possible, name colors of fruit incorrectly colored (Card IV); subtract time to name fruit correctly colored (Card II); that is, Cards IV-II
9.	Fruit Distraction D	Number of peripheral pictures recalled from Card III after naming colors of fruit
10.	Leveling-Sharpening House A	Number of display on which first change is detected in scene of house continually displayed: first stop score
11.	Leveling-Sharpening House B	Number of correct changes detected in scene of house continually displayed

12.	Leveling-Sharpening House C	Ratio of number of changes detected and immediacy of detection, to total number of changes contained in test
13.	Object Sort A	Total number of groups constructed with objects
14.	Object Sort B	Mean developmental score of concepts assigned to typical groups constructed
15.	Object Sort C	Total number of groups constructed assigned atypical score
16.	Piagetian Task A	Conservation of substance: determine whether one of two equal balls of clay, deformed in shape, still contains the same amount as other ball
17.	Piagetian Task B	Conservation of numbers: determine whether a row of 10 cups, paralleling a row of 10 disks, still contains the same number when the cups are moved further apart
18.	Piagetian Task C	Classification: determine, from row of purple and red circles and squares, whether all items of one shape are of one or another color, and whether all items of one color are of one or another shape
19.	Bender-Gestalt	Copy Bender designs A, 2, and 5; scored according to Koppitz (1964)
20.	Associated Movements	With preferred hand: hold paper clip with thumb and first finger; spread third and fourth fingers; lift designated finger; touch each finger to thumb: number of times hand or finger of opposite hand moved associatively
21.	California Test of Mental Maturity (CTMM), A	Numerical Values (e.g., indicate largest or smallest and incorrect number in a number sequence)
22.	CTMM, B	Number Problems: mark picture that answers quantitative problem presented by E
23.	CTMM, C	Inferences: mark picture that corresponds to logical outcome of statement presented by E
24.	CTMM, D	Verbal Comprehension: mark picture that represents word E pronounces
25.	CTMM, E	Immediate Recall: mark picture that corresponds to second member of word pair E verbalizes
26.	CTMM, F	Delayed Recall: mark picture that represents answer to question asked about a story E read earlier

The factor analytic study to be considered was conducted with 43 first graders attending a public school: 26 were boys, 17 girls, 41 were Caucasian, one was black, and one oriental. The children had been selected for a study of a cognitive treatment method discussed in Part IV of this book. As part of this study, the children were administered 11 tests. Five were assessments of cognitive controls, three were assessments of Piagetian tasks (conservation of substance, numbers, and classification), two were assessments of neurological tasks (Bender-Gestalt Test and Associated Movements Tests), and one was a standardized test of mental maturity (California Test of Mental Maturity). The tests and a description of the process evaluated by each are presented in Table 6. The raw scores on each variable were subjected to a principal component factor analysis. Varimax rotation produced eight orthogonal factors (Table 7).

An examination of this factor structure enables us to observe whether cognitive control tests emerge to define cognitive control principles in the midst of measures of Piagetian cognitive tasks, Bender-Gestalt drawings, mental maturity tests, and neurological tests. Moreover, the factor structure observed might provide information about the relations between cognitive control principles, as conceptualized and made operational according to Klein’s cognitive control theory, and these other measures of cognitive, neurological, and academic functioning.

Seven of the eight factors obtained define cognitive control principles in that measures of cognitive controls are dominant in describing the psychological process captured by each of these factors. Four of the factors provide information about the relation between measures of cognitive controls and other measures, with one factor linking a specific cognitive control with one particular Piagetian task. Only one factor is defined predominantly by Piagetian tasks, along with associated movements and Bender-Gestalt test performance. Here cognitive control tests play a subordinate role. For convenience, let us first consider the factors that primarily define cognitive controls. Following this, we discuss the two factors that implicate Piagetian tasks.

Factor I describes the process of passive-narrow to active-broad scanning (focal attention cognitive control). The directions of the loadings indicate that children who traversed a large distance in marking circles and crosses (Test B), also showed a high mean distance traversed (Test C). To interpret this cluster, it should be noted that the mean distance is determined by dividing the number of total circles and crosses marked into the total distance. A large mean, when the total distance is large, indicates that the circles and crosses were marked in sequence such that the distance from one shape to the next was relatively large. Taken as a whole, the cluster defines broad scanning for children who produce high mean distances and narrow scanning for those who produced low mean distances.

The second factor defines the process of active-broad versus passive-narrow scanning (focal attention) interacting with the selective deployment of attention (field articulation), relating both these cognitive control principles to the solution of number problems. The direction of the loadings indicates that the child who scans actively (Scattered Scanning Test A) and broadly (Scattered Scanning Test B) also names the colors of Card II rapidly (Fruit Distraction A) and is not delayed by the irrelevant, peripheral figures when naming colors on Card III of this test (Fruit Distraction B). This factor resembles factors obtained in the previous studies discussed in which the process of focal attention (scanning) was observed to be integrated within the process of field articulation, as well as standing alone in defining a dimension. Moreover, this factor suggests that the cognitive controls involving broad scanning and not being distracted by peripheral, irrelevant information are uniquely implicated in solving number problems as presented by that subtest of the California Test of Mental Maturity. Here the child hears a quantitative problem stated by the examiner, then scans a row of pictures and marks the one that answers the problem.

Table 7. Factors Obtained from Cognitive Control, Piagetian, and Neurological Tasks and Academic Achievement Performance of 43 First Grade Boys and Girls: Sixth Study (Gunnoe, 1975)

Factor	Test	Factor Loading
Factor I: Focal attention cognitive control (passive-narrow vs. active-broad scanning)	Scattered Scanning B	.89
	Scattered Scanning C	.88
Factor II. Field articulation and focal attention cognitive controls (directing attention indiscriminately and narrow scanning vs. selectively and broad scanning)	Scattered Scanning A	.74
	Fruit Distraction A	-.43
	Scattered	.40

	Scanning B	
	Fruit Distraction B	-.35
	CTMM, B	.50
Factor III: Field articulation cognitive control	Fruit Distraction C	.68
	Bender-Gestalt	.42
Factor IV: Leveling-sharpening cognitive control (constructing global memory images fused with present vs. articulate images differentiated from present)	Leveling-Sharpening House A	.78
	Leveling-Sharpening House B	-.57
	Piagetian Task A	.38
Factor V: Leveling-sharpening cognitive control and delayed recall	Fruit Distraction D	-.62
	Leveling-Sharpening House B	.40
	CTMM, F	-.36
Factor VI: Equivalence range cognitive control (constructing few vs. many groups to categorize information)	Object Sort A	-.92
	Leveling-Sharpening C	.55
Factor VII: Equivalence range cognitive control: level of abstraction and the use of illogical concepts	Object Sort B	-.85
	Object Sort C	.78
Factor VIII: Piagetian and neurological tasks	Piagetian Task B	.81
	Piagetian Task A	.59
	Piagetian Task C	.57
	Bender-Gestalt	.77
	Associated Movements	.56
	Fruit Distraction A	.47
	Fruit Distraction B	.37
	Fine Motor Delay B	-.31

The third factor primarily defines the field articulation principle (Fruit Distraction C has the highest loading) and secondarily relates one aspect of the field articulation cognitive control with copying Bender-Gestalt designs. The loadings indicate that the child who responds to the presence of incorrect "background" colors by delaying in naming the color that should be there, draws poorly organized Bender designs. This relationship brings our attention again to the possibility that the process involved in handling Card IV of the Fruit Distraction Test is especially related to cognitive processes implicated in tasks where the management of information contained in the background, context, figure-ground relations is critical. The relation between Fruit Distraction Card IV and the Bender test observed here converges with the relation between Card IV and the Exploded Block Design Subtest observed in the factor analytic study of brain-damaged children discussed earlier.

Factor V primarily defines the leveling-sharpening principle and relates it to delayed recall as measured by the California Test of Mental Maturity. In interpreting the Fruit Distraction D loading, it should be noted that this is a measure of the number of peripheral figures the child recalls after Card III has been removed. As the previously discussed factor analytic studies revealed, recall of peripheral figures correlates with the leveling-sharpening house test measures; therefore this aspect of the Fruit Distraction Test relates uniquely to the process of forming memory images of information. Here, answering questions asked about a story read earlier (California Test of Mental Maturity, Delayed Recall) appears, as expected, to be uniquely related to the cognitive control principle that concerns the process of constructing and maintaining memory images of information over time. Interestingly, the CTMM subtest that measures immediate recall (child marks picture that corresponds with second of two words spoken by the examiner) does not appear here. One possibility is that this form of immediate recall does not implicate in its process, in a major way, the construction of differentiated memory images elaborate enough to correlate with leveling-sharpening measures.

This factor analytic study also defined a cognitive control principle of equivalence range (Factor VI). As in the previous factor studies discussed, the leveling-sharpening cognitive principle plays a subordinate role in defining the process that concerns categorizing information. This finding again reminds us of the issue of the relations among cognitive controls which is considered in the next chapter. The loadings indicate that children who produced few, narrow groups or categories when conceptualizing information tend to level information (Leveling-Sharpening Flouse C), whereas children who produce many categories tend to sharpen information or construct differentiated memory images.

The seventh factor also supports previous studies discussed in extending the definition of the equivalence range cognitive control to include the issue of the level of abstraction employed and the extent to which the relations, constructed between objects, are realistic. The loadings indicate that children who employed concrete, low-level concepts (Object Sort B) in conceptualizing information also make use of unrealistic, atypical conceptual relations (Object Sort C). Children who employed abstract concepts also made use of reality-related connections among the objects clustered in a group.

Let us now consider the two factors in which Piagetian tasks appear. In Factor IV the Piagetian task of conservation of mass plays a subordinate role in defining a process that primarily involves leveling-sharpening measures. In Factor VIII all Piagetian tasks appear, along with the Bender-Gestalt test and Associated Movement tasks, in defining a process common to all, with the Fruit Distraction Test playing a minor role.

Factor IV defines the principle of leveling-sharpening. The direction of the loadings indicates that children who detected the first change late in the series of presentations of the house scene (House A) also detected few changes (House B), whereas children who noticed the first change early in the display detected many changes. As observed in previous studies, this cluster defines a process concerning the construction of global versus differentiated memory images of information. Factor IV also suggests that the Piagetian task concerning the conservation of substance is uniquely related to the cognitive control of leveling-sharpening. This finding is all the more significant if we observe that the other Piagetian conservation tasks do not appear here. An examination of the response process unique to conservation of substance task helps us interpret why the construction of memory images is especially implicated. In the conservation task used by Gunnoe, the child is presented with two balls containing the same amount of clay and is told that one ball has just as much clay as the other. Then while the child watches, the examiner deforms one ball, first rolling it into a sausage shape, then into a pancake, and then into 10 small balls. With each deformation the child is asked, "Do they still have the same amount of clay or does one have more than the other?"

Because the conservation task appears in this factor, we can infer that the more the child maintains a clear, differentiated, memory image of the ball of clay before it is deformed, the more likely it is that the child will observe that the clay, in its present deformed state, contains the same amount of clay as remembered. The construction of memory images, or the leveling-sharpening process, appears to be especially recruited in solving the task of conserving mass.

An examination of the two other conservation tasks used by Gunnoe may tell why the leveling-sharpening process is not especially implicated in solving them. In solving the Piagetian task of conserving numbers, the child scans two parallel rows of items (cups and disks). Then the row of cups is spread out to cover a greater distance than the disks. In terms of cognitive control theory, the information the child is processing in this task is present and static (two rows of objects); it is scanned selectively and in terms of its geographic locations. Memory images of the cups or disks are not especially required in the process of solving this task.

In the classification task the child scans a row of circles and squares arrayed in the followed order from left to right: purple circle, purple square, purple circle, purple circle, purple square, red square, purple circle, red square, purple circle. The child is asked to look over the row of cutouts as he answers questions such as "Are all the purple things circles?" "Are all the square things red?" An examination of the process involved in this task, in terms of cognitive control theory, suggests that scanning the row of cutouts (focal attention) and selectively attending to one type or color and not to others (field articulation) would be especially involved. The construction of memory images and the relating of memory images to present information do not appear to be critical to the process elicited by the demands of classification task and its information.

With the benefit of the preceding discussion of the response process involved in each Piagetian task, let us turn our attention to Factor VIII, in which all three Piagetian tasks appear, as well as the Associated Movement and Bender-

Gestalt tests, as the major contributors to the definition of Factor VIII. The cognitive control of field articulation (selective deployment of attention) and of body regulation (fine motor delay) also make minor contributions. The direction of the major loadings indicates that the child who is not able to conserve substance and numbers or to classify logically, also draws poorly organized Bender designs and performs associated fine motor movements with his fingers while moving fingers of the other hand. The direction of the minor loading indicates that the same child is less able to delay fine motor movement (Fine Motor Delay B), is less able to selectively deploy attention to the colors and to name them rapidly (Fruit Distraction A), and is more distracted by peripheral irrelevant information (Fruit Distraction B). Gunnoe (1975) interpreted this finding as indicating that successful performance of the Piagetian tasks, the Bender test, and the Associated Movements tasks requires the child to inhibit or withhold attention from irrelevant stimuli contained by these tasks (i.e., to exercise the field articulation cognitive control). The Conservation of Substance Task, however, appeared alone in Factor IV; in addition to the inhibition of distractions and the selective deployment of attention, therefore, it seems to call for the construction of clear, stable memory images.

With this discussion of the factor analysis of cognitive control, Piagetian, neurological, and academic achievement measures, we can return to the questions asked at the start of this study. First, we have seen the measures of cognitive controls remained dominant in defining the psychological space generated by these various measures. Seven of the eight factors were defined primarily by cognitive control measures. On the one hand then, this result adds support to the stability of cognitive control constructs as defining unique, individual consistencies in the cognitive functioning of children.

The results of this factor analysis also help us with our particular interest in the relation between cognitive control constructs (and the tests designed to measure them) and Piagetian constructs (and the tests designed to measure them). The Piagetian tasks played no role in differentiating the total psychological space factor analyzed. This suggests that the Piagetian tasks (conservation of mass, numbers, and classification) do not define basic cognitive principles when examined along with measures of cognitive controls but rely on more basic cognitive control processes in their solution.

From another viewpoint, the results suggest that cognitive control tasks and Piagetian tasks do not measure the same domain of behavior. We observed that one Piagetian task and construct (the conservation of mass) relies uniquely on the cognitive control principle concerned with constructing and maintaining memory images (leveling-sharpening). But we observed that this was also the case with the California Mental Maturity Test measure of Delayed Recall of Stories. If we consider these findings together, one hypothesis would be that the conservation of mass task is like the delayed recall task in presenting a cognitive problem for solution that significantly implicates the manner in which memory images are constructed and maintained. Moreover, neither task, with its construct, defines a cognitive principle that is one of the basic structures involved in processing all the tasks and information included in. the analysis. We should note particularly that in this study, which combined Piagetian tasks with cognitive control measures, academic, and neurological tests, the three Piagetian tasks clustered together with neurological tasks, suggesting the sharing of common psychological process rather than the definition of unique individual consistencies. The common process shared by all the Piagetian and neurological tasks, as suggested in this study, is the process of deploying attention to relevant information contained in each and withholding attention from irrelevant information (a basic cognitive control principle).

The sixth factor study also provides clues concerning the relation between cognitive controls and academic skills. Measures of mental maturity or academic skills provided by the California test did not define individual factors, suggesting too that these psychological behaviors rely for their operation on more basic cognitive control principles.

THE SEVENTH FACTOR ANALYTIC STUDY: THE PERFORMANCE OF HOSPITALIZED EMOTIONALLY DISTURBED CHILDREN WITH COGNITIVE CONTROL TESTS AND THE WISC

The last factor analytic study to be considered evaluates the cognitive control test performance of children hospitalized because of emotional disturbances. Here we have the opportunity to address the question of whether the test performance of children whose emotional disturbances are severe enough to require hospitalization produce factors that define cognitive control constructs like those produced by nonhospitalized children. In other words, are the cognitive controls of severely emotionally disturbed children the same or different in organization when compared with those of children who are not emotionally disturbed ? Because the WISC was also included as a measure in this study, we have the opportunity to examine further the relationships between cognitive controls and intelligence.

The 164 children involved (101 boys and 63 girls) represent all the children admitted to an inpatient psychiatric facility, primarily for diagnostic study, over a period of about 18 months. The children ranged in age from 4 years, 10 months, to 17 years, 7 months, with a mean age of 11.98 years (SD = 2.93). Eighty of these children had also been administered the WISC. The mean total IQ observed was 97.9 (SD= 16.2). This intellectual level was believed to characterize the total sample. Table 8 presents numbers of boys and girls at each of the age levels constituting the total population.

Table 8. Information About Hospitalized Children Involved in the Seventh Factor Analytic Study

	Group Number				
	1	2	3	4	5
Total subjects	14	16	32	59	43
Girls N	5	2	10	22	24
Boys N	9	14	22	37	19
Mean age (years)	6-5	9-0	10-11	13-2	15-3
SD (months)	11.1	6.2	7.2	6.9	5.9

Age range	4 years, 10 months to 7 years, 9 months	8 years, 2 months to 9 years, 11 months	10 years, 0 months to 11 years, 11 months	12 years, 0 months to 13 years, 11 months	14 years, 0 months to 17 years, 6 months

The average hospital stay for the children was about 4 months, and the range was 2 to 9 months. For the most part, the emotional disturbances represented various character and borderline disorders. Only a small number of children were diagnosed psychotic. As part of the diagnostic work-up upon admission, each child was administered individually the battery of cognitive control tests. As noted earlier, about half the group also took the WISC.

Table 9 lists the cognitive control test scores and WISC variables obtained from the children. To make the most use of these measures, they were examined in four separate factor analyses. The first factor analysis conducted examined only the cognitive control test scores of all children combined. Then, to explore whether different factors would be produced by different ages, the total population was divided into two groups. For the second factor analysis the cognitive control test scores of only Groups 1,2, and 3 were analyzed. This cluster of subjects represented the younger half of the total population; ages ranged from 4 years, 6 months, to 11 years, 11 months (i.e., preadolescent children). The third factor analysis examined the cognitive control scores of only Groups 4 and 5, the older half of the total population, ranging in age from 12 years to 17 years, 7 months (i.e., from very early adolescence to late adolescence). The fourth factor analysis examined the cognitive control test scores along with the WISC scores of the total sample of children to whom the WISC had been administered (84 children). This study is discussed for convenience in the next chapter in a section devoted to cognitive controls and intelligence. Here we deal with each of the first three factor analyses.

Table 9. Cognitive Control Test and Intelligence Test Scores Selected for the Seventh Factor Analytic Study: 164 Boys and Girls Admitted to Inpatient Psychiatric Facility

Test		Description
1.	(Age)	
2.	Fine Motor Delay I	Draw line on maze at typical tempo; time in seconds
3.	Fine Motor Delay II-I	Draw line on maze as slowly as possible versus at typical tempo; time difference in seconds
4.	Motor Tempo	Mark with pencil each of 16 shapes at typical tempo; time in seconds
5.	Scattered Scanning A	Search out and rapidly mark circles and crosses randomized among many shapes; number marked in 30 seconds
6.	Scattered Scanning B	Total distance in centimeters represented by connecting circles and crosses marked in 30 seconds
7.	Scattered Scanning C	Mean distance in centimeters represented by connecting circles and crosses marked in 30 seconds
8.	Scattered Scanning D	SST ratio I: number of circles and crosses marked multiplied by number of seconds taken to mark shapes in Motor Tempo Test
9.	Scattered Scanning E	SST ratio II; total distance in centimeters represented by connecting circles and crosses marked times number of seconds taken to mark shapes in Motor Tempo Test
10.	Fruit Distraction A	Name colors of fruit correctly colored (Card II) as quickly as possible; time in seconds

11.	Fruit Distraction B	Number of errors made in naming colors of correctly colored fruit (Card II)
12.	Fruit Distraction C	As quickly as possible name colors of fruit correctly colored but surrounded by pictures of objects, (Card III); subtract time to name fruit correctly colored; that is, Cards III-II
13.	Fruit Distraction D	Number of errors made in naming correctly colored fruit surrounded by peripheral distraction (Card III) minus errors made in naming correctly colored fruit (Card II); error difference; that is, Cards III-II
14.	Fruit Distraction E	As quickly as possible, name colors of fruit incorrectly colored (Card IV); subtract time to name fruit correctly colored; that is, Cards IV-II
15.	Fruit Distraction F	Number of errors made in naming incorrectly colored fruit (Card IV) minus errors made in naming correctly colored fruit (Card II); error difference; that is, Cards IV-III
16.	Fruit Distraction G	Number of peripheral pictures from Card III recalled after naming colors of fruit
17.	Leveling-Sharpening House A	Number of display on which first change is detected in scene of house continually displayed: (first stop score)
18.	Leveling-Sharpening House B	Number of correct changes detected in scene of house continually displayed
19.	Leveling-Sharpening House C	Ratio of number of changes detected and immediacy of detection, to total number of changes contained in test
20.	Leveling-Sharpening House D	Number of incorrect changes perceived in information that is contained in house scene continually displayed (A changes)
21.	Leveling-Sharpening House E	Number of incorrect changes perceived involving information that is not contained in house scene continually displayed (B changes)
22.	Leveling-Sharpening House F	Total number of incorrect changes perceived in house scene (A + B changes)
23.	Object Sort A	Total number of groups constructed with objects
24.	Object Sort B	Mean developmental score of concepts assigned to typical groups constructed
25.	Object Sort C	Total number of groups constructed assigned a miscellaneous score
26.	Object Sort D	Total number of groups constructed assigned a major atypical score
27.	WISC A	Full-scale IQ
28.	WISC B	Information Subtest scaled score
29.	WISC C	Comprehension Subtest scaled score
30.	WISC D	Arithmetic Subtest scaled score
31.	WISC E	Similarities Subtest scaled score
32.	WISC F	Vocabulary Subtest scaled score
33.	WISC G	Digit Span Subtest scaled score
34.	WISC H	Picture Completion Subtest scaled score
35.	WISC I	Picture Arrangement Subtest scaled score
36.	WISC J	Block Design Subtest scaled score
37.	WISC K	Object Assembly Subtest scaled score
38.	WISC L	Coding Subtest scaled score

The factors produced by each of these three analyses are presented in Table 10. To facilitate a comparison of the clusters obtained from the total sample, and from the younger and older children within the sample, the factor clusters are rearranged so that comparable clusters are arrayed together. In addition to comparing the factors obtained from the two age subsamples, it should be useful to compare factors produced by the total sample of hospitalized children with those produced by public school children in the factor analyses discussed previously.

Table 10. Factors Obtained from the Cognitive Control Test Performance of 164 Hospitalized Children: Seventh Study

	All Ss (TV = 164)		Younger Ss (TV = 62)		Older Ss (TV= 102)	
Factor	Test	Loading	Test	Loading	Test	Loading
Factor I. Focal attention cognitive control (passive-narrow vs. active-broad scanning)	Scattered Scanning B	.82	Scattered Scanning A	.94	Scattered Scanning B	.82
Scattered Scanning A	.73	Scattered Scanning B	.91	Scattered Scanning A	.73	
Motor Tempo	–.56	Motor Tempo	–.27	Motor Tempo	–.56	
Factor II. Field articulation cognitive control (directing attention indiscriminately vs. selectively; time of performance)	Fruit Distraction E	.63	Fruit Distraction C	.68	Fruit Distraction C	.63
	Fruit Distraction C	.53	Fruit Distraction B	.60	Fruit Distraction E	.61
			Fruit Distraction A	.41		
Factor III. Field articulation cognitive control (directing attention indiscriminately vs. selectively; error in performance)	Fruit Distraction F	.78	Fruit Distraction F	.79		
	Fruit Distraction D	.76	Fruit Distraction D	.73	No comparable cluster	
			Fruit Distraction B	-.40		
Factor IV. Leveling-sharpening cognitive control (maintaining global vs. differentiated memory images)	Leveling-Sharpening B	-.76	Leveling-Sharpening B	-.93	Leveling-Sharpening B	-.70
	Leveling Sharpening A	.70	Leveling-Sharpening C	.93	Leveling-Sharpening A	.67
	Leveling-Sharpening C	.61	Leveling-Sharpening A	.73	Leveling-Sharpening C	.42
Factor V. Leveling-sharpening cognitive control (maintaining unstable, fluid vs. stable, constant memory images)	Leveling-Sharpening D	.61	Leveling-Sharpening E	.52	Leveling-Sharpening F	.93
	Leveling-Sharpening E	.37	Fruit Distraction G	.40	Leveling-Sharpening D	.84
	Leveling-Sharpening	.59			Leveling-Sharpening	.56

	F				E	
Factor VI. Equivalence range cognitive control (employing few vs. many categories to conceptualize information)	Object Sort C	.72	Object Sort C	.69	No comparable cluster	
	Object Sort A	.68	Object Sort A	.68		
Factor VII. Equivalence range cognitive control (employing concrete concepts and disordered thinking vs. abstract concepts and logical thinking in conceptualizing information)	Object Sort B	-.60	Object Sort B	-.72	Object Sort D	.60
	Object Sort D	.54	Object Sort D	.32	Object Sort B	-.47
Factor VIII. Pathological cognitive style (extensive scanning; maintaining fluid memory images of existing information)			Scattered Scanning E	.68	No comparable cluster	
			Leveling-Sharpening D	.47		
Factor IX. Pathological cognitive style (broad scanning; attending to irrelevant information; maintaining global memory images; high motor delay)			No comparable cluster		Scattered Scanning C	.99
					Scattered Scanning A	-.37
					Fruit Distraction A	.94
					Fruit-Distraction B	.88
					Fruit-Distraction D	.74
					Fruit-Distraction F	.61
					Leveling-Sharpening C	.86
					Fine Motor Delay I	.80
					Fine Motor Delay II-I	.43

FACTOR I: FOCAL ATTENTION COGNITIVE CONTROL

The cluster of tests that make up Factor I of the total sample clearly defines a focal attention process as measured by the Scattered Scanning Test. The loadings indicate that children who scanned broadly across the page in marking circles and crosses (total distance traversed—Test B) also marked many circles and crosses (Test A). Although a rapid time in marking the shapes of the Motor Tempo Test is associated with this performance (the loading has a negative sign), the loading is smaller in magnitude than those of the Scattered Scanning Test scores. Therefore the motor response involved in marking circles and crosses is a minor aspect of the process defined here, relative to the breadth and vigor of visual scanning.

When the scores are analyzed by age groups, the factors observed, with one exception, are the same in organization and in the magnitude of the loadings. Time taken to mark the shapes of the Motor Tempo Test appears to play a much smaller role in the factor defined by the younger children. This finding suggests that the motoric aspect of the response required by the Scattered Scanning Test is an almost insignificant part of the response process for younger children, for whom breadth and vigor of visual scanning appears to be the dominant process elicited by this procedure. In contrast, the typical motor tempo of the adolescents appears to be more heavily implicated in the response process, but again to a small degree relative to the visual scanning required.

The factor clusters obtained from the total sample and from both younger and older children closely resemble the focal attention factors produced by the public school children studied (see especially the fourth factor analytic study). However one difference is noted in the test items that cluster. The mean distance traversed (total distance covered by marking circles and crosses divided by the number of circles and crosses marked) contributed to the public school factor and is absent here. As we discuss below, the average distance a child traverses in one visual sweep from one circle or cross to the next appears in a factor that is unique to the older hospitalized children. Thus the focal attention cognitive control of severely emotionally disturbed children appears to be defined primarily by the total distance covered as a child scans and samples his environment, as well as by the number of bits of information registered. In contrast, the focal attention control of nonhospitalized children appears to be defined by both these dimensions as well as by the average distance covered in one visual sweep from one bit of information to the next. It may be that the mean distance traversed did not appear in the factor produced by hospitalized children because the average distance involved in one visual sweep to another tends to be too variable and erratic. This possibility suggests future studies matching emotionally disturbed, hospitalized children with normals in terms of age and total distance traversed in completing the Scattered Scanning Test, then investigators could attempt to determine whether the two groups differ with regard to the mean distance traversed when moving from one geometric shape to the next.

FACTOR II: FIELD ARTICULATION CONTROL (TIME TO COMPLETE TASK)

A field articulation factor was defined by the total group (Factor II). The children who took longer to name the colors of fruit incorrectly colored versus the baseline card (Card II, Test E) also took longer versus the baseline card to name the colors of fruit surrounded by peripheral distractions (Test C). The opposite pole represented by these relationships indicates that other children named the colors on each of the cards with irrelevant information as quickly as they named the colors on Card II. This cluster is the same as that produced by public school children, and it defines a process concerned with ignoring or attending to irrelevant information (field articulation control).

The field articulation cluster produced by the older children in the hospitalized sample is virtually the same as that produced by the total sample. However the cluster produced by the younger children contains a unique feature. Their factor is also defined by the speed of naming the colors of fruit surrounded by peripheral irrelevant figures (Test

C), but the number of errors made in naming colors on Card II (Test B) and the time taken to name the colors of Card II (Test A) contribute to the process. This unique factorial organization produced by younger children suggests that the pictures of fruit colored correctly, alone, represent irrelevant information powerful enough to elicit the process of field articulation (ignoring or attending to irrelevant information). With the older subjects, however, the baseline card alone does not appear to present sufficiently compelling irrelevant information to elicit the field articulation process. Thus performance with the baseline card does not appear in the factor cluster of older children. This hypothesis is also suggested by the finding that the time taken to name colors of fruit incorrectly colored (Test E) does not appear in the factor of younger children but is present in the factor of older children.

This difference in the field articulation factors produced by the younger and older children converges with differences observed in the factorial results of the public school, brain-damaged, and orphaned children discussed in connection with the first, second, and third factor studies. There we saw that the baseline card (Card II) contained irrelevant information powerful enough to contribute to the field articulation process unique to the clinical groups, yet was not distracting for the nonclinical children.

Although further study is needed, the observations made thus far suggest that the Fruit Distraction Test represents levels of compelling, irrelevant information that must be managed. For children who are *cognitively* immature, the baseline (Card II), with its colors formed in the shape of fruit, and Card III, with its fruit surrounded by peripheral objects, represent irrelevant information powerful enough to disrupt attention being given to the relevant information and central task. For children who are more mature cognitively, these irrelevant bits of information are not especially disruptive, whereas fruit colored incorrectly on Card IV have a distracting effect.

FACTOR III: FIELD ARTICULATION CONTROL (ERRORS WHILE COMPLETING TASK)

The foregoing considerations bring us to the second field articulation factor produced by the hospitalized children (Factor III). The cluster defined by the total sample indicates that children made more errors in naming the colors of fruit on both distraction cards—Card III (Test D) and Card IV (Test F)—than in naming colors of Card II, the baseline card. The performance of the hospitalized children then isolates a separate field articulation factor that concerns errors made in naming colors. The factor analyses of public school children discussed earlier revealed that these children did not produce a separate field articulation factor that isolated the part of the test process involving errors made when calling out the names of colors. In this regard the results of the fifth factor study are especially noteworthy. This study also analyzed both time difference and error difference scores of the Fruit Distraction Test, and the field articulation factor observed is defined only by time difference scores.

It would appear then that the Fruit Distraction Test scores involving errors made in naming colors may be related to a cognitive control issue unique to severely emotionally disturbed children. But a closer inspection of Table 10 shows that the issue appears to be exclusive to the younger children. The field articulation error factor produced by the total sample is in fact the result of the test performance of only the younger children in the sample. Virtually the same factor was produced by the younger children, but this factor did not appear in the analysis of the test performance of the older children in the sample.

Let us therefore limit our attention to this factor produced by the younger children and examine it more closely. The loadings indicate, as with the factor of the total sample, that children who made many errors naming colors of fruit colored incorrectly (Test F, Card IV) also made many errors naming colors of fruit surrounded by irrelevant pictures (Test D, Card III). However the factor produced in the analysis of younger children only includes an additional test loading that is small in magnitude but very meaningful. The loading of Test B (-.40) indicates that these children, who made many errors with Cards III and IV (the distraction cards), made relatively *few* errors when naming the colors of baseline Card II (the loading has a negative sign). In other words, children who make few errors with the “neutral card” make many errors naming colors when faced with a task containing powerful irrelevant distractions. This minor loading by Test B underscores the hypothesis that the process of calling out the name of colors incorrectly is related to the influence of distractions and is a process separate from the speed with which the colors are named.

To develop an interpretation of this factor and to guide future studies, it would be helpful to rely on the findings of the other factor analyses that yielded a number of observations suggesting how we might understand the meaning of the field articulation factor, defined by error scores alone.

In the first factor analytic study, discussed earlier, we observed that children who showed an increase in fine motor delay during the arousal of stressful affects (created by the examiner speaking emotionally toned words) also tended to ignore irrelevant information in a task that measured the field articulation process. There we speculated about the binding of affects by means of the physical process of delay, and about the relation between the regulation of affects and field articulation functioning. The same speculation suggested itself in the fourth and fifth factor studies, where we observed that kindergarten children who were rated as somewhat physically aggressive and physically on the move, tended to ignore irrelevant information as measured by the Fruit Distraction Test. Moreover, in the fifth study we also observed a factor suggesting that children who made many errors when naming colors of the fruit tended to construct images to Rorschach ink blots that were rated as revealing primitive fantasy aggression (e.g., “an animal shot and bleeding”).

These observations converge to suggest that the organization of the field articulation control (managing irrelevant information) is closely tied to the regulation and isolation of stressful affects so that they do not interfere with cognitive efficiency. The relationship suggested is that effective sublimating of affects and impulses in activity and in fantasy is associated with ignoring irrelevant information in a cognitive task whereas maladaptive regulation of affects is associated with deploying attention indiscriminately. These observations contain a number of clues suggesting that errors in naming colors is a cognitive response that uniquely reveals the manner in which affects are regulated.

If we hold these considerations in mind, we should next consider that the psychopathology of the hospitalized children studied represented primarily character disorders, impulse disorders, and tension-discharge disorders, that is, severe psychological deviations in the regulating of affects and impulses.

At this point let us return to our finding. We observed that the children studied, who present severe deficits in the regulation of affects and impulses and ranged in age from 4 to 12 years, produced factors that segregated time measures and error measures of the Fruit Distraction Test as unique components in defining the management of irrelevant information.

We also observed that the adolescents in this population did not produce a field articulation factor defined by errors in color naming. A look at the older children, in general clinical terms, suggests that they tended to show histories of very well-organized, directed, and purposeful acting-out behaviors. That is, the action mode was used heavily to achieve discharge of impulses and to express affects. Perhaps the adolescents did not produce a field articulation factor specifically tied to the regulation of affects because the individuals were managing affects quite successfully from their point of view (i.e., in acting-out, antisocial, organized behaviors). The preadolescents in this population instead of exhibiting consistent, organized acting-out behaviors, seemed to show more diffuse, episodic acting out. Perhaps the preadolescents produced a second field articulation factor with respect to errors in color naming because they had not yet stabilized an organized behavioral system for regulating affects and impulses. As a group they showed both disordered affect regulation and disordered field articulation functioning.

Factors II and III suggest several methodological and theoretical questions about the relation between cognitive controls and affects. Is the Fruit Distraction Test score of errors made in naming colors a measure of that component of the field articulation control uniquely tied to the regulation of affects? From preliminary observations, this seems to be the case. But to understand the meaning of naming errors fully, we next need to explore the role of verbal fluency in naming colors on this test. We also need to know more about the relation between verbal fluency on the one hand, and on the other the regulation of affects in the language mode, fantasy mode, and action mode (see Santostefano, 1970).

FACTOR IV: LEVELING-SHARPENING CONTROL: DEGREE OF DIFFERENTIATION OF MEMORY IMAGES

A leveling-sharpening cognitive control process was defined by the test performance of both the younger and older children. Moreover, the process defined by these emotionally disturbed children articulates two component parts that are the same as those articulated by the test performance of public school children. One component concerns the degree of differentiation imposed on a memory image constructed of information (Factor IV). The other element concerns the degree of stability imposed on the memory image over time (Factor V).

In terms of the first component, individuals among these hospitalized children who noticed the first change late in the series of house pictures (Test A) also noticed few changes subsequently (Test B) and detected these changes long after their first occurrence (Test C). This factorial cluster is identical to that produced by public school children in several studies (see above) and defines the degree of differentiation imposed on a memory image of information. This cluster of tests indicates that if a child constructs a differentiated memory image of the house scene and compares it with subsequent displays, he detects the first change early in the series; he also detects many changes and designates them soon after they first appear. If the child constructs a global image of the house scene and relates it to subsequent displays, he detects the first change late in the series; moreover, the changes detected are few and are noted long after the first appearance.

FACTOR V: LEVELING-SHARPENING CONTROL: DEGREE OF STABILITY AND FLUIDITY OF MEMORY IMAGES

In terms of the second component of the leveling-sharpening process, the hospitalized children as a group showed that those who perceived changes in information contained by the house scene (Test D) also perceived changes in information that was not in fact a part of the house scene (Test E), and they perceived more total changes (Test F). This cluster of tests defines a process that concerns the fluidity and stability of a memory image once it is constructed, and it is the same as that produced by the test performance of public school children. Here the fourth factor study is especially relevant because that analysis also included scores of incorrect changes perceived in the House Test as well as the three basic scores (first stop, number correct, and ratio).

If we now consider the factors observed when the test performances of the younger and older children are analyzed separately, a noteworthy difference appears. The leveling-sharpening component involving the stability of memory images is defined in the younger sample exclusively by changes perceived in information that is not part of the house scene (Test E; e.g., the child perceives that “the rooster on the weather vane” has dropped out, although that detail was never a part of the information). The cluster of tests produced by the younger group indicates that children who perceived many such incorrect changes also tended to recall more peripheral figures of Card III of the Fruit Distraction Test (Test G). Because number of recalls appears in this cluster, the figures recalled may have contained a significant number of fabulated or “invented” figures; these data are not available, however.

The comparable factor produced by the adolescents in the sample is dominated by the number of incorrect changes perceived in the information actually contained by the House Test (Test D; e.g., the child thinks he sees that the cloud has shifted from one side of the card to the other). Changes perceived in information that is fabulated or invented play a lesser role (loading = .56 for Test E) in this cluster.

When the factors of the younger and older children are viewed comparatively, an issue is articulated for future study. Fluidity of memory images, as revealed by fabulating information with details that have not been a part of the information to be remembered, appears to be a characteristic of younger children. Or stated in developmental terms, this type of fluidity is characteristic of immature developmentally early cognitive stages, whereas fluidity of memory images, as revealed by embellishing the existing information, appears to be a characteristic of older children or individuals in more advanced stages of cognitive development.

FACTOR VI: EQUIVALENCE RANGE CONTROL: NARROW AND BROAD CATEGORIES

The hospitalized children produced two factors that define two components of the equivalence range cognitive control. Factor VI concerns whether few or many categories are used to conceptualize information, and Factor VII is related to the level of abstraction and the extent of disordered, illogical thinking represented by the categories formed. This finding parallels the finding obtained from public school children (see the fourth factor study in particular), who also defined these two part-processes of the equivalence range control.

Among Factor VI children, those who formed categories rated as “typical” by the scoring system (see Chapter 10), also form categories rated as “miscellaneous.” Both categories concern locating objects in the same group such that the membership of each object in that group is reasonable and realistic given its properties. In terms of age differences observed, the same cluster was produced by the younger children. However the analysis of the test performance of the adolescents failed to produce a comparable factor. One possibility here is that the categorizing behavior of these severely disturbed adolescents was dominated by illogical, unreasonable concepts that lacked reality relatedness. Therefore this component of their equivalence range functioning obscured the part-process that concerns number, or breadth, of categories employed.

FACTOR VII: EQUIVALENCE RANGE CONTROL: LEVEL OF ABSTRACTION AND DEGREE OF UNREALISTIC THINKING

This speculation is supported by the makeup of clusters defining the part of equivalence range functioning involving level of abstraction and degree of illogical thinking. As a total sample, the hospitalized children produced a factor indicating that children who constructed many groups rated as atypical by the scoring system (Test D; i.e., the objects grouped and the reason given for their belonging together were illogical and unrealistic) also tended to produce typical (realistic) groups that revealed concrete conceptualizing (Test B; the loading is a negative value). Therefore children who constructed few atypical groups also tended to construct typical groups that revealed abstract conceptualizing. This process is the same as that defined by public school children (see above).

If we now compare the factor of the younger children with that of the adolescents, we observe a difference in the loadings of the test. The factor of the younger children is dominated by the score assigned to level of abstractions revealed by typical groups (Test B), whereas the factor of the adolescents is dominated by the score that represents the number of atypical groups constructed (Test D). It would appear that the adolescents as a group revealed more atypical, unrealistic conceptual thinking. This may account for their failure to produce a factor that articulates number of typical groups as an index of breadth of categorizing. Since their categorizing behavior was dominated by illogical thinking, they produced fewer groups rated as typical. Perhaps this component of equivalence range functioning appeared too infrequently to generate a factor cluster. In any event, the degree of illogical thinking among these severely disturbed adolescents is an overriding factor in their equivalence range functioning, and category width does not appear to be a characteristic dimension. Future work must determine whether this difference is related to age or to the severity and type of pathology presented by these adolescents, or both.

FACTORS VIII AND IX: PATHOLOGICAL COGNITIVE STYLES

A comparison of the factor structures produced by the younger children, by the adolescents, and by all children combined revealed that both subgroups produced a factor unique to each. These factors appear to define a process that represents a configuration of two or more cognitive controls. As discussed in Chapter 4, cognitive control theory defines a configuration of controls as representing a "cognitive style." Therefore these factors could be viewed as revealing cognitive styles that (*a*) characterize severely disturbed children or (*b*) represent a configuration of cognitive controls that is pathological in terms of ideal development.

The factor produced by the younger children (Factor VIII) indicates that the children who scanned broadly (i.e., covered a large distance in marking circles and crosses: Scattered Scanning E) tended to perceive many changes in information that in fact was *not* contained by the house scene (Leveling-Sharpening D). In interpreting the loading of Scattered Scanning Test E, it should be recalled that the higher the value obtained when multiplying distance traversed in marking circles and crosses by motor tempo time, the more extensive the scanning. This cluster, then, suggests a style that combines broad, extensive scanning with maintaining fluid memory images of information and fabulating memory images. On the face of it, we would expect in normal cognitive control functioning that broad extensive scanning would coordinate with maintaining stable memory images. But in this group of preadolescent, hospitalized children, the reverse seems to be the case.

It may be helpful to consider this finding in the same terms used earlier to discuss the differences observed between the public school, brain-damaged, and orphaned populations. There we also observed relationships between cognitive controls, forming a style, that represent a reversal of what is expected. It may be recalled that among orphaned children *narrow* scanning was associated with ignoring peripheral, irrelevant information, and for brain-damaged children *narrow* scanning was associated with ignoring irrelevant contextual information. Accordingly, the opposite pole represented by this cognitive control dimension would relate broad scanning with attending to irrelevant information. In each case the effective organization of one control is associated with the compromise of another.

In our present study of character disorders we find that extensive scanning is associated with maintaining fluid memory images, which represents a compromising of leveling-sharpening, whereas narrow scanning (compromising of focal attention) is associated with maintaining stable memory images. Is there some adaptive value in each configuration (narrow scanning plus stable memory images vs. broad scanning plus fluid memory images), or is one more adaptive than the other? These and other questions await further investigations of cognitive styles unique to types of psychopathology and the adaptive significance of these styles.

The factor produced by the older children in the sample (Factor IX) combines four cognitive controls. The test items and the directions of their loadings indicate that children whose average visual sweep or scan, from one circle or cross to the next, covers a relatively great distance (Scattered Scanning C, mean distance traversed) also tend to mark *fewer* circles and crosses (the loading of Scattered Scanning A is negative). The mean distance of visual scanning is determined by dividing the total distance traversed (the distance generated by connecting all the circles and crosses marked) by the number of circles and crosses marked. Since few circles were marked and the mean distance is large (Scanning C has a positive loading), the visual sweep from one geometric shape to the next is large.

This quality of the focal attention control (individual visual sweeps are broad) is associated with taking much time (Test A) and making many errors (Test B) when naming the colors of the baseline card of the Fruit Distraction Test. And even more errors are made, versus the baseline card, when naming the colors on Card III with its peripheral pictures (Test D) and on Card IV with its incorrect colors (Test F). Detecting few changes, and long after they first appear, in the series of scene of the house test (Leveling-Sharpening C) is also a part of this configuration. Last, much time is taken when drawing a line at one's regular tempo. And despite this slow regular tempo, there is a tendency to slow down fine motor movement even more (Fine Motor Delay II-I has a moderate, positive loading).

Taken together then, these test loadings suggest a cognitive style that includes the tendency to sweep broadly with one visual scan, to be disrupted by irrelevant information (in particular, to be disrupted in the task of naming colors), to maintain global images of information over time, and to delay fine motor movement even beyond a typical tempo that is slow. The other style suggested by this configuration, if we polarize the dimension, would relate narrow scanning, little disruption by irrelevant information, maintaining differentiated memory images, and employing a quick tempo and little delay.

Although further study is needed to clarify the adaptive significance of this cognitive style for adolescents exhibiting severe character disorders, we can make a few speculations relying on our earlier discussions of cognitive controls and psychopathology.

First, this cognitive style is dominated by extensiveness of scanning (focal attention), as was the style observed with other clinical groups (orphaned and brain-damaged children). In this study, moreover, we again observed the association of the compromising of focal attention (narrow scanning) with efficient functioning in other controls.

Second, this cognitive style is also influenced heavily by the part of the field articulation process that we have some basis for supposing to be uniquely related to the regulation of affects and impulses (as measured by the error score of the Fruit Distraction Test). If we accept this proposal for the sake of discussion, we can speculate that narrow scanning, ignoring irrelevant information, maintaining differentiated memory images, and employing motor delay represents a cognitive style that is efficient in processing information without the disrupting influence of affects that are irrelevant to the cognitive task at hand. On the other hand, broad scanning, motoric impulsivity, global memory images, and attending to irrelevant information could be hypothesized to constitute a cognitive style that is inefficient in processing information and is associated with inadequate regulation of disrupting affects.

In summary then, as with our studies of brain-damaged and orphaned children, we observe in this work involving another clinical group that the compromising of some controls is associated with the adaptive functioning of others. Among the younger children, broad scanning was correlated with maintaining fluid memory images. And a compromise of scanning (narrow visual sweeps) was coordinated with maintaining stable images. For adolescents, focal attention (narrow scanning) and motor delay (slow usual tempo with delay) are compromised in their organizations to combine with field articulation (ignoring irrelevant information) and leveling-sharpening (maintaining differentiated memory images) for cognitive functioning that is free of conflicts and disrupting affects.

These observations suggest that future investigations might explore further whether pathological cognitive styles are formed by the compromising of one or more controls in the service of fostering efficient organization of others. Studies are also needed to discover how these cognitive styles serve the adaptational efforts of clinical groups of children.

SUMMARY OF RESULTS OF THE SEVEN FACTOR ANALYTIC STUDIES

Let us summarize the results of the seven factor analytic studies in terms of the issues raised in the critique of the cognitive control concept that concluded Chapter 4. Although the factor analytic method and the results obtained are particularly suited to handle the question of the validity of the construct of cognitive controls as applied to children, the factor analytic results can also provide useful clues and some data concerning several of the other issues articulated earlier, as well as pointing the direction for future research.

1. The Issue of the Stability and Validity of Cognitive Control Constructs and Cognitive Control Tests for Children

In seven independent factor analytic studies involving normal and clinical populations of children, we repeatedly observed clusters of tests that could be interpreted in terms of cognitive control constructs and their operational definitions, as formulated with adults by Klein and his co-workers. In the first three studies, preliminary versions of the cognitive control tests devised for children were administered to three sample populations: 44 boys and girls attending public school (age range, 7 to 12 years; mean IQ, 110); 38 girls and boys living in an orphanage and attending public school (age range, 6 to 13 years; mean IQ, 104); and 44 brain-damaged children attending a private special-education center (age range, 6 to 13 years; mean IQ, 72). These children were also administered a variety of other cognitive tasks—for example, placing cutouts of different colors into a form board in specified sequences; maintaining continuous attention and vigilance, to be able to detect the appearance of particular geometric shapes in the viewer of a memory drum; experiencing a spot of light as moving when the test setting indicates that it does not move (phi phenomenon) ; judging whether a design is rotated in space; drawing designs from memory; locating blocks into a form board so that, if juxtaposed, the blocks would make the design being copied; completing geometric designs partially formed by line segments; and locating marbles in a form board to copy a design made of marbles. When these measures were intercorrelated and factor analyzed, the cognitive behaviors elicited by all the tests could be accounted for by three separate processes, each of which fit the definition of one of the cognitive control principles formulated by Klein, namely focal attention (sampling information in the field with broad and extensive scanning vs. narrow and passive scanning), field articulation (deploying attention at relevant information while ignoring irrelevant information vs. indiscriminate attention deployment), and leveling-sharpening (constructing global memory images of information and fusing present information with past vs. constructing differentiated memory images and articulating present information from past). In addition, motoric delay appeared as an important dimension in accounting for the cognitive consistencies the children revealed in dealing with each task. Accordingly, we proposed the concept of body schema-tempo regulation to define another cognitive control principle useful in understanding the cognitive functioning of children.

The four above-named cognitive control principles emerged when we observed in separate studies the performance on the same tasks of the public school children, the orphaned children, and the brain-damaged children.

Following the initial studies, a revised and elaborated battery of cognitive control tests was administered to four separate populations of children in separate studies: 184 boys and girls comprising the total kindergarten population of a public school, 164 boys and girls comprising the entire kindergarten population admitted the following year to the same public school, 43 first grade boys and girls, 24 of whom had been selected for cognitive therapy because of significant lags in cognitive development, with the remainder of the group serving as a control sample. The fourth group consisted of 164 boys and girls admitted over a 2-year period to a children's psychiatric hospital because of severe emotional disturbances; the average hospital stay was about 3 months, the age range was 5 to 17 years, and mean IQ was 98.

With each of these factor analytic studies, cognitive control tests again dominated the meaning of each cluster of tests. And each cluster was clearly interpretable in terms of one or another cognitive control principle. In addition to the four principles that appeared in the first set of studies, the cognitive control principle of equivalence range (categorizing information) appeared in these latter studies because measures of this principle had been included.

The last four factor analytic studies conducted are important not only because cognitive control principles maintained their stability from population to population, and from age group to age group, but also because cognitive control principles emerged unchanged when a variety of personality and cognitive measures and behavioral ratings were added to the "factor space" (e.g., teacher ratings of mathematical, reading, and language skills, aggression, paying attention, body activity, and knowledge of classroom routine; Rorschach indices of aggression; fantasy tests of castration anxiety and aggression; performance tests of aggression; word associations to emotionally toned words;

neurological tests of associated movements ; Bender-Gestalt test scores; California Test of Mental Maturity scores; and Piagetian tasks).

When interrelating with all the various measures, cognitive control measures repeatedly defined cognitive control principles as accounting for the total test performance of the children. The main measure in defining each factor, then, did not prove to be, for example, a Piagetian task, a subtest of the California Mental Maturity Test, the Bender-Gestalt test, the Benton Visual Retention Test, the Marble Board Test, or a Rorschach score, but a measure of one or another cognitive control.

This broad finding across seven factor analytic studies provides considerable support for two propositions: that cognitive controls are valid constructs with which to define the basic, unique cognitive strategies used by normal and clinical children in managing a wide variety of tasks, and that the tests of cognitive controls devised for children are valid and measure what they purport to measure.

Although the factor analytic studies are designed and were conducted primarily to determine the validity of the construct of cognitive controls and to evaluate the tests devised for children, aspects of the findings also relate to several of the other issues raised in the critique of Chapter 4. These findings do not supply conclusive support for the issue raised. They are discussed here as suggestive and by way of stimulating further research.

2. The Issue of Specifying the Process Conceptualized by Each Cognitive Control Concept

Chapter 4 pointed out the need to further clarify and specify the unique process conceptualized by each cognitive control. The results of the seven factor analyses bear on this issue. In general, the factors obtained support the cognitive process conceptualized by each control and the contention that each test devised for children samples the process of each control as defined by Klein. Beyond this general finding, the results obtained suggest further specifications and clarifications of the several cognitive controls. Let us consider each cognitive control in turn.

FOCAL ATTENTION

Each of the studies produced a factor that defined the process of visually sampling information by means of broad and active or passive and narrow visual sweeps. In each factor defining this process, breadth of visual scanning appeared as it was measured by the total distance and the mean distance covered by the circles and crosses marked on the Scattered Scanning Test. The degree of activity or vigor of visual scanning, as measured by the number of circles and crosses marked within the time limit, also appeared in each factor defining the focal attention process. Neither of these components of the focal attention principle (breadth and vigor of visual scanning) defined separate independent factors in any of the studies conducted. Rather, they always appeared together. In terms of the data available thus far, then, the process of focal attention involves the interactive contributions of both breadth of the scanning and vigor of scanning. To explore this issue further, we must study children who show discordance in the interaction of these two components. For example, a study could compare children, along other variables, who show narrow scanning (in total distance traversed) and vigorous scanning (in number of circles and crosses marked) with children who show broad scanning and passive scanning.

FIELD ARTICULATION

In the process of this control principle, attention is selectively directed at information relevant to the task at hand and irrelevant information is ignored, or attention is withheld from it. The Fruit Distraction Test, which has been used as a measure of this process, contains two types of irrelevant information. One type, geographically and physically peripheral to the relevant information, is represented by the pictures of common objects surrounding the colored fruit on Card III. The second type which is in the form of the context or background of the relevant information, is represented by the incorrectly colored fruit on Card IV. In several studies, Card IV, with its incorrect colors as contextually irrelevant information, clustered with the Bender-Gestalt or with block design tasks to form separate factors that related to a definition of the field articulation concept. In the same studies, however, Card III, with its peripheral pictures as irrelevant information, defined separate factor clusters.

The makeup of these factors suggests the criticality of the type of irrelevant information being managed, along with the relevant information; each type, moreover, appears to generate a separate part-process within the broad field articulation principle. One part-process seems to involve tasks that contain *spatially irrelevant* information that needs to be ignored if the relevant information is to be handled efficiently. The other part-process seems to involve *contextually irrelevant* information that must be ignored. These suggestive findings remind us that when using tests to provide a measure of the field articulation principle, care should be taken to explore whether the method emphasizes one or the other type of irrelevant information. For example, the Rod and Frame Test, used as a measure of the field dependence-independence style, may be an example of a method that emphasizes spatially irrelevant information (i.e., the frame surrounding the rod), whereas the Embedded Figures Test, used to assess this style, may emphasize contextually irrelevant information (i.e., the drawings in which the figure is embedded).

In several factor studies the field articulation control, as measured by the Fruit Distraction Test (especially the scores involving errors in naming colors), was related to the regulation of affects. Children who ignored irrelevant information on the Fruit Distraction Test, and in some studies children who made few errors when naming colors, were assessed as binding and isolating affects by exerting much delay over physical motion, as being physically on the move or physically aggressive (discharging affects through motility), or as constructing fantasies of sublimated aggressive acts. Moreover we observed that errors in naming colors on the Fruit Distraction Test were unique in characterizing the cognitive control functioning of children who are hospitalized because of episodic, explosive outbursts and mood swings. These findings emphasize the need to explore whether and how the cognitive control of field articulation is involved, in particular, with the regulation of affects and impulses as information.

LEVELING SHARPENING

This principle, as originally defined, concerns the degree of differentiation or refinement imposed on memory images of information and the degree to which present information is articulated from past information. Our factor analytic studies suggest that two part-processes are involved, and in considering this issue it should be noted that Leveling-Sharpening House Test, used as the measure, gave information about the number of changes detected, how soon the changes were detected, and whether incorrect changes had been perceived (i.e., whether changes were perceived that in fact did not occur in the test stimuli).

In several studies (notably the fourth factor analytic study), two independent leveling-sharpening factors were obtained. One defined the process concerned with the degree to which a differentiated memory image is constructed of past information. This process was revealed in how soon the first correct change, and subsequent changes, are detected, and in the total number of correct changes noticed. The second leveling-sharpening factor concerned the stability or fluidity of memory images over time, as revealed in the number of incorrect changes perceived. Here the issue is the tendency to fabulate, modify, or embellish memory images held over time. Our results, then, suggest that the conceptualization of the leveling-sharpening principle should be modified to acknowledge these two separate part-processes of remembering information and relating memory images to present information.

In almost every study, measures of fine motor delay played a minor but consistent role in defining the leveling-sharpening process with respect to the construction of differentiated memory images. Measures of fine motor delay did not play a part in defining the process concerned with the fluidity of images. This and other issues pertinent to the heuristic value of refining the leveling-sharpening process into two subparts are considered below in a discussion of the relation between the leveling-sharpening control and regulation of effects.

EQUIVALENCE RANGE

As Wolitzky and Wachtel (1973) note in their review of studies of the equivalence range process, it is not yet clear whether this control concept is unidimensional or multidimensional. Our factor analytic results suggest that the process so conceptualized contains three part-processes (see especially the fourth factor analytic study). One part-process concerns the breadth of categories typically used. This is revealed in the number of groups an individual imposes on the objects presented by the Object Sort Test in placing together those that are perceived to belong together. Imposing many groups is interpreted as a strategy of narrow categories, and imposing few groups is regarded as a conceptual strategy of broad categories. This process, involving the number of categories imposed, appeared in our factor analytic studies and defined a separate factor. Our finding, then, agrees with the observations of several investigators (see Wolitzky and Wachtel, 1973).

However we have observed two other part-processes that concern the equivalence range principle. To consider these, we first review our manner of evaluating the sorting-categorizing behavior of children. We evolved a scoring system that goes beyond the index used by most investigators, namely, the number of groups imposed on the objects. Our system evaluates the reason the child gives for considering the grouped objects to belong together, as well as the content of the objects in the group. Thus we are asking whether the objects grouped and the label linked to them represent realistic conceptual thinking related to the information at hand, or unrealistic, disordered thinking violating the information at hand. The first type of grouping is referred to as "typical" or "miscellaneous" and the second as "atypical" (see Object Sort Test manual in Chapter 10). Moreover, the system evaluates the level of abstraction represented by the reason or concept the child gives to groups judged as typical.

Our studies produced factors that defined width of categories and of abstraction of typical groups, and degree of unrealistic thinking as independent dimensions of the equivalence range principle. In the same factor study, then, the performance of children defined as separate the following part-processes: the number of groupings they imposed on the objects and the information they presented, the level of abstraction represented by the reason or concept the children attached to groups judged as typical, and the number of groups and explanations the children gave that revealed unrealistic use of the information.

Although these part-processes defined independent factors, they also showed a general relationship. The use of few typical groups (broad category width) seems to go along with the use of abstract concepts in explaining the membership of the objects in each group, and with the use of few or no groupings rated as atypical or unrealistic.

The next section, which considers the relation between cognitive controls and affects, and the section of Chapter 6 that discusses age studies, afford the opportunity to explore the value of distinguishing these part-processes of the equivalence range principle.

BODY SCHEMA-TEMPO REGULATION

Our studies to date have made use of only one aspect of the recently developed Body Schema-Tempo Regulation Test (see Chapter 10), namely, the measure of fine motor delay. Therefore we have been able to observe the role of only one measure of the body-schema tempo regulation principle in factor analyses. Fine motor delay defined a major factor only in the brain-damaged children study, yet it appeared in several studies, linked especially with measures of the leveling-sharpening principle in a subordinate way. This finding supports Klein's proposal that delaying motility is critically implicated in the process of constructing memory images. To explore this issue further, as well as the principle proposed here according to which body schema and the regulation of tempo comprise a cognitive control, studies need to be conducted that employ all parts of the Body Schema-Tempo Regulation Test. My colleagues and I have a number of these in progress.

3. The Issue of Cognitive Control Process and Child Psychopathology

The preceding discussion specified the process unique to each control when the controls are most broadly conceived, to encompass the functioning of all children, normal and clinical. The factor analyses were examined primarily to answer the question of whether different age groups and populations (i.e., public school, orphaned, brain damaged, hospitalized) would reveal essentially the same cognitive control principles in their cognitive functioning. We have convincing evidence that this appears to be the case. However in addition to providing data about the consistency of these control principles across populations, the factor studies permit us to search for subtle differences in the processes of cognitive controls of clinical groups that might have value for practice and future investigations.

Viewed from this vantage point, the findings obtained from the first group of public school children and from the orphaned and brain-damaged children offer clues about the processes of cognitive controls unique to psychopathologies. We observed that the orphaned children produced a cluster of tests defining a focal attention process (breadth and vigor or scanning) that resembled the process cluster produced by public school children. Key positions in both groups were occupied by the Circles Test (scanning and judging pairs of circles) and the Stromberg Test (scanning a wide array of cutouts).

The brain-damaged group also produced a focal attention factor that includes the Circles Test as a key, but the other tests in the cluster of this population suggest qualities of a scanning control unique to the issue of brain damage. The factor of the brain-damaged group includes a test in which the child is asked to limit his attention to the relatively narrow viewer of a memory drum, to scan the row of geometric shapes displayed in the viewer, and to press a button when the row includes a square and a cross (Attention Test A). The cluster also included handling irrelevant, contradictory background information (Card IV of the Fruit Distraction Test). The directions of the factor loadings of these tests in the cluster indicate that the tendency to scan in a narrow way (as measured by the Circles Test) is associated with detecting many squares and crosses in the viewer of the memory drum and with ignoring the incorrect colors that form the background of Card IV of the Fruit Distraction Test. Conversely, among brain-damaged children, broad scanning with the Circles Test is associated with detecting few squares and crosses displayed in the viewer and with attending to irrelevant background information. The process of focal attention unique to braindamaged children, then, seems to implicate the physical boundaries that frame information (the viewer restricted visual scanning to an area 2 x 6 inches), and the embeddedness of information.

A comparison of the subtle differences in the field articulation process defined by each of these three groups also suggests unique qualities. The public school sample defined a field articulation process primarily with performance on the parts of the Fruit Distraction Test that compare naming colors of fruit surrounded by peripheral pictures (Card III), and when looking at incorrect colors (Card IV), with the naming of colors of fruit when no irrelevant information is present (Card II). Both the orphaned and brain-damaged children defined this process with performance on the same parts of this test. In addition, however, the factor clusters of both braindamaged and orphaned children included another part of the Fruit Distraction Test that does not appear in the public school factor. This part involves comparing time taken to name colors of fruit with no distractions present (Card II) with time taken to name colors bars (Card I). This subtle difference suggests that with both clinical groups, the presence of colors presented in the shape of common fruit (as opposed to the same colors presented in the shape of rectangles) is irrelevant information powerful enough to be a distracting influence. With normals, on the other hand, the colors formed in the shape of fruit are too low keyed, as information, to represent distractions. Peripheral pictures and incorrect colors are required before the tasks represent distracting information that must be ignored.

With the field articulation factors observed in each of these three populations, only that of the brain-damaged children included the task of placing blocks apart to form a design (Exploded Block Design Test), and this task carried the highest loading in the factor. This observation converges with the observation of the key role played by the memory drum task in defining focal attention in suggestion that figure-ground relationships and embeddedness of information play a role in the cognitive control process unique to brain-damaged children.

4. The Issue of Relations Among Cognitive Controls

In each of the factor analytic studies, a measure of one cognitive control was observed to contribute in a minor way to the meaning of a factor cluster that primarily defined another cognitive control. On close examination of this, we see that a measure of one control—for example, the Circles Test of focal attention—does *not* appear, now in a factor that defines leveling-sharpening in one study, and now in a factor that defines field articulation in another. Rather, a pattern is revealed that supplies clues concerning the question of the relations among cognitive controls discussed in Chapter 4.

Whenever one cognitive control test appears in a subordinate role (i.e., with a low but meaningful factor loading) in a factor dominated by tests of another cognitive control, the following pattern is observed: (*a*) measures of the focal attention control play a subordinate role in factors defining the field articulation control, (*b*) measures of the field articulation control play a subordinate role in factors defining the leveling-sharpening control, (*c*) measures of the leveling-sharpening control play a subordinate role in factors defining the equivalence range cognitive control, and (*d)* measures of motor delay play a subordinate role in factors defining each of the other controls.

This pattern suggests a hierarchical relationship among the controls from motoric delay (representing the first level of the hierarchy) to focal attention, to field articulation, to leveling-sharpening, and to equivalence range (representing the highest level). The proposed hierarchical relations among cognitive controls is concordant with the developmental ordering of cognitive functioning proposed by both Werner and Piaget; that is, cognitive development proceeds from sensorimotor functioning, to perceptual functioning, to conceptual functioning.

The relation between body schema-tempo regulation (motoric delay) and the other cognitive controls deserves special attention. Although in the studies considered measures of fine motor delay related to measures of all other cognitive controls, tempo regulation, at least the delay of fine motor movement, seems to be especially linked to the leveling-sharpening control. In four of the five studies that included a measure of fine motor delay, a specific factor was obtained defined primarily by measures of leveling-sharpening and secondarily by motor delay. This finding, requiring further study, suggests that although the subordinating of motoric activity is a prerequisite for the unfolding of the cognitive processes of focal attention and field articulation, motoric delay becomes critical in the leveling-sharpening process, perhaps because now the individual manages the representation of information in memory rather than information that is concretely available.

This proposed hierarchical relationship among controls brings out the significance of the direction of the factor loading of the subordinate cognitive control measure when it contributes to the definition of another cognitive control. The direction of the factor loadings suggests that the direction of the relation of each control with another remains consistent. For example, broad, extensive scanning is related to ignoring irrelevant information while attending to relevant. Narrow, passive scanning is related to attending to both relevant and irrelevant information (e.g., see first and sixth factor studies). Deploying attention selectively is related to maintaining differentiated memory images over time (e.g., first study), whereas attending to irrelevant information is related to maintaining global memory images. Maintaining differentiated stable memory images over time, furthermore, is related to employing many categories and abstract concepts when conceptualizing information, and the tendency to construct global, fluid memory images is related to employing few categories and concrete concepts.

The relations among cognitive controls and among levels within a control are considered further in Chapter 7. At this point the proposed hierarchical relationship among cognitive controls leads us to the issue of cognitive styles as defined by Klein, that is, the patterning or configurations of cognitive controls.

5. The Issue of Patterns of Cognitive Controls (i.e. Cognitive Style) and Normalcy and Pathology

As discussed in Chapter 4, George Klein used the term “cognitive style” to signify a pattern of two or more cognitive controls. Typically, investigators have studied cognitive controls one at a time, mainly because of the need to clarify the process of each. However cognitive control theory proposes that as an individual manages the environment and its information, several cognitive controls operate simultaneously, forming a configuration or pattern unique to that individual. This pattern of controls is conceptualized as the individual’s cognitive style, which he habitually employs to negotiate adaptation with environments.

Studies are needed to explore the role of cognitive styles in the total psychological functioning of individuals (e.g., Wolitzky and Wachtel, 1973). Possible approaches include observing the different patterns of cognitive controls exhibited by children at various age levels, comparing the pattern of controls shown by a group of individuals when coping with one situation to the pattern of controls they use when coping with a different situation, or comparing the patterns revealed by several populations whose members differ in terms of some life history variable.

The first three factor analytic studies provide an example of the latter approach. Measures of several cognitive controls were obtained from public school children, orphaned children, and brain-damaged children; the individuals represented about the same age range (6 to 13 years). However there are limitations in using these studies to explore the issue of styles: the mean intelligence level of the brain-damaged children was significantly lower than that of the other children, the test administered to each group differed somewhat, and factor analysis reduces the tests to a few common denominators, whereas a statistic such as multiple correlations would illuminate the patterning of tests revealed by each group. Nonetheless, a comparison of selected factors produced by each group gives clues about cognitive style that may serve in planning future studies.

To illustrate, let us consider the cluster of test scores produced by each group and interpreted as defining the focal attention cognitive control (Factor I of each study). The public school children revealed their unique scanning behavior with the Circles Test (in which pairs of circles are to be scanned and compared) and with the Stromberg Test (in which circles of wood arrayed over a large area are to be scanned and sampled). Broad scanning with one test was associated with broad scanning on the other, and vice versa.

The orphaned children also revealed their unique scanning behavior with the Circles Test. However their factor also included, in a minor role, the Fruit Distraction Test measure that presents irrelevant information in the form of peripheral pictures of objects (Card III). The relation between these two measures suggests that orphaned children who scan within a narrow zone are assisted in this behavior by their tendency to withhold attention from irrelevant, peripheral information, whereas those who scan broadly tend to give attention to irrelevant, peripheral information.

Like their orphaned counterparts, the brain-damaged children revealed their unique scanning behavior with the Circles Test. Yet their factor included, in a minor role, the Fruit Distraction Test measure that presents irrelevant information in the form of an incongruous context or background (incorrect colors). The relation between these two measures suggests that brain-damaged children who scan within a narrow zone (focal attention) have the assistance of a tendency to withhold attention from irrelevant *contextual* information, whereas the broad scanners are assisted by the tendency to give attention to background information.

This comparison suggests that when sampling information in the environment, orphaned children use a style that combines breadth of scanning (focal attention) with the management of *peripheral* information (one aspect of field articulation), but braindamaged children use a style that combines breadth of scanning (focal attention) with the management of *contextual* information (another aspect of field articulation; see issue 2, above). The style used by public school children contains aspects of the focal attention control only (i.e., breadth and vigor of scanning).

A further clue about the issue of cognitive style is supplied by relating this comparison to the field articulation factor (Factor II, first study) produced by the public school children. Although measures of the field articulation control (Fruit Distraction Test) dominate in defining this factor, a minor role is occupied by a measure of focal attention (Circles Test). This cluster suggests that for *public school children, broad scanning combines with ignoring irrelevant information.* Yet with both *orphaned and brain-damaged children, narrow scanning combines with ignoring irrelevant information* (peripheral information for orphaned children and contextual information for brain damaged).

From these observations we might speculate that in pathological development one cognitive control is modified or compromised, in terms of the developmental ideal, when combining with another to form a cognitive style. The compromise is an attempt to construct a cognitive style that accommodates to and serves the unique psychological vulnerability to informational demands associated with the pathological state. In terms of the populations and observations we are considering, it could be hypothesized that the brain-damaged children are cognitively vulnerable to the demands of the context or background; thus they can be viewed as “context bound” when processing information. The orphaned children are vulnerable to outlying, irrelevant information and can be viewed as “periphery bound.” (See the second and third factor analytic studies.)

Let us now consider these vulnerabilities in terms of the patterns of cognitive controls revealed by each group. When sampling the environment with their context-bound vulnerability, brain-damaged children use a cognitive style that combines either narrow scanning with ignoring the context of information or broad scanning with attending to the context. Orphaned children, who are vulnerable to overincluding peripheral information when sampling the environment, use a style that combines narrow scanning with ignoring peripheral information or broad scanning with attending to peripheral information. If the public school children are considered, for discussion’s sake, to represent no unique vulnerabilities in coping with information demands, they can be said to use a style that combines broad scanning with ignoring both peripheral and contextual bits of information. The styles of the public school, orphaned, and brain-damaged children, then, differ in unique ways when aspects of focal attention and field articulation are combined to cope with the environment.

Clues about the issues of psychopathology and cognitive style also emerged from the (seventh) factor analytic study of hospitalized emotionally disturbed children. First, in the results obtained from both a preadolescent group and an adolescent group we observed a factor that appeared to define a cognitive style in which one compromised control was combined with the adequate organization of another. The preadolescents produced a style cluster that coordinated focal attention and leveling-sharpening. The tendency to employ narrow visual sweeps was associated with maintaining stable memory images. Following the line of reasoning used earlier, we could assume that the psychological vulnerability of these severely disturbed preadolescents is a function of their failure to maintain constant, stable objects and contacts with the environment. The cognitive style that accommodates to and serves the vulnerability calls for a compromise of focal attention (i.e., *narrow* scanning) coordinated with stable memory images. The other end of this continuum combines broad scanning with a compromising of leveling-sharpening (i.e., maintaining fluid, unstable memory images). When considered from the vantage point of cognitive strategies, then, the factor appears to define a style unique to the adaptive efforts of this pathological group.

Similarly, the hospitalized adolescents studied produced a factor that combined several cognitive controls, among which one was compromised in coordination with the adequate organization of others. With these older children, who represented impulse and character disorders, narrow scanning was combined with (*a*) ignoring irrelevant information (especially as revealed by making no errors in naming colors), (*b*) maintaining differentiated memory images, (*c*) employing a slow motor tempo, and (*d*) exercising even greater delay over motility. If we assume that the psychological vulnerability of this group involves regulating and binding affects, we could hypothesize that this style was constructed to accommodate to and serve this vulnerability. To this end, one control is compromised (focal attention results in narrow scanning) and combines with a tendency to ignore irrelevant information (which, as suggested by other data, is related to ignoring affects) and with delaying motility, which is also related to binding affects.

Certainly, more formal investigations are needed to explore patterns of cognitive controls (styles) unique to various pathological groups and the hypothesis that the cognitive styles serving pathology are characterized by the compromising of one or more cognitive controls that make up the configuration. The clues available to us from the above-mentioned studies suggest that the concept of a configuration of cognitive controls is of value in understanding the role cognition plays in psychopathology. Moreover, a cognitive style approach to the question of cognition and psychopathology may ultimately point to innovations in treatment. To illustrate, let us consider the preadolescent hospitalized population. The results obtained raise the question of whether such children should be trained to employ a *narrow scanning* strategy. Would such training result in an increase in the stability of memory images and in object consistency, therefore in more adaptive transactions with the environment, free of fabulated and distorted information?

6. The Issue of Cognitive Controls and the Management of Affects

Because several of our factor analytic studies employed personality tests and procedures that aroused various affects such as anxiety, guilt, and tensions related to aggression and succorance, we have available clues about the relations between cognitive control functioning and the regulation and management of affects. Again, these clues are viewed as suggestions for future studies, not as supporting or refuting some hypothesis.

Let us first array the several findings. In the initial factor analytic study, we observed (Factor V) that public school children delayed fine motor movement even more than their usual slow tempo when the examiner spoke emotionally stressful words (e.g., bad, blood, father, mother). We also observed that this behavior was associated with scanning broadly (focal attention). One could speculate that the physical activity involved in moving a pencil very slowly served to bind and manage anxiety and stressful affects, and that this binding combines with cognitive control functioning that is adaptive.

Observations from the fourth and fifth factor analytic studies, also involving public school children, converge with this speculation. Here we observed that children who ignored irrelevant information (both peripheral and contextual; see Factor II) were rated by teachers as showing some body movement in class and some physical aggression (e.g., pushing and shoving). Again we can speculate that for kindergarten children, body activity serves to bind and manage affects; and this binding is associated with adaptive field articulation control functioning.

Examining the fourth and fifth factor analytic studies yields further clues because in both investigations measures were obtained of the management of affects in fantasy (i.e., representations) as well as of the management of affects by means of physical motion. In the fourth study we observe (Factor V) that constructing memory images of information (leveling-sharpening) is associated with both physical binding of affects (motor delay) and fantasy binding of affects (e.g., the child imagines a boy's finger is cut).

The fourth study also revealed that the use of unrealistic groupings to conceptualize information is observed among children who manage anxiety by fantasizing primitive forms of castration (e.g., the monkey's tail is cut off) and who manage aggression by fantasizing primitive outcomes (e.g., boy smashes the windshield of a car with his baseball bat). The latter finding is also observed in the fifth factor study (Factor V). Moreover, this study produced a factor that related the use of abstract concepts in explaining why objects belong together (equivalence range control) with managing aggression, not only in fantasy but also by speaking words associated to emotionally toned stimulus words (knife and mouth).

If we reexamine the findings, a pattern is suggested in the relations between cognitive control and the management of affects. Scanning (focal attention) and selective attention (field articulation) are associated with binding affects by physical movement. Constructing memory images (leveling-sharpening) is associated with binding affects by both physical movement and fantasy activity. Categorizing and conceptualizing information (equivalence range) is associated with binding affects by fantasy activity and spoken language.

Although these findings are obtained primarily from 6 year olds, they suggest a broad hypothesis that could be pursued with different age groups and clinical populations: namely, that the relation between cognitive control functioning and the management of affects varies from one control to the next in terms of the ego mode that dominates in binding and managing affects, that binding affects by means of physical motility is associated with the adaptive functioning of focal attention and field articulation, and that binding affects by means of fantasy activity and language behavior is associated with the adaptive functioning of equivalence range.

Studies would need to explore in particular the direction of the relationship that is most adaptive at each stage in development. For example, physical motility, as an ego mode to manage affects, may be associated with adaptive functioning of particular cognitive controls in 5 year olds, whereas subordinating physical movement to the use of fantasy activity may be associated with the adaptive functioning of particular cognitive controls in 12 year olds. We also need to know more about the relation between the intensity of affective expression and cognitive control functioning. For example, primitive fantasies of aggression may be associated with the adaptive functioning of some cognitive control at one stage, and more sublimated, attenuated fantasies of aggression may be associated with another stage. Moreover, future studies could pursue the relations between the management of different affects (e.g., aggressive tensions vs. nurturant tensions) and various cognitive controls.

7. The Relations Between the Concept of Cognitive Controls and Piaget's Model of Cognitive Functioning

When tests of cognitive controls were factor analyzed along with Piagetian tests of conservation of mass, numbers, and classification (sixth factor study), we observed that cognitive control measures dominate in defining the basic cognitive processes that underlie all the tests administered. No Piagetian task played a key role in defining a unique independent factor. Moreover, Piagetian measures showed differential relations to cognitive controls. All Piagetian tasks used seem to share one cognitive control process. Our findings suggest that each task involves deploying attention to relevant information and ignoring irrelevant information.

In addition to this general relationship, one Piagetian task, the conservation of mass, seems to have a unique tie to the leveling-sharpening principle. Since the measure of conservation of mass appeared with a small loading, in a factor dominated by measures of leveling-sharpening, it is suggested that a problem that requires conserving mass may rely on the construction of memory images for its solution.

From the findings of this study, cognitive control functioning appears to underlie the solution of Piagetian tasks, and the concept of cognitive controls has the conceptual status of representing the substrate of cognitive schemata (see Chapter 4). The relation between cognitive control tests and constructs, and Piagetian tasks (and their constructs), must have further study, of course, especially with children at different stages of development.

8. The Issue of the Relation Between Cognitive Controls and Academic Skills

Suggestions about the relation between cognitive controls and academic skills came from the sixth factor study, which included, in addition to measures of cognitive controls, measures of five academic skill areas: number problems, inferences, verbal comprehension, immediate recall of words spoken by the examiner, and answers to questions about stories read by the examiner. First, we observed that these measures of skills played no part in defining factors. This suggests that the skills measured do not define cognitive principles basic to the functioning represented by all the measures included in the study. Rather, it would be hypothesized that cognitive controls functioning is basic to or implicated in the handling of various skill tasks.

Skill measures were not significant in defining factors, but they appeared in particular factors with minor loadings, which give clues about how individuals rely on cognitive control processes in the solution of skill tasks. For example, solving number problems, as presented by the California Test of Mental Maturity (CTMM) was associated with broad scanning (focal attention) and attending to relevant information while ignoring irrelevant information (field articulation). This may indicate the existence of a relation between a skill area, solving number problems, and the cognitive controls on which the skill area uniquely relies. Further study is needed, however, to ensure that such a relation is not an artifact of the content of the CTMM number subtest, in which the child looks over a row of pictures and marks one that answers the quantitative problem stated by the examiner. The relation observed may have to do with the linkage of the child's efficiency and his scanning the row of pictures broadly, ignoring irrelevant information. Or it may have to do with the link between solving number problems as such and focal attention and field attention processes. Future studies of this relationship should include measures of the number problem skill that make use of stimuli in addition to rows of pictures.

Another factor suggested that a child's efficiency in answering questions after hearing a story read by the examiner (CTM M Delayed Recall Subtest) demonstrated a unique reliance on the leveling-sharpening cognitive control. We should consider this finding along with the observation that for the immediate recall of words spoken by the examiner, the child did not rely on leveling-sharpening functioning. On the face of it, this finding seems to fit, since answering questions about a story heard some minutes ago appears be a function of maintaining, in memory, a differentiated image of the bits of information contained by the story.

This initial study does not agree with the position taken by Gardner, Jackson, and Messick (1960) that cognitive controls and academic abilities represent a single set of variables. Rather, the findings suggest that cognitive controls are fundamental cognitive processes on which academic abilities rely. Moreover, this study reminds us of the need to clarify and specify the makeup, requirement, and response process of academic skill measures as the relation between these and cognitive controls are explored (see critique in Chapter 4).

9. The Issue of the Relations Between Cognitive Controls and IQ

Four factor analytic studies included measures of cognitive controls and of intelligence. In each study IQ measures did not play a role in defining factors, except in the analysis of the performance of brain-damaged children. Thus it appears that cognitive control tests do not measure the same processes measured by intelligence tests. These results also suggest that cognitive controls, like academic skills, may be strategies of information processing that underlie the solution of tasks presented by intelligence tests. The specific findings that relate cognitive controls and intelligence tests are discussed in Chapter 6.

COMMENT ON THE CONSTRUCT VALIDITY OF THE COGNITIVE CONTROL CONCEPT AND COGNITIVE CONTROL TESTS FOR CHILDREN

Taken together, our seven factor analytic studies offer convincing evidence that the cognitive functioning of children as observed in connection with a variety of cognitive tasks can be reduced to several basic principles that satisfy the operational definitions of cognitive controls formulated by Klein in work primarily with adults. When children deal with, process, and solve cognitive tasks, they employ a set of mechanisms that register, select, avoid, control, and manipulate the information along five basic lines: body motility and delay, extent of visual scanning, directing attention to relevant information and ignoring irrelevant information, constructing and maintaining memory images of information that changes over time, and categorizing and conceptualizing information. These factor analytic studies may help the clinician conclude that cognitive controls are not a figment of the researcher's imagination but are constructs with substantial ties to cognitive behaviors of children. The behaviors investigated were exhibited by public school children, orphaned children, brain-damaged children, and children hospitalized because of emotional problems, and the subjects represented a range of intellectual functioning, as well as several age levels.

The need remains to refine factor analytic support for the construct validity of cognitive controls by systematically studying age differences and other clinical populations. The results obtained thus far with seven independent analyses indicate that this venture should be a fruitful one for clinicians and researchers.

6

RELIABILITY AND CRITERION-RELATED VALIDITY OF COGNITIVE CONTROL TESTS FOR CHILDREN

This chapter presents additional formal findings to support the treatment plan proposed in Chapter 1 as an aide to clinicians in need of technological advances. It may be useful at this point to review the steps we have taken thus far in our attempts to apply the developmental point of view in clinical practice with children. After tracing the history of child development research and child clinical psychology, we concluded that fundamental differences in the philosophical assumptions and experiences of each field have limited the extent to which the clinician can rely on child development research for new diagnostic and treatment technology. Yet the problems the present-day clinician is asked to handle make his need for new technology critical. As one solution, given the limited assistance the clinician can expect from child development research, it was recommended that the clinician first construct a single theoretical framework capable of embracing all the issues of importrapsychic and interpersonal, normal and pathological. This framework could then serve as a guide in searching for new technology.

The biodevelopmental framework, discussed in Chapter 2, was proposed to satisfy this recommendation. With this framework as a roadmap, we turned to investigate new ways of diagnosing and treating cognitive functioning and disabilities in children. The biodevelopmental framework pointed us in the direction of the concept of cognitive controls, formulated by Klein and Schlesinger, and to the methods devised by them and their colleagues to measure these psychological variables.

The concept of cognitive controls seemed to me to afford an excellent approach to the task of constructing new diagnostic concepts and methods that could provide the practitioner and clinical investigator, interested in cognition, with dynamically and developmentally oriented technology. As proposed by Klein two decades ago, the concept of cognitive controls already emphasized several biodevelopmental requirements: that cognition be viewed as a system of structures that regulate information, that affects be included in a consideration of cognitive functioning, and that cognition be related to adaptation. However the tests of cognitive controls developed by Klein were found to be inadequate on several grounds for evaluating children. Therefore it seemed desirable to begin by constructing new tests of cognitive controls that might be more suitable for children.

My colleagues and I examined a series of cognitive control tests that I had devised, taking Klein’s concept and methods as a starting point. The tests were constructed to meet the operational definitions of cognitive controls on the one hand, and, on the other, to be suitable in work with children, especially those in need of psychological help. On the face of it, each of these tests appeared to require a process of cognitive functioning that fit one or another of the definitions of cognitive control principles. To gather validating support for these tests and for the construct of cognitive controls, we considered a number of factor analytic studies. The results of these studies indicated that a wide variety of cognitive activities of children could be accounted for in terms of several cognitive control principles defined as unique, stable, individual differences (structures) involved in management of information. Moreover, the factor analytic studies indicated that the tests devised measure behaviors that fit the definitions of cognitive controls formulated by Klein.

We now have before us five tests of cognitive controls designed for children and a way of conceptualizing cognitive functioning that has considerable validating support. For the clinician and investigator to determine whether these procedures and the cognitive control concept provide diagnostic data about cognitive functioning that are useful in practice, a number of questions must be raised following the biodevelopmental model.

Do these tests measure behaviors that are reliable ? Do they measure cognitive behaviors that define stages of development? And what is the relation between these test measures and intelligence, sex, socioeconomic status, and certain personality variables? Do these tests diagnose cognitive disabilities in a form that is useful in clinical practice? For example, do the tests predict a child's failure or success in the classroom? Do they guide the clinician in deciding whether therapeutic intervention is indicated for a cognitively disabled child, and, if so, what form therapy should take? And do the tests provide a way of measuring changes in cognitive control organization as an individual copes with and adapts to changing environments?

The next three chapters are devoted to these questions. The present chapter considers the reliability of the cognitive control tests devised for children and sets out further data concerning their validity. Consideration is also given to issues important to professionals interested in these tests as diagnostic instruments—for example, the relation between measures of cognitive controls and intelligence, sex, socioeconomic status, and several personality variables. The chapter that follows describes studies that concern the question of stages of cognitive control development. Relying on the findings of these age studies and on the factor analytic studies already discussed, Chapter 8 presents a developmental-adaptational model of cognitive controls that elaborates the theory of cognitive controls initially formulated by Klein. The proposed model conceptualizes stages of cognitive control development, mobility of cognitive controls in adaptation, and cognitive controls and affects. Chapter 9 then outlines clinical studies of cognitive controls that were guided by this developmental-adaptational model and discusses questions raised by the model for clinical practice and investigation.

Taken together the studies, observations, and discussions presented in Chapters 5 to 9 supply information about the validity and reliability of the tests of cognitive controls, the constructs they purport to measure, and the effectiveness of these tests and constructs in practice.

Let us now turn to the specific issue of the reliability and criterion-related validity of the tests of cognitive controls devised for children. The reader is referred to the discussion of validity at the start of Chapter 5 and to the discussion of validity and evidence of reliability in *Standards for Educational and Psychological Tests* (American Psychological Association 1974).

CRITERION-RELATED VALIDITY

As pointed out in the previous chapter, criterion-related validity of a new test procedure is explored by observing the extent to which the behavior elicited by the test relates to behaviors elicited by another procedure (the criterion) considered to reflect, directly or indirectly, some characteristic of the variable in question. The criterion may be a measure provided by another test that appears to assess the same domain of behavior, or a rating of that behavior observed in some real-life context. The criterion may also be represented in some difference inherent in populations. On theoretical grounds, groups of children may be expected to differ in their performance with a test because according to a given hypothesis they are characterized by differing degrees or qualities of the behavior sampled by the test. Next we consider studies that relate to each of these types of criterion validity.

I. Relations Between Cognitive Control Tests and Other Tests of Cognitive Functioning

CORRELATIONS OBSERVED IN THE FACTOR ANALYTIC STUDIES

The factor analytic studies discussed in the previous chapter, in addition to providing information about the validity of the cognitive control construct, also tell us about criterion validity. Whenever factor clusters contain measures both by cognitive control tests and by other tests, this essentially means that the tests are highly correlated with each other in sharing and defining a common psychological process. In the first factor analytic study, involving public school children, for example, we observed that the manner in which a child directed attention when judging the relative size of two circles (Circles Test) correlated with the way he directed attention when the informational field was narrowly or broadly segmented (Stromberg Tests A and B). This correlation supports the proposal that the Circles Test assesses whether a child tends to scan information narrowly and passively or broadly and actively. In the same study, the number of changes a child detected in a series of pictures of a wagon (Leveling-Sharpening Wagon Test) correlated with the accuracy with which he drew a geometric design from memory (Benton Visual Retention Test). This correlation supports the proposal that the Leveling-Sharpening Wagon Test assesses the images of information (global or differentiated memory) that a child constructs.

CORRELATIONS AMONG THREE TESTS OF COGNITIVE CONTROL AND THE BENTON VISUAL RETENTION, INCOMPLETE FIGURES, AND MARBLE BOARD TESTS

In addition to relations among tests suggested by the factors obtained, we can examine' patterns of specific correlations, to gather support for criterion-related validity of the cognitive control tests. Table 1 shows the intercorrelations obtained among three tests of cognitive controls used in an early study and three other tests of cognitive functioning. In the sample were the public school children studied in the first factor analytic study. In the Benton Visual Retention Test, the child looks over a design and then draws it from memory. In the Incomplete Figures Test, the child uses a pencil to complete geometric designs, each consisting of two overlapping figures made up of line segments. In the Marble Board Test (Strauss and Lehtinen, 1947), the child looks over a design made of black marbles set into a form board consisting of 10 rows of 10 holes reach. With this standard before him, he attempts to copy the design by placing marbles in another form board.

Table 1. Intercorrelations of Cognitive Control Tests and Three Measures of Cognitive Functioning: 44 Public School Boys and Girls

	Benton Visual Retention Test				Incomplete Figures Test		Marble Board Test	
Cognitive Control Test	Accuracy Score	Total Errors	Parts Omitted	Time	Accuracy Score	Time	Accuracy Score	Time
Circles, 9 mm	.19	.24	.17	.13	.03	–.14	.28*	–.36*
Circles, 9/12 mm	–.25	.29*	.25	.07	.30*	.33*	.53**	_ 49**
Fruit Distraction III-II: time (seconds)	–.22	.19	.04	–.27	.22	.09	40**	–.53**
Fruit Distraction IV-II: time (seconds)	–.31	45**	.27	.12	.15	.01	.33*	–.28*
Leveling-Sharpening Wagon: first stop	–.35*	.34*	43**	39**	.27	.03	.27	–.18
Leveling-Sharpening Wagon: number correct changes	.66**	–.63**	–.45**	_ 50**	44**	.34*	–.23	.29
Leveling-Sharpening Wagon: ratio	–.58**	.56**	44**	48**	.35*	–.32*	.33*	–.23

*p = .05.

**p = .01.

Accuracy scores for each of these tests were included in the factor analysis discussed in Chapter 5, and only the Benton contributed to the definition of one factor. Although the three tests did not play a major role in defining factors, it would still be useful to examine how each of them correlates with measures of cognitive controls. In terms of our interest in criterion validity, we want to know whether the tests of cognitive controls correlate differently with each of these tests of cognitive functioning, and whether the pattern of correlations provides support for criterion-related validity.

To optimize the value of this comparison of intertest correlations, we examined scores from each test, in addition to the accuracy score included in the factor analysis. With the Benton Visual Retention Test we included the total number of errors produced by the child in completing the drawings, the number of subparts of a design omitted from the drawing by the child (i.e., "forgotten"), and the mean time in seconds the child took to complete the drawings. Similarly, the time taken to complete the partially drawn geometric figures and the time to construct the patterns of marbles are included.

To interpret the correlations, it should be recalled that a *high* score with the Circles Test (9 mm), and a *low* score with the Circles Test positive illusion condition (9/12 mm) means accurate estimation of the sizes of circles, therefore active, extensive scanning. With the Fruit Distraction Test, the lower the time difference between each distraction card (Cards III and IV) and the baseline card (Card II), the less the child is distracted by peripheral, irrelevant pictures or by incorrect colors. The leveling-sharpening scores are interpreted as discussed in Chapter 5, with a low first stop score, a high number of correct changes, and a low ratio indicating that a clear, stable memory image is constructed of information.

Inspection of the pattern of correlations reveals that extensiveness of scanning (Circles Test) and the selective deployment of attention (Fruit Distraction Test) are related more to performance with the Marble Board Test and much less to that with the Benton test.

Children who accurately estimated the sizes of circles (extensive scanning) and were not distracted by irrelevant information in naming colors, tended to construct more accurate marble designs and to do this rapidly. Children who showed narrow scanning with the Circles Test tended to construct inaccurate designs and took more time to complete the task. This relationship agrees with our expectation. When the child studies a pattern of marbles arrayed on a form board consisting of 100 holes and tries to copy the pattern by locating marbles on another form board, the process appears to involve the cognitive principles of scanning and articulating the field of information; the principle of holding information in memory, however, does not seem to be involved in a major way.

On the other hand, performance with the Leveling-Sharpening Wagon Test correlates more with performance with the Benton test and the Incomplete Figures Test and less with the Marble Board Test. Children who detected a change early in the series of pictures and detected many subsequent changes, reporting these soon after they were first introduced, tended to draw more accurate designs from memory, to make fewer errors in their drawings, to omit or forget fewer subparts of the designs, and to take less time to complete the designs. Moreover, these children produced more accurate designs when completing partially drawn figures and took less time at the task. Children who detected a change late in the series of pictures with the Wagon Test and detected few changes, noting them some time after they first occurred, made more errors and took longer when drawing designs from memory and were less accurate in completing designs partially drawn. These findings agree with the behavioral processes involved with each test. In handling the Benton test, the extent to which a child maintains a clear memory image of the design is a dominant aspect of the process elicited by the task. With the Incomplete Figures Test, given the correlation observed, it appears that the clarity of memory images of information is a critical part of the process. It seems plausible that if a child quickly and accurately connects line segments forming a geometric shape, he is maintaining a stable, articulate image of that shape to guide his performance.

This comparative examination of the correlations obtained lends some support to the criterion-related validity of the three cognitive control tests evaluated.

CORRELATIONS BETWEEN THE FRUIT DISTRACTION TEST AND THE ROD AND FRAME TEST

Fifty adolescents (25 boys and 25 girls; age range, 14 to 16 years; mean age, 15 years) were administered parts of the Fruit Distraction Test (Cards II and IV) and the Rod and Frame Test. Both procedures are intended to measure the selective deployment of attention (Chapter 4), and the study explored the relationship between them. The Rod and Frame Test emphasizes in its task the manner in which an individual ignores or is influenced by the field (frame surrounding the rod) as he attempts to direct his attention at the relevant information (rod) and place it in an upright position.

Card IV of the Fruit Distraction Test presents the subject with fruit incorrectly colored. The incorrect colors are seen as representing a context that must be ignored as the child calls out the names of the colors that should be there. Card II, naming colors of fruit correctly colored, was used as the baseline measure. Reading time and reading error difference scores were correlated with two Rod and Frame Test scores: (*a*) the total number of degrees, over 16 trials, that the rod deviated from the upright position, and (*b*) the variance of the subject's performance from trial to trial. Each deviation was subtracted from the mean of the subject's total deviation and squared, and the sum of these squared deviations was divided by the number of trials. This score was viewed as assessing the consistency of a subject's performance in righting the rod. The tests failed to correlate. Fruit Distraction Test reading time difference scores correlated .10 and .12, respectively, with RFT total deviations and RFT variance.

Fruit Distraction Test reading error difference scores correlated .13 and –.02 with RFT total deviations and RFT variance, respectively.

From this single study it appears that the two tests do not assess the same cognitive process in adolescence. (The sex difference observed in these subjects with the two tests is discussed in the section on cognitive controls and sex differences.)

CORRELATIONS BETWEEN THE FRUIT DISTRACTION TEST AND THE CONTINUOUS PERFORMANCE TEST

In an intensive study of attention in children, Ricks (1974) asked second grade teachers to refer children who were inattentive in the classroom and at least 6 months below grade level in reading. Seventeen children were referred (5 girls and 12 boys), and they were matched with a group referred by the same teachers as attentive and average in reading (mean IQ, attentive = 107; inattentive = 96; mean age, attentive = 8.1 years; inattentive = 7.9 years). The children were administered a number of procedures including the Fruit Distraction Test and the Continuous Performance Test (CPT) developed by Rosovold et al. (1956). We consider here only the relationship observed by Ricks between these two tests. The next section compares the test performances of the two groups of children.

The CPT was designed as a measure of sustained attention. It consists of an X task and an A-X task. By means of a memory drum, the child is presented a series of 31 letters that appear in a rectangular viewer, one at a time, at approximately 0.92 second intervals. For the X task the child is to press a button each time the letter X appears. For the A-X task, administered subsequently, the child is to press the button only when the letter X appears immediately after the letter A. There are 32 possible correct X responses and 24 possible correct responses on the A-X task. Electrical counters register correct and incorrect responses.

Ricks correlated the CPT scores and Fruit Distraction Test scores of the attentive and inattentive children. In general she found that all children who correctly responded to the series of appearances of the letter X (i.e., showed a high level of sustained attention) tended to name the colors of the fruit on Cards II and III more rapidly. She concluded that the capacity to sustain attention, as required by the CPT, appears to be associated with the capacity to attend to relevant stimuli and to withhold attention from irrelevant stimuli as measured by the Fruit Distraction Test. From the point of view of the cognitive control principle of field articulation, as assessed by the Fruit Distraction Test, it could be said that children who habitually withheld attention from irrelevant stimuli could limit their attention to the small viewer of the CPT memory drum and attend selectively to the letters that appeared. The relation observed by Ricks between Fruit Distraction Test performance and CPT performance lends support to the criterion validity of the Fruit Distraction Test.

CORRELATIONS BETWEEN MULTIPLE FORMS OF THE LEVELING-SHARPENING HOUSE TEST METHOD

In our early work we constructed several forms of the Leveling-Sharpening House Test method, to facilitate the exploration of the criterion validity of this method of measuring the leveling-sharpening control principle. We also attempted to relate the method employed in the Leveling-Sharpening House Test to that employed by Klein and his associates in the assessment of leveling-sharpening behavior.

The procedure most frequently used as a criterion measure of leveling-sharpening has been the Schematizing Squares Test (see Chapter 4). The subject is to judge the sizes of a succession of 150 squares of light, which gradually increase in size. At the beginning of the test the five smallest squares are presented in three different orders. Following this, the smallest square of the set is omitted, and a square, slightly but noticeably larger than any one of the first five, is added without interrupting the sequence of presentation. By removing the smallest square and adding a larger square after each series, the entire range of sizes is gradually presented. Studies (e.g., Gardner, 1959; Holzman and Klein, 1954) show that some subjects (sharpeners) can keep accurate track of the gradual increase in size, whereas others (levelers) assimilate previous memories of size with ongoing impressions and tend to lag behind the trend toward increasing size. For example, some subjects judged a 13 inch square to be smaller than an 8 inch form. The Schematizing Squares Test has proved to be effective as a measure of the leveling-sharpening principle in the studies with adults (e.g., Gardner et al., 1959), but based on a few administrations to child patients I concluded that children (especially clinical populations) tend to find the task of comparing the sizes of 150 squares monotonous and tiring. During these pilot administrations of the Squares Test to children, it was difficult to determine whether one was assessing primarily the manner in which a child constructed memory images of information (leveling-sharpening cognitive control) or the influence of fatigue and the capacity to remain work oriented and focused throughout a long test procedure.

Accordingly, the Leveling-Sharpening Circles Test and devised in an attempt to retain the essential features of the Squares Test while simplifying the task by modifying the geometric shape presented and lowering the number of shapes the child is asked to examine and judge. (See Appendix B for a complete description.) The test material consists of 14 circles, increasing in diameter from 6 to 20 mm, in 1 mm increments. Each circle, beginning with the smallest, is displayed four times in succession, before the next larger circle is displayed. Therefore the total test requires that the child view 60 circles. Each circle is presented for 2 seconds with a memory drum. The child is to press a button each time the circle in the viewer "looks different" or "has changed in some way." Pressing the button stops the drum, and the examiner inquires about the change perceived before reactivating the drum. This procedure is repeated until all 60 circles have been examined. As with the Squares Test, it was assumed that if a child accurately detected the increase in size of a circle, he was constructing a differentiated, stable memory image of the previous circle (sharpening process). If the child did not detect the increase in size, he was constructing a global image of the previous circle and assimilating past information with present (leveling).

In addition to this Leveling-Sharpening Circles Test, resembling the Squares Test employed by Klein and his associates, another test was constructed to try to discover whether a simple drawing of some familiar object could be used as a stimulus instead of a geometric shape. Since observations suggested that some children found even the Circles Test boring, tiring, and monotonous, we wanted to devise test materials that would be as effective as possible for the assessment of leveling-sharpening in clinical work with children, keeping the boredom-fatigue factors to a minimum.

Accordingly the Leveling-Sharpening Wagon Test was devised (Appendix B). This test used the same memory drum employed for the Circles Test, and again, the child was instructed to press the button each time the image (i.e., the wagon) "looked different" or "changed in some way." A two-dimensional line drawing of a child's wagon is presented three times in succession, with all its elements present. On the fourth display, the right-front wheel (most of which is behind the left-front wheel because of the perspective, employed) is omitted and remains absent during the fifth and sixth displays. On the seventh display, in addition to the front wheel, the line forming the back right corner of the wagon is omitted; the wagon, with these two elements absent, is then presented for three displays. In this manner eight elements of the wagon are gradually omitted, accumulatively. Each new display, containing some combination of omissions, is presented three successive times. The child views a total of 27 displays of the wagon, but only the first three displays contain all details. From pilot work, an order was chosen for dropping out the elements so that the least conspicuous element was eliminated first and the most conspicuous last.

The assumptions made with the Squares Test were made here. If a child constructed a clear, stable image of the previous wagon and its elements, he would notice a changed element in the present picture. If he constructed a global, diffuse image of the previous wagon, he would not notice a changed element in the present display; that is, he would be seen as assimilating or fusing present information with global images of past information.

The Wagon Test represents changes in information in the form of omitting details. Of course one could also represent changes in information by adding details, and to explore the value of this circumstance in assessing the process of constructing images of information and relating present information with a memory of past information, a second form of the Wagon Test (Elements Added) was devised. The same picture of a wagon is used, but the first display presents the wagon with eight elements (the same ones) already eliminated. After three displays of this picture, an element is added (the first one eliminated in the Elements Subtracted series), and this picture is presented three times. Thus each one of the elements that were eliminated in the first tape is systematically added, and each new stimulus is displayed three successive times. As with the first Wagon Test, the child views 27 displays and presses the button each time the picture "changes" or "looks different."

In an early study (Santostefano, 1964a), we administered these three procedures to a group of children in the following order: Wagon Test, Elements Omitted, Wagon Test, Elements Added, Circles Test. This study was designed to assess age and sex differences as well as the relations among test forms, and it was impossible to vary the order in which the tests were administered because of the number of subjects available. The children were selected randomly from a public school serving a white, middle to low SES area to form three age groups (6, 9, and 12 years), with 10 boys and 10 girls in each. The groups were matched for intelligence (California Test of Mental Maturity), and all showed normal visual acuity as measured by the standard visual chart of the American Optical Company. In addition all subjects were judged by teachers to be typical in school performance and social adjustment.

As discussed in Appendix B, each test yields three scores, paralleling the Leveling-Sharpening House Test, which was eventually designed for the basic battery of cognitive control tests: *first stop score*: the display number of the circle or picture on which the child first detects and reports a correct change; *number of correct changes reported*: the number of changes a child detects and reports that do in fact take place; and *leveling-sharpening ratio:* this index combines the number of times a change is displayed before it is detected, the number of changes not detected, and the number of changes that take place (i.e., 8 for the Wagon Tests and 14 for the Circles Test).

Table 2. Intercorrelations Among First Stop Scores, Number of Correct Changes Reported, and Ratio Values of the Three Leveling-Sharpening Tests (6, 9, and 12 year olds)

	Wagon Elements Omitted			Wagon Elements Added			Circles		
	First Stop	Number Correct Changes	Ratio	First Stop	Number Correct Changes	Ratio	First Stop	Number Correct Changes	Ratio
	1	2	3	4	5	6	7	8	9
6 year olds									

1	—	–.71	.90	–.23	–.03	–.17	.58	–.47	.57
2		—	–.84	–.08	.15	–.09	–.51	.31	–.37
3			—	–.02	–.18	.07	.52	–.39	.43
4				—	–.64	.84	–.09	.23	–.24
5					—	–.89	.05	.04	.02
6						—	–.13	.17	–.24
7							—	–.71	.80
8								—	–.95
9									—
9 year olds									
1	—	–.71	.92	.43	–.35	.40	.41	–.04	.12
2		—	–.89	–.51	.71	–.71	–.37	.20	–.30
3			—	61	–.59	.64	.43	–.12	.22
4				—	–.58	.79	.27	.10	.03
5					—	–.95	–.26	.36	–.44
6						—	.27	.22	.33
7							—	–.50	.67
8								—	–.95
9									—
12 year olds									
1	—	–.35	.70	–.28	–.22	–.12	–.14	–.18	.07
2		—	–.75	–.17	.36	–.30	–.37	.57	–.56
3			—	.02	–.46	.26	.15	–.51	.44
4				—	–.39	.84	.04	.03	.07
5				—	–.77	–.09	.39	–.29	
6						—	.11	–.22	.22
7							—	–.55	.75
8								—	–.95
9									—

These three scores were intercorrelated for each age group. With the sample size used, correlation coefficients of .44 and .56 are significant at the .05 and .01 levels of confidence, respectively. As Table 2 indicates, the relations among the three scores produced by the same test are stronger than the relations between three scores of one test and three of another. Thus with each test, a child who detected a correct change early, in the series of either wagon pictures or circles, also detected more subsequent changes and reported these at the time they first appeared or soon after. When interpreting the signs of the correlations, it should be noted that a low first stop score indicates that the first change was detected early (sharpening). A high score for number of correct changes means that many correct changes were detected (sharpening). And a low ratio score indicates that few changes were missed and the changes detected were perceived at the time they first occurred or very soon after. Since each of these scores could be viewed as a different measure or test form of the same process, the high correlations found among them supports the criterion-related validity of this method of assessing the leveling-sharpening principle.

In terms of omitting versus adding elements of information to assess leveling-sharpening, an appreciable relationship between the two forms was observed with the 9 and 12 year olds, but not with the 6 year olds. Although a number of the coefficients correlating elements added with elements omitted were not statistically significant, all correlations were in the expected direction, suggesting a common process between the two measures. These results comparing the test forms of elements added and subtracted lend some support to the validity of the test method.

The Wagon Test, Elements Omitted, correlates most highly with the Circles Test, especially with the 6 and 9 year olds. This finding suggested that simple line drawings of objects familiar to children may be used as stimuli instead of geometric shapes, and that the leveling-sharpening process, studied originally with the Schematizing Squares Test, might also be assessed by tests that use familiar pictures.

Related to the issue of type of stimulus, we observed in this study and with other applications of these three methods with patients, that most children seemed to be more involved with the task when pictures of a wagon were used instead of circles. Based on these observations, and the results of this comparison of three forms of leveling-sharpening tests, I decided to make use of schematic line drawings of familiar objects and the method of omitting details accumulatively, since the latter seemed to discriminate best among age groups and populations (see discussion below). Accordingly the Leveling-Sharpening House Test (Chapter 10) was devised. A two-dimensional line drawing of a house was the basic configuration of information to be remembered. To increase the complexity of the task and to make the same test suitable for children as young as 3 and as old as adolescents, however, the number of pictures presented was increased to 60, and the number of details omitted was increased to 19.

This Leveling-Sharpening House Test, discussed extensively in the factor analytic studies reported earlier, was also related to an alternate form designed to measure the leveling-sharpening principle in a study by Guthrie (1967). This work assessed changes in leveling-sharpening functioning as a function of changing environments and stress. The method and results of this study are discussed in detail in Chapter 9. We consider here only the aspect pertaining to alternate test forms for assessing leveling-sharpening.

Guthrie compared leveling-sharpening functioning in novice parachutists observed first at home and then two weeks later at the airport before a jump was to be performed. In addition to using the Leveling-Sharpening House Test, Guthrie used the same test procedure to present for remembering a configuration of information that related to the stress situation; namely, a picture of a parachutist falling through the air with his parachute just beginning to deploy. The Leveling-Sharpening Parachute Test consists of 61 pictures of a parachutist. As with the House Test, details (20) are omitted from the scene accumulatively, one at a time, and each scene is presented three times. The subject is to stop the display whenever the scene "changes or looks different."

The House Test and the Parachute Test were administered to 44 novice sport parachutists (mean age, 19 years; mean education, 13 years). To test the assumption that both tests are measures of the leveling-sharpening principle, the performance of the subjects with each procedure was correlated. Guthrie found a significant positive correlation between House Test and Parachute Test scores (r = ,38;p = .01), indicating that two tests, using the same method but different content, tapped the same cognitive process.

This finding, along with those obtained with the Wagon Tests and the Circles Test, suggests that the procedure of presenting a sequence of information that changes over time can be used to assess a common cognitive principle relatively independently of the content of information presented.

II. Relations Between Cognitive Control Tests and Teacher Ratings of Classroom Behavior

THE FIRST STUDY

To explore criterion-related validity further, selected cognitive control measures were correlated with teacher ratings of specific classroom behaviors that appeared to relate to the same domain of behaviors tapped by the tests. As part of a longitudinal study designed to predict learning disabilities from cognitive control assessments, the entire kindergarten populations entering a school system in two successive years were administered the basic battery of cognitive control tests. This study is described in detail in a subsequent chapter. Here we concentrate on criterion validity, as indexed by comparisons of particular cognitive control tests and selected teacher ratings.

The cognitive control measures were obtained when the children were attending kindergarten. One population to be considered is referred to as the "1970-1971 sample" and consisted of 57 boys and girls. The second population, the "1971-1972 sample," consisted of 64 boys and girls. The school system these children were attending serves a middle-class, suburban community of predominantly white, technical and professional families. When each of these population was attending kindergarten, the basic battery of cognitive control tests was administered. The following year, when the children had advanced to first grade, I met with the first grade teachers individually and asked each to rate each child in her classroom in terms of several variables on a five-point scale. The teachers did not know the cognitive control test scores of the children in their respective classrooms obtained during the previous kindergarten year. (Appendix B gives a complete description of the teacher rating scale.)

Relation Between Body Activity in the Classroom and Performance with the Fine Motor Delay Test. The degree of body activity a child typically showed in the classroom was one variable rated by the teachers. The teacher was asked to assign the rating of 1 to children who were the most physically restless and active while in the classroom, and a rating of 5 to those who tended to remain physically still. Children who showed what the teachers judged to be an average degree of physical motility for that grade level were rated 3. The ratings of 2 and 4 represented above and below average expectations, respectively.

For our study of criterion validity, children were selected who received a rating of either 1 (most restless, always in motion) or 5 (always sits still; little or no restlessness). We wanted to learn whether these two groups of children, who represented extremes in body activity as rated by teachers, would show a difference in the degree of delay as revealed by performance on the Fine Motor Delay Test, in which a child draws a line with a pencil through an S-shaped maze “at regular tempo” and again as slowly as possible. We also wanted to discover whether the two groups would post different times in completing the Motor Tempo Test, in which the child marks with a pencil each of 18 geometric shapes “at regular tempo.” It was hypothesized that children who were observed to be most restless in the classroom would mark the shapes of the Motor Tempo Test more rapidly, would draw lines during the first and second trials on the Fine Motor Delay Test at a quicker tempo, and would show less delay when time taken to draw the second line (slow trial) was compared with the time taken during the first.

The results of these comparisons appear in Table 3. The children who were rated as the most active and restless in both populations marked the shapes of the Motor Tempo Test more quickly. The difference of the 1970-1971 sample approaches statistical significance. On the Fine Motor Delay Test, the children in both populations who were rated as most restless showed a quicker tempo in drawing a line during trial I (“regular tempo”) and during trial II (“as slow as you can”). And they showed less delay when the two trials are compared. The mean differences were statistically significant only for the 1971-1972 sample.

Taken together, those findings provide some support for the proposal that the Motor Tempo Test and Fine Motor Delay Test sample behaviors that indeed involve motor tempo and delay.

Table 3. Comparison of Fine Motor Delay Test Scores of First Graders Rated by Teachers as Very Restless or Calm

	1970-1971 Sample					1971-1972 Sample				
	Very Restless, N= 24		Calm, N = 33			Very Restless, N= 29		Calm, N= 34		
	Mean	SD	Mean	SD	*p*	Mean	SD	Mean	SD	*p*
Motor Tempo: time (seconds)	26.6	14.3	21.9	9.1	.08	27.2	10.7	25.8	7.9	NS
Fine Motor Delay I: time (seconds)	13.4	6.8	14.1	7.1	NS	15.8	5.7	20.4	7.3	.001
Fine Motor Delay : II time (seconds)	—	—	—	—	—	33.8	13.7	52.1	30.5	.003
Fine Motor Delay Il-I: time (seconds)	18.1	17.1	22.2	18.6	NS	18.0	13.3	31.7	22.2	.01

Relation Between Paying Attention in the Classroom and Performance with the Scattered Scanning and the Fruit Distraction Tests. The same first grade teachers were also asked to consider all the children in their classrooms in terms of the variable “paying attention.” Each teacher was to assign a rating of 1 to a child who seemed “tuned out” or was easily distracted by many different stimuli. These behavior types were linked because the teacher had to expend considerable effort to get the attention of children of both types focused on the classroom work at hand. The rating of 5 was assigned to a child who seemed to direct and focus attention on academic material being presented; the teacher needed to do little work to get the attention of these children. Again, children who showed a level of paying attention that the teacher judged to be average and expectable for a first grader were rated 3. The ratings of 2 and 4 were used for children who fell just above or below average expectation, but not within the extreme groups. Again the teachers had no knowledge of any child's kindergarten performance with the cognitive control tests. When the ratings were completed, children who had been assigned a rating of 1 or 5 were selected for the study.

We then sought to determine whether two groups of children, judged as showing either a very poor or a very good attention span in the classroom, would perform differently on the Scattered Scanning Test and the Fruit Distraction Test, which purported to measure some aspect of "paying attention." The Scattered Scanning Test was designed to assess the breadth and degree of activity involved in scanning, whereas the purpose of the Fruit Distraction Test to evaluate the manner in which attention is directed selectively and to learn whether irrelevant information is ignored. It was hypothesized that children who were observed by the teacher to be distractible and unable to pay attention to relevant academic tasks would mark fewer circles and crosses, which covered less distance, and would take more time and make more reading errors when naming the colors of the fruit during each of the trials of the tests selected.

Table 4 presents the results of these comparisons. As predicted, the children of both populations who had been judged by the teacher to be the most inattentive in class, marked fewer circles and crosses with the Scattered Scanning Test. Moreover, the distance traversed by connecting these markings was less than that produced by the attentive children. Each of these mean differences is statistically significant. In terms of the inferences drawn from the Scattered Scanning Test, the children who were rated as inattentive showed more passive and more narrow scanning than children rated as attentive.

Table 4. Comparison of Scattered Scanning Test (SST) and Fruit Distraction (FD) Test Scores of First Graders Rated by Teachers as Inattentive or Attentive

	1970-1971 Sample					1971-1972 Sample				
	Inattentive, N = 23		Attentive, N = 29			Inattentive, N = 35		Attentive, N = 30		
Score	Mean	SD	Mean	SD	*p*	Mean	SD	Mean	SD	*p*
SST: number correct	13.2	4.3	16.7	3.1	.001	14.1	3.3	16.7	2.7	.001
SST: total distance (cm)	94.3	35.9	119.3	34.5	.01	95.6	24.0	107.1	33.6	.05
FD II: time (seconds)	109.1	44.7	70.2	21.6	.001	93.5	30.6	78.5	32.8	.03
FD III-II: time (seconds)	27.7	48.1	12.8	15.0	.06	20.8	30.7	14.7	28.3	NS
FD IV-II: time (seconds)	84.7	61.7	75.0	51.1	NS	73.2	75.9	69.7	53.0	NS
FD II: errors	4.5	4.5	3.6	3.5	NS	6.1	6.2	1.9	1.5	.001
FD III-II: errors	0.2	4.2	-0.3	3.5	NS	-0.5	5.1	-0.1	2.7	NS

FD IV-II: errors	4.7	7.1	1.4	5.6	.06	6.8	11.6	2.5	8.5	.05

Both groups performed as predicted in all comparisons on the Fruit Distraction Test. The inattentive children took more time to name the colors of the fruit on Card II; they were also more distracted while naming the colors of the fruit by the peripheral figures on Card III and by the incorrect colors on Card IV. Moreover, they made more errors in naming colors than did the attentive groups. Six of these comparisons reach statistical significance. The findings suggest that the children whom teachers rated to be the most distractible and inattentive showed by their performance on the Fruit Distraction Test a tendency to give attention to both relevant and irrelevant information; it also appeared that irrelevant information interfered with their work on the main task. Children who were judged most attentive directed attention at the relevant information of the task (correct colors) and ignored the irrelevant information (peripheral pictures and incorrect colors).

Taken together, the results lend some support to the criterion validity of the Scattered Scanning Test and the Fruit Distraction Test.

Relation Between Knowledge of Classroom Routine and Performance with the Leveling-Sharpening House Test. Another variable rated by the teachers was a child's knowledge of classroom routine. A rating of 1 was assigned to children who needed to be reminded very frequently to prepare material for a project that all children were expected to know was about to begin, to bring some item from home, or to put material away because the class was to engage in another scheduled activity. Children who needed no reminders of classroom routine and schedule were rated 5. The rating of 3 again represented average knowledge of routine expected of a first grader, and the ratings of 2 and 4 were reserved for children who fell just above or below average expectations.

As before, the children who fell into the extreme groups were compared, this time in terms of performance with the Leveling-Sharpening House Test. We raised the question of whether a child's remembering classroom routine would be related to his performance with the Leveling-Sharpening House Test, which was designed to assess his organization of memory images of information over time and his ability to maintain them. It was hypothesized that children who were observed by the teacher to need frequent reminders about routine would look at more displays before they detected the first change (first stop score), would detect fewer changes (number of correct changes), and would finish with a lower ratio involving the number of correct changes detected, lag in detecting changes, and number of changes missed. It was also hypothesized that children with a low knowledge of routine would perceive more changes in the test material that were incorrect (i.e., not contained in the displays: A and B changes).

Table 5. Comparison of Leveling-Sharpening (LS) Test Scores of First Graders Rated by Teachers as High or Low in Knowledge of Classroom Routine

	1970-1971 Sample		1971-1972 Sample	
	Low Knowledge of Routine, N= 20	High Knowledge of Routine, N=41	Low Knowledge of Routine, N =23	High Knowledge of Routine, N= 36

LS Score	Mean	SD	Mean	SD	*p*	Mean	SD	Mean	SD	*p*
First stop	16.5	12.1	15.4	9.9	NS	26.3	17.1	20.7	11.2	.08
Number correct changes	8.2	4.1	8.2	3.3	NS	5.9	3.9	7.3	3.2	.07
Ratio	19.4	4.7	19.2	4.2	NS	22.1	4.6	20.9	4.1	NS
Number of A changes	3.2	3.5	1.6	3.2	.05	0.9	1.3	0.3	0.5	.03
Number of B changes	0.4	0.8	0.4	1.3	NS	0.2	0.5	0.1	0.3	NS
Total errors (A + B changes)	3.0	4.1	1.9	3.8	NS	1.1	1.5	0.4	0.3	.02

Table 5 gives the results of these comparisons. As predicted, the children in both populations who were identified by teachers as needing constant reminders about class routine did not detect their first change in the House Test until later in the series of displays. The 1971-1972 sample difference approaches statistical significance. In terms of the number of correct changes detected, the same sample population revealed the predicted difference, with the low-knowledge children perceiving fewer changes. The leveling-sharpening ratios observed were in the predicted direction, with the low-knowledge groups showing a tendency to lag in detecting changes and to miss more changes. It is interesting to note that the low-knowledge group reported more incorrect changes, and several of these differences are significant. As noted in the manual for this test (Chapter 10), and in the factor analytic studies discussed earlier, the perception of incorrect changes indicates that the memory images constructed of information are fluid and unstable and undergo change over time.

As a whole, the comparisons of Leveling-Sharpening House Test performances of children who show differences in remembering details of classroom routine provide some support for the criterion validity of this test. The children who were judged to have difficulty in remembering classroom routine tended to level information presented by the House Test, that is, they took longer to detect the first change, they detected fewer changes, and they perceived more incorrect changes. Relying on the interpretation drawn from the House Test, as supported by the factor analytic studies discussed earlier, children who were judged to have low knowledge of classroom routine would be viewed as forming global memory images of information that change over time.

THE SECOND STUDY

A study conducted by Ricks (1974) also contributes information about the criterion validity of the Fruit Distraction Test. Ricks asked second grade teachers in two school districts (one located in the East and one in the Middle West) to select children who were inattentive in the classroom and were 6 months or more below grade level in reading. Seventeen children were designated (5 girls and 12 boys). Reading achievement test scores verified the lag in reading. Asked to nominate children viewed as attentive and as average readers, the same teachers selected 16 children to match for sex (5 girls and 11 boys), IQ (mean total WISC IQ for the inattentive group and for the controls, 96 and 107, respectively), and age (7.9 mean years for the inattentive group; 8.1 mean years for the controls).

The children were administered the Fruit Distraction Test and the Continuous Performance Test developed by Rosovold (1956). We consider here only the results obtained with the Fruit Distraction Test. The correlation between the Fruit Distraction Test and the CPT was covered in the previous section in relation to the cognitive control tests and other tests of cognitive functions.

Ricks found that the time taken to name the colors on each of the four cards of the Fruit Distraction Test was significantly longer for the inattentive children than for the attentive (Appendix A gives group means). Moreover, the inattentive children recalled significantly more distracting objects located on the periphery of Card III than did the attentive children. Ricks interpreted these findings as indicating that the attentive children performed more efficiently with the Fruit Distraction Test by ignoring irrelevant information (peripheral pictures and incorrect colors), whereas the children judged by teachers to be inattentive directed more of their attention to both irrelevant and relevant information.

The results obtained by Ricks lend support to the validity of the Fruit Distraction Test as a measure of the selective deployment of attention.

III. Relations Between Cognitive Control Test Performance and Population Differences

Let us now consider evidence of the validity of cognitive control tests provided by studies that examine the differences revealed by populations. In each case we wanted to find out whether differences in some characteristics represented by the populations in question related to differences in cognitive control test performance in ways that support the validity of the tests as measuring consistent cognitive strategies used to process information.

COGNITIVE CONTROL TEST PERFORMANCE OF PUBLIC SCHOOL, ORPHANED, AND BRAIN DAMAGED CHILDREN

One study (Santostefano, 1964a) compared the performance of public school, orphaned, and brain-damaged children on two of the cognitive control tests: the Circles Test (the early method for assessing focal attention) and the Fruit Distraction Test. The children were the same as those discussed in the factor analytic studies presented in Chapter 5. There were 44 public school children (32 boys and 12 girls), having a mean age of 10 years (age range 6 to 13 years) and a mean IQ of 110. The orphaned children numbered 38 (19 boys and 19 girls) with a mean age of 9 ½ years (age range, 6 to 13 years), and a mean IQ of 104. For the 44 brain-damaged children (32 boys, 12 girls), the mean age was 11 years (age range 6 to 13 years), and the mean IQ was 72. Intellectual levels were determined by the WISC, and all children showed normal visual acuity as determined by the standard Visual Acuity Chart of the American Optical Company, as well as adequate color perception.

As discussed in Chapter 5, a high score with the Circles Test indicates that many errors were made in judging which of two circles is larger and is interpreted as suggesting narrow, passive scanning (focal attention). A low score indicates that few errors were made and is interpreted as indicative of broad, extensive scanning.

The brain-damaged children showed the poorest size estimation. The orphaned children were next, and the public school children the best. The respective group means were 9.9, 7.4, and 6.6. The differences between the means were significant at the .01 level (F = 5.37). Interpreted from the conceptual viewpoint of the focal attention cognitive control, although all the children tested represented the same mean age, the brain-damaged children, as a group, were characterized by narrow-passive attention deployment, the public school children by broad-active attention deployment, and the orphaned children by a level of scanning that fell between the other two groups. When these group differences were examined by means of analysis of covariance, controlling the intelligence of each child, the means were not significantly different. This result appears to be primarily attributable to the finding of a significant correlation between Circles Test scores and IQ with the brain-damaged children, but not with the other two groups. As discussed in the section below on the relation between cognitive control tests and intelligence, this group of brain-damaged children was the only population of the several studied that revealed a relation between measured intelligence level and performance with several cognitive control tests. The implications of this relationship are discussed there.

Turning to the Fruit Distraction Test, the children's performances with Card II (fruit colored correctly) and Card III (fruit colored correctly but surrounded by peripheral distraction) were also compared. A most interesting finding emerged. The orphaned children were delayed most in naming the colors of the fruit surrounded by peripheral distractions. The mean reading time difference of Card III minus Card II was 19.42 seconds. The brain-damaged children were delayed less (mean reading time difference, 9.44 seconds), and the public school children least (mean reading time difference, 4.52 seconds). The differences between these means with an analysis of variance were significant ($F=3.16$; p = .05) and remained so with an analysis of covariance, with IQ score controlled.

These group differences were mirrored in the errors each made in naming colors. The orphaned children made the most reading errors and the public school children the least. Although these differences were not statistically significant, they converge with and support the reading time differences observed.

Interpreted from the viewpoint of the field articulation cognitive control, this finding suggests that the orphaned children tended to direct more attention at relevant and irrelevant information than did brain-damaged and public school children. The finding and the interpretation are in superficial disagreement with clinical opinion that stereotypes brain-damaged children as more distractible. However an analysis of the number and type of peripheral distractions recalled by each group helps us to understand the finding and points toward the relation between cognitive control functioning and life experiences and the regulation of affects.

Recall that after the child deals with Card III of the Fruit Distraction Test, the card is removed and the child is asked to recall the peripheral objects he “happened to notice” as he named colors. The peripheral items depicted are food-related and non-food-related objects. Although the number of objects recalled by each group did not differ statistically, the orphaned children tended to recall more objects overall, and to recall more of food-related objects.

This finding relates to the concept of cognitive controls as mediators between information and affects and needs, and it suggests interesting directions for future research. The population differences observed indicate that life experiences associated with being orphaned may result in an organization of field articulation functioning that overincludes information, both relevant and irrelevant. That is, perhaps being deprived of social-emotional stimulation and experiencing loss of primary caretakers results in a field articulation cognitive control characterized by a tendency to permit affects and needs to override other determinants of what is relevant information for the task at hand. A number of possibly useful studies are suggested here. For example, one could compare age at which a child loses primary caretakers with field articulation functioning. Or one could compare groups of children who have lived in an orphanage (representing more diffuse care-taking) with children who have lived with foster parents (representing more focused caretaking).

Indeed, viewing overinclusive attention development (field articulation functioning) as a cognitive structure organized in part by the experience of being “orphaned” is only one side of the coin. It is also possible to see field articulation as assuming an organization designed to manage the life situation of being “orphaned.” That is, does the orphaned child overinclude information, especially need-related information, that is irrelevant to the task at hand because he is trying to manage the affects and need for nurture that arise from being orphaned? An interesting study is suggested here: by comparing orphaned children who exhibit one level of field articulation functioning (attention withheld from irrelevant stimuli) with orphaned children who show another level (attention deployed to relevant and irrelevant stimuli) one could identify the group whose social-emotional functioning is more efficient and growth promoting.

COGNITIVE CONTROL PERFORMANCE OF REFLECTIVE AND IMPULSIVE CHILDREN

Zarembo (1967) has explored the relations between three cognitive controls (focal attention, field articulation, and leveling-sharpening) and reflection-impulsivity as defined by Kagan (e.g., 1966, 1971). Reflection-impulsivity has been proposed as a cognitive style or disposition that influences performance in a wide variety of test situations and cognitive tasks. When faced with a cognitive task containing a high degree of uncertainty about the appropriateness of various responses, individuals who are characterized by the reflective disposition ponder alternative solutions before performing. Impulsively disposed individuals quickly select a solution to a cognitive problem that contains a high degree of response uncertainty.

Kagan’s (1964) Matching Familiar Figures (MFF) Test is used to obtain a measure of the reflective-impulsive cognitive style. The child is shown a stimulus picture (e.g., a stuffed toy bear seated on a chair) plus six other pictures, one is exactly like the stimulus, and the other five contain one or another modification (e.g., the bow around the bear's neck is located on the right side instead of the left). The child is asked to point to one of pictures in the set of six that looks just like the stimulus picture. Two test cards, one with the stimulus and one with the six alternatives, are presented to the child at the same time for each of the 12 test items. The examiner records the time the child takes to make his first choice, as well as the total number of errors the child makes before locating the correct figure.

Zarembo administered the MFF test to 60 white children from middle-class homes, attending third and fourth grades at a public school in a large Eastern city. On the basis of MFF performance, 22 children were selected to make up a "reflective group" (12 boys and 10 girls) and 22 an "impulsive group" (10 boys and 12 girls). The age range of the reflective group was 8-2 to 10-0 years; mean IQ was 122 [SD = 14.2 as measured by the short form of the WISC (Jastak and Jastak, 1964)]. The age range of the impulsive group was 8-2 to 10-1 years; the mean IQ was 110 (SD= 17.2).

These 44 children were administered individually the Circles Test of focal attention (see Appendix B and Chapter 5), the Fruit Distraction Test of Field Articulation (Cards II, III, and IV), and the Leveling-Sharpening House Test. Zarembo hypothesized that when compared to the reflective group, the impulsive children would make more errors in estimating the sizes of circles (i.e., would show passive, narrow scanning), would take longer to read Cards 111 and IV containing irrelevant, distracting, or contradictory information (i.e., would tend not to selectively withhold attention from irrelevant stimulation), and would detect fewer changes on the House Test (i.e., would construct global fluid memory images of information changing over time).

The Circles Test yields scores on three subtests (see Appendix B): (1) judging the size of a 9 mm circle in a nonillusion condition, (2) judging the size of a 9 mm circle embedded within a 12 mm circle (positive illusion condition), and (3) judging the size of a 9 mm circle embedded within a 45 mm circle (negative illusion condition). Under the nonillusion condition, the higher the score, the poorer the size estimation performance, and the more narrow and passive the child's attention deployment. Under the illusions conditions, the lower the score, the less the illusion is operating (narrow, passive scanning).

The Circles Test scores of the impulsive and reflective groups were examined by an analysis of variance, and no significant difference was observed in the children's performance on this test. Impulsive group means and SD, respectively, were as follows: nonillusion, 5.90, 3.61; positive illusion, 5.82, 3.06; negative illusion, 2.46, 3.18. Reflective group means and SD respectively were as follows: nonillusion, 4.59, 3.42; positive illusion, 6.04, 3.48; negative illusion, 3.36, 3.08.

Similarly, the impulsive and reflective children did not differ significantly in any of the time and error scores analyzed on the Fruit Distraction Test, except one. The mean time difference scores, comparing Cards II and III, were 2.36 seconds (SD = 9.58) for the impulsive group and 0.32 second for the reflective group (SD = 6.60; *F* ratio = 0.68). The mean time differences, comparing Card II and Card IV, were 34.9 seconds (SD = 20.81) for the impulsive group and 28.32 seconds; (SD = 11.16; *F*= 1.71) for the reflective group. In terms of errors made while naming colors on Card II versus Card III, the impulsive group (mean = 0.09, SD = 0.86) and the reflective group (mean = 0.04, SD = 0.72) showed nearly identical performances.

The two groups differed only with respect to the number of errors made when naming colors on Card IV (incorrect colors) relative to Card II. The impulsive group mean error difference score (mean = 0.64; SD= 1.50) is significantly higher (*F*= 5.68, *p* = .05) than that of the reflective group (mean= -0.18, SD = 0.58).

The same general finding was obtained by Zarembo with the Leveling-Sharpening House Test. The performance of impulsive children was very much like that of the reflective group. The analysis of variance showed no significant differences on any of the measures. The means and standard deviations of the impulsive group (IG) and the reflective group (RG) for each of the House Test scores are:

	IG		RG	
	Mean	SD	Mean	SD
First stop score	11.96	5.11	14.96	5.53
Number correct changes	11.09	2.36	11.09	1.68
Leveling-Sharpening ratio	15.43	3.81	16.02	2.36

The correlations Zarembo reported between MFF test scores and scores from each of the cognitive control tests should also be considered. Although the impulsive group did not differ from the reflective group in cognitive control test performance, we might inquire whether a child's impulsive-reflective disposition is correlated to some degree with his performance on each of the cognitive control tests. Of the 30 coefficients obtained by correlating three MFF test scores (response time, errors, number correct on first choice) with 10 scores provided by the tests of cognitive controls, only three reached significance, the majority were near zero in magnitude.

The correlations between MFF response time and 10 cognitive control scores range from 0 to 21 and do not reach significance.

Two of the 10 correlations between MFF errors and 10 cognitive controls scores reach significance. Children who made more errors before choosing the correct picture took longer to name the colors on Card IV and made more reading errors on Card IV versus Card II (MFF errors x Fruit Distraction Times IV-II *r* = .30; MFF errors x Fruit Distraction Errors IV-II r = .40).

One of the 10 correlations between MFF number correct on first choice and cognitive control test scores reached significance, and this again involved Card IV of the Fruit Distraction Test (MFF number correct on first choice x Fruit Distraction Test errors IV–II r= –.36). Therefore children who made many errors on their first choice to each of the 12 MFF items also made more errors naming colors on Card IV (incorrect colors as irrelevant information) than on Card II (correct colors).

Taken together, Zarembo's findings suggest that the disposition to be reflective or impulsive, as conceptualized and assessed by Kagan's MFF test, is not critically related to (*a*) whether one directs attention narrowly and passively or actively and broadly at pairs of circles (focal attention principle), (*b*) the extent to which one tends to selectively withhold attention from irrelevant information (field articulation), or (*c*) the manner in which memory images are formed of ongoing stimulation and changes are detected and reported (leveling-sharpening).

The lack of significant relationships between the impulsive-reflective disposition and cognitive controls has implications both for the tests used to measure cognitive controls and for the conceptual status of the construct of impulsiveness-reflectivity relative to the construct of cognitive controls.

In terms of test methodology, questions could be raised about the presumed behaviors measured by each cognitive control test. For example, does a child make many errors in judging the sizes of pairs of circles because he is impulsive in making his decisions rather than because of the manner in which he deploys attention (narrow vs. extensive)? Zarembo's findings suggest that impulsivity is not the critical variable. Does a child take longer to name the colors on Card III of the Fruit Distraction Test because his cognitive impulsivity causes him to leap with his attention at information rather than because of the strategy with which he selectively deploys attention in terms of the relevance of information? And are the changes reported by a child on the Leveling-Sharpening House Test a measure more of his disposition to respond impulsively than of his tendency to construct differentiated stable memory images? Again Zarembo's data suggest that a child's response to the cognitive control tests devised does not seem to be related to his disposition to reflect on or to perform impulsively with cognitive tasks.

In terms of the conceptual status of the impulsive-reflective principle, I suggest that a relationship may be more likely to exist between this principle and the cognitive control principle of body schema-tempo regulation discussed in this book. One could hypothesize a correlation between the Fine Motor Delay Test and MFF test performance. A close look at the response process of the MFF suggests that the test could be primarily a measure of motor delay. The behavior recorded with the MFF test is the time a child takes *to point* to a picture. Even the number of incorrect choices could reflect a child's tendency *not to delay the motor response of pointing.* Future investigations could help clarify whether the impulsive-reflective principle is a general, basic cognitive style, as Kagan suggests, or whether it is more a conceptualization of motor delay that relates to one particular cognitive control strategy.

The hypothesis that the MFF test is more a measure of motor delay relates to the correlations observed between errors children make with MFF test and the time they took (and the errors they made) when managing information that contains contradictions represented by the context or background of the information. This correlation appears to be meaningful, rather than a chance finding, because MFF test scores did not correlate with the other part of the Fruit Distraction Test—namely, Card III, which requires managing peripheral information as irrelevant distractions. In speculating about this selective relationship between MFF test performance and Card IV of the Fruit Distraction Test, for the sake of stimulating future studies, it may be helpful to recall particular observations made by the factor analytic studies discussed in Chapter 5. Card IV of the Fruit Distraction Test played a unique role in distinguishing brain-damaged children from orphaned and public school subjects. Moreover, in two studies the factor generated by public school kindergarten children suggested a relation between performance on Card IV and ability to regulate motor delay and physical aggression as rated by teachers. These observations lead to the hypothesis that MFF test performance is related more to the regulation of motility. In terms of cognitive control theory, the issue of motor delay in conceptualized as one cognitive control, not as a basic, broad disposition. Is it true that children who are assessed as impulsive on the MFF test are children who cannot delay motility *especially* when the information to be processed accentuates the figure-background relationships and the context of information? Further study should help answer this question.

COGNITIVE CONTROL PERFORMANCE OF KINDERGARTEN CHILDREN RATED AS TYPICAL AND SUSPECT LEARNERS

Three separate studies compared the cognitive control test performance of kindergarten children judged by their teachers to be “typical” learners and children judged to be “suspect” of having a learning disability and needing special help.

All studies involved the same school system and the same teachers; all kindergarten classes were maintained in the same school building, and the kindergarten teachers functioned as a team, sharing views of curriculum and classroom management. The school system served a middle-class suburb outside a large Eastern city. In the first study, conducted during the 1969-1970 academic year, the kindergarten teachers were asked to select about 25 children whom they considered to be “suspect” in that they showed difficulty in meeting classroom demands and difficulty in learning, and were likely to be in need of special, remedial help in subsequent grades. The teachers were also asked to select about 25 children whom they considered to be “typical” in meeting kindergarten classroom demands and in learning kindergarten material. Five cognitive control tests (Fine Motor Delay, Scattered Scanning, Fruit Distraction, Leveling-Sharpening, and Object Sort) were administered to 24 of the 25 suspects referred, and to 27 children designated as typical learners. The test performance of typical learners was compared with that of suspects to explore whether this population difference (success in meeting kindergarten demands) related to differences in cognitive control functioning.

This study was repeated in the same school system during the next two academic years. In the second series, however, each child in the entire kindergarten population was designated by teachers as either a typical learner or suspect. It was felt that besides providing a larger sample, this procedure would minimize the possibility that teachers might be biased in their selection of a group of “typical” learners that in fact included only very bright, exceptional children.

During the 1970-1971 academic year, of the total 184 children, teachers selected 34 as suspect (23 boys and 11 girls), leaving a sample of 150 typical learners (75 boys and 75 girls). During the 1971-1972 academic year, teachers selected 56 children as suspect (37 boys and 19 girls) of the total population of 164 children. This left a sample of 108 typical learners (54 boys and 54 girls). As with the first study, all children in each school year took the same five tests of cognitive controls, and the test performances of the two groups were compared by means of an analysis of variance. Because of the number of children involved, three examiners (two female and one male) administered the procedures in individual sessions.

Table 6 presents the results obtained from the 1969-1970 sample. A comparison of the means indicates that the *suspect* learners (1) drew a line through the maze during the first "regular" trial at nearly the same tempo displayed by the typical learners (Fine Motor Delay I), (2) showed less delay in moving a pencil slowly during trial 2 (Fine Motor Delay II-I), (3) marked fewer circles and crosses on the Scattered Scanning Test in the time limit, (4) covered a shorter total distance in marking circles and crosses scattered over a page, (5) showed about the same average distance in scanning from one circle or cross to the next, (6) took more time to name the colors on the baseline card (Card II) of the Fruit Distraction Test, (7) took slightly longer to name the same colors when they were surrounded by irrelevant, peripheral pictures (Cards III-II), (8) took considerably longer to name the colors in the face of contradictory colors (Cards IV-II); (9) detected the first change in the Leveling-Sharpening House Test scene later in the series of displays, (10) detected fewer correct changes of those introduced in the series of house scenes, (11) detected correct changes much later, after they were first introduced in the series of pictures, (12) constructed the same number of groups to categorize the objects of the Object Sort Test, and (13) assigned more concrete concepts or explanations of why the objects grouped belonged together.

Table 6. Cognitive Control Test Performance of Kindergarten Children Designated by Teachers as Typical or Suspect Learners (1969 1970 sample)

	Typical Learners (18 boys, 9 girls)		Suspect Learners (18 boys, 6 girls)			
Score	Mean	SD	Mean	SD	F	*p*
Fine Motor Delay I: time (seconds)	15.1	8.3	14.9	5.0	0.01	NS
Fine Motor Delay II-I: time (seconds)	32.2	23.9	20.6	15.0	4.16	.05
Scattered Scanning: number correct	22.1	4.5	17.4	4.6	13.50	.001
Scattered Scanning: total distance (cm)	123.4	28.7	99.3	29.4	8.81	.01
Scattered Scanning: mean distance (cm)	5.6	0.7	5.6	0.9	0.31	NS
Fruit Distraction II: time (seconds)	86.6	24.2	103.5	30.7	4.78	.05
Fruit Distraction III-II: time (seconds)	14.4	19.8	15.5	30.3	0.02	NS
Fruit Distraction IV-II: time (seconds)	57.6	29.0	77.0	48.1	3.09	.10
Leveling-Sharpening: first stop	15.0	8.9	18.3	11.7	1.28	NS
Leveling-Sharpening: number correct changes	9.5	2.6	6.8	3.7	8.50	.01

Leveling-Sharpening: ratio	17.6	3.6	21.7	4.7	11.92	.01
Leveling-Sharpening: total incorrect changes	1.7	2.0	1.3	1.9	0.65	NS
Object Sort: total groups	8.1	2.9	8.0	3.5	0.01	NS
Object Sort: mean score	4.6	0.8	3.7	1.3	8.23	.01

Although only 8 of the 14 comparisons reached statistical significance, it should be noted that in all comparisons (except time to draw a line at ones regular tempo, mean SST distance, and number of groups formed in categorizing), the suspect learners showed functioning characterized by one end of each cognitive control continuum. Interpreting these findings in terms of cognitive control concepts, the suspects exhibited a tendency, or cognitive control preference, to employ little delay over fine motor movement (tempo regulation principle), to scan passively and narrowly (focal attention principle), to attend to both relevant and irrelevant information (field articulation principle), to construct and maintain global images of information over time (leveling-sharpening principle), and to categorize information in terms of concrete concepts (equivalence range principle). The typical learners, on the other hand, tended to employ delay over fine motor movement, to scan actively and broadly, to attend to relevant information and ignore irrelevant information, to construct and maintain differentiated memory images of information over time, and to categorize information in terms of relatively abstract concepts.

The results of the two subsequent studies, which make use of larger numbers of children, suggest the same relationships between cognitive control tendencies and the population variable of typical versus suspect learners. Both these studies, moreover, include test scores that were not analyzed in the first investigation, and these deserve our attention (Tables 7 and 8).

The suspect learners and the typical learners in both the 1970-1971 and 1971-1972 samples tended to employ about the same typical tempo in fine motor movement (Delay I), but the former employed less delay during the slow trial (Delay II-I).

On the Scattered Scanning Test, both suspect groups marked fewer circles and crosses and covered a shorter distance in making circles and crosses than did typical learners. Again we observe that although the total area scanned by the suspect group is smaller, the average scan from one circle or cross to the next is about the same as that of the typical learners. This finding replicates the finding and interpretation of the 1969-1970 study—namely, that suspects tend to scan more narrowly and passively.

With the Fruit Distraction Test, the mean differences observed in both samples are in the same direction recorded for the 1969-1970 sample. The suspects took longer to name the colors of the baseline card (Card II). And when this time score was used as the child's own control, the suspects took longer to name the colors when the fruit were surrounded by peripheral pictures (Cards III-II) and when the fruit was colored incorrectly (Cards IV-II).

Errors made by the 1970-1971 sample in naming colors were also analyzed. The suspects made fewer errors in naming the colors on the baseline card, and they tended to make fewer errors in each of the distraction cards, even though they took longer to name the colors. This is an interesting finding in light of our earlier discussions about the relation between color-naming errors on the Fruit Distraction Test and the regulation of affects. Does this finding suggest that children who at the age of 5 attend to irrelevant information, therefore perform more slowly, also restrict their affects and feelings? Or is this finding more related to the possibility that with typical learners, all of whom are beginning to read more successfully than suspects, verbal fluency as a behavioral system is in a phase of rapid flux and restructuring? Questions such as these point to interesting future studies.

Interpreting the time score measures of the Fruit Distraction Test in keeping with our factor analyses, it appears that the suspects are more likely to attend to irrelevant information, and typical learners to ignore irrelevant information, whereas the typical learners show regulation of affects such that feelings disrupt one aspect of the field articulation process as measured by the Fruit Distraction Test (errors in naming colors).

When performance on the Leveling-Sharpening House Test by the suspects of both populations are compared with those of typical learners, it is seen that the suspects detected the first change later in the series. Subsequently they detected fewer correct changes, and these subsequent changes were reported long after they first appeared (the leveling-sharpening ratios of both suspect groups are larger than those of the typical groups, and the difference of the 1971-1972 sample reached significance).

The number of incorrect changes perceived during the House Test was also analyzed in both the larger studies. The suspect groups in each year perceived and reported more incorrect changes than did the typical groups, although this difference did not reach statistical significance.

Taken together, the results of the Leveling-Sharpening House Test suggest that the suspects, as a group, form more global and more fluid memory images of information than do typical learners, who tend to form images that are more differentiated and stable over time.

On the Object Sort Test, both suspect groups constructed fewer groups in categorizing the objects (the difference was significant with the 1970-1971 sample). At the same time they related the objects placed in a group with concepts that were rated as more concrete. These significant differences replicate the finding of the 1969-1970 study. The larger studies also examined the number of atypical groups formed by the children in categorizing the objects. As Tables 7 and 8 show, both suspect groups produced significantly more atypical groupings than did typical learners.

Table 7. Cognitive Control Test Performance of Kindergarten Children Designated by Teachers as Typical or Suspect Learners (1970-1971 sample)

	Typical Learners (75 boys, 75 girls)		Suspect Learners (23 boys, 11 girls)			
Score	Mean	SD	Mean	SD	F	*p*
Fine Motor Delay I: time (seconds)	13.5	5.3	15.1	6.3	2.28	NS

Fine Motor Delay II-I: time (seconds)	20.4	22.0	15.4	13.6	1.60	NS
Motor Tempo: time (seconds)	22.1	8.4	25.0	13.3	2.67	NS
Scattered Scanning: number correct	15.8	3.4	14.3	3.8	4.81	.05
Scattered Scanning: mean distance (cm)	6.9	1.5	7.3	1.2	2.01	NS
Scattered Scanning: total distance (cm)	111.5	33.9	106.6	36.1	0.56	NS
Fruit Distraction II: time (seconds)	80.4	23.7	114.5	54.6	32.2	.001
Fruit Distraction III-II: time (seconds)	15.5	30.6	28.8	44.6	4.37	.05
Fruit Distraction IV-II: time (seconds)	66.2	42.9	77.9	58.3	1.77	NS
Fruit Distraction: number recalls	1.4	1.4	1.3	1.5	0.37	NS
Fruit Distraction II: errors	5.3	4.5	3.8	3.3	4.99	.05
Fruit Distraction III-II: errors	0.8	4.5	0.7	5.3	0.02	NS
Fruit Distraction IV-II: errors	3.1	5.9	2.6	4.5	0.19	NS
Leveling-Sharpening: first stop	15.4	8.2	13.0	7.6	2.34	NS
Leveling-Sharpening: number correct changes	8.4	3.0	7.9	3.8	0.63	NS
Leveling-Sharpening: ratio	19.2	4.1	19.4	5.1	0.05	NS
Leveling-Sharpening: total incorrect changes	1.8	3.2	2.7	3.4	2.28	NS
Object Sort: typical groups	10.7	5.7	7.7	6.1	7.26	.01
Object Sort: mean typical score	3.5	1.6	2.4	1.7	14.60	.001
Object Sort: atypical groups	0.7	0.9	1.8	3.8	10.67	.01

Table 8. Cognitive Control Test Performance of Kindergarten Children Designated by Teachers as Typical or Suspect Learners (1971-1972 sample)

	Typical Learners (54 boys, 54 girls)		Suspect Learners (37 boys, 19 girls)			
Score	Mean	SD	Mean	SD	F	*p*
Fine Motor Delay I: time (seconds)	18.2	7.5	17.8	7.9	0.11	NS
Fine Motor Delay II-I: time (seconds)	29.7	32.5	18.3	26.7	5.07	.05
Motor Tempo: time (seconds)	26.2	8.9	31.2	14.6	7.21	.01
Scattered Scanning: number correct	16.1	2.8	14.6	3.5	8.59	.01
Scattered Scanning: mean distance (cm)	6.6	1.2	6.3	1.2	1.42	NS
Scattered Scanning: total distance (cm)	106.2	24.8	96.3	22.3	6.33	.05
Fruit Distraction II: time (seconds)	80.2	26.9	108.8	61.4	17.18	.001
Fruit Distraction III-II: time (seconds)	14.2	26.5	20.4	30.8	1.50	NS
Fruit Distraction IV-II: time (seconds)	63.8	57.0	79.1	64.3	2.43	NS
Fruit Distraction: number recalls	1.6	1.3	1.3	1.3	2.62	NS
Fruit Distraction II: errors	4.2	3.9	7.3	7.5	12.11	.001
Leveling-Sharpening: first stop	22.1	13.5	28.7	17.1	7.35	.01
Leveling-Sharpening: number correct changes	7.1	3.8	4.9	3.9	11.66	.001

Leveling-Sharpening: ratio	21.5	4.4	23.5	4.6	6.78	.05
Leveling-Sharpening: total incorrect changes	0.7	1.2	0.9	1.3	0.28	NS
Object Sort: total number groups	10.6	4.4	10.4	5.2	0.07	NS
Object Sort: mean typical score	4.6	1.0	3.1	1.4	16.31	.001
Object Sort: atypical groups	0.4	0.7	0.9	1.3	11.81	.001

In terms of the equivalence range principle, these findings can be interpreted as indicating that the suspect groups tend to categorize information by *(a)* employing fewer groupings that contain realistic information (narrow equivalence range), (*b*) imposing more concrete concepts on information in these typical groupings, and (*c*) using more categories or groupings that relate information in unrealistic, illogical ways.

In summary, the cognitive control test performances of children judged by teachers to be typical learners or suspect were compared in three separate studies. Although a number of the differences between these groups in each study did not reach statistical significance, it is important to note that the direction of each difference in test performance remained highly consistent from one study to the next. The test performances of the children judged as not meeting classroom demands suggested that they tended to employ little fine motor delay, to scan passively and narrowly, to attend to irrelevant information, to form global fluid images of information in memory, to use narrow, concrete categories when conceptualizing information in realistic terms, and also to use more categories that are unrealistic and illogical. By the same standards, children judged to be typical learners, meeting classroom demands, seemed to tend to employ more delay over fine motor movements, to scan broadly and actively, to ignore irrelevant information, to form differentiated and stable images of information, to use broad, more abstract categories when conceptualizing information in realistic terms, and to make less use of unrealistic, disordered conceptual thinking.

In three separate studies, then, the cognitive control tests were reasonably successful in discriminating between children who were meeting kindergarten demands and children who were having difficulty and needed special help. These results contribute support to the criterion validity of the cognitive control tests.

IV. Relations Between Cognitive Controls and Sex, IQ, Academic Skills, and Socioeconomic Status

The foregoing studies of criterion validity seem to lead to the following complex question. How does a child's performance with cognitive control tests relate to his sex, intelligence quotient, academic skills, and socioeconomic status? Studies conducted thus far in response to other questions relate to criterion validity. If it were demonstrated that girls and boys differed significantly in their performance with these tests, the concept of cognitive controls as consistent organizing tendencies in all individuals would have to be reformulated to account for sex differences. Similarly if IQ and academic skill scores were shown to relate significantly to cognitive control test performance, the concept of cognitive controls as the cognitive base on which skills and intellectual efficiency rely would need reformulation. Last, the relation between socioeconomic status and cognitive control functioning must be explored, since cognitive control theory postulates that life experiences contribute to the formation and organization of cognitive controls, which then become consistent strategies a child uses in managing information. Whether children from different socioeconomic settings vary in some particular way in their cognitive control functioning should be of interest to both practitioners and investigators.

SEX DIFFERENCES IN COGNITIVE CONTROL TEST SCORES

Kindergarten Children Rated as Typical Learners or Suspect. The kindergarten children involved in this study are the same as those described in Section III, Tables 7 and 8. The cognitive control test differences between 5-year-old boys and girls were examined in two studies. The children in both studies were attending kindergarten classes in a public school system serving a middle-class suburb. Each group of children represented the entire kindergarten population enrolled into the school system in successive years (1970-1971, 1971-1972). During each academic year the teachers were asked to designate the children who appeared to be having difficulty learning and meeting classroom demands and for whom special help would be needed by the first grade—that is, children who were suspected by the teachers of having a learning disability. Children who were not so designated were viewed as being typical kindergarten learners.

From among the 1970-1971 kindergarten population, 44 children were selected as suspects (23 boys and 11 girls) and 150 as typical learners (75 boys and 75 girls). Of the 1971-1972 sample, 56 children were selected as suspects (37 boys and 19 girls) and 108 as typical learners (54 boys and 54 girls). The test performance differences between suspect and typical learners was discussed in Section III. Here we consider only the differences observed between boys and girls.

All children in both populations were administered the five tests that make up the basic battery of cognitive control measures. To explore possible sex differences in cognitive control performance in children with learning difficulties versus typical learners, the boys and girls within each subgroup were compared. Tables 9 and 10 present the differences in test scores between boys and girls who were typical learners or suspects of the 1970-1971 and the 1971-1972 samples, respectively. Examination of the results indicates that, in general, the boys and girls within each subgroup did not differ consistently and significantly in their performance with the tests of cognitive control.

A few exceptions to this general finding deserve our attention. Of the many typical learners' test means compared, only one significant difference was observed in both samples: the girls marked significantly more circles and crosses than did boys in the Scattered Scanning Test. This difference was not observed with the suspects. Because the difference appeared in two fairly large populations of 5-year-old typical learners, it would seem that girls at this age are somewhat more active in visual scanning than are boys. Boys and girls do not differ, however, in breadth of scanning nor in any of the controls compared by the tests.

Turning to the suspects, the 11 girls of the 1970-1971 sample were delayed significantly more than the boys in naming the colors of Card III, with its peripheral pictures. However the 19 girls of the 1971-1972 sample showed that they were *less* distracted by the peripheral pictures when naming colors. Thus the significant sex difference observed in the 1970-1971 suspect group is very likely unique to the 11 girls and 23 boys in question. The suspect boys and girls of the 1970-1971 sample also differed in terms of Object Sort Test performance. The boys employed significantly more groups. Although the difference is not significant, it is interesting to note that the boys also tended to employ *more* abstract concepts than did the girls when explaining why the objects grouped belonged together. The suspect boys then were characterized by the tendency to use *many narrow* categories, which were assigned *abstract* concepts, whereas the suspect girls tended to use few *broad* categories to which were assigned *concrete* concepts. This pattern between breadth of categories and level of abstraction, for boys and girls with learning difficulties, does not appear in the 1971-1972 sample, however. Both these findings deserve further study to establish whether they are the outcome of chance sampling or sex differences unique to poor learners.

Table 9. Sex Differences in Cognitive Control Test Scores of Kindergarten Children Rated as Typical Learners or Suspects (1970-1971)

	Typical Learners					Suspect Learners				
	Boys, N =75		Girls, N= 75			Boys, N= 23		Girls, N= 11		
Score	Mean	SD	Mean	SD	*p*	Mean	SD	Mean	SD	*p*
Fine Motor Delay I: time (seconds)	13.7	4.9	13.3	5.6	NS	15.6	7.1	14.0	4.1	NS
Fine Motor Delay II-I: time (seconds)	19.9	18.9	20.8	24.8	NS	16.3	14.8	13.3	10.8	NS
Motor Tempo: time (seconds)	23.6	8.6	20.5	7.9	.02	24.2	12.6	26.8	15.1	NS
Scattered Scanning: number correct	15.0	3.8	16.5	2.9	.01	14.6	3.8	13.6	3.9	NS
Scattered Scanning: total distance (cm)	106.2	35.5	116.7	31.7	NS	109.5	36.1	100.4	36.9	NS
Scattered Scanning: mean distance (cm)	68.9	16.3	69.7	14.0	NS	73.7	11.7	72.3	13.8	NS
Fruit Distraction II: time (seconds)	85.1	24.1	75.7	22.4	.02	115.7	55.6	112.0	55.0	NS
Fruit Distraction III-II: time (seconds)	17.0	33.1	13.9	28.0	NS	18.0	43.8	51.4	39.0	.05
Fruit Distraction IV-II: time (seconds)	68.6	48.0	63.8	37.1	NS	72.6	43.6	89.0	82.5	NS
Fruit Distraction recalls	1.6	1.5	1.2	1.4	NS	1.4	1.5	1.0	1.4	NS
Fruit Distraction: II: errors	4.0	2.9	3.6	3.6	NS	5.6	4.8	4.7	3.8	NS
Fruit Distraction III-II: errors	0.9	4.1	0.7	4.8	NS	0.5	5.2	1.1	5.6	NS
Fruit Distraction IV-II: errors	3.7	6.0	2.4	5.7	NS	2.5	4.1	2.7	5.3	NS
Leveling-Sharpening: first stop	16.1	8.7	14.6	7.6	NS	13.9	8.2	11.1	6.3	NS
Leveling-Sharpening: number correct changes	8.5	3.3	8.3	2.8	NS	7.9	3.8	8.0	4.2	NS
Leveling-Sharpening: ratio	19.0	4.5	19.4	3.5	NS	19.4	4.9	19.4	5.7	NS
Leveling-Sharpening total in correct changes	1.8	3.3	1.7	3.1	NS	3.2	3.8	1.6	2.3	NS
Object Sort: total groups	10.1	5.7	11.2	5.7	NS	9.2	6.6	4.6	3.4	.02
Object Sort: mean developmental score	3.6	1.6	3.4	1.5	NS	2.6	1.6	1.8	1.8	NS

Object Sort: atypical groups	0.5	0.8	0.9	1.1	.01	2.1	4.5	1.3	1.6	NS

Table 10. Sex Differences in Cognitive Control Test Scores of Kindergarten Children Rated as Typical Learners or Suspects (1971-1972 sample)

	Typical Learners					Suspect Learners				
	Boys, N= 54		Girls, N= 54			Boys, N= 37		Girls, N= 19		
Score	Mean	SD	Mean	SD	*p*	Mean	SD	Mean	SD	*p*
Fine Motor Delay II-I: time (seconds)	23.6	29.3	35.7	34.5	NS	17.6	30.8	19.7	16.4	NS
Motor Tempo: time (seconds)	26.1	8.3	26.3	9.5	NS	30.4	15.5	32.7	12.9	NS
Scattered Scanning: number correct	15.5	2.9	16.7	2.4	.05	14.2	4.0	15.6	2.2	NS
Scattered Scanning: total distance (cm)	103.8	27.1	108.7	22.4	NS	94.6	24.4	99.5	17.7	NS
Fruit Distraction II: time (seconds)	79.2	24.2	81.1	29.7	NS	109.6	62.6	107.3	60.4	NS
Fruit Distraction III-II: time (seconds)	13.5	23.1	14.9	29.7	NS	21.2	35.1	17.3	20.5	NS
Fruit Distraction IV-II: time (seconds)	57.5	65.9	70.1	46.1	NS	70.1	60.6	96.5	69.1	NS
Fruit Distraction II: errors	4.3	4.5	4.1	3.4	NS	8.1	8.7	5.7	4.1	NS
Leveling-Sharpening: first stop	20.1	11.7	24.0	14.8	NS	28.8	17.7	28.3	16.1	NS
Leveling-Sharpening: number correct changes	6.9	3.5	7.2	4.1	NS	5.1	4.1	4.4	3.5	NS
Leveling-Sharpening: ratio	21.7	4.2	21.4	4.7	NS	23.3	4.6	23.7	4.9	NS
Leveling-Sharpening: total incorrect changes	0.6	1.1	0.8	1.2	NS	1.0	1.5	0.6	1.0	NS
Object Sort: total groups	10.3	4.4	10.9	4.4	NS	9.8	4.9	11.5	5.8	NS
Object Sort: mean developmental score	4.6	10.1	4.6	10.2	NS	3.7	1.7	3.9	1.3	NS
Object Sort: atypical groups	0.4	0.6	0.4	0.8	NS	1.0	1.3	0.8	1.3	NS

Kindergarten, First, and Second Grade Children Experiencing Academic and School Adjustment Problems. Sex differences in cognitive control test performance were examined in another group of children ages 5, 6, and 7 years, who were being followed by personnel of the special services department because of academic and school adjustment problems identified by teachers. The total sample consisted of 96 children; 40 were boys and 56 girls; 80 were white and 16 black. They were attending kindergarten, first, or second grades in a school system that served primarily a low socioeconomic area of a large Eastern city. The age range of the total group was 64 to 101 months, with a mean of 78.4 months (SD = 13.29). The IQ range, as measured by the WISC, was 64 to 121 (mean IQ = 94.8; SD = 12.19). The age and IQ characteristics of boys and girls were comparable.

	Boys		Girls	
	Mean	SD	Mean	SD
Age (months)	79.0	10.53	77.91	15.04

IQ	94.9	10.93	94.70	13.11

The children were administered four tests of cognitive control: the Circles Test of focal attention, the Fruit Distraction Test, the Leveling-Sharpening House Test, and the Fine Motor Delay Test. Table 11 lists the results of an analysis of variance comparing the mean scores of boys and girls on each variable.

Table 11. Differences in Cognitive Control Test Performance Between Public School Boys and Girls, Kindergarten to Second Grade, Experiencing Academic and School Adjustment Problems

	Boys, N = 40		Girls, N = 56			
Score	Mean	SD	Mean	SD	F	*p*
Fine Motor Delay I: time (seconds)	32.8	19.53	27.8	15.20	1.65	NS
Fine Motor Delay II: time (seconds)	14.0	5.59	13.7	5.23	1.14	NS
Fine Motor Delay II-I: time (seconds)	18.7	18.88	14.1	15.73	1.44	NS
Circles Test, 9 mm	4.05	3.03	4.69	2.92	1.08	NS
Circles Test, 9/12 mm, positive illusion	6.02	3.45	6.00	5.18	1.26	NS
Circles Test, 9/45 mm, negative illusion	-2.67	6.69	-4.57	7.40	1.23	NS
Fruit Distraction I: time (seconds)	95.32	46.79	77.64	26.71	3.07	.01
Fruit Distraction II: time (seconds)	95.80	45.95	79.73	30.97	2.20	.01
Fruit Distraction II-I: time (seconds)	0.48	34.99	2.09	22.36	2.45	.01
Fruit Distraction III-II: time (seconds)	5.00	33.14	8.64	18.68	3.15	.01
Fruit Distraction IV-II:.time (seconds)	66.55	50.96	65.61	36.28	1.97	.05
Fruit Distraction II-I: errors	-0.03	5.96	1.05	4.17	2.05	.01
Fruit Distraction III-II: errors	.00	5.53	0.01	3.85	1.07	NS
Fruit Distraction IV-II: errors	4.45	7.91	1.61	5.58	2.01	.01
Fruit Distraction: recalls	1.1	1.37	1.6	1.46	1.13	NS
Leveling-Sharpening: first stop	20.6	12.19	17.9	10.3	1.39	NS
Leveling-Sharpening: number correct changes	7.2	2.98	7.4	3.06	1.05	NS
Leveling-Sharpening: ratio	21.11	3.77	20.6	4.20	1.24	NS

No significant differences were observed between the test performances of boys and girls except on the Fruit Distraction Test. The means indicate that boys took longer than girls to name the colors on Card I (colored rectangles) and Card II (fruit colored correctly). Although boys were slower in naming the colors of these two baseline cards, the girls were more delayed in naming the colors of Card II (when compared with Card I), and in naming the colors of Card III (correctly colored fruit surrounded by irrelevant peripheral pictures) versus Card II. With Card IV, where the irrelevant information to be ignored is represented by incorrect colors, the sex difference shifts, and the boys revealed that they were more delayed than the girls when dealing with this information (Cards IV-II). The difference observed in errors made when naming colors also follows this pattern. Girls made more errors naming colors on Cards II and III (when each is compared with its respective baseline card). Boys made more errors when naming colors on Card IV compared with the baseline Card II.

To explore the potential significance of these sex differences, recall that Chapter 5 discussed the possibility that the four cards of the Fruit Distraction Test contain different levels of distracting information. Encouraged by several observations, especially the differences observed among public school, orphaned, and brain-damaged children, we speculated that relative to Card I, Card II contains a minimal level of distraction in that the colors are in the form of common fruit. We observed that colors in the shape of common fruit supplied a powerful enough distraction for brain-damaged and orphaned children to contribute to the field articulation factor defined by these groups, but not to the factor defined by public school children. We also speculated that Card III represents another level of information containing more powerful distractions (peripheral pictures), and Card IV (with its incorrect colors forming the background) represents still another level.

With these considerations in mind, let us review the findings with the Fruit Distraction Test. Boys were slower than girls in naming the colors of both Card I and II. But when these cards are used as baseline measures, girls were more delayed, therefore were distracted, by the lower levels of distraction represented by colors in the form of fruit (Card II) and in the form of peripheral pictures (Card III). Boys were more delayed by the level of distraction hypothesized as being more intense (incorrect colors on Card IV). When managing irrelevant information, moreover, the girls of this sample were “peripheral bound”—much like the sample of orphaned children in the first there factor analytic studies—in being vulnerable to overincluding peripheral irrelevant information. Boys, on the other hand, were more “context bound,” much like the sample of brain-damaged children, in being vulnerable to the embeddedness of context of the information.

Finally, the differences observed between the boys and girls of this sample might also be considered in terms of the relation pointed out in Chapter 5 between field articulation, as measured by the Fruit Distraction Test, to the regulation of affects. As noted, the children in the present sample were designated by teachers not only as experiencing academic difficulty but also as being impulsive and aggressive, and having difficulty adjusting to the school situation. If we relate the sex differences observed with the sample in Fruit Distraction Test performance to the findings obtained with the hospitalized, emotionally disturbed children (see seventh factor analytic study, Chapter 5), several interesting issues emerge that may be useful in future studies. In showing greater distractibility in the face of colors in the form of fruit (Card II) and peripheral, irrelevant pictures (Card III), the girls resembled most the *younger* hospitalized population, who revealed mood swings and affect disorders rather than systematic, directed acting-out behavior. In showing greater distractibility in the face of incorrect colors (Card IV), the boys of the present sample resembled most the *older* hospitalized population, who also revealed disorders in affect but showed more habitual use of organized, directed, anti-social acting-out behavior.

In summary, no sex differences were found in three measures of cognitive controls with a group of public school children experiencing academic and adjustment problems related to focal attention, leveling-sharpening, and fine motor delay. Sex differences were noted in field articulation, with girls showing vulnerability to low-keyed irrelevant information and boys showing vulnerability to more intensive irrelevant information. These differences add to the finding that field articulation, as measured by the Fruit Distraction Test, is uniquely related to impulse disorders and the regulation of affects, suggesting future studies that distinguish between forms of affective disorder and levels of field articulation functioning.

Public School Children, Ages 6, 9, and 12 Years. Another source of information concerning sex differences in cognitive control functioning is provided by an early study (Santostefano and Paley, 1964; Santostefano, 1963) comparing 10 boys and girls at three age levels (6, 9, and 12 years) in terms of performance with several tests of cognitive controls: the Circles Test of focal attention, the Fruit Distraction Test of field articulation, and three early test forms of the leveling-sharpening cognitive control—the Wagon Test, Elements Omitted; the Wagon Test, Elements Added; and the Circles Test. The age differences observed in this study are discussed in the next chapter. The reader is also referred to Chapter 5, which describes these procedures in detail, as well as several factor analytic studies of these earlier versions of cognitive control tests.

For the study of sex differences, the test performance of the boys and girls at each age level was examined by an analysis of variance with age and sex and interaction of these as the main effects. Errors in the Circles Test (child is asked to judge which of two circles is larger) receive a value such that a large score indicates poor size estimation and narrow passive scanning, and a low score indicates accurate size estimation and active broad scanning. No significant differences were found in the performance of girls and boys (F= 0.17) and in the interaction between age and sex (F = 1.22). The means of both sexes followed a developmental progression, discussed in the next chapter, and did not differ at any of the age levels.

	6 Year Olds		9 Year Olds		12 Year Olds	
	Mean	SD	Mean	SD	Mean	SD
Boys	13.3	7.6	6.8	3.6	7.6	2.4
Girls	12.3	8.0	10.5	5.5	6.7	2.9

The time taken by both sexes to name the colors on Card III of the Fruit Distraction Test was compared with time taken to name the colors of Card II (peripheral, irrelevant information vs. correctly colored fruit only) by means of a difference score. As discussed earlier, the larger the time difference, the more the child deploys attention at both relevant and irrelevant information; the smaller the time difference, the more the child deploys attention selectively at relevant information and ignores irrelevant information.

Again no significant difference was found in the performances of girls versus boys (F = 0.05) and in the interaction of age and sex (F = 0.15). The mean time difference scores of both boys and girls showed a developmental trend (discussed in the next chapter) and did not differ at any of the age levels.

	6 Year Olds		9 Year Olds		12 Year Olds	
	Mean	SD	Mean	SD	Mean	SD
Boys’ time difference (seconds)	7.6	6.9	5.3	7.7	1.1	4.3
Girls’ time difference (seconds)	7.9	8.6	3.6	7.5	1.4	3.6

Finally, an analysis of the errors made by boys and girls in naming colors on Card II versus Card III also showed that the two groups performed very much the same *(F*= 0.05) and there was no interaction of age with sex *(F*= 0.92).

The performances of the boys and girls on the three tests of leveling-sharpening were compared in terms of the three basic scores: first stop score, number of correct changes reported, and leveling-sharpening ratio (lag in detecting changes). With the Wagon Test, Elements Omitted although there were no sex differences at any age level, boys as a total group reported their first change earlier in the sequence of displays (mean = 10th display) than girls (mean = 15 display); boys reported more changes (mean number correct = 4) than girls (mean number correct = 3); and boys detected changes more quickly (mean ratio = 8.1) than did girls (mean ratio = 9.7). Each of these differences is significant at better than the .05 level of confidence. These sex differences were not observed in the performance by these same children with the Wagon Test, Elements Added, and with the Circles Test of leveling-sharpening. Thus we have a suggestion that latency boys (6 to 12 years) are characterized more by the sharpening end of the leveling-sharpening principle and girls by the leveling end.

Taken together, the findings indicate that boys and girls at three age levels do not differ in terms of the breadth of scanning (focal attention), selective deployment of attention (field articulation), and constructing memory images of information (leveling-sharpening). In only one of the three tests of leveling-sharpening did the sexes differ, with boys showing a tendency to sharpen (maintaining discrete memory images of information that are articulated from present information) and girls a tendency to level (maintaining global memory images of information that are fused with present information).

Public School Children Ages 8 and 9 Years. A study by Zarembo (1967) was designed to explore the relation between the impulsive-reflective cognitive disposition and cognitive controls. The subjects were 22 girls and 22 boys, all third or fourth graders attending public school and ranging in IQ from 75 to 155 (mean =116). The children were administered three tests of cognitive controls: the Circles Test of focal attention (described in Chapter 5 and in Appendix B), the Fruit Distraction Test of field articulation; and the Leveling-Sharpening House Test.

Population differences observed have been discussed above; here we compare boys and girls. Briefly, no significant differences were observed between the performances of the girls and the boys on the Circles Test of focal attention.

No Illusion Condition		Positive Illusion Condition		Negative Illusion Condition	
Mean	SD	Mean	SD	Mean	SD

Boys	5.86	3.26	5.40	3.64	3.04	3.18
Girls	4.64	3.77	6.46	2.77	1.77	3.14

Similarly no significant differences were observed between the performances of boys and girls on the Fruit Distraction Test.

	III-II		IV-II	
	Mean	SD	Mean	SD
Boys' time difference (seconds)	3.46	10.35	34.09	16.20
Error difference	0.22	0.92	0.32	1.08
Girls' time difference (seconds)	–.77	4.62	29.14	17.48
Error difference	-0.09	0.61	0.14	1.32

On the Leveling-Sharpening House Test first stop score, a significant difference appeared, with girls reporting the first change earlier than boys (girls' mean =11.68, SD = 4.24; boys' mean =15.22, SD = 6.07). No significant differences were observed with the number of correct changes reported or with the leveling-sharpening ratio.

	Number of Correct Changes		Leveling-Sharpening Ratio	
	Mean	SD	Mean	SD
Boys	10.8	2.34	16.6	3.38
Girls	11.4	1.65	14.9	2.68

In summary, this study of 8- and 9-year-old public school children revealed no differences between boys and girls in measures of focal attention, field articulation, and leveling-sharpening. With only one measure of leveling-sharpening was a difference observed—the display at which the first correct change is reported. Girls reported the first change earlier and therefore are characterized by this measure as tending to sharpen more. Note however that in the previous study girls tended to level more than boys on one of three leveling-sharpening tests.

Adolescent Public School Boys and Girls. As part of a study examining the relation between performance on the Fruit Distraction Test and the Rod and Frame Test (RFT), these two procedures were administered to 50 adolescents (25 boys and 25 girls). The subjects were selected at random from 90 volunteers who were attending public schools and were members of community centers in a large Midwestern city. Their ages ranged from 14 to 16 years with a mean of 15 years (SD = 0.83). Here we consider only the sex differences. The relation between the procedures is discussed in Section I.

The subjects were administered only Card II (fruit colored correctly) and Card IV (fruit colored incorrectly) of the Fruit Distraction Test. Reading time and reading errors were recorded, in keeping with the procedure of this test, and reading time and error difference scores were computed for each subject, with Card II serving as the control. Positive difference scores would indicate that more time had been taken and more errors were made when naming the colors of Card IV, with the incorrect colors serving as distracting, irrelevant information. Sex differences were examined by means of an analysis of variance.

For the boys, the reading time difference score (Cards IV-II) was 23.6 seconds (SD = 11.2), and the reading error difference score (Cards IV-II) was 1.3 (SD = 2.1). The respective scores for the girls were 18.8 seconds (SD = 8.80) and 0.48 error (SD = 1.7). Although the mean scores show that the boys took slightly longer to name the colors on Card IV, and they made slightly more errors, these differences fall well short of the F ratio required for significance at the .05 level (reading time difference, F=2.81; reading error difference, F= 2.33).

This adolescent population, then, failed to show a sex difference with the Fruit Distraction Test.

When the same subjects were administered the Rod and Frame Test, the scores computed for each one were the total number of degrees the rod deviated from the upright and the variance reflected in the rod adjustments. Both these scores revealed sex differences as reported by Witkin and others. In terms of total number of degrees the rod deviated from the upright, boys showed significantly more field independence than girls. For the boys, mean total number of degrees the rod deviated from the upright was 56.8 (SD = 45.3), and for the girls, 88.5 (SD = 47.8). This difference is significant at the .05 level (F=5.83). The same sex difference appears in the variability exhibited by boys and girls from trial to trial in placing the rod in the upright position. Mean variance score for the boys was 15.1 (SD = 19.62) and for the girls, 30.6 (SD = 28.93), a difference that is statistically significant (F= 5.03).

In this study the same adolescent subjects showed no sex differences on a test of cognitive control (Fruit Distraction Test), a finding that parallels the results of other work with younger children discussed earlier. Yet the adolescents showed expected sex differences in a test of cognitive style. These data suggest that future work should explore sex differences when tests of cognitive controls and tests of cognitive style are administered to the same subjects. If boys and girls show no difference in cognitive control functioning, while at the same time exhibiting differences in cognitive style tests, we would have further support for the hypothesis that cognitive controls represent organizing structures basic to both boys and girls. Such findings also raise the question of whether sex differences observed in connection with tests of cognitive style, such as the Rod and Frame Test and the Matching Familiar Figures Test, appear because the behavioral process elicited by these tests implicates variables such as assertiveness and aggression that are tied more to gender than to cognitive control organization as such. This question has been investigated, also employing adolescent subjects, and the results of the study, discussed below, should help us in thinking through the reasons for the failure of the adolescents of the present study to show sex differences with the Fruit Distraction Test, although they did with the Rod and Frame Test. The study to be described also is related to the issue of approaching the question of sex differences with all tests of cognitive controls.

Adolescent Boys and Girls: The Relation Between a Measure of Masculinity-Femininity and the Leveling-Sharpening Cognitive Control. Lemieux (1966) explored the relationship between the cognitive principle of leveling-sharpening and masculinity-femininity in college women and men. This study is of interest because rather than relying on gender alone, the Gough Femininity Scale (Gough, 1952) was used to classify individuals as masculine or feminine. The Gough scale consists of 58 items to which the subject responds true or false, according to how the individual sees himself or herself. For example, a response of "false" to the following items contributes to a high femininity score: I want to be an important person in the community; I think I would like to drive a racing car. A response of "true" to the following items also contributes to high femininity score: I'm not the type to be a political leader; I think I would like the work of librarian. The Gough scale was validated with the responses of high school and college males and females.

Lemieux administered the Leveling-Sharpening House Test to 45 college students attending a summer session at an eastern university. The ages of the 22 males and 23 females ranged from 19 to 24 years. The two groups did not differ significantly in their performance with the Leveling-Sharpening House Test:

	Male Mean	Female Mean	F
First stop score	10.9	12.3	0.52
Number correct changes	14.3	13.8	1.10
Leveling-Sharpening ratio	12.1	12.9	1.10
Number incorrect changes	1.9	1.5	0.5

The two groups did differ significantly in their response to the Gough scale ($F=48.6$; $p = .0001$). The maximum femininity score is 58, and the means of the male and female groups were 26.3 (SD = 4.6) and 35.2 (SD = 6.1), indicating that the responses of the females to the test items characterized these subjects as more feminine than did the responses of the males.

Correlating scores on the Gough scale with Leveling-Sharpening House Test scores for each sex permits us to explore the relationship in both sexes between degree of femininity (as measured by the Gough scale) and leveling-sharpening functioning. In general, males who revealed a higher degree of femininity tended to level information, and males who revealed a lower degree (high masculinity) tended to sharpen information. As Table 12 shows, the higher the Gough score (feminine), the later in the series the first correct change was detected, the lower the number of correct changes perceived, and the greater the lag (ratio) between the appearance of a change and the number of the display at which it was detected.

Table 12. Correlations Between Leveling-Sharpening House Test Scores and Gough Femininity Test Scores in College Women and Men

	Leveling-Sharpening House Test		
Subjects	First Stop Score	Number of Correct Changes	Ratio
Females, N = 23	–.22	.07	–.18
Males, N = 22	.30*	–.43**	.33*

*p = .10.

**p= .05.

With the females, there is a suggestion that the opposite relationship holds. Although the magnitude of the correlations obtained from females was low, the directions of the correlations were uniformly opposite from those obtained from males. That is, women who showed a higher degree of femininity tended to sharpen information and those who showed a lower degree (masculinity) tended to level information. The signs of the correlations indicate that women who score high on the Gough scale (feminine) tended to detect the first change early in the series of displays, detected more changes, and reported changes soon after they first appeared.

Taken together, these results suggest that individuals of both sexes whose psychological-sexual identity is syntonic with gender identity are characterized by the cognitive control tendency of sharpening, whereas individuals of both sexes whose psychological-sexual identity is dystonic with gender identity are characterized by the cognitive control tendency of leveling.

These results raise interesting questions for the further study of sex differences in cognitive control functioning. The study reported illustrates the need to obtain various measures of sex-role identification rather than simply noting differences in cognitive control test performance between boys and girls, the discordance and concordance between gender and psychological sex-role identity also must be recorded. This approach used here with young adults should be replicated at various age levels throughout latency, a phase of development during which sex-role identification is being formed and is undergoing change.

If findings of the present study are viewed in terms of the age trends discussed in the next chapter, the relation of one aspect of personality with cognitive control development and organization comes into focus. Both males who scored higher in masculinity and females who scored higher in femininity tended to function at higher developmental stages of leveling-sharpening; that is, they constructed and maintained differentiated memory images of information (sharpening), whereas males who scored lower in masculinity and females who scored lower in femininity tended to function at earlier developmental stages (constructing and maintaining global memory images). This developmental view of the findings leads us to inquire whether individuals who develop a sex-role identification that is syntonic with their gender identification tend to reach more advanced stages of cognitive control functioning than individuals who develop dystonic sex-role and gender identifications. Psychoanalytic theory holds that sex-role identification, articulated during latency, results as oedipal issues are being negotiated and resolved. A boy and a girl who show dominant masculine and feminine sex-role identification, respectively, would be viewed as having successfully negotiated oedipal issues. Is this success in the domain of emotional development a context for advances in cognitive control development? Conversely, in terms of ideal development, a boy who shows a dominant feminine identification and a girl who shows a dominant masculine identification would be viewed as “failing” to negotiate oedipal issues. Does this developmental failure contribute to a compromising of cognitive control development resulting in the individual’s functioning cognitively at some early stage?

Of course these questions can be turned around. It may be that lags in the development of cognitive control organizations set the stage for a developmentally unsuccessful negotiation of oedipal issues; that is, the oedipal solution makes use of a crossover of sex-role identification. Clinical and laboratory studies of the sex-role identity of children and young adults who are extreme levelers and extreme sharpeners, for example, and studies of the cognitive control functioning of children who are high in psychological femininity or masculinity, should shed light on the broad issues of the relation between gender identification, sex-role identification, and cognitive control functioning and development.

Comment on Sex Differences in Cognitive Control Functioning. In summary, the several investigations to date of the cognitive control test performance of boys and girls suggest that there are no major, consistent differences from age 5 years to adolescence. This broad finding agrees with the conclusion of Maccoby and Jacklin (1974), drawn after a very exhaustive review of studies comparing boys and girls on a wide variety of tests of intellectual abilities and cognitive styles. These authors note that the performances of boys and girls do not differ consistently over a wide age range.

One study considered previously brings attention to the importance of obtaining assessments of psychological sex-role identification in attempting to establish the relation between cognitive controls and the part of personality organization concerned with psychosexual identity. Perhaps our understanding of sex differences in cognitive control functioning would be broadened if the psychological variable of psychosexual identity were considered in addition to gender. The reader interested in pursuing this issue is referred again to the work of Maccoby and Jacklin (1974) for a superb discussion of the origins of psychological sex differences and the theoretical and methodological approaches to the study of sex differences in relation to cognitive, intellectual, and personality functioning.

Another study we considered brings attention to the need to explore sex differences in the regulation of affects, as well as the relation between those differences in affect regulation and cognitive controls, especially the control of field articulation.

IQ AND COGNITIVE CONTROL TEST SCORES

As we noted in Chapter 5, none of the factor analyses that included IQ as a measure along with cognitive control measures produced factors in which IQ measures dominated the meaning of the cognitive process defined by the cluster of tests (see the first, second, third, sixth, and seventh factor analytic studies). The only exception was the third study, in which brain-damaged children produced an IQ factor. This general finding suggested that the cognitive activity sampled by the Wechsler Intelligence Scale for Children does not generate basic cognitive principles that underlie and organize the cognitive activity sampled by a wide range of tasks, especially those assessing cognitive controls. Rather, the results of the factor analytic studies suggested that the cognitive solutions required by intelligence scales rely on cognitive controls. We postponed a detailed review of the results obtained in these factor analyses for this section, and we also consider these findings along with those of other studies that address the relation between measures of cognitive controls and measures of intelligence.

Public School, Orphaned, and Brain-Damaged Children. In the first, second, and third factor analytic studies (Chapter 5), the performances on a wide variety of cognitive tasks of three populations were subjected to factor analysis. Table 1 of Chapter 5 indicates that the factor analyses of 33 tests scores included the WISC total IQ. The three populations involved in these studies were as follows: 44 public school children (ages 7 to 12 years); WISC IQ range, 70 to 124; WISC mean IQ 110; 38 children living in an orphanage (ages 6 to 13 years); WISC IQ range, 80 to 122; WISC mean IQ, 104; and 44 brain-damaged children enrolled in a private, residential special education center (ages 6 to 13 years); WISC IQ range, 46 to 108; WISC mean IQ, 72. The factor analyses of the correlations among the 33 test scores produced a factor that was dominated by WISC total IQ score only for the brain-damaged children. The analyses of the test scores of public school and orphaned children did not produce factors in which IQ played a primary, or even secondary, role in defining a factor.

Table 13 displays the factor obtained from brain-damaged children (Table 1 of Chapter 5 defines the test scores and their meaning). In general, the factor is dominated not only by IQ but by tests that implicate in a major way figure-ground, part-whole relationships among bits of information—that is, the tests and their requirements that are traditionally viewed as especially sensitive to brain dysfunction. The factor loadings indicate that children who attained higher IQ scores on the WISC (1) were accurate in locating marbles into a form board to copy standard designs, took more time to solve a task requiring them to locate blocks apart but also to form a design, (3) were accurate in completing drawings made of line segments, (4) drew designs accurately from memory, (5) detected few letters “b” and geometric shapes (squares and crosses) from displays presented continuously by a memory drum, and (6) were accurate in estimating the sizes of circles in a negative illusion condition. Only Circles Test C (item 6) was designed to assess a cognitive control (focal attention), and the direction of the loading indicates narrow, passive scanning (because the illusion condition was not experienced). This IQ factor, therefore, does not suggest a major relation between IQ and cognitive controls but appears to define a cluster of cognitive activities unique to brain dysfunction.

Table 13. IQ Factor Obtained from the Performance of Brain-Damaged Children with Cognitive Tasks and the WISC

Test	Factor Loading	Meaning of Score
WISC IQ	.85	High total IQ
Exploded Block Design B	.93	Much time taken to arrange blocks to form designs
Marble Board	.95	Accurate location of marbles to form design copied
Incomplete Figures	.85	Accurate completion of designs made of line segments

Benton Visual Retention	.84	Accurate drawing of designs from memory
Memory for Spatial Orientations of Designs	.61	Accurate identification (memory) of initial spatial orientation of rotated designs
Circles C	–.61	Accurate estimation of size of circle in negative illusion; illusion not operating —narrow scanning
Continuous Attention C	–.61	Few letters "b" detected in continuous display of letters
Continuous Attention A	–.50	Few squares and crosses detected in continuous display of geometric shapes

In addition to this factor cluster produced by the brain-damaged children, it would be useful to examine also the specific correlations obtained between IQ and each cognitive control test score for each population. As Table 14 reveals, of the 39 correlations, only one approaches statistical significance (IQ x errors on Fruit Distraction Test cards IV-II). For the most part, the correlations are low in magnitude, suggesting little relationship between WISC total IQ and measures of cognitive controls.

Table 14. Correlations Between IQ and Cognitive Control Test Scores of Public School, Orphaned, and Brain-Damaged Children

Score	Public School, N= 44	Orphaned, N= 38	Brain-Damaged. N= 44
(Age)	–.04	–.27	.30
Circles, 9 mm	–.18	.19	–.25
Circles, 9/12 mm	–.10	.13	.29
Circles, 9/45 mm	.04	.37	.10
Fruit Distraction II-I: time (seconds)	–.04	–.05	–.11
Fruit Distraction II-I: errors	.04	.06	.05
Fruit Distraction III-II: time (seconds)	–.14	.02	–.08
Fruit Distraction III-II: errors	–.09	–.17	.01
Fruit Distraction IV-II: time (seconds)	–.10	.17	.03
Fruit Distraction IV-II: errors	–.38	–.11	–.28
Fruit Distraction: recalls	.08	.06	.01
Leveling-Sharpening Wagon, Elements Omitted: first stop	.01	–.32	—
Leveling-Sharpening Wagon, Elements Omitted: number correct	.14	–.01	—
Leveling-Sharpening Wagon, Elements Omitted: ratio	–.16	–.13	—

Children Hospitalized in a Psychiatric Facility. The subjects in this study of the relation between IQ and cognitive control test scores are the children described in the seventh factor study (Chapter 5). Of 164 children admitted to an inpatient psychiatric service because of severe emotional problems (Table 8, Chapter 5), 84 were administered the WISC in addition to the basic battery of cognitive control tests. The relations between IQ and cognitive control test scores for these 84 children are considered here. The sample consisted of 61 boys and 23 girls, ranging in age from 6-5 to 17-0 years (mean age= 11.9 years; SD = 29.3). Their total WISC IQs ranged from 61 to 125, with a mean of 97.9 (SD = 16.2).

The relations between IQ and cognitive control test performance were explored by way of two separate factor analyses. In one, the 26 cognitive control test scores listed in Table 9, Chapter 5, were factor analyzed along with WISC total IQ. In the other, the same 26 test scores were factor analyzed along with 11 WISC subscale scores (B-L), listed in Table 9, Chapter 5.

A twofold question was asked of the first factor analytic study: would including WISC total IQ in the factor space result in factors whose meaning would be dominated by total IQ; and would the factors obtained be modified appreciably in makeup and meaning from those obtained when the test scores were factored without IQ scores present?

The factor analysis of the 26 cognitive control test scores plus total WISC IQ yielded the same nine factors listed in Table 10, Chapter 5. The total WISC IQ loaded with a value of .35 or more in only two factors, and IQ factor loadings were near 0 in all other factors.

Table 15. Factors Containing WISC Total IQ when Cognitive Control Test Scores and WISC IQ Are Factor Analyzed: 84 Hospitalized Children

Factor	Test	Loading
A (see Factor II, Chapter 5, Table 10)	Fruit Distraction E	–.62
	Fruit Distraction C	–.56
	WISC total IQ	.38
B (see Factor IV, Chapter 5, Table 10)	Leveling-Sharpening B	.77
	Leveling-Sharpening A	–.70
	Leveling-Sharpening C	–.59
	WISC total IQ	.47

The two factors in which WISC total IQ appeared are listed in Table 15. Comparison of these factors with those obtained in the factor analysis that did not contain WISC IQ reveals Factor A is essentially the same as Factor II in Table 10, Chapter 5, and Factor B is essentially the same as Factor IV. The WISC total IQ plays a very minor role in Factor A, which is defined primarily by measures in the field articulation principle (Fruit Distraction Test) and in Factor B, which is defined primarily by measures of the leveling-sharpening principle (House Test).

The directions of the loadings indicate that ignoring irrelevant pictures (Fruit Distraction C) and incorrect colors (Fruit Distraction E), so that the distraction cards are read as quickly as the baseline card, is associated to a very moderate degree with a higher IQ score. Similarly, detecting many changes in the series of house scenes (Leveling-Sharpening B), detecting the first change early in the series (Leveling-Sharpening A), and detecting subsequent changes soon after they are first introduced (Leveling-Sharpening C), are behaviors associated to a very moderate degree with a higher IQ.

In considering the appearance of the WISC IQ in these factors, it seems that general intelligence, as measured by this instrument, plays a small role in the cognitive control processes of ignoring irrelevant information (field articulation principle) and maintaining differentiated memory images of information over time (leveling-sharpening principle) However we should also keep in mind that the IQ score does not play even a minor role in other factors that defined the process of scanning, categorizing information, and maintaining stable images (Table 10, Chapter 5).

If we relate the factor analytic findings of this study to the twofold question posed at the start, we could draw the broad conclusion that measures of general intelligence did not define a basic cognitive principle when factor analyzed along with cognitive control tests, and they did not modify the cognitive constructs defined by tests of cognitive controls. Rather, even when scores of general intelligence were included in the cognitive activity analyzed, the clusters of tests of cognitive controls emerged unchanged, defining the same cognitive constructs as when intelligence measures were not included. Thus this study suggests that cognitive controls, as defined by the tests devised, are basic cognitive strategies that underlie the cognitive activity sampled by the WISC, and that solving the various tasks presented by the WISC relies on these cognitive control strategies. With this study, then, we have further evidence that tests of cognitive controls do not measure general intelligence.

To delve deeper into this question, we conducted a second factor analysis involving the same 26 cognitive control test scores, but adding the 11 WISC subscale scores to the factor space (Table 9, Chapter 5 gives these variables). We observed in the study just discussed that cognitive control principles emerged unchanged when they were factor analyzed along with WISC total IQ. Next we asked whether cognitive control principles would emerge unchanged if they were factor analyzed along with scores of WISC subtests. The answer was uncertain because the relatively homogeneous, circumscribed cognitive process involved in each of the WISC subtests might dominate the meaning of the cognitive process measured by one or another cognitive control test. In other words, although control tests appear to measure something other than general intelligence, one or another test of cognitive controls may measure what some particular WISC subtest measures which in turn may dominate in defining the process involved.

To approach these implied questions, the factors obtained from the cognitive control test performance of the total population of hospitalized children were compared with the factors obtained from the hospitalized children who also took the WISC. To facilitate this comparison, Table 16 was prepared, listing the factors obtained from a factor analysis of cognitive control tests only (described in Chapter 5, Table 10). Alongside these factors are those obtained from the analysis of cognitive control tests and WISC subtest scores.

Table 16. Comparison of Two Factor Analyses of Cognitive Control Test Performance With and Without WISC Subtest Scores: 84 Hospitalized Children

	Cognitive Control Tests Alone	Cognitive Control Test and WISC Scores

Factor	Test	Loading	Test	Loading
Factor I. Focal attention cognitive control (passive-narrow vs. active-broad scanning)	Scattered Scanning B	.82	Scattered Scanning B	.85
	Scattered Scanning A	.73	Scattered Scanning A	.83
	Motor Tempo	–.56	Motor Tempo	–.38
Factor II. Field articulation cognitive control (directing attention indiscriminately vs. selectively): time of performance	Fruit Distraction E	.63	Fruit Distraction C	.62
	Fruit Distraction C	.53	Fruit Distraction E	.58
			WISC Vocabulary	–.31
Factor III. Field articulation cognitive control (directing attention indiscriminately vs. selectively): error in performance	Fruit Distraction F	.78	Distraction D	.78
	Fruit Distraction D	.76	Distraction F	.76
Factor IV. Leveling-Sharpening cognitive control (maintaining global vs. differentiated memory images)	Leveling-Sharpening B	–.76	Leveling-Sharpening A	.72
	Leveling-Sharpening A	.70	Leveling-Sharpening B	–.63
	Leveling-Sharpening C	.61	Leveling-Sharpening C	.46
Factor V. Leveling-Sharpening cognitive control (maintaining unstable, fluid vs. stable, constant memory images)	Leveling-Sharpening D	.61	Leveling-Sharpening D	.59
	Leveling-Sharpening E	.37	Leveling-Sharpening E	.38
	Leveling-Sharpening F	.59	Leveling-Sharpening F	.59
		WISC Information	–.35	
Factor VI. Equivalence range cognitive control (employing few vs. many categories to conceptualize information)	Object Sort C	.72	Object Sort A	.72
	Object Sort A	.68	Object Sort C	.49
			WISC Picture Completion	–.39
Factor VII. WISC—synthesizing and level of abstraction (equivalence range)	See Factor VII; Table 10, Chapter 5		WISC Object Assembly	.67
			WISC Picture Arrangement	.65
			Object Sort C	–.34
			Object Sort B	.32
Factor VIII. WISC—handling isolated symbols and disordered thinking (equivalence range)	See Factor VII, Table 10, Chapter 5		WISC Coding	.58
			WISC Digit Span	.51
			Fruit Distraction G	–.42
			Object Sort D	–.39
Factor IX. WISC—verbal intelligence, leveling-sharpening cognitive control, and delay			WISC Information	.78
			WISC Vocabulary	.78
			WISC Similarities	.71
			WISC Arithmetic	.68

WISC Comprehension	.60
WISC Picture Completion	.59
WISC Block Design	.49
Leveling-Sharpening B	.41
Leveling-Sharpening C	–.32
Fine Motor Delay II-I	.33

Nine factors were abstracted from the analysis of both cognitive control tests and WISC subtest scores. Factors I to VI are virtually identical to factors produced when cognitive control tests only were analyzed, and these are defined similarly by cognitive control measures. In Factors VII to IX, WISC subtest scores play a major role.

Let us quickly review the six factors that replicate the results of the analysis that did not include WISC subscale scores. First, the second factor analysis consisted of only half the total population (84 children) involved in the analysis that is serving as our point of comparison, essentially the same factor space was defined by the cognitive control tests when WISC subtest scores were included, however, as when WISC subtest scores were absent. With WISC subtest scores included, the first factor defines a focal attention principle, the second and third factors define components of the field articulation principle (ignoring irrelevant information as revealed in time scores and error scores), the fourth and fifth factors define components of the leveling-sharpening principle (the degree of differentiation and the stability of memory images), and the sixth factor defines one component of the equivalence range principle (the number or breadth of categories used to conceptualize information).

One factor did not emerge unchanged, and it concerns level of abstraction and degree of disordered thinking (equivalence range principle). The factor was produced by all the children when cognitive control tests were factored (Factor VII, Table 10, Chapter 5). When the WISC subtests were included, these components of the equivalence range emerge in factors but are now linked with clusters that are defined primarily by WISC subtests, as discussed below.

Before leaving the six cognitive controls that remained unchanged, we should note that WISC subtest scores play a very minor role in defining three of the factors. Recall that a factor loading of .40 or higher is traditionally taken to be of psychological significance. In the spirit of exploring the relations between cognitive control tests and IQ measures, however, and in searching for clues, factor loadings of .30 or greater are considered here.

The WISC Vocabulary Subtest score appears in Factor II. The directions of the loadings indicate that attending to irrelevant information (peripheral pictures and incorrect colors), as revealed in time difference scores, is associated at a minimal level with a low vocabulary subtest score. Conversely the tendency to ignore irrelevant information would be associated with a high vocabulary score.

The WISC Information Subtest score appears in Factor V. Here the tendency to embellish and fabulate memory images (perceiving many A and B changes on the Leveling-Sharpening House Test) is associated at a minimal level with a low Information Subtest score. A high Information Subtest score (high fund of everyday information) would be associated with the tendency to maintain stable memory images.

The WISC Picture Arrangement Subtest score appears in Factor VI. When sorting objects, the tendency to use many groups, which are rated as appropriate (typical groups or miscellaneous groups) and do not reveal disordered thinking is associated at a minimal level with a low score on the Picture Arrangement Subtest. Conversely, a high Picture Arrangement score (analyzing and synthesizing individual pictures into a coherent story) is associated with the tendency to use a small number of appropriate groupings. This finding suggests that children who use many groups may be more likely to deal with the pictures as isolated bits, failing to link them as if unified by a story (concept).

Let us now turn to the three factors that are dominated by WISC subtest scores. The cluster that makes up Factor VIII relates to the previous discussion of number of groupings employed versus Picture Arrangement Sub test performance. The meaning of Factor VIII is dominated by the Picture Arrangement Subtest, now joined by the Object Assembly Subtest. The response process elicited by both tests involves relating and unifying bits of information in terms of a relevant whole. The Object Sort Test appears here with moderate loadings. The direction of the loadings indicate that high (successful) performance on the Object Assembly and Picture Arrangement subtests is associated (at a moderate level) with employing few miscellaneous groups (Object Sort C) and assigning abstract concepts to typical groups constructed (Object Sort B). Low performance in these two WISC subtests would be associated with employing many miscellaneous groups and assigning concrete concepts to typical groups. Level of conceptual abstraction and the use of groupings that reveal reality relatedness seem to be cognitive control processes (equivalence range) that are uniquely implicated in performance on the Picture Arrangement and Object Assembly subtests.

A noteworthy feature of Factor VIII is that the Similarities Subtest, which is designed to assess conceptual thinking, does not appear here or in any factor that implicates Object Sort Test performance. Rather, the Similarities Subtest appears in Factor IX along with all other verbal subtests. Factor VIII also leads to the suggestion that the Object Sort Test links up with Picture Arrangement and Object Assembly performance because all three procedures involve physically manipulating and grouping materials, not because equivalence range (conceptualizing) is uniquely implicated in Picture Arrangement and Object Assembly performance. This proposal is weakened by several observations. First, the Block Design Subtest, which also requires that materials be manipulated and grouped, does not appear in Factor VIII. Second, the Object Sort Score “level of concepts” derives from cognitive behavior that does indeed play a role while the objects are being grouped but occurs primarily after the objects have been physically manipulated, and while the child is discussing his reasons for having formed the groups. Third, the Picture Arrangement Subtest is linked with the Object Sort Test in Factor VI as well as in Factor VIII.

The meaning of Factor VII is dominated by the Coding and Digit Span subtests. Small contributions are made to this factor by the number of peripheral pictures recalled incidentally (Fruit Distraction Test G) and by the number of groups formed during the Object Sort Test that reveal unrealistic, disordered conceptual thinking (atypical groups). High scores in Coding and Digit Span are associated with recalling few peripheral irrelevant pictures and with constructing few atypical groups, whereas low scores are associated with recalling incidentally many irrelevant pictures and forming many atypical groups.

The response processes of Coding and Digit Span are uniquely similar in requiring that symbols (geometric shapes and numbers) be managed as isolated bits of information. The degree of disordered conceptual thinking and the recall of irrelevant information appear to be especially linked with the adequate management of isolated symbols as information. In considering the psychological significance of this factor further, it may be helpful to recall that the incidental remembering of the irrelevant pictures and the construction of disordered groups have been related in other studies (discussed in Chapter 5) to the regulation of affects and anxiety such that direct, primitive expressions predominate. Future investigations should attempt to determine whether this factor concerns the interplay of the regulation of affects, cognitive control of disordered thinking, and the management of symbols (e.g., numbers). We know from clinical experience that the individual whose cognition is being swamped by feelings and irrelevant thoughts has particular difficulty with number work.

The meaning of Factor IX is dominated by all six verbal subtests of the WISC. Significantly, the only two performance subtests that appear here (Picture Completion and Block Design) were not involved in the previous factors. This cluster suggests that with the hospitalized children, the WISC verbal subtests share a common process—namely, thinking, reasoning, and expressing a solution to a task primarily in verbal terms—suggesting further that this verbal process is an important part of the process required by the Picture Completion and Block Design subtests. Moreover, the Leveling-Sharpening House Test and the Fine Motor Delay Test appear here with low loadings. High scores on the verbal subtests are associated with the tendency to maintain differentiated memory images over time (many correct changes are detected, measured by Test B, and changes are reported soon after they first appear, measured by Test C) and with the tendency to delay fine motor movements.

Let us summarize the findings of the second factor analytic study involving children hospitalized because of emotional disturbances. When WISC subtest scores are included in the factor analysis, clusters of cognitive control tests emerge that are the same as those observed when cognitive control tests alone were analyzed. These clusters (six factors) defined cognitive controls. Three factors defined dimensions of intellectual functioning. One dimension concerned synthesizing information (Object Assembly and Picture Arrangement), another managing symbols (Coding and Digit Span), and a third verbal intelligence. Moreover, WISC subtest scores do not contribute in any major way to the makeup of cognitive control factors. And cognitive control tests do not bear significantly on the makeup of intelligence test factors. Therefore we can conclude that the basic cognitive processes measured by cognitive control tests are not the same as those measured by the WISC subtests.

In terms of unique relations between particular cognitive controls and particular WISC subtests, we observed that in conceptual thinking categorizing width uniquely related to Object Assembly and Picture Arrangement, that disordered conceptual thinking related uniquely to Coding and Digit Span, and that the leveling-sharpening principle and fine motor delay related uniquely to all verbal subtests.

The clues provided by this study must of course be explored further in other studies of nonclinical children. This comparative examination of two factor analyses adds convincingly to our evidence that cognitive control tests do not measure what intelligence scales measure.

Although our main interest is in the factor clusters defined by cognitive control and intelligence tests, the individual correlations among these measures are also provided for the interested reader (Table 16A). With the number of children involved, correlations of .23 and .30 were significant at the .05 and .01 levels, respectively.

Table 16A. Intercorrelations Among Cognitive Control Tests and WISC Total IQ and Subtest Scale Scores: 84 Hospitalized Children

Score	Total IQ	Information	Comprehension	Arithmetic	Similarities	Vocabulary	Digit Span	Picture Completion	Picture Arrangement	Block Design	Object Assembly	Coding
Motor tempo time (seconds)	–.24	–.06	.00	–.13	–.06	.07	–.08	.02	–.18	–.17	–.20	–.35
Fine Motor Delay I: time (seconds)	–.29	–.09	–.03	–.25	.02	–.06	–.24	.05	–.12	–.10	–.10	–.25
Fine Motor Delay II-I: time (seconds)	.23	.25	.15	.19	.28	.28	.09	.16	–.03	.28	–.02	.11
Scattered Scanning: number correct	.30	.20	.26	.29	.14	.18	.42	–.08	.19	.22	.07	.28
Scattered Scanning: total distance (cm)	.35	.20	.20	.32	.24	.16	.36	.02	.30	.26	.13	.23
Scattered Scanning: mean distance (cm)	.12	.12	–.01	.03	.18	.05	–.11	.20	.19	.09	.14	–.06
Scattered Scanning: ratio C	.01	.06	.05	.13	–.08	.14	.27	–.08	.03	.04	–.07	–.06
Scattered Scanning: ratio D	.13	–.13	.02	.18	.08	.10	.21	–.08	.19	.02	.06	–.01
Fruit Distraction II: time	–.12	.00	–.05	–.31	.09	–.15	–.26	.19	–.25	–.14	–.01	–.28

(seconds)												
Fruit Distraction II: errors	–.12	–.08	–.06	–.08	.07	–.16	–.14	.16	–.01	.01	–.02	–.18
Fruit Distraction III-II: time (seconds)	–.19	–.17	–.09	–.23	–.04	–.33	–.12	–.08	–.26	–.05	–.16	–.13
Fruit Distraction III-II: errors	.05	–.13	.10	–.11	.05	–.03	–.14	–.23	–.06	–.07	–.05	.12
Fruit Distraction IV-II: time (seconds)	–.41	–.28	–.25	–.38	–.12	–.47	–.25	–.22	–.27	–.20	.11	–.37
Fruit Distraction IV-II: errors	–.02	–.06	–.03	–.10	.06	–.19	–.15	–.23	–.02	–.06	.03	.11
Fruit Distraction: recalls	.04	.17	.10	.07	.06	.02	–.17	.13	.09	–.08	.14	–.23
Leveling-Sharpening: first stop	–.27	–.22	–.22	–.04	–.07	–.19	.09	–.19	–.17	–.22	–.29	–.14
Leveling-Sharpening: number correct changes	.51	.44	.45	.26	.34	.53	.25	.16	.27	.33	.35	.18
Leveling-Sharpening: ratio	–.44	–.36	–.35	–.23	–.25	–.44	–.12	–.18	–.27	–.31	–.35	–.16
Leveling-Sharpening: number A changes	.06	.31	.29	–.02	.18	.21	.20	.03	–.11	.04	–.16	.07
Leveling-Sharpening: number B changes	.03	.19	.05	.02	.04	.11	.01	.00	.17	.04	.05	–.06
Leveling-Sharpening: number A + B changes	.02	.29	.29	.00	.13	.18	.17	.05	–.08	–.05	–.21	.04
Object Sort: typical groups	–.09	–.09	–.07	–.20	–.01	–.09	–.15	–.37	–.18	–.06	–.08	–.13
Object Sort: mean score	.19	.09	.03	.21	.09	.19	.22	–.12	.19	.24	.16	.19
Object Sort: atypical groups	.01	.11	.04	–.07	.04	–.08	–.18	.19	–.04	–.09	–.17	–.15
Object Sort: miscellaneous groups	–.31	–.08	–.12	–.24	–.09	–.04	–.22	–.19	–.28	–.24	–.20	–.26

Public School Children Experiencing Academic and School Adjustment Difficulties. The relation between WISC total IQ and cognitive control test performance was also studied in research involving 96 public school children who were designated by teachers as experiencing academic and school adjustment difficulties. The population consisted of 40 boys and 56 girls (80 whites and 16 blacks) attending kindergarten through the second grade in a public school system serving a low socioeconomic segment of a large Eastern metropolitan area. They ranged in age from 64 to 101 months (Mean = 78.39 months, SD = 13.29) and in IQ from 64 to 121 (mean IQ = 94.8, SD= 12.19). In addition to the WISC, the children were assessed by means of four tests of cognitive controls: the Circles Test of focal attention, the Fruit Distraction Test, the Leveling-Sharpening House Test, and Fine Motor Delay Test. Table 17 gives the correlations obtained between WISC Total IQ and cognitive control test scores.

Of the 18 correlations computed, only one reached statistical significance. Children who experienced the negative illusion (broad scanning) when judging the sizes of pairs of circles (see Appendix B) tended to achieve higher total IQ scores. The other 17 correlations, however, were low in magnitude, frequently near 0. Thus results of this study with public school children who had been designated as experiencing academic and adjustment problems, again lead us to the conclusion that the WISC measures cognitive processes that differ from those measured by cognitive control tests.

Table 17. Correlations Between Tests of Cognitive Controls and Total WISC IQ: 96 Public School Children, Kindergarten to Second Grade, Experiencing Academic and Adjustment Problems

Score	Correlation
Circles (9 mm), no illusion	.14
Circles (9/12 mm), positive illusion	.01
Circles (9/45 mm), negative illusion	.25*
Fruit Distraction I: time (seconds)	–.03
Fruit Distraction II: time (seconds)	–.13
Fruit Distraction II-I: time (seconds)	–.14
Fruit Distraction III-II: time (seconds)	.18
Fruit Distraction IV-II: time (seconds)	.01
Fruit Distraction II-I: errors	–.09
Fruit Distraction III-II: errors	.06
Fruit Distraction IV-II: errors	.02
Fruit Distraction: recalls	.22
Leveling-Sharpening: first stop	–.16
Leveling-Sharpening: number correct changes	.13
Leveling-Sharpening: ratio	–.21
Fine Motor Delay I: time (seconds)	.05
Fine Motor Delay II: time (seconds)	–.17
Fine Motor Delay II-I: time (seconds)	.10

*p = .05.

Public School Children With and Without Reading Problems. Additional information about the relation between intelligence test scores and cognitive control test scores comes from two studies. In one study of cognitive control functioning and reading disability (further described in Chapter 9) the subjects were 24 boys ranging in age from 8 to 13 years and measured as reading at least one year behind grade level, and 23 grade-level readers matched in terms of age and mean IQ. The children were administered the IPTA Test (1962), which yields a measure of intellectual level relatively independently of a child's language skills, as well as the Circles Test of focal attention, the Fruit Distraction Test, and the Leveling-Sharpening House Test. Correlations between IPTA IQs and each of the measures of cognitive control functioning did not result in any statistically significant coefficients. Moreover, there were no coefficients that appeared to be meaningful, despite the lack of statistical significance.

In the other study Zarembo (1967) administered the short form of the WISC Vocabulary Subtest (Jastak and Jastak, 1964) to 44 third and fourth grade public school children (22 boys and 22 girls) from primarily middle-class homes. The IQs ranged from 75 to 155, with a group mean of 116 (SD = 16.6). The children were also administered three cognitive control tests: the Circles Test of focal attention, the Fruit Distraction Test of field articulation, and the Leveling-Sharpening House Test. The 10 scores obtained with these procedures were correlated with IQ. The coefficients were insignificant, and for the most part near 0 (range of coefficients –.02 to .23).

Comment on the Relation Between Cognitive Controls and Intelligence. Rapaport (1945) was perhaps the key figure in first bringing attention to the unique response process involved when dealing with the various subtests of the Wechsler intelligence scales. He points out that particular cognitive control principles are implicated in responding to these subtests. For example, on the face of it, the Information Subtest relies on memory images of information, the Digit Span Subtest on attention, and the Similarities Subtest on the construction of concepts. In a formal study of cognitive control principles and various intellectual abilities, Gardner, Jackson, and Messick (1960) conclude that cognitive controls and intellectual abilities may relate to a common set of basic cognitive variables. This conclusion, as discussed in Chapter 5, may result, at least partly from the great similarity in form and process of the intellectual tasks employed by these workers and cognitive control procedures.

The several studies we have considered relating cognitive control test scores and Wechsler total IQ and subtest scores strongly suggest that cognitive control tests and the WISC measure different aspects or levels of cognitive-intellectual functioning. Our studies also suggest further elaborations of this general conclusion. It appears that cognitive controls define cognitive principles that are basic to and underlie intellectual test performance and that the ability to handle a task presented by Wechsler intelligence test items requires the use of particular cognitive controls. Our results, then, support Rapaport’s proposal implicating cognitive control principles in response to Wechsler subtests. However the relations between cognitive controls and Wechsler subtests as defined by factor analytic studies do not appear to agree completely with the relations suggested by an inspection of the task requirements of the subtests. Our data suggest that the equivalence range principle (categorizing and conceptualizing information) is implicated in particular with the Object Assembly and Picture Arrangement subtests, that the field articulation principle (ignoring irrelevant information) is implicated with the Digit Span and Coding subtests, and that the leveling-sharpening principle is implicated in all verbal subtests plus the Block Design and Picture Completion subtests, all of which appear to have a common intelligence variable that involves verbal reasoning.

Finally our studies bring attention to the need to include the issue of the relation between cognitive controls and regulation of affects in any consideration of cognitive controls with respect to intelligence. The relation between cognitive controls and intelligence may not be a two-lane road but a three-lane highway, which includes the regulation of affects and impulses.

COGNITIVE CONTROLS AND ACADEMIC ACHIEVEMENT TEST SCORES

Having discussed the relations between cognitive controls and intelligence test scores, it seems logical to turn our attention to the issue of academic achievement test performance. If Wechsler intelligence scale and cognitive control tests appear to measure different cognitive levels and to define different cognitive constructs, is this also the case with scales of academic achievement? And are various academic skills differentially related to cognitive control principles?

The Performance of Public School First Grade Children with Cognitive Control Tasks and Academic Achievement Tests. The sixth factor analytic study, discussed in detail in Chapter 5, relates to our interest (see Tables 6 and 7 in Chapter 5). The cognitive control test scores of 43 first graders (26 boys and 17 girls) were factor analyzed along with six subtest scores of the California Test of Mental Maturity (CTMM): Numerical Values, Number Problems, Reasoning by Inferences, Verbal Comprehension, Immediate Recall (of spoken words), and Delayed Recall (of the content of stories read by the examiner). Although this factor analysis also included Piagetian and neurological tasks, the results of the analysis should give us clues about the relation between scores on academic achievement and cognitive control tests.

As noted in Chapter 5, no one of the CTMM achievement scores played a major role in defining the factors obtained. Thus it is possible that academic skills, as measured by the CTMM, do not represent cognitive principles that are basic to cognitive controls, but rather, the latter are basic to academic skills.

In terms of possible unique relations between the academic skills measured and cognitive controls, we noted that only two skill measures appeared with meaningful loadings within cognitive control factors. CTMM Number Problems appeared in a factor defined primarily by measures of focal attention (Scattered Scanning Test) and in the field articulation (Fruit Distraction Test). The direction of the loadings indicates that broad, active scanning and ignoring irrelevant information was associated with a high score on the CTMM Number Problems Subtest. The earlier discussion of this study pointed out that these loadings could suggest a unique relationship between two cognitive controls and the skill of solving mathematical problems. Or they could be a function of the makeup of the CTMM Number Problems, in which the child listens to a number problem verbalized by the examiner, then surveys a row of pictures and marks the one that answers the problem. Further study needs to clarify, then, whether the relationship observed is linked more with the manner in which a child scans the rows of pictures and ignores irrelevant information in the pictures, and less with the processing of numbers as such.

In the only other factor implicating CTMM subtest scores, the CTMM measures of delayed recall appeared in a factor defined predominantly by the leveling-sharpening principle (by measures of the House Test and of the recall scores of the Fruit Distraction Test). The factor suggested that the child who tended to maintain differentiated memory images of information also answered questions successfully about a story the examiner had read aloud some minutes previously.

This study then suggested that cognitive controls have a conceptual status (as constructs) independent of academic skills and achievement scores and that some achievement tasks uniquely rely on particular cognitive controls for their solution.

Relation Between Measures of Cognitive Controls and Measures of Third and Fourth Grade Academic Skills. The population of kindergarten children discussed in the fourth factor analytic study (see Chapter 5) provided another opportunity to explore the relation between measures of cognitive controls and measures of academic skills. The public school these children attended administered routinely to all children the Otis-Lennon Mental Ability Test—Elementary I Level (Harcourt, Brace, Jovanovich, 1963) in the fall of the second grade, and the lows Tests of Basic Skills (Houghton Mifflin, 1971) in the fall of the third and fourth grades. Both procedures are pencil-and-paper tests and group administered.

The Otis-Lennon test assesses general mental ability or scholastic aptitude. Emphasis is placed on measuring the child's facility in reasoning and in dealing abstractly with verbal, symbolic, and figural test content. The test yields a single score, the Deviation IQ (DIQ) with a mean of 100 and a standard deviation of 16.

The Iowa Tests of Basic Skills measure skill development in five areas. Four of these areas were assessed in the present study: (1) Vocabulary; (2) Reading Comprehension; (3) Language Skills (spelling, capitalization, punctuation, usage); and (4) Mathematics (concepts and problem solving). For each area, three scores are obtained from the child's test performance: (1) grade-equivalent score, which represents performance in terms of grade levels, (2) percentile ranking based on national norms, and (3) percentile ranking based on local norms (i.e., those of the school system the child is attending).

Of the 184 children who were administered cognitive control tests during the kindergarten year of 1970-1971, 116 had been administered the Otis-Lennon in second grade, 114 had been administered the Iowa Test, Level 5, in the third grade, and 103 had been administered the Iowa Test, Level 6, in the fourth grade. Relating the children's kindergarten cognitive control test scores with their performance on these skill tests in the third and fourth grades enabled us to explore further the question of the relations between cognitive controls and academic skills.

We decided to employ first the method of factor analysis, much as we had done to investigate the relation between cognitive controls and intelligence test scores (see preceding section). We asked a twofold question. If the cognitive control test scores of these children are factor analyzed, then factored again along with academic skill scores, would including skill scores in the factor space modify the meaning of the factors defined by cognitive control tests when they are analyzed without the presence of skill scores? And would the factors produced by cognitive control and skill scores be dominated in their meaning by academic skill scores? If cognitive control factors are modified and dominated by achievement test scores, cognitive control principles would not have the status as independent cognitive constructs proposed in Chapter 5 and suggested by the preceding study.

Two sets of factor analyses were conducted. One involved cognitive control test scores and Grade 3 Iowa test skill scores. The other set involved cognitive control test scores and Grade 4 Iowa test skill scores. The Otis-Lennon was included in each set because this procedure assesses general mental ability rather than specific academic skills as such. Within each set of analyses involving one grade level, four separate factor analyses were conducted. Each analysis included cognitive control test scores and one type of Iowa skill score: the first included all of the Iowa skill scores, the second included only the Iowa test grade equivalent scores, the third included only the Iowa test national percentile rankings, and the fourth included only the Iowa test local percentile rankings. These separate analysis were conducted within each set because we wondered whether the results would be modified by including, for example, only percentile rankings of academic skills based on national norms versus only percentile rankings based on local school norms. All factor analysis made use of the principal component method, and factors were rotated by means of the varimax method.

FACTOR ANALYSIS OF COGNITIVE CONTROL SCORES AND THIRD GRADE SKILL SCORES. The children included in the present study had taken cognitive control and personality tests during the kindergarten year. Teacher ratings of academic performance and classroom behavior were also obtained at that time. The same scores, along with the Otis test and Iowa test Grade 3 scores, were included in the first set of factor analyses conducted. The variables analyzed are listed in Table 18A. The reader should note that these variables are the same items listed in Table 2, Chapter 5 and, in addition, the Otis test and Grade 3 Iowa test skill scores. It is assumed the reader is familiar with the meaning of each cognitive control test score, teacher rating, and personality test scores as discussed in Chapter 5, and with the results of the factor analytic study discussed there.

Since our main approach initially was to compare the factors defined by cognitive control tests alone with those defined by cognitive control tests and achievement tests, we began by factor analyzing only the cognitive control test scores (i.e., the first 23 variables listed in Table 18A). This analysis produced eight factors, which are presented in

Table 18B (analysis I) and replicate the cognitive control principles defined by the several factor analytic studies discussed in Chapter 5.

1. The first two factors define both components of the focal attention principle. Factor I involves active versus passive scanning ; children who marked many circles and crosses also covered a larger distance over the test form and marked geometric shapes quickly in the Motor Tempo Test. Factor II defines a principle of narrow versus broad scanning; this factor is dominated by the mean distance a child covered in moving from one circle or cross marked to the next.

2. The third and fourth factors define test responses that are related to managing information in the face of distractions and contradictions (field articulation principle: Chapter 5). Factor III concerns the speed with which colors are named on distraction cards; Factor IV concerns the number of errors made when naming colors on distraction cards.

3. The fifth and sixth factors define components of the leveling-sharpening principle. Factor V concerns the degree to which a differentiated memory image is formed of information over time. Again we see that motoric delay plays a subordinate role in defining leveling-sharpening. Children who form global memory images impose little delay on fine motor movements, whereas children who form differentiated images impose more delay on fine motor movements. The sixth factor concerns whether a stable or fluid memory image of information is maintained over time.

Table 18A. Cognitive Control Tests, Personality Tests, Teacher Ratings, and Academic Achievement Tests Factor Analyzed

Cognitive control tests

1. Fine Motor Delay I (FMD): time (seconds)
2. Fine Motor Delay II-I (FMD): time (seconds)
3. Motor Tempo (MT): time (seconds)
4. Scattered Scanning (SST): correct shapes marked
5. Scattered Scanning (SST): total distance covered in marking shapes (cm)
6. Scattered Scanning (SST): mean distance between two shapes marked (cm)
7. Fruit Distraction (FD): Card II, time (seconds)
8. Fruit Distraction (FD): time difference, Cards III-II (seconds)
9. Fruit Distraction (FD): time difference, Cards IV-II (seconds)
10. Fruit Distraction (FD): naming errors, Card II
11. Fruit Distraction (FD): error difference, Cards III-II
12. Fruit Distraction (FD): error difference, Cards IV-II
13. Fruit Distraction (FD): distractions recalled, Card III
14. Leveling-Sharpening (LS): first stop score
15. Leveling-Sharpening (LS): number correct changes
16. Leveling-Sharpening (LS): ratio
17. Leveling-Sharpening (LS): number incorrect (*a*) changes

18. Leveling-Sharpening (LS): number incorrect (*b*) changes

19. Object Sort (OS): typical groups

20. Object Sort (OS): mean developmental score of typical concepts

21. Object Sort (OS): miscellaneous groups

22. Object Sort (OS): atypical groups

23. Object Sort (OS): atypical additional responses

Personality tests

24. Fable I of Castration Anxiety: monkey's tail

25. Fable II of Castration Anxiety: boy's (girl's) finger

26. Structured Fantasy Test of Aggression: developmental level of fantasied aggression

Teacher ratings

27. Reading skill

28. Mathematic skill

29. Language skill

30. Knowledge of classroom routine

31. Paying attention

32. Forgetting classroom details

33. Body Activity—restlessness

34. Physical aggression

IOWA Achievement Test, grade 3

35. Vocabulary—grade equivalent

36. Vocabulary—national percentile

37. Vocabulary—local percentile

38. Reading—grade equivalent

39. Reading—national percentile

40. Reading—local percentile

41. Language—grade equivalent

42. Language—national percentile

43. Language—local percentile

44. Mathematics—grade equivalent

45. Mathematics—national percentile

46. Mathematics—local percentile

Table 18B. A Comparison of Factors Obtained from Analyzing Cognitive Control Tests and Measures of Academic Skills

	Analysis I (cognitive control tests alone)		Analysis II (cognitive control test and all Iowa test scores)		Analysis III (cognitive control tests and Iowa national percentile rankings)	
Factor	Item	Loading	Item	Loading	Item	Loading

I	SST number correct	.81	SST number correct	.91	SST number correct	.90
	SST total distance	.56	SST total distance	.70	SST total distance	.71
	MT seconds	–.45	MT seconds	–.39	MT seconds	–.41
II	SST mean distance	.91	SST mean distance	.90	SST mean distance	.90
	SST total distance	.78	SST total distance	.66	SST total distance	.64
III	FD (IV-II time)	.81	FD (IV-II time)	.81	FD (IV-II time)	.79
	FD (III-II time)	.73	FD (III-II time)	.57	FD (III-II time)	.64
	FD (II time)	.34	FD (II time)	.22	FD (II time)	.26
IV	FD (III-II errors)	.75	FD (III-II errors)	.71	FD (III-II errors)	.74
	FD (IV-II errors)	.70	FD (IV-II errors)	.71	FD (IV-II errors)	.72
	FD (II errors)	–.35	FD (II errors)	–.42	FD (II errors)	–.43
V	LS ratio	.99	LS ratio	.98	LS ratio	.98
	LS number correct changes	–.88	LS number correct changes	–.91	LS number correct changes	–.91
	LS first stop	.33	LS first stop	.27	LS first stop	.31
	FMD (II-I)	–.27	FMD (II-I)	–.26	FMD (II-I)	–.27
VI	LS number A changes	.98	LS number A changes	.98	LS number A changes	.97
	LS number B changes	.97	LS number B changes	.95	LS number B changes	.96
VII	OS typical groups	.65	OS typical groups	.68	OS typical groups	.68
	FD recalls	.40	FD recalls	.39	FD recalls	.41
VIII	OS typical mean	.76	OS typical mean	.70	OS typical mean	.74
	OS miscellaneous groups	–.59	OS miscellaneous groups	–.64	OS miscellaneous groups	–.62
	OS additional atypicals	.48	OS additional atypicals	.36	OS additional atypicals	.49
			Otis-Lennon	.33	Otis-Lennon	.24
IX			Iowa test scores—grade 3		Iowa test scores—grade 3	
			Vocabulary—grade equivalent	.71	Vocabulary-national percentile	.80
			Vocabulary-national percentile	.69	Reading-national percentile	.73
			Vocabulary-Local percentile	.72	Language—national percentile	.81
			Reading—grade equivalent	.39	Mathematics—national percentile	.76
			Reading—national percentile	.39	Otis-Lennon	.36
			Reading—local percentile	.40	Teacher rating—language	.32
			Language—grade equivalent	.86		
			Language—national percentile	.86		

	Language—local percentile	.86		
	Mathematics—grade equivalent	.44		
	Mathematics-national percentile	.47		
	Mathematics-local percentile	.44		
	Teacher rating—language	.32		
	Otis-Lennon	.27		
X	Teacher ratings		Teacher ratings	
	Reading	.81	Reading	.78
	Mathematics	.78	Mathematics	.79
	Forgetting	.72	Forgetting	.77
	Attention	.61	Attention	.66
	Language	.71	Language	.68
	Routine	.61	Routine	.68
	Iowa vocabulary-national percentile	.35	Iowa vocabulary—national percentile	.32
	Iowa mathematics—national percentile	.28	Iowa mathematics-national percentile	.32
	FD (III-II time)	–.36	FD (III-II time)	–.33
	FD (II time)	–.33	FD (II time)	–.26
X	Teacher ratings		Teacher ratings	
	Body activity	.80	Body activity	.78
	Physical aggression	.72	Physical aggression	.77
	Attention	.56	Attention	.50
	Routine	.52	Routine	.44
XII	Iowa test scores—grade 3		OS atypical groups	.53
	Reading—grade equivalent	.84		
	Reading—national percentile	.86		
	Reading—local percentile	.86		
	Vocabulary-national percentile	.37		
	Vocabulary—local percentile	.37		
XIII	Iowa test scores—grade 3			
	Mathematics—grade equivalent	.79	Fable—monkey's tail	–.53
	Mathematics—national percentile	.76	FD (II-time)	–.44
	Mathematics—local	.81		

percentile

* SST = Scattered Scanning Test, MT = Motor Tempo, FD = Fruit Distraction Test, LS = Leveling-Sharpening, FMD = Fine Motor Delays, OS = Object Sort Test.

4. Factors VII and VIII define components of the equivalence range cognitive control. The seventh factor concerns the breadth of categories imposed on information (many, narrow categories vs. few, broad ones). The eighth factor concerns the conceptual level (concrete vs. abstract) of the label assigned to the typical groups constructed.

The next factor analysis conducted included all 46 variables listed in Table 18A. This analysis extends the one conducted for the fourth study (Chapter 5) in adding the Otis-Lennon score and all Iowa Grade 3 achievement test scores (variables 35 to 46). The 13 factors obtained are also arrayed in Table 18B (analysis II) to facilitate comparisons. With a few exceptions, only items with a factor loading of .30 or larger are included. It should be recalled, however, that a factor loading of .40 or greater traditionally is considered to represent a meaningful relationship between that item and the factored principle. As discussed in Chapter 5, we have elected to include items with smaller loadings in the hope of uncovering clues about the construct of cognitive controls.

Eight of the 13 factors (I to VIII) define the same cognitive control principles as those associated with the first analysis of cognitive control measures only. Including third grade skill scores does not modify the makeup of cognitive control factors.

None of the Iowa skill scores resulted in a loading that would qualify it for membership in one of the cognitive control factors. The several Iowa scores received loadings of. 17 or lower on each of the cognitive control factors. Only the Otis-Lennon score appeared with a very moderate loading in Factor VIII, which defines the level of abstraction used by the child to describe the typical groups formed with the Object Sort Test. The subordinate role of the Otis-Lennon score in the equivalence range factor fits conceptually, since the Otis test is designed to measure the child's facility in reasoning abstractly with verbal and symbolic content. This process is very much a part of the labeling and categorizing required by the Object Sort Test.

Two of the factors (X and XI) define teacher ratings of the child's academic performance and behavioral adjustment. Factor X essentially clusters the teacher's view of the child's academic functioning in the classroom. Iowa measures of vocabulary and mathematics skills appear with low loadings, as do measures of field articulation. Factor XI, dominated by the teacher's ratings of restlessness and physical aggression, seems to involve nonacademic classroom behaviors.

Before leaving the factors we have considered thus far, it may be of use to note that the eight cognitive control factors and two teacher rating factors obtained closely parallel those obtained in the fourth factor study (Chapter 5), which of course did not involve academic skill scores. There are a few minor differences when the present results are compared with those in Chapter 5. First, only one teacher factor was obtained in the previous analysis, whereas the present study segregates ratings of academic and nonacademic behavior. Second, in the present study the personality measures of anxiety did not appear in the factors defining leveling-sharpening and equivalence range. These differences suggest that including skill scores in the factor space differentiated classroom skill behavior from nonskill behavior and subordinated the combination of anxiety measures.

Last, the second analysis we are considering here produced three factors formed by Iowa test skill scores. Factor IX contains all the Iowa Grade 3 test scores. The factor is dominated by language and vocabulary measures, with reading and mathematics skills playing a subordinate role. Therefore the principle abstracted by this factor is common to all the Iowa subtests and appears to involve primarily skill in using language and knowledge of words. Teacher ratings of language skill observed in the classroom and the Otis-Lennon also appear but with very small loadings. Since all Iowa skill scores appear with a loading of nearly .40 and higher, this factor defines general academic skill in all areas, but language skill is dominant in the child's handling of mathematical and reading comprehension tasks.

Factor XII clusters reading comprehension and vocabulary skills. Since reading dominates, we can interpret this as a reading comprehension factor. Factor XIII clusters each of the mathematics scores and therefore defines a factor that involves skill with number concepts.

In terms of the focus of our interest, we should note especially that Iowa achievement scores do not appear in any of the cognitive control factors and that cognitive control scores do not appear in the Iowa skill factor. The highest control test loading on the Iowa skill factor is .18 (Fruit Distraction Test Card II time), with most of the factor loadings of cognitive control tests falling below .10. As noted earlier, the highest loading of any achievement score on any one of the cognitive control factors was .17. This finding clearly suggests that cognitive controls (as measured by the tests devised) and academic skills (as measured by the Iowa tests) represent different, independent behavioral constructs and that the measures of each are tapping different aspects of cognitive activity.

To pursue further the issue of the relations between cognitive controls and academic skills, the test scores were subjected to three additional factor analyses to determine whether academic skill scores represented in the form of national percentiles or local percentiles, or grade equivalents, would reveal relationships between controls and skills not observable when all skill scores are included as in the second analysis just discussed.

The third factor analysis included the first 34 variables listed in Table 18A and only the Iowa national percentile scores. The fourth and fifth analyses included, respectively, the same 34 variables and only the Iowa local percentile scores, and the same basic variables and only the Iowa grade equivalent scores. Because the outcomes of all these additional analyses were essentially the same, only the results of one, cognitive controls and Iowa national percentile scores, are presented in Table 18B (analysis III).

Again the same cognitive control and teacher rating factors appear. In addition, all the Iowa national percentile scores appear in one factor, with the Otis-Lennon and teacher language rating again playing a very minor role in the definition. When only one type of skill score is included (national percentile), the four skills appear in one factor, suggesting considerable commonality among the skill levels a child has achieved in vocabulary, reading, language, and mathematics. Reading comprehension scores and math scores do not define additional separate factors as in the previous analysis involving all scores.

The third analysis also produced two minor factors (the loadings on one were relatively low) that were not observed in the second analysis. Factor XII defines a principle concerning the number of groups constructed with the Object Sort Test that reflect unrealistic illogical thinking (a factor also observed in the studies discussed in Chapter 5). Factor XIII defines a principle that relates castration anxiety, expressed in fantasy, with speed in naming colors on Card II of the Fruit Distraction Test. The loadings indicate that children who expressed "literal forms of castration in fantasy (e.g., completing the fable by noting that the monkey's tail was chopped off) tended to name the colors rapidly.

The factor analyses that dealt separately with Iowa scores represented as grade equivalents and as local percentiles, produced the same results as did this analysis, which dealt only with national percentiles The exception, of course, was the factor clustering of the Iowa scores. The factor defined by national percentiles was replaced in one analysis by a factor defined by grade equivalent scores and by a factor defined by local percentile scores in the other. Each of these analyses also produced a factor defined by atypical groups with the Object Sort Test, and another defined by the fable test of castration anxiety and Fruit Distraction Test Card II.

With each factor analysis that included only one type of Iowa skill score, we again observed that skill scores did not appear in factors defining cognitive controls, and cognitive control measures did not appear in the factor defining academic skills. We have further support, then, for the proposition that academic skills and cognitive controls represent different, independent principles of cognitive activity.

A final word about the Otis-Lennon test used by the school system to obtain a measure of mental ability in the second grade: with one minor exception, the Otis test did not produce a loading in any of the factors. Since the Otis test appears to be a measure of general intelligence, and our previous studies indicated that intelligence test measures do not correlate with measures of cognitive controls, we would expect this finding. The Otis-Lennon mean score was 115.3 (SD= 17.7), indicating that the total group of children was characterized by average intelligence and a normal distribution of individual IQ scores.

FACTOR ANALYSIS OF COGNITIVE CONTROL SCORES AND FOURTH GRADE SKILL MEASURES. The same procedure was followed with Iowa test skill measures obtained during the fourth grade. Four separate factor analyses were conducted: (1) cognitive control measures and all Iowa test skill scores, (2) cognitive control measures and Iowa national percentile scores, (3) cognitive control measures and Iowa local percentile scores, (4) cognitive control measures and Iowa grade equivalent scores.

The factors obtained with all these analyses were essentially the same as those obtained with the parallel analysis involving third grade Iowa scores. Since there were no important variations in the makeup of factors, the specific factors and loadings obtained with fourth grade skill scores are not presented. Again, given the focus of our interest, note that cognitive control tests and fourth grade skill scores did not appear in the factors defined by the other, adding further support for the proposition that cognitive controls and academic skills define independent behavioral constructs.

CORRELATIONS BETWEEN COGNITIVE CONTROL SCORES AND THIRD AND FOURTH GRADE SKILL SCORES. The method of factor analysis, in reducing and clustering all the test behaviors assessed to the smallest number of common dimensions, helped us to explore the question of whether academic skills and cognitive controls are related or independent constructs. We can also study the relations between cognitive controls and academic skills if we examine the correlations obtained between skill and control scores. Even though cognitive control factors were independent of skill factors, it is possible that one of another cognitive control could correlate differentially with mathematics or reading or vocabulary or language skills, providing further information about the relations between cognitive controls and academic skills.

Tables 18C and 18D present correlations obtained between each of the cognitive control test scores and grade three Iowa test national percentiles and obtained between cognitive control scores and grade four Iowa national percentiles, respectively. The findings obtained with each grade level are generally similar. First, the magnitude of the correlations that reach statistical significance is relatively small, reflecting the observation made with the factor analytic method that measures of cognitive control and of academic skills do not share a common behavioral process to a high degree.

Table 18C. Correlations Between Cognitive Control Test Scores and Third Grade Iowa Test Skill Scores

		Iowa Test National Percentile Scores Grade 3, N= 177			
Cognitive Control Tests (abbreviated as in Table 18B)		Vocabulary	Reading	Language	Math
1.	FMD I	–.02	.08	.12	.11
2.	FMD II-I	.16	–.01	–.01	.05
3.	MT: time	–.01	–.11	–.07	–.10
4.	SST: number correct	.22*	.18	.21*	.16
5.	SST: total distance	.06	.09	.09	.06
6.	SST: mean distance	–.13	–.03	–.08	–.09
7.	FD II: time	_ 27**	–.28**	–.36**	–.39**
8.	FD III-II: time	–.26**	–.31 **	–.26**	–.26**
9.	FD IV-II: time	–.15	–.22*	–.35**	–.24*
10.	FD II: errors	–.17	–.08	–.16	–.06
11.	FD III-II: errors	–.13	–.03	–.03	–.07
12.	FD IV-II: errors	–.30**	–.21*	–.13	–.21*

13.	FD III: recalls	.06	.03	.02	.04
14.	LS: first stop	–.14	–.12	–.13	–.17
15.	LS: number correct changes	.15	.02	.08	.02
16.	LS: ratio	–.23*	–.07	.01	–.12
17.	LS: number incorrect (*a*) changes	.06	–.06	.05	–.05
18.	LS: number incorrect (*b*) changes	.05	–.07	.07	–.02
19.	OS: typical groups	.00	.07	.11	–.06
20.	OS: mean developmental score	.21*	.28**	27**	.22*
21.	OS: miscellaneous groups	–.04	–.08	–.15	–.16
22.	OS: atypical groups	.07	.08	.09	.00
23.	OS: additional atypicals	.24*	.17	.10	.05

*p = .05.

**p = .01.

Of the cognitive control methods, only two show consistent relationships with skills—the Fruit Distraction Test and the Object Sort Test.

The Fruit Distraction Test correlated most consistently, particularly the three time scores and Card IV error scores, with each of the skills areas assessed. The directions of the correlations indicate that children who ignored irrelevant information (peripheral figures and incorrect colors), therefore naming the colors on the distraction cards rapidly, and also made few errors with Card IV, tended to attain higher skill scores in vocabulary, reading, language, and mathematics. The uniform correlation of these Fruit Distraction Test scores with all skill scores suggests that the field articulation control is not uniquely implicated in one skill area but in all skill areas assessed by the Iowa test. One possible explanation for this finding is that the field articulation control is related not so much to a particular skill area but to the child's managing the format of the Iowa test.

Table 18D. Correlations Between Cognitive Control Test Scores and Fourth Grade Iowa Test Skill Scores

Cognitive Control Tests (abbreviated as in Table 18B)		Iowa Test National Percentile Scores Grade 4, N= 103			
		Vocabulary	Reading	Language	Math
1.	FMD I	.01	.06	.02	–.10
2.	FMD II-I	.03	.13	.04	.00
3.	MT: time	–.13	–.18	–.23*	–.16
4.	SST: number correct	.23*	.14	.18	.18
5.	SST: total distance	–.06	–.02	–.01	.13
6.	SST: mean distance	–.21**	–.15	–.15	.03
7.	FD II: time	–.31**	–.35**	–.29**	–.28**
8.	FD III-II: time	–.17	–.13	–.24*	–.13

9.	FD IV-II: time	–.26**	–.24*	–.24*	–.19
10.	FD II: errors	–.09	.02	–.08	–.07
11.	FD III-II: errors	–.11	–.17	–.16	–.15
12.	FD IV-II: errors	–.16	–.12	–.12	–.13
13.	FD III: recalls	.07	.02	–.07	–.10
14.	LS: first stop	–.25**	–.16	–.21*	–.08
15.	LS: number correct changes	.00	–.02	–.14	–.18
16.	LS: ratio	–.11	–.12	.00	.06
17.	LS: number incorrect (*a*) changes	.07	.04	.02	–.16
18.	LS: number incorrect (*b*) changes	.05	.06	.02	–.14
19.	OS: typical groups	–.06	–.07	–.09	–.12
20.	OS: mean developmental score	39**	29**	.25**	.22*
21.	OS: miscellaneous groups	–.14	–.22*	–.20*	–.13
22.	OS: atypical groups	–.19	–.11	–.04	–.17
23.	OS: additional atypicals	.20*	.04	.06	.02

*p = .05.

**p = .01.

The Iowa test booklet presents a number of tasks, assessing one skill, on each of several pages. For example, in the vocabulary subtest a test word is presented, and under it is a column of words, one of which best explains the meaning of the test words. Each page contains about 36 test words, each with a column of response words, representing a considerable field of information. Similarly for the mathematics subtest, from 14 to 18 word problems are presented on each page; each problem is accompanied and surrounded by small pictures of clocks, diagrams, geometric shapes, and so on. Again, examined from the view of amount of information, there is a great deal on each mathematics page for the child to manage.

Given our findings, we would say that the child who ignores columns of words not relevant to the item at hand, selectively focuses on the relevant vocabulary task, and selectively attends to the mathematics problem at hand while ignoring irrelevant drawings and printed words, obtains a higher scores in each skill area. This line of reasoning converges with the explanation offered in the previous study discussed, which reported a relation between field articulation and the CTMM mathematics subtest. There the relation seemed to have more to do with the test format of the CTMM than with the cognitive process involved in solving problems. The findings of the present study lend further support to this explanation, since field articulation measures related to all skill measures.

With the Object Sort Test the mean level of abstraction assigned to the groups constructed is the only measure that relates consistently with skill scores. Here too, the relation is with all skill areas. A possible explanation for this finding lies in the content of each Iowa subtest. The vocabulary, reading comprehension, mathematics and language tasks that make up the Iowa test are all stated as words problems. To be solved successfully, problems described in words require that the information presented, whatever the substance of the problem, be viewed in abstract terms.

Performance of Public School Fifth Graders with Cognitive Control Tests and Academic Achievement Tests. A study by Garrity (1972) also provides information concerning the relation between cognitive controls and academic achievement in fifth grade boys. The sample consisted of 60 middle-class and 60 lower-class boys, of average intelligence (30 blacks and 30 whites in each group), attending public schools in a large Midwestern city. Garrity correlated Stanford Achievement Test scores, obtained by school personnel in the fall of the fifth grade year, with cognitive control measures, obtained by her research team in the spring of that academic year (Circles Test of focal attention, Fruit Distraction Test, and Leveling-Sharpening House Test). Of the 10 subtests that make up the Stanford Achievement Test, Garrity selected four that appeared to be especially relevant to general academic functioning: reading, mathematics, science, and social studies. The scores on these subtests were also summed and treated as a total measure of academic achievement. These five measures—four subtest scores and a total score—were correlated with the child's performance on each of the tests of cognitive controls.

Table 19. Correlation Between Cognitive Controls and Stanford Achievement Test Scores of 120 Fifth Grade Boys (Garrity, 1972)

Score	Subjects	Circles Test, 9 mm	Fruit Distraction Test III-II (seconds)	Leveling-Sharpening House Test Ratio
Reading	Lower SES	.07	–.42	–.43*
	Middle SES	–.10	–.04	–.20
	Total Ss	–.03	–.28*	–.36**
Math	Lower SES	.08	–.40*	–.38*
	Middle SES	–.13	.14	.03
	Total Ss	–.03	–.22*	–.28*
Science	Lower SES	–.35*	–.37*	–.24
	Middle SES	–.19	.06	–.15
	Total Ss	–.09	–.20*	–.35*
Social studies	Lower SES	.11	–.35*	–.38*
	Middle SES	–.14	.05	–.04
	Total Ss	–.03	–.20*	–.28*
Total Score	Lower SES	.08	–.40*	–.41*
	Middle SES	–.16	.05	–.14
	Total Ss	–.05	–.25*	–.35*

*p = .05.

**p = .01.

As Table 19 shows, scores on the Fruit Distraction Test and the Leveling-Sharpening House Test correlated significantly with total academic achievement scores for the total sample. With the Fruit Distraction Test, the direction of the correlation indicates that children who took longer to name the colors on Card III versus Card II (i.e., were distracted more by the peripheral irrelevant information) attained lower total academic achievement test scores, whereas children who showed a small time difference in naming the colors on Card III versus II, attained higher achievement test scores. With the Leveling-Sharpening House Test, the correlation shows that for the total sample, children who detected few changes, reporting them some time after they occurred (high ratio-levelers) attained low academic achievement scores, and children who detected many changes, soon after they first appeared (sharpeners) attained higher academic achievement scores. No relation was observed between the Circles Test and academic achievement. These findings suggest that at the fifth grade level the developmental status of the field articulation cognitive control (selective deployment of attention at relevant information) and of the leveling-sharpening cognitive control (constructing differentiated, stable memory images of information) are critical cognitive strategies in academic success, but the focal attention principle (breadth of scanning) is not.

Table 19 also reveals that the same relationships hold between the three cognitive controls measured and each of the subtests of academic achievement: reading, mathematics, science, and social studies.

When the children are considered in terms of SES, however, a comparison of the correlations obtained shows that the relations between cognitive control measures and achievement scores holds only for lower SES children. In considering this difference, it should be noted that the lower SES group attained lower achievement scores. Moreover, as discussed in a further review of this study in the section on cognitive controls and SES (see below), the cognitive control functioning of the lower SES children, in comparison to middle SES children, appears to be more immature developmentally. That is, the lower SES children were characterized more by scanning unsystematically and passively at narrow segments of the informational field, by deploying attention at relevant and irrelevant information, and by constructing global, fluid memory images. It would seem then that the power of cognitive control tests to predict and discriminate among levels of academic achievement is greatest when the population is characterized by cognitive control lags and dysfunction. When the population is cognitively more mature in terms of control principles, and academically more successful in achieving, the tests of cognitive controls discriminate less among levels of academic success.

Last, we should note that differential relations were not observed between a particular cognitive control and a particular academic achievement. Whether the subject matter is reading, mathematics, science, or social studies, a child's level of achievement relates in the same way to the three cognitive controls measured. This suggests that strategies of scanning, attending selectively, and constructing memory images are implicated as basic underlying functions in many, various forms of academic achievement.

These relations between cognitive controls and academic achievement receive further detailed consideration in Chapter 8 in connection with clinical studies designed to predict academic performance, as rated by teachers, from cognitive control test scores.

Comment on the Relation Between Cognitive Controls and Academic Skills. The studies discussed in this section strongly suggest that cognitive controls and academic skills represent two different domains (constructs) of cognitive activity. The tests devised to assess cognitive controls do not measure what standardized tests of basic academic skill measure. Moreover, when cognitive control tests are factor analyzed along with measures of skills, cognitive control principles maintain their basic individual identities and continue to define fundamental strategies in managing information.

The findings available to date do not suggest that particular cognitive control processes are uniquely implicated in the process of one or another basic academic skill: vocabulary, reading comprehension, language, and mathematics. However much more work needs to be done to explore this issue further before some understanding can be achieved of the relation between cognitive controls as fundamental strategies that process information of all types, and academic skills as competence with reading, solving number problems, and the like.

The studies reported uncovered one methodological problem that needs to be solved first, involving the format and content of tests of academic skill. Some tests that are used to reflect level of skill achieved measure general mental ability (e.g., the Otis-Lennon). Others measure domains articulated into traditional areas, such as vocabulary, language usage, reading comprehension, and mathematical concepts. Our results show that these skill areas have much in common; and when factor analyzed with cognitive controls, they reflect a single broad level of academic skill.

Moreover, skill tests such as the Iowa and the CTMM use material and a format that implicate a single cognitive control across several skill areas. For example, we observed that if a child characteristically ignores irrelevant information and limits his attention to relevant information, his achievement of higher scores in all skill areas apparently occurs because his manner of managing distracting information serves in managing the format and layout of tasks in the test booklet.

There is a need, then, to construct tests that tap the mental process unique to each skill and minimize the influence of content and layout of tasks. Measuring mathematical skills by using word problems blurs the domain of math with the domain of vocabulary. Arraying many items for each skill test on each test page could blur the uniqueness of each skill because the layout presents as a major requirement that the child give selective attention to its elements.

The need to construct more differentiated skill tests relates to the need to clarify the operational definition of academic skills. Some skill tests are designed to measure traditional areas such as knowledge of words and reading comprehension. But are these areas distinct? What should a skill concerning the comprehension of words and sentences represent operationally? How is the skill of processing mathematical problems different from the skill of reading comprehension? Other tests presented as skill measures, such as CTMM Delayed Recall, appear to assess a very different cognitive domain.

Clarifying the definition of skills, constructing skill tests that do not overlap, and studying the relations between skills and cognitive controls seem to have critical relevance for educating children. If a child has developed the habit of attending equally to relevant and irrelevant information, this habit must be changed if he is to improve his performance with paper-and-pencil skill tests and also, presumably, assimilate new information more successfully. His field articulation habit must be educated along with skill areas. We will return to this in Parts IV, V, and VI, devoted to cognitive therapy or the treatment and rehabilitation of cognitive control.

SOCIOECONOMIC STATUS AND COGNITIVE CONTROL TEST SCORES

As part of her study of the relation between cognitive controls and the reflective-impulsive dimension (see Section III) Zarembo (1967) examined the relation between cognitive controls and SES. The subjects consisted of 44 third and fourth graders (22 boys and 22 girls) ranging in IQ from 75 to 155 (mean IQ =116). Each child was assigned a numerical SES rating as determined by the North-Hatt scale which is based on public attitudes regarding occupations. The children were also administered three tests of cognitive controls: the Circles Test of focal attention, the Fruit Distraction Test of field articulation, and the Leveling-Sharpening House Test.

The 10 scores yielded by these procedures were correlated with SES ratings. Only two of the coefficients reached significance, both relating aspects of the Fruit Distractions Test to SES. Children who made more errors naming the colors on Card III (containing peripheral pictures as distractions) than on Card II (baseline card) were assigned lower SES ratings ($r= -.50$; $p = .01$) Children who made more errors naming colors on Card IV (containing incorrect colors as distractions) also were assigned lower SES ratings ($r= -.36$; $p = .05$).

In this study, then, only one cognitive control, field articulation, and only one component of that control, errors in naming colors, related to SES. Our discussions earlier in this chapter and in Chapter 5 about the meaning of errors in color naming with the Fruit Distraction Test, indicate the significance of this correlation, and suggestions for future studies emerge. In brief, errors in naming colors appear to be related uniquely to the regulation of affects in general, and reliance on expressing impulses and affects in action in particular. As a group, the low SES children in this study could be characterized by acting-out impulses and affects and by conflicts with discharging tensions in socially acceptable ways. If this is the case, the unique correlation between Fruit Distraction Test error scores and SES begins to have psychological meaning, intertwining cognitive controls, the regulation of affects, and SES. This speculation is offered only to point to future studies. Investigations of the relation between cognitive controls and SES should also include, as suggested here, measures of acting on impulse as a way of regulating affects.

A study by Garrity (1972) provides further information concerning cognitive control functioning and socioeconomic status. The subjects were 120 fifth grade boys, attending a public school in a large Western city. By means of the Elamburger Revised Occupational Scale for Rating Socioeconomic Status, 60 boys were selected to comprise a lower SES group, and 60 the middle SES group. There were 30 whites and 30 blacks in each group. The criterion for lower SES was a rating of 6 or 7 on the Hamburger scale (i.e., a rating representing one of the two lowest categories on the scale). The criterion for middle SES was a rating of 5, 4, or 3 on the scale. All children scored within the normal range on a group intelligence measure employed by the school, and all showed normal visual acuity. No boy included in the study had repeated more than one grade.

The children were administered three tests of cognitive controls: the Circles Test of focal attention, the Fruit Distraction Test (Cards 11 and III) of field articulation, and the Leveling-Sharpening House Test. Using a room provided by the school, a black examiner administered the tests to the black children, and a white examiner tested the white children.

As Table 20 indicates, the lower SES boys showed cognitive functioning that was developmentally more immature in each of the procedures. With the Circles Test of focal attention, values are assigned to errors in size estimation; thus a high numerical score indicates narrow, unsystematic attention deployment. The lower SES group was characterized by more narrow and passive scanning—an organization associated with younger age groups (see Chapter 7). Similarly, the lower SES boys showed that they were distracted more by the peripheral irrelevant pictures on Card III (larger mean time difference score), indicating a more immature level of field articulation functioning relative to their age, as reflected by their failure to deploy attention selectively at relevant stimuli. They also tended to detect fewer changes in the series of pictures that make up the House Test, and they noticed these changes some time after they first occurred. Here, too, with the leveling-sharpening cognitive principle, the lower SES children were characterized, as a group, by more immature cognitive functioning in that they tended to construct global, fluid memory images.

Table 20. Cognitive Control Test Means of Lower and Middle Socioeconomic Fifth Grade Boys (Garrity, 1972)

	Circles Test, 9 mm		Fruit Distraction Test III-II (seconds)		Leveling-Sharpening House Test Ratio	
Subjects	Mean	SD	Mean	SD	Mean	SD
Lower SES, N=60	5.79	2.09	6.08	5.94	16.19	3.18
Middle SES, N=60	3.81	1.36	4.52	4.31	12.28	3.30
Total	4.80	1.79	5.30	5.23	14.24	3.78

In the same study Garrity also correlated scores the children obtained on these three tests of cognitive controls with social deprivation as assessed by Deutsch's (1968) Deprivation Index Scale. This aspect of Garrity's study furnishes a deeper look into the relation between SES and cognitive control functioning and suggests interesting new directions for research.

Following Deutsch's scale, Garrity interviewed each child to obtain information about the following variables: (1) housing dilapidation, (2) number of children in the home under the age of 18, (3) extent of dinner conversation at home, (4) number of cultural experiences the child anticipates for the coming weekend, and (5) whether the child had attended kindergarten. The parents were telephoned to obtain information for the sixth variable, namely, the level of education to which they aspired for the child. The six variables were combined to produce a composite score. The smaller the numerical value of the score, the larger the degree of social deprivation.

The correlations Garrity reports between this social deprivation index and each of the cognitive control test scores were as follows: (*a*) Circles Test (9 mm)= –.13, *(b)* Fruit Distraction Test Cards III-II (seconds) = –.07, (*c*) leveling-sharpening ratio = –.52 (p = .01).

Of the three cognitive control measures, only the Leveling-Sharpening House Test correlated significantly with Deutsch's social deprivation index. The direction of the relation indicates that fifth grade boys whose cognitive control functioning was characterized by the tendency to construct global, fluid memory images (high ratio indicates that information is leveled in memory) experienced little social stimulation and interaction. Fifth graders who characteristically constructed articulate, stable memory images (low test ratio indicates that information is sharpened in memory) experienced a high degree of social stimulation. This finding raises the question of whether social stimulation uniquely contributes to the organization of the leveling-sharpening cognitive control—that is, the habitual way a child constructs memory images of past information and relates these to present information.

To shape questions and issues for future study suggested by this finding, it would be useful to examine a child's family experiences as reflected by the Deprivation Index Scale. When a child receives a low composite score (which Deutsch proposes indicates a high degree of social deprivation), he lives in a setting that is physically dilapidated, he lives with three or more children under the age of 18 years, he experiences little conversation at dinner time (because little conversation takes place, because the child eats alone, or because the children are not allowed to converse), he does not anticipate taking part in any cultural experience for the coming weekend (e.g., a visit to relatives, a trip to the local zoo or museum), and he did not attend kindergarten. In addition, his parents anticipate that he will attain a college education or less and do not expect him to do graduate work.

Looking for a way to tie these several variables together in light of the selective relationship between the index and leveling-sharpening, we notice that object constancy and the relating of present information to past information seem to run through a number of the variables. One could speculate that if the physical makeup of a child's living quarters is shabby, the arrangement and location of materials is fluid and unpredictable. If there are many other children at home, social interactions could be global and fluid. If there is little conversation at dinner time, the child does not benefit from the experience of calling up memories of past events and information and organizing them to relate to the information, interest, and focus at hand. And if the child does not anticipate participating in some socially stimulating event for the coming weekend, he does not benefit from the experience of calling up memories of similar settings he has visited and relating them to images of the anticipated event.

In short, when these variables are viewed from the perspective of the cognitive principle concerned with organizing and sustaining memory images, they do seem to define life experiences that either foster the repeated construction of differentiated memory images of information or encourage the construction of global, fluid memory images. To explore further the role of family experiences in the organization of cognitive controls, more detailed information is required about anticipated experiences, family conversation, and the stability of the physical setting in which the child lives. Studies producing such information could help us determine whether these variables have a more important correlation with the leveling-sharpening cognitive tendency a child has developed than do his attendance or nonattendance of kindergarten and his parents' educational aspirations for him.

These considerations relate to the issue of cognitive control functioning in adaptation, which is discussed more fully in the next chapter. Here we only raise the question of whether a child is better adapted cognitively (i.e., is "fitted" to his social-family context) if he functions by means of constructing global, fluid memory images of information when in fact he must participate in a social-physical environment that is global and fluid.

Of course the relation between social stimulation and the formation of cognitive control tendencies should be investigated at different age levels. Among the fifth grade boys studied by Garrity, social deprivation correlated only with the leveling-sharpening principle. As discussed later in more detail, I conceive the leveling-sharpening principle as being dominant in the cognitive functioning of older children. It is useful to wonder for future study whether social deprivation assessed in prekindergarten or kindergarten children correlates to a greater degree with measures of body tempo and delay, and with measures of the focal attention cognitive control, both of which are more dominant controls in the functioning of younger children.

With a large sample of children, the second study suggests that life experiences in a lower SES environment are associated with cognitive control functioning more characteristic of earlier developmental levels, when lower SES children are compared with age mates from higher SES environments. This study also suggests a unique relationship between life experiences that involve the relating of present information with past and the formation of an individual's leveling-sharpening cognitive preference.

Comment on SES and Cognitive Control Functioning. More work needs to be done, of course, to study the relations between SES and cognitive control functioning. The two studies discussed here suggest that life experiences associated with SES are a factor in the organization of cognitive controls children employ habitually. The little data available to us thus far suggest that lower SES environments are associated with levels of cognitive control organization that are more typical of earlier stages of cognitive development. In pursuing this issue in further studies, the reader is reminded of the discussions in Chapters 4 and 5 concerning the social value imputed to one level of cognitive control functioning versus another. If lower SES children continue to show cognitive control organization that when compared with higher SES children is seen to be more characteristic of earlier stages of development, this finding relates *only* to the *developmental viewpoint.* That is, children from lower SES environments could be characterized by cognitive control functioning typical of earlier stages of development.

Such a finding would not relate to the viewpoint of adaptation. From this stand we would need additional data before making inferences about the adaptive success and failure of the cognitive control organizations typical of lower SES children. To this end several interrelated questions must be addressed in future studies. For example, are the cognitive controls of lower SES children adaptive in managing their *home environments* which are for them average and expectable? Does the school setting represent for the low SES child an environment that is not average and expectable? Are the cognitive controls of the low SES child ill-suited in managing and controlling the stimulation of the public school? And if so, which particular controls fail to preadapt the child for the informational demands of the school setting?

In summary, these and other considerations should be addressed as we continue to explore the relations between low SES and cognitive control functioning. First we need to replicate the finding that lower SES children are characterized by developmentally lower stages of cognitive control organization. Our initial findings suggesting this relation are not surprising if we recall the hypothesis that the cognitive controls we come to use habitually are partly a function of life experiences. If replicated, we need further data to establish how and in which environmental contexts the developmentally immature cognitive controls of lower SES children are *adaptive* and *maladaptive.*

The same considerations apply to higher SES children. The developmentally more advanced stages of cognitive control functioning of these children may preadapt them for typical school demands. But are there high SES environments that result in the habitual use of prematurely advanced cognitive controls that are as maladaptive in some contexts as are immature cognitive controls in others? We must learn more about the relation between cognitive control organization and various SES levels and about the adaptive significance of various cognitive controls. In terms of the relevance of these considerations for education, it may be necessary to study educative methods, techniques, and content in light of the cognitive control organization they require and to determine whether educational content and method should be accommodated to the cognitive controls unique to children from different SES environments.

Relations Between Cognitive Controls and Personality Dispositions that Relate to Test Performance

As we explore the psychological meaning of these tests of cognitive controls, we should ask whether particular personality dispositions, such as the need to achieve or the tendency to experience test anxiety, account to a significant degree for a child’s performance with a cognitive control test. For example, if children who show a high need for achievement also tend to make accurate estimations of the sizes of circles in the Circles Test of focal attention, then perhaps the test could measure the need to achieve, and to be successful, as much as it might measure breadth of scanning.

The study by Garrity (1972), also discussed previously, provides some information about this issue. The subjects were 120 fifth grade boys attending public schools in a large Western city. Half the boys represented low socioeconomic status and half middle socioeconomic status as determined by the Hamburger Revised Occupational Scale. There were 30 blacks and 30 whites in each group. All children selected for the study scored within the normal range (90-110) on the group intelligence scale employed by the schools, and they showed normal visual acuity as determined by standard visual acuity charts.

The children were administered three tests of cognitive controls for children: the Circles Test of focal attention, the Fruit Distraction Test of field articulation, and the Leveling-Sharpening House Test. They also took tests assessing three personality dispositions: test anxiety, achievement motivation, and self-responsibility.

The Test Anxiety Scale for Children (Sarason et al., 1960) consists of a questionnaire to which the child responds "yes" or "no" with respect to 30 school and test-taking situations (e.g., When the teacher asks you to get up in front of the class and read aloud, are you afraid that you're going to make some bad mistakes?). The second personality disposition was measured by the Children's Achievement Motivation Scale (Weiner and Kukla, 1970). The child checks off which one of two alternatives applies to him, and the choices are designed to differentiate between high and low achievement motivation (e.g., I would rather play: *(a)* fun games; (*b*) games where I would learn something). The instrument assessing sense of personal control or responsibility for one's actions was the Children's Intellectual Achievement Responsibility Questionnaire (Crandall, Katkovsky, and Crandall, 1962). The questionnaire lists 34 situations, each depicted as the outcome of the child's behavior or as the outcome of the behavior of someone else—parent, teacher, or peer (e.g., If you can't work out a puzzle, is it because: *(a)* you are not especially good at working puzzles or (*b*) the instructions weren't written clearly enough?). A child's score is the number of times he endorses an item as being the result of his own actions.

Table 21. Correlations of Cognitive Controls of 120 Fifth Grade Boys with Test Anxiety, Achievement Motivation, and Self-Responsibility (Garrity, 1972)

Personality Measures	Circles Test of Focal Attention, 9 mm	Fruit Distraction Test III-II (Seconds)	Leveling-Sharpening House Test (Ratio)
Test anxiety	.15	.17	34**
Achievement motivation	.04	–.08	–.17
Self-responsibility	–.18	–.09	.00

Garrity correlated scores obtained from the three tests of cognitive control with the measures of each of the personality dispositions. As Table 21 reveals, the Circles Test of focal attention and the Fruit Distraction Test did not correlate with any of the personality measures. The leveling-sharpening ratio correlated only with the Test Anxiety Scale.

These findings suggest that among fifth grade boys, the cognitive control tendencies to scan narrow or broad segments of the environment, and to direct attention at relevant and irrelevant information or selectively at relevant information, are not related to (*a*) anxiety experienced in school and in test-taking situations, (*b)* assuming responsibility for one's intellectual achievements, and (*c*) achievement motivation. Similarly, the tendency to form global and fluid or differentiated and stable memory images is unrelated to achievement motivation and self-responsibility.

The lack of correlation between the measure of achievement motivation and the three cognitive control tests administered is especially noteworthy because it has been proposed that the cognitive control tests measure cognitive preferences. An important question is whether handling the demands of each cognitive control test critically implicates, in its process, motivation to do one's best or to achieve. For example, does a child do a good job in estimating the sizes of circles in the Circles Test in part or primarily because he is highly motivated to achieve, rather than because of his cognitive control tendency to scan broadly ? Or is a child slow in naming colors on Card III (with distractions) relative to Card II primarily because he is characterized by a low need to achieve, rather than because of the way he manages distractions? Similarly, does a child's noticing many changes on the House Test, soon after they occur, reveal his motivation to succeed or the cognitive control preference to construct sharp memory images of information? Garrity's results support the proposition that the manner in which cognitive control tests are handled by children is not influenced by the need to do their very best.

The lack of correlation between each of the cognitive control tests and intellectual achievement responsibility also deserves a comment. As noted earlier, this scale presents the child with a wide variety of intellectual school-related experiences and samples the extent to which the child assumes responsibility for his success or failure (e.g., When you have trouble understanding something in school is it because *(a)* the teacher didn't explain it clearly or (*b*) you didn't listen carefully?). That no relation was observed between a child's response to these questions and his performance with the cognitive control tests adds further support to the assumption that a child's attitudes and feelings about academic tasks and situations do not play a key role in his response to cognitive control tests. The finding also bolsters the proposal that cognitive control tests afford a child an opportunity to reveal his cognitive tendencies, and they are not experienced as "school tests."

Let us now return to the one significant finding, the correlation between the Leveling-Sharpening House Test and Sarason's measure of test anxiety. The direction of the correlation suggests that children who described themselves as being anxious in school situations noticed few changes on the House Test and reported them many displays after they first appeared (high ratio). High test anxiety, then, is associated with a leveling tendency and low anxiety with a sharpening tendency. This result suggests two hypotheses: (*a*) being anxious when handling schoollike tasks is a part of the response process experienced when handling the Leveling-Sharpening House Test; (*b*) the management of anxiety is uniquely associated with the cognitive control functioning as such.

Our discussion of the fourth factor analytic study in Chapter 5 is useful in considering these possibilities. We observed that a measure of anxiety concerning bodily harm and castration defined a factor along with the Leveling-Sharpening House Test. In other words, these test procedures, with kindergarten children, were highly correlated and shared a common process. Children who leveled information (i.e., noticed changes late in the series) tended to complete a story about a boy's finger by imagining that the finger was cut off or smashed, whereas children who sharpened information (constructed clear, stable images) tended to complete the story by imagining more attenuated injury (e.g., the finger was scratched). This relationship between fantasied castration anxiety and leveling-sharpening cognitive functioning converges with Garrity's finding in which test taking and school anxiety are related to leveling-sharpening. We should note that in one correlation anxiety was sampled by means of a fantasy test that concerns bodily harm; in the other, anxiety was sampled by means of a questionnaire (self-report) dealing with school performance. Psychoanalytic theory would hypothesize that when children read before the class, for example, they are displaying their competence. We need to know whether performing before a class arouses deeper concerns about possible bodily harm, so that children who describe themselves as subjectively anxious in school situations would also experience a high degree of castration anxiety in unconscious fantasy.

The general agreement between the factor analytic finding and Garrity's finding suggests that anxiety associated with leveling-sharpening cognitive control functioning is not only related to the school situation or taking tests, but has a broader dynamic base that involves imagined bodily harm. The general agreement also suggests that Garrity's finding relates further data to the issue of the relation between leveling-sharpening and the regulation of castration anxiety. Future studies are needed with various age groups, and various measures of anxiety, to explore further how the expression and management of anxiety is uniquely related to, and coordinated with, the cognitive control that concerns the construction of memory images of information. The issue here concerns not only the correlation between measures of anxiety with leveling-sharpening functioning, but the role played by leveling-sharpening in the adaptive management of anxiety. We return to this issue in Chapter 8 when we consider cognitive controls and adaptation to stress.

Another study (Lemieux, 1966) provides information about the relationships between the leveling-sharpening cognitive control and personality dispositions, as measured by the Edwards Personal Preference Schedule. The Leveling-Sharpening House Test and the Edwards scale were administered individually to 45 college students, 22 males and 23 females (age range, 19 to 24 years).

The Edwards scale is a pencil-and-paper instrument designed to assess 15 "normal" personality "needs" as defined by H. A. Murray. The individual marks one of a pair of statements that is more characteristic of himself or herself.

Since there is no clear theoretical base on which to relate cognitive controls and these personality dispositions, no hypotheses were formulated to describe expected relationships. The study was conducted mainly to probe the issue.

Table 22. Correlations Between Leveling-Sharpening House Test and Edwards Personal Preference Schedule Percentile Scores: College Men, N=22, Women N=23

	First Stop Score			Number Correct Changes			Ratio		
Edwards Item	Males	Females	Total	Males	Females	Total	Males	Females	Total
Achievement	–.21	.30	.06	.02	–.13	–.06	–.13	.18	.03
Deference	.04	.12	.08	.04	–.06	–.01	.10	.11	.10
Order	–.25	–.19	–.22	.36*	.44*	.41***	–.31	–.35	–.34**
Exhibitionism	–.17	.05	.01	–.32*	–.42**	–.40***	.18	.30	.27
Autonomy	–.11	.21	.06	.02	–.16	–.09	.04	.12	.04
Affiliation	.47**	–.10	.14	–.31	.28	.02	.40*	–.09	.11
Intraception	.02	–.18	–.07	.33	.34	.30*	–.23	–.42**	–.30***
Succorance	.25	–.10	.07	–.21	–.27	–.23	.19	.18	.18
Dominance	–.15	.21	.06	.37*	.11	.21	–.36*	.02	–.13
Abasement	.12	.02	.07	–.20	–.25	–.24	.09	.29	.21
Nurturance	.10	.41**	–.15	.02	.13	.04	–.03	–.18	–.09
Change	.03	.23	.11	.14	–.30	–.06	.07	.23	.11
Heterosexuality	.14	–.13	.01	–.17	.18	–.01	.25	–.17	.06
Aggression	–.26	.14	–.03	.00	.09	.07	–.21	–.07	–.15
Endurance	–.24	–.16	–.20	.06	–.04	.01	–.20	–.05	–.13

*p = .10

**p = .05.

***p = .01.

Table 22 lists the personality variables assessed by the Edwards scale and the correlations obtained with the Leveling-Sharpening House Test. Of the 15 personality variables, a cluster of three relate significantly and consistently with leveling-sharpening for both males and females; namely, order, exhibitionism, and intraception. Relying on the definition of these variables provided by Edwards, the direction of the correlations suggests certain relationship. Males and females who tend to form global, fluid memory images of information and to fuse present information with past (leveling), described themselves in the following ways:

1. *Regarding the Need for Order.* He or she is disorganized with details of work; no definite times for eating are set aside, and schedules are not constructed to ensure that things run smoothly. He or she produces poorly organized and sloppy written work, does not keep things neat, and usually does not make plans before starting on a different task.

2. *Regarding the Need for Intraception.* He or she tends not to analyze his or her motives and feelings, nor to observe and analyze the behavior of others, nor to understand how others feel. There is little interest in predicting how others will act or attempting to put oneself in another’s place.

3. *Regarding the Need for Exhibitionism.* He or she does not say clever or witty things or talk about personal experiences, and avoids having others notice his or her appearance. The individual prefers not to be the center of attention.

On the other hand, the subjects in this study who tended to form differentiated, stable memory images of information and articulate present information from past (sharpening), described themselves as follows:

1. *Regarding the Need for Order.* He or she writes neatly and organizes details of work. The individual has definite times for eating and clear schedules so that things run smoothly.

2. *Regarding the Need for Intraception.* There is a tendency to analyze one's motives and feelings and to observe others and try to understand how others feel. There is also a tendency to analyze the motives of others and to predict how others will act.

3. *Regarding the Need for Exhibitionism.* He or she says witty and clever things and enjoys talking about personal experiences. Having others notice one's personal appearance is sought after and enjoyed. Being the center of attention is preferred.

In addition to these relationships produced by both male and female subjects, a relationship unique to the male subjects was observed, between leveling-sharpening and affiliation and dominance, and another, unique to females, appeared between leveling-sharpening and nurturance.

Table 22 shows that males who tended to level information described themselves as high in affiliation and low in dominance, whereas those who sharpened information considered themselves to be low in affiliation and high in dominance. Edwards describes the affiliation disposition as follows: to make as many friends as possible, to share with friends, and to do things with friends rather than alone. Dominance is defined as the tendency to argue one's point of view, to be a leader in groups, and to supervise and direct the actions of others.

The female subjects alone showed a significant correlation between the display at which they first detected a change and nurturance. Women who tended to detect the first change late in the series (leveling) described themselves as low in nurturance, whereas those who detected the first change early (sharpening) were reportedly high in that need. Nurturance concerns helping friends, showing a great deal of affection toward others, and sympathizing with persons who are hurt or sick.

In summary, this study suggests that late adolescents who tend to manage changing information by constructing global, fluid images describe themselves as disorderly with details of life, as avoiding being the center of attention, and as lacking introspectiveness. Among males, this cognitive control tendency is also associated with seeking social settings and friendships, and being a follower. The "leveling" females tend not to help others or to show kindness. On the other hand, late adolescents who tend to manage changing information by constructing differentiated images describe themselves as orderly in their daily living, as seeking the center of attention, and as being very introspective. Here, males also show a preference to be alone and to be dominant over others, and females prefer to give affection and kindness.

Of the relationships observed, the one between leveling-sharpening and introspectiveness and order seems to fit most with clinical and theoretical expectations. Observing, analyzing and predicting the feelings and actions of oneself and of others are traits that appear to go along with a tendency to construct differentiated, stable memory images of events, experiences, and information. Moreover, the tendency to articulate memory images also seems to fit with maintaining an orderly, systematic daily routine, whereas the tendency to construct global memory images is not inconsistent with a disorderly, confused daily routine. Although these relationships need to be explored further in adolescents and in younger children, the findings do suggest that connections exist between cognitive control organizations on the one hand and, on the other, negotiating and managing social, personal, and work details in day-to-day living.

Indeed, relationships were observed with only a small cluster of normal personality variables that appeared to fit together, which enhances the meaningfulness of these preliminary findings. High orderliness, introspection, and low exhibitionism fit together as dispositions, and this cluster, observed with all subjects, was associated with the tendency to sharpen. Similarly, high dominance and low affiliation fit together as dispositions, and this cluster, observed with males, was also associated with sharpening.

Last, the lack of correlation between Leveling-Sharpening House Test performance and several other dispositions included in this study also deserves attention because further information is provided concerning the influence of dispositions such as social desirability and personal effort on performance with the House Test. The achievement variable of the Edwards scale measures doing one's best and trying to out do others. The deference variable assesses doing what is expected and necessary to conform. It appears that detecting changes presented by the House Test is not influenced by the needs to achieve or to defer to the suggestions of others. The variable "change" assesses the need to do new and different things and to experience novelty. Apparently the cognitive habit of constructing global or differentiated memory images of changing information is not related to this disposition or need for novelty.

To this point we have considered five main sources of evidence for the criterion validity of the cognitive control tests devised for children. The first source consisted of studies correlating cognitive control test measures with scores obtained from a variety of other cognitive tasks. As the second source of evidence, we used research that selectively related cognitive control test scores with teacher ratings. Differences observed in cognitive control test performance between various groups of children who differed in terms of some population variable comprised the third source, and investigations of the relations between cognitive controls and sex, IQ, academic achievement, and socioeconomic status made up the fourth. Last, we reviewed studies of personality dispositions that could influence performance on cognitive control tests. Let us now turn from these studies of criterion validity to the issue of the reliability of cognitive control tests.

STUDIES OF RELIABILITY

To be useful in clinical practice as well as in research, the measurements provided by a test procedure should be reliable, that is, reasonably consistent and stable (American Psychological Association, 1974). The dimensions of stability and consistency emphasize a particular attribute of the reliability of psychological measurement. Stability emphasizes reliability of a test measure over time. That is, the score elicited by a test from an individual at one point in time is nearly the same as the score elicited by the same test for that same individual at another point in time. It can be seen that stability relates as much to the effectiveness of the test instrument as it does to the stability of the psychological variable, or response, being sampled.

Consistency emphasizes reliability of the form or content of the test used to sample the behavior in question. Consistency is an important consideration, especially when the set of items that make up the test is only one of many possible sets. For example, if one is evaluating the reliability of a second grade mathematics test consisting of 20 addition problems, there would be no reason to suppose that the set of 20 problems chosen is superior to some other comparable set of 20 addition problems. When this issue dominates the development of a test, it is desirable to explore not only the degree to which an individual varies his response to the test from time to time, but also the degree of sampling fluctuation involved in using one set of items rather than another. In the case of the second grade mathematics test, one would correlate a child's performance with one set of 20 problems with his handling of a second set of comparable problems.

In the case of tests of cognitive controls, we can illustrate the issue of consistency using our previous discussions, in Section I of this chapter, of the leveling-sharpening control. Asking an individual to judge the relative sizes of squares that are presented in series and change in size over time, represents one test form that assesses leveling-sharpening behavior. Asking an individual to view a series of pictures of a house and to report changes perceived in the scene represents a different form or content. Showing a relationship between these forms demonstrates reliability in terms of consistency.

If a cognitive control test score correlates with another cognitive test in an expected direction, or if a cognitive control test score discriminates between two populations as expected, we can infer that the test procedure, like its score, is reliable. If the tests were not reliable, one would not be likely to observe the expected correlation with another test or the discrimination between populations. But this is an indirect measure of reliability. Direct measures of reliability can be obtained. Stability is evaluated typically by administering the test to the same individual on two or more occasions, and recording the degree of sameness in the individual's test performances. Consistency is evaluated by administering alternate forms of the same test to the individual and assessing to the degree to which the individual shows the same performance with both forms.

In terms of indirect evidence of reliability for tests of cognitive control, our previous discussion of criterion-related studies revealed that these tests have been reasonably successful in correlating with other tests of cognitive functioning, in correlating with teacher ratings of relevant cognitive behaviors observed in the classroom, and in discriminating among several populations of children. These studies provide considerable indirect evidence that the tests are reliable. Let us now consider work that explores reliability more directly.

I. Studies of Consistency: Alternate Forms of Tests of Cognitive Controls

Except for the Leveling-Sharpening blouse Test, alternate forms, as such, have not yet been constructed and evaluated for the tests of cognitive controls. However alternate forms are possible for each control principle. For example, an alternate form of the Scattered Scanning Test (which makes use of geometric shapes) could consist of a sheet of paper on which is printed a random array of silhouettes of common simple objects. The child would be asked to look around and mark a designated figure.

My colleagues and I are investigating one possible alternate to the Fruit Distraction Test that makes use of clusters of dots and numbers rather than colored fruit. The test cards are the same in size and general design as those of the fruit test. On the first card, four different clusters of dots (from one to four) are arrayed randomly in rows, each cluster appearing eight times (as does each of four colors on the Fruit Distraction Test). The child is asked to name aloud, as quickly as possible, the number of dots in each cluster. This card is seen as approximating the color bars on Card I of the Fruit Distraction Test. On the second card the numbers 1 through 4 are printed in the same order, so that the child’s number naming is the same. (This card is seen as paralleling Card II of the fruit test where the colors are shaped in the form of common fruit.) In the next card the printed numbers are arrayed in the same order, but each is surrounded by the peripheral objects also used on Card III of the Fruit Distraction Test. Unlike the first three cards, the fourth card is less comparable to its counterpart of the Fruit Distraction Test: the child is asked to call out the number of dots in the clusters (1 through 4) arrayed as in Card I, but the dots are printed over numbers (1 through 4) that do not correspond to the number of dots. Thus a cluster of two dots is printed over the numbers 1, 3, and 4 but never over number 2. The child is asked to ignore the printed number and to name the number of dots in each cluster.

This number naming test is being explored as an alternate form of the Fruit Distraction Test and also as a method for assessing the role of color as such as the relevant information to be processed, and the role of color as a stimulus in studying cognitive controls and the regulation of affect. We discussed earlier how the field articulation principle appears to be related to the regulation of affects and impulses. We need to establish more precisely the extent to which these findings are a function of the fact that the Fruit Test uses color and therefore arouses affects, or the extent to which the relationships are due to the uniqueness of the field articulation principle in regulating affects, independent of the stimulus used.

We have not yet made sufficient study of this alternate form of the Fruit Distraction Test, but the Fruit Distraction Test does lend itself to an examination in terms of alternate forms. Card III (with its peripheral, irrelevant pictures) and Card IV (with its incorrect colors) could be viewed as alternate forms of the same test, when the performance observed with each is compared with the performance observed with Card II. With each comparison (Cards III-II and Cards IV-II) seen as alternate tests, the child is observed naming colors of fruit with no distracting, irrelevant information present, then he is observed naming the same colors in the presence of distracting, irrelevant information. Therefore correlations observed between difference scores of Cards III-II and Cards IV-II could be viewed as studies of consistency of this procedure.

Alternate forms of the Leveling-Sharpening House Test, in which the information to be remembered consists of a child's toy wagon and displays of a circle, have been explored and are discussed below.

We have not had the opportunity to date to work with alternate forms of the Object Sort Test. Alternate forms of this instrument ideally should make use of the same number of objects, which represent the same degree of familiarity but vary in content.

ALTERNATE FORMS OF THE LEVELING-SHARPENING HOUSE TEST

In an earlier section of this chapter (see I. Relations Between Cognitive Control Tests and Other Tests of Cognitive Functioning) we considered studies that can also be viewed as investigations of consistency of the Leveling-Sharpening House Test. In one study involving children at three age levels (see Table 2), three forms of the procedure of the Leveling-Sharpening House Test were compared. With one form, the children examined a sequence of pictures of a toy wagon from which details were omitted accumulatively. In another form the child examined a sequence of pictures of the same toy wagon to which details were added accumulatively. And in a third form the child examined a sequence of circles that gradually increased in size.

With each form the child reported any perceived changes. The responses were evaluated in terms of three basic scores: the display number at which a child first detected and reported a correct change (first stop score), the number of correct changes reported, and the lag between the appearance of a change in the series of pictures and the child's detecting that change (ratio score).

For the purpose of our interest in consistency as reliability evidenced in alternate forms, we should now examine Table 2 to see how a score with one form correlates with the same scores obtained from another form.

For example, what are the correlations among the number of correct changes a child detected when viewing *(a)* a series of pictures of a wagon with elements gradually omitted, (*b*) a series of pictures of a wagon with elements gradually added, and (*c*) a series of circles that gradually increased in size? Table 2 shows the following correlations for 9 year olds: wagon subtraction x wagon addition = 71, wagon omission x circles = 20, wagon addition x circles = 36. The results indicate more agreement in general between comparable scores of wagon omission and wagon addition tests than between either of these and the Circles Test. Moreover the 9 and 12 year olds showed more consistency across forms than did the 6 year olds.

In another study also considered earlier in this chapter, an alternate form was used by Guthrie (1967). Here the Leveling-Sharpening House Test was correlated with a comparable test that made use of the scene of a parachutist rather than of a house. The subjects, who were novice parachutists, showed significant consistency in their performance with each procedure.

An alternate form of the Leveling-Sharpening House Test was also used by Shapiro (1972) in an attempt to examine changes in leveling-sharpening functioning associated with the stresses of surgery and dental work. The children studied consisted of three groups of 15 boys each matched for age and IQ (age range 7 to 11 years). Members of one group were scheduled to enter a hospital to undergo hernia repair. Members of the second group were scheduled for appointments with a dentist, and a third group served as a control.

The children were administered a battery of personality tests and two tests of leveling-sharpening. The House Test considered in this book and the Leveling-Sharpening Hospital Test (see Chapter 9). The information to be remembered provided by the second test related to the stress conditions under study. A two-dimensional, line drawing of a doctor standing in a hospital room constituted the basic scene. As with the House Test, a series of 57 pictures of this scene is presented, and 16 details are eliminated accumulatively through out the course of the presentation. The child is asked to examine each picture as carefully as possible in the time allowed and to report any changes perceived. The Hospital Test was evaluated using the same scoring categories applied to the House Test: (1) the display at which the child detected the first change (first stop score), (2) the number of correct changes detected, (3) the lag, in number of presentations, between the display at which the detail is first omitted and the display at which the child detects the change, (4) the number of changes perceived in the information given that in fact do not occur (A changes), (5) the number of changes perceived in information that never was part of the scene presented (B changes), and (6) total number of incorrect changes perceived (A + B changes).

These tests were administered on three separate occasions: at home (time 1); one week later—in the hospital for the surgical group, in the dentist's office for the dental group, and at home for the control group (time 2); and three weeks after discharge from the hospital, the dental appointment or the second testing, as appropriate (time 3).

This study is discussed in detail in Chapter 8. Here we consider only the relations observed between the House Test and the Hospital Test, as an alternate form of leveling-sharpening test. The correlational analysis was conducted to explore whether the House Test correlated with the Hospital Test in both stress and nonstress conditions.

Table 23. Correlations Between the Leveling-Sharpening House and Hospital Tests at Three Different Evaluations (N = 45 boys)

Leveling-Sharpening Score	Time 1: No Stress	Time 2: Stress	Time 3: No Stress
First stop	.08	.14	.29

Number of correct changes	.55	.57	.51
Ratio	.55	.60	.38
Number of A changes	.71	.14	–.06
Number of B changes	.32	.53	.27
Number of A + B changes	.75	.39	.29

Table 23 presents the correlations obtained between the two test forms of leveling-sharpening. With two variables and 43 degrees of freedom, correlation coefficients of .29 and .38 are significant at the .05 and .01 levels, respectively. In general there is a very high agreement between each of the test scores of each test form except for the first stop scores of times 1 and 2, and the number of A changes of times 2 and 3. There is higher agreement between the two tests at time 1 than at the subsequent evaluations. This may well be due to the influence of the experience of surgery or having a cavity filled on a child's performance in remembering details of the hospital scene in ways that reduced the correlation between the two tests at those times. Data about changes in leveling-sharpening functioning, as measured by these two tests, associated with the stress conditions are discussed in Chapter 9.

In general these results provide considerable support for the consistency of the House Test in stress and nonstress conditions. If we consider these findings along with those obtained by Guthrie with the Parachute Test, it appears that the House Test assesses a leveling-sharpening principle (degree of differentiation and stability of memory images) that is fundamental and operates independently of the particular content of stress present. The house scene tapped the same cognitive functioning of each individual as did the Parachute Scene for parachutists, and as did the hospital scene for children who were experiencing painful medical procedures. The content of the House Test then appears to provide reliable measures independent of the environmental context and situation.

These studies lend support to the consistency of the Leveling-Sharpening House Test.

ALTERNATE FORMS OF THE FRUIT DISTRACTION TEST

As discussed earlier, correlations between Fruit Distraction Test, Cards III-II and Cards IV-II differences could be viewed as relating to the consistency of this test. In a number of studies, discussed in other sections, both distraction cards (III and IV) were administered to various groups of children. These studies, therefore, provide information about the consistency of the performance observed with two different types of distraction card. Here we note only the main features of the study and the correlation coefficients observed between Cards III-II and Cards IV-II. The reader is referred to the respective sections in this and other chapters for a full description of each study.

1. Teachers judged 150 kindergarten children to be typical learners and 34 to be at risk, or suspect, academically. Correlations of Cards III-II x IV-II: typical learners = .58, suspect learners = .71, total sample = .63. All are statistically significant.
2. Teachers judged 108 kindergarten children to be typical learners and 56 to be at risk, or suspect,

academically. Correlations of Cards III-II x IV-II: typical learners = .46, suspect learners = .54; total sample = .50. All correlations reach statistical significance.

3. Subjects were 65 third and fourth graders in a public school system (see Section IV above; study by Zarembo, 1967). Correlation of Cards III-II x IV-II = .44 ($p = .05$).

4. Subjects were 60 third and fourth grade public school children (see text accompanying Table 25). Correlation of Cards III-II x IV-II = .51 ($p = .01$).

5. Subjects were 166 children hospitalized in a psychiatric facility (see text accompanying Tables 15 and 16). Correlation of Cards III-II x IV-II = .40 ($p = .01$).

These findings lend some support to the contention that the Fruit Distraction Test is characterized by consistency and reliability.

II. Studies of Stability, Readministration of Tests at Two or More Points in Time

How stable over time are the measures provided by cognitive control tests? Two longitudinal studies have been conducted thus far, over a relatively long period, to explore this question.

FIVE ADMINISTRATIONS OVER A 5 YEAR PERIOD OF THE BASIC BATTERY OF COGNITIVE CONTROL TESTS

To examine the stability of the five tests of cognitive controls, the procedures were administered individually to 51 kindergarten children attending the same public school, then readministered on four subsequent occasions to the same children: during the first, second, fourth, and fifth grades. The initial sample consisted of 24 children selected by teachers as having difficulty coping with kindergarten demands, and 27 children selected randomly from those designated as typical learners. There were 18 boys and 6 girls in the problem group, and 18 boys and 9 girls in the typical group. All children were Caucasian and from middle to upper socioeconomic level families. Because several of the families moved from the study area during the succeeding 5 years, only 31 members of the original sample were available for the final follow-up testing during the fifth grade. (These children are the same as those discussed in Section III, Relations Between Cognitive Control Test Performance and Population Differences, and in Table 6.)

The test scores obtained during each of the evaluations were intercorrelated. The analyses combined all children because of the relatively small number in each group. The total sample then represents children who were judged either to be adequate learners or to be having difficulty, therefore it should be representative of a typical school population. Table 24 presents the correlation coefficients obtained. No correlations are reported between the Scattered Scanning Test scores obtained in kindergarten and in the subsequent years because the form of this test changed in significant ways between the kindergarten year and first grade. Therefore intercorrelations obtained after the first grade are reported.

Table 24. Test-Retest Reliability of Five Administrations of Cognitive Control Tests Over a 5 Year Period: Public School Children

Scores	K x 1st N = 46	K x 2nd N = 44	K. x 4th N= 33	K x 5th N= 31	1 x 2nd N = 44	1 x 4th N = 33	1 x 5th N = 31	2 x 4th N= 33	2 x 5th N= 31	4 x 5th N= 31
Fine Motor Delay 1: time (seconds)	–.02	–.25	–.30	.03	.58***	.28**	.27*	.28*	.33**	.33**
Fine Motor Delay II-I: time (seconds)	.39***	.24**	.29**	–.21	.50***	.08	–.08	.10	.37***	.56***
Motor Tempo: time (seconds)	—	—	—	—	.49***	—	.26	—	.53***	—
Scattered Scanning: number correct	—	—	—	—	.29*	.39***	.47'**	.34**	.34**	.54***
Scattered Scanning: total distance (cm)	—	—	—	—	–.03	.56***	.25	.20	.25*	.18
Scattered Scanning: mean distance (cm)	—	—	—	—	–.05	–.11	.25	.05	.20	.22
Fruit Distraction II: time (seconds)	.64***	.59***	73***	.40**	69***	.68***	.57***	.63***	.51***	.74***
Fruit Distraction III-II: time (seconds)	.23	.34**	–.09	.08	.62***	.38**	4]**	.23	.18	.13
Fruit Distraction IV-II: time (seconds)	43***	.50***	.19	.31*	.29*	.13	.42**	.20	.45**	.40**
Fruit Distraction: recalls	–.17	–.17	–.17	–.27	–.03	.12	–.27	.50***	.17	.45***
Leveling-Sharpening: first stop	.29*	.52***	.04	.11	.34**	.62***	.38**	.09	.44***	.26
Leveling-Sharpening: number correct changes	.60***	54***	.17	.26	59***	.34**	45***	.35**	47***	59***
Leveling-Sharpening: ratio	.58***	.65***	.23	.41**	.58***	.19	.48***	.36**	.52***	.72***
Leveling-Sharpening: number A changes	.28*	.11	.37**	–.18	.36**	.04	.13	.03	.51***	–.10
Leveling-Sharpening: number B changes	–.09	–.06	–.04	–.11	–.14	–.10	.09	–.07	.24	.14
Leveling-Sharpening: number A + B changes	.22	.39**	.21	–.25	.16	.26	.23	.14	.41**	.41**
Object Sort: total groups	.05	.32**	.34*	–.14	.38*	.22	.07	.10	–.14	.43**
Object Sort: typical groups	.10	.22	.23	–.09	.44**	.28**	.29*	.10	–.06	.43**
Object Sort: atypical groups	.15	.00	.28	.03	.13	.00	.20	–.04	.05	–.22
Object Sort: miscellaneous groups	–.12	–.08	.15	–.20	.35**	–.17	–.10	–.27	.31*	.21
Object Sort: mean developmental score	.54***	.15	.24	–.19	.40**	.10	.24	.27	.28	.40**
Object Sort: additional atypicals	.07	.07	–.20	–.06	.24	.14	.23	.30	.00	.41**

*p= .10.

**p= .05.

***p= .01.

The findings suggest several general conclusions concerning the stability of the cognitive control tests devised. First, a fair degree of stability is observed with each test from year to year. As might be expected, a higher degree of agreement is usually observed between test scores of one year and scores obtained in the very next year. Coefficients tend to be lower when comparing test performance in kindergarten or first grade with performance in fourth or fifth grade. Of all the tests, the Object Sort Test shows the lowest degree of stability over the 5 year period. The number of groups a child used to conceptualize the information displayed, and the developmental ranking of these groups (from concrete to abstract), were most noticeably stable between the first and second grades and again between the fourth and fifth. Overall these results suggest that the tests are fairly stable through much of latency.

In considering the degree of stability represented by these coefficients, one should note a number of situational factors that could have contributed both to the stability and the lack of stability observed. First children were tested individually in a room in their school, and each examiner attempted to establish appropriate rapport before beginning the testing. These factors would contribute to the stability of scores. However the examiners varied from year to year, and there were male and female examiners. An effort was made to provide adequate training to the examiners in administering the test; as might be expected, however, some examiners were quite skillful in relating to children and in administering tests, while others were of average or marginal skill. Multiple examiners would contribute to the instability of the tests. Of course there are the usual situational factors such as the time of day the child was tested, whether he or she had just finished gym or mathematics or was about to enter these activities, and so on. In spite of the many sources that might contribute to the instability of measures, an impressive degree of stability was observed.

If we shift our view of these data from an interest in test-retest reliability to the issue of the stability of cognitive controls over time, a hypothesis is suggested for future study by the pattern of intercorrelations obtained. The cognitive controls of tempo regulation, focal attention, and field articulation develop more or less in a continuous course from the kindergarten year (age 5) to the fifth grade (age 10). In contrast, the equivalence range principle, concerned with the conceptual organization of information, appears to move through a discontinuous course. This principle is unstable, undergoing change from the kindergarten year to the first grade. At this time the child’s unique cognitive structures involved in conceptualizing information are in a state of flux. The control then achieves a stable organization from the first grade to the second. Following this it undergoes another period of reorganization until the fourth and fifth grades, when the structure again stabilizes.

TWO ADMINISTRATIONS OVER A 4 YEAR PERIOD OF THE BASIC BATTERY OF COGNITIVE CONTROL TESTS

Another study compared the test performance of two groups of public school children tested for the first time during kindergarten and for the second time in either the third *(N*= 31) or fourth *(n* = 29) grade. The children were selected for retesting from among larger groups in a study of children rated initially by kindergarten teachers as typical learners or at risk in developing learning problems. This study is discussed in detail in Chapter 9. Here we consider only the test-retest coefficients obtained.

In 1970-1971 and again in 1971-1972 the entire kindergarten populations entering a suburban public school system serving primarily middle-class, Caucasian children, were administered a battery of cognitive control tests. The 1970 group consisted of 150 children judged by teachers to be typical learners, and 34 to be at risk or suspect in terms of developing difficulty with learning. In the 1971 group were 108 typical learners and 56 suspects. (These are the same populations discussed in Section III and described in Tables 7 and 8.) In 1974-1975, the 1970 group was attending the fourth grade, and the 1971 group the third grade. Retests were administered to 29 fourth graders (16 typical learners and 13 suspects) and 31 third graders (17 typical learners and 14 suspects). Kindergarten test scores were correlated with third or fourth grade test scores, as indicated, with the typical learners and suspects combined for each year.

Table 25 presents the correlations obtained. In general, each of these groups shows some stability in test performance, with the 1970 sample exhibiting the greatest degree, as suggested by the number of significant coefficients obtained. Of the several procedures, the Scattered Scanning Test shows the lowest degree of stability.

The inverse relationship observed with the Object Sort Test between kindergarten and follow-up assessments deserves special attention. With both groups, children who constructed many groups to categorize objects during kindergarten tended to construct fewer groups several years later, and vice versa. Although the size of the correlations is small, the same direction is observed in the correlation involving number of typical and number of atypical groups. Interpreted in terms of the concept of the equivalence range cognitive control, these relationships lead us to ask whether children who, at a young age, manage information conceptually by using many, narrow categories tend to use broader categories at an older age, and vice versa. The implications of this inverse developmental relationship in breadth of categorizing behavior are discussed in Chapter 7, which reviews age studies.

Table 25. Test-Retest Reliability of Cognitive Control Tests: Kindergarten Measurers Compared with Third and Fourth Grade Measures

Score	1970-1971 Sample, K x 4, N=29	1971-1972 Sample, K x 3, N=31
Fine Motor Delay I: time (seconds)	–.24	–.11
Fine Motor Delay II-I: time (seconds)	.08	.20
Motor Tempo: time (seconds)	.37*	.08
Scattered Scanning: number correct	49**	.27
Scattered Scanning: mean distance (cm)	.19	.21
Scattered Scanning: total distance (cm)	.27	.23
Scattered Scanning: ratio I	.07	.15
Scattered Scanning: ratio II	.03	.18

Fruit Distraction II: time (seconds)	75**	58**
Fruit Distraction III-II: time (seconds)	.13	.05
Fruit Distraction IV-II: time (seconds)	.17	43**
Fruit Distraction: recalls	.11	.24
Leveling-Sharpening: first stop	49**	.13
Leveling-Sharpening: correct changes	.40*	.37*
Leveling-Sharpening: ratio	46**	.21
Leveling-Sharpening: number A changes	44**	.14
Leveling-Sharpening: number B changes	–.02	.17
Leveling-Sharpening: number A + B changes	.41**	.12
Object Sort: total groups	–.36*	–.21
Object Sort: typical groups	–.14	–.35*
Object Sort: atypical groups	–.20	–.01
Object Sort: miscellaneous groups	.11	.16
Object Sort: mean typical score	.17	.33*
Object Sort: additional atypicals	.02	.06
Object Sort: additional miscellaneous	.32*	.25

As with the first longitudinal retest study discussed, different examiners were involved in the two evaluations considered here. Given this factor, which would contribute to the instability of measures, and given the results of the previous study indicating the greatest stability between one year and the very next one, we would not have expected a very high correlation between kindergarten scores and scores obtained 3 and 4 years later. Yet some scores show an impressive degree of stability, with the Leveling-Sharpening Test showing the highest.

TWO ADMINISTRATIONS OF THE LEVELING-SHARPENING HOUSE TEST OVER A 1 WEEK PERIOD

Some evidence for the stability of the Leveling-Sharpening House Test is also provided in a study conducted by Guthrie (1967) designed to explore changes in leveling-sharpening functioning associated with changing environments and stress (parachute jumping). Since this study is discussed in detail in Chapter 9, we consider here only the data that relate to the stability of the House Test.

Guthrie administered the House Test to 44 male novice sport parachutists (mean age: 19 years; mean education: 13 years). Twenty-two of these constituted the experimental group because they were scheduled to perform a jump during the next week. These subjects were administered the House Test at home and then 6 or 7 days later at the airport before they were to execute a jump. The 22 controls, also sport parachutists, were administered the House Test in their homes and again 6 or 7 days later in their homes.

To test the assumption that the House Test provides a stable measure in nonstress and stress situations, the performance obtained in the first test session was correlated with that of the second, obtained one week later. A significant positive correlation was found in the performance of the controls between sessions 1 and 2 ($r = .67$; $p = .01$) and for the experimental subjects ($r = .70$; $p = .01$). These results suggest that the House Test yields a highly stable measure over a short period of time in both stress and nonstress conditions.

THREE ADMINISTRATIONS OF THE LEVELING-SHARPENING HOUSE TEST OVER A 4 WEEK PERIOD

Further evidence of the stability of the Leveling-Sharpening House Test in both stress and nonstress conditions is provided by Shapiro's study (1972) on alternate test forms and studies of consistency. As described in the previous section, three groups of 15 boys each were evaluated on three separate occasions in this study. The first evaluation took place in the child's home, the second occurred one week after the first, either in a hospital, in a dentist's office, or at home (for the control sample). The third evaluation was made three weeks after the second at the child's home.

By correlating a child's House Test scores of one evaluation with those of the others, we have another opportunity to study the stability of the House Test over a 4 week period and in stress and nonstress conditions. In terms of our discussion of adaptation within the biodevelopmental framework (Chapter 2), we could ask whether a child shows the same leveling-sharpening control tendency when functioning in an environment that is average and expectable (his home) and when functioning in an environment that is not average or expectable (a hospital or dentist's office).

Table 26 presents the correlations obtained by Shapiro. Coefficients of .29 and .38 are significant at the .05 and .01 levels of confidence, respectively. Overall, the results show that the House Test measures are quite stable over a 4 week period and when administered in very different environments. The one exception is the first stop score, which did not show stability in two of the comparisons.

Table 26. Reliability (Correlation Coefficients) of the Leveling-Sharpening House Test Over Three Evaluations in Stress and Nonstress Environments: Home, Hospital, Dentist Office

Score	Time 1 x Time 2	Time 2 x Time 3	Time 3 x Time 4
First stop	.02	.36	–.12
Number of correct changes	.76	.74	.60
Ratio	.61	.80	.55
Number of A changes	.73	.68	.56
Number of B changes	.35	.64	.28
Number of A + B changes	.65	.82	.52

As might be expected, there is slightly higher agreement in general between evaluations that occurred close in time (first and second testings; second and third testings) than between evaluations that were separated by four weeks.

Combining the results of Guthrie's study with college-age novice parachutists and Shapiro's with latency boys, we have considerable evidence for the stability of House Test measures in several stressful, atypical environments.

Comment on Reliability (Consistency and Stability) of Cognitive Control Tests for Children. The investigations conducted thus far to study directly the stability of cognitive control test scores are encouraging. The scores provided by each of the five tests of cognitive controls appear reasonably stable over a period of 5 years with latency children. Short-term stability has also been observed with older individuals. Moreover, the Leveling-Sharpening House Test appears to provide very stable measures when administered in different environments, both stressful and nonstressful (i.e., schools, hospitals, dentists' offices, airports, and homes of the subjects).

Although much more needs to be done to study reliability (especially of each cognitive control test in different environments), the evidence gathered thus far suggests that the clinician and the investigator can use the cognitive control tests with some assurance of obtaining stable measures.

It is in the area of exploring the consistency of the cognitive control tests devised that the most work is needed. Alternate forms have been successfully constructed for the Leveling-Sharpening House Test, but alternate forms are still required for the other tests. Studies of alternate forms should reassure the clinician that the content selected for each of the cognitive control tests is an effective assessor of the cognitive principle in question. Further studies that establish the effectiveness of alternate forms would furnish alternative tests to the practitioner and investigator, to be used when it became necessary to conduct a reevaluation with a different but equally effective procedure.

CONCLUDING REMARKS

This chapter considers a number of studies that relate directly to the issue of criterion validity and reliability of the tests of cognitive controls devised for children.

Several approaches were taken to demonstrate criterion validity. In one, studies explored the relations between cognitive control tests and tests of other cognitive functions. We observed that cognitive control tests did not correlate with all other cognitive tests studied; rather, they correlated selectively, revealing patterns of relations that supported their validity. In another set of studies cognitive control tests were correlated with teacher ratings of children's behavior, which served as independent criterion. Again cognitive control tests related selectively to ratings of attentiveness in the classroom, knowledge of classroom routine, and degree of restlessness in the classroom, adding further validating support. Last, as another approach to exploring criterion validity, the cognitive tests were used to distinguish between various populations: orphaned and brain-damaged children and public school children who were typical learners or experiencing academic difficulty.

One study showed that performance with several cognitive control tests was not related to whether a child was cognitively impulsive or reflective as these traits were defined by Kagan. Other work demonstrated that performance on the cognitive control tests devised for children was not significantly influenced by several needs or personality dispositions: to do the very best, to do what others expect, to assume responsibility for one's academic failure, versus to blame others, to seek novelty and change, to conform, to become anxious when taking tests.

Other research addressed the relations between performance on the cognitive control tests devised for children and sex, IQ scores, academic skill scores, and socioeconomic status. No consistent differences were observed between the test performances of boys and girls. We did however recognize, in response to one study, the need to study differences in cognitive control functioning associated with psychosexual identity and the concordance or discordance of this variable with gender. This approach takes advantage of the conceptualization of cognitive controls as mediators between personality and cognitive functioning.

In terms of cognitive controls and intelligence and academic skills, the findings of several studies suggested the relations involved here: that tests of cognitive controls do not measure what tests of intelligence and academic skills measure, and that cognitive controls are cognitive strategies that underlie IQ and academic skills tasks that rely on cognitive control strategies for their solution. In addition to observing that the construct of cognitive controls and the construct of intelligence represent different domains of behavior, we also noted several unique ways in which the two interrelate.

Other studies suggested that socioeconomic status and social deprivation were related to cognitive control functioning. These findings support the concept that cognitive controls develop in part as a function of life experiences and point up the need to study further the match or mismatch between cognitive control strategies of children from different socioeconomic settings and the informational demands of the school they attend.

In terms of reliability, we considered a number of studies that furnish encouraging support for the proposal that the tests of cognitive controls devised for children yield scores that are consistent and stable over time (up to 5 years) and in a variety of environmental contexts (home, school, hospital, dental office, airport).

Finally, as the clinician and researcher consider the evidence accumulated thus far to explore the reliability and validity of the tests devised and to evaluate the possible value of these in their work, it should also be noted that the studies were conducted in several geographic areas in the United States (Midwestern urban and rural areas; Eastern urban and suburban areas), with several SES levels (low, middle, and high), with both black and white children, and with children of several ethnic backgrounds. Although these variables were not the subject of study (except for SES), the tests have proved to be effective in a wide geographic range and with children from various life settings.

7

THE DEVELOPMENT OF COGNITIVE CONTROLS

To this point we have discussed the concept of cognitive controls, we have examined evidence supporting the construct validity of this concept, and we have reviewed data that support the criterion validity and reliability of the methods devised to assess cognitive control functioning in children. Influenced by the biodevelopmental framework, which we have selected as our roadmap in an effort to approach cognition "dynamically," we have also remained alert, when examining data, to the relations between cognitive controls and the regulation of affects, life experiences, situational factors, various personality dispositions, psychosexual identity, intelligence, and academic skills.

The factor analytic approach helped us to conclude that when dealing with a variety of cognitive tasks, children appear to employ consistently, as a preference, some level of cognitive organization: from active-extensive scanning to passive-narrow scanning (focal attention cognitive structure), from directing attention at both relevant and irrelevant information to limiting attention to relevant information (field articulation cognitive structure), from maintaining global and fluid to articulate and stable memory images of changing information (leveling-sharpening cognitive structure), and from using many and narrow to few and broad categories to conceptualize information (equivalence range cognitive structure).

But we have not yet considered cognitive controls in terms of the one concept that lies at the core of the biodevelopmental framework, namely, the concept of multiple modes and goals and stages of development. Unless we do this, we will not go beyond nosology, as we had hoped in Chapter 3, in our diagnoses of cognitive functioning from the viewpoint of cognitive controls. Unless we consider cognitive controls in terms of changes in development and individual differences, assessing and labeling a child as a leveler or a sharpener, or as a narrow scanner or broad scanner, would simply serve to qualify him for membership in a diagnostic category. Our aim is to illustrate that the biodevelopmental viewpoint takes us beyond determining the presence or absence of traits, in providing a view of levels or stages of cognitive functioning through which a child can move, regressively or progressively, in development and in dealing with changing environments.

This chapter examines data that pertain to the question of whether cognitive control functioning defines developmental stages. Before proceeding it may be useful to recapitulate the concept of multiple modes and goals and stages of development. The biodevelopmental framework assumes the broad proposition that whenever development occurs, it follows an inherent course of change from a state of relative globality and lack of differentiation to a state of increasing differentiation, articulation, and hierarchic integration. This proposition in turn leads to the assumption that each behavioral system undergoing change, in our case cognitive controls, can be ordered along continua that define stages of maturity in terms of differentiation. The developmentally immature individual functions with a mode that is global and undifferentiated, whereas the developmentally more mature individual functions with a mode that is more differentiated and articulate. In recalling the concept of stages of differentiation, we should bear in mind discussions in previous chapters which make clear that global modes (immature) do *not* represent “badness” or “inadequacy” any more than differentiated (mature) modes are the equivalent of “goodness” or “adequacy.” The concept of stages limits itself to defining the organizational changes that occur in some behavioral response in the course of development. Whether one or another stage is more or less adequate relates to the concepts of adaptation and mobility of function (see Chapter 4).

One convenient and effective way of examining whether a behavioral mode undergoes change that can be viewed in terms of differentiation is to assess that mode in children at different age levels. This approach reflects the assumption that children of a younger age represent immature psychological states and older children represent more mature psychological states.

Applying the foregoing discussion to our interest in cognitive controls, several questions become apparent. Do children at different ages show differences in cognitive control functioning? If they do show differences, can these be interpreted in terms of the developmental proposition of differentiation and stages of development? That is, does the functioning of each cognitive control, as measured by the tests devised, appear to be global and undifferentiated when young children are examined, and more differentiated and articulated when older children are examined ? If the answer to this question proves to be affirmative, we might be able to begin to identify stages of development for each cognitive control. As we considered in Chapter 3, knowledge about stages of cognitive control development should be of considerable use to the clinician. With information about the cognitive control functioning typical of a particular age, the practitioner has some basis on which to decide whether a given child patient is lagging in the development of a control or is operating precociously at a more advanced stage. From this diagnostic information, the clinician could then attempt to determine whether the lagging, or precocious, control is serving adaptive failure, and if so, what treatment method might reorganize the control to obtain a better fit with stage expectations and adaptive success.

Let us now turn to available data that relate to the questions we have asked. For convenience, the research is discussed in two sections: cross-sectional studies that examine the cognitive control functioning of groups of children representing different age levels, and longitudinal studies of the cognitive control functioning of the same group of children followed over some period of time. Before considering this work, a few comments about methodological issues that surround the variable of age are in order. The chronological age of an individual has generally represented one of the most popular independent variables used in child development research; there is increasing dissatisfaction, however, with research based on the paradigm that behavior is a function of age (e.g., Kessen, 1960; Wohlwill, 1970a, 19706). Among the issues is the criticism that investigators have tended to view the correlation between an age level and some behavioral response as indicating that age causes or determines the response. For example, if the vocabulary level of 4 year olds is observed to be 100 words and that of 6 year olds, 400 words, the finding is often represented explicitly or implicitly as indicating that reaching the age of 6 years determines the increase in knowledge of words. In this way, age is given the status of an independent variable influencing the dependent variable— in this case, vocabulary level. A moment's reflection tells us that many factors other than age contribute to or influence the acquisition of vocabulary.

Wohlwill's (1970*a*, 1970*b*) theoretical and methodological discussions have been most helpful in dealing with this criticism. He points out that age should not be viewed as an independent variable, nor as a shorthand for other variables supposedly determining behavioral changes observed to occur "as a function of age." Rather, Wohlwill proposes, age should be viewed as part of the dependent variable. In elaborating the proposal this author notes that in studies of forgetting, for example, psychologists do not assume that some behavior that indicates forgetting is determined by time; instead, they regard forgetting behavior as an integral part of the variable of time. In terms of our example, Wohlwill would say that the increase in vocabulary from 100 to 400 words is not determined by time (i.e., increase in age); the increase in vocabulary represents in fact a change in vocabulary behavior that is a part of the variable of time. Therefore one needs to follow the changes (increases or decreases) in vocabulary that occur as part of time and to plot the course of these changes.

To help us with this point of view concerning age and with this task of plotting the course of changes, Wohlwill offers the concept of "developmental function," which refers to the *form* of the relationship between an individual's age at different points in time and the changes that occur in his response on some particular dimension of behavior over the course of his life.

This concept is valuable in prescribing several methodological steps an investigator should follow in pursuing the question of changes in some behavior with development. First the researcher should observe and describe the organization of the behavior under study at various points in the life span, noting whether these organizations or behavioral forms show quantitative and qualitative differences. Then it is necessary to establish whether the various forms of behavior observed at different points in time define some overall pattern of change or function (e.g., monotonically increasing, inverted U-shaped, S-shaped, etc.) and to record the approximate age periods within which each differentiable phase of the function is contained. Once the investigator has described the pattern of changes, or the developmental function, particular attributes of the age changes observed may be related to various independent variables, whether experimentally induced and manipulated or studied *in natura.*

If we consider vocabulary development as an example, the investigator would first establish the function that describes changes in vocabulary size observed in children, let us say from the ages of 2 to 7 years. Let us assume that the function the investigator plots over this 5 year period is S-shaped. The experimenter could now take this S-shaped function as a dependent variable and use it to study the influence expected to be exerted on this time function of vocabulary changes by various independent variables. For example, the investigator could study the vocabulary changes of three groups of children: one participates in preschool language curriculum A, one participates in preschool language curriculum B, and one does not enroll in preschool but begins formal education in a kindergarten program. The developmental functions, or changes in vocabulary, exhibited by these three groups could then be compared. Or the investigator could compare the rate of change and functions defined by the vocabulary development of twins versus sibs versus unrelated pairs of children. The dependent variable then, in both examples, would be the direction and rate of change in vocabulary size (the developmental function defined by the changes in vocabulary observed). The investigator might be interested in periods of highest rate of change, inflection points, or ages at which asymptotes are reached, as these or other variables relate to the independent variables of presence or absence of preschool training, type of preschool language training, and being a twin, a sib, or an only child.

Relating these considerations to the development of cognitive controls, our interest in age studies does not include the view that achieving a particular chronological age determines or causes the achievement of a particular level of cognitive control functioning. Rather, our interest is in discovering whether cognitive controls change in form over periods of time—that is, with age. The first task, then, is to gather observations to aid in determining whether quantitative and qualitative changes in the organization of each cognitive control occur in uniform and consistent ways across a wide range of individuals and environmental conditions. That is, if we observe the cognitive control functioning of several different populations of children over time, do they show similar developmental functions? A second task would be to gather data indicating how situational, experimental, or organismic variables (independent variables) relate to selected parameters of these developmental functions. For example, does the rate of change of some cognitive control (and the shape of the function that describes these changes) differ among children who have lived in family homes and among those who were raised in an orphanage? Does the rate of change of some cognitive control (and the shape of the function that describes the changes) differ among children who have received dissimilar types of cognitive training?

The cross-sectional and longitudinal studies described below provide us primarily with information that concerns the first task, namely, whether changes in the form of each cognitive control occur at different age levels, and whether these changes form a pattern. Chapter 7 and especially Chapter 9 also consider observations on the relation between some independent variable and differences in developmental changes observed.

It should be borne in mind that the cross-sectional method, though probably easier to employ than the longitudinal, has several limitations. If a difference in the form of some behavioral response is observed between, let us say, 4 year olds and 6 year olds, one must assume that in two years the 4 year olds will show the same response now observed in the 6-year-old group. One must also assume that the two age groups are similar in respects other than age and that there are no cohort differences (i.e., differences in populations of children born four years ago as opposed to six years ago in the locations at which the samples were obtained). In spite of these limitations, cross-sectional studies can supply valuable clues about developmental functions. Thus cross-sectional studies of age and cognitive control functioning can help us to probe into and explore this unknown area.

Longitudinal observation is by far the best method that enables the investigator to explore the developmental functions describing changes that take place with age in behavioral dimensions (Wohlwill, 1970). Since the individuals remain the same over time, we have the opportunity to isolate more carefully changes in a particular behavioral response, as long as our assessment method remains more or less consistent. I have conducted three separate longitudinal studies that assist us in going beyond previous cross-sectional investigations in exploring the developmental changes characteristic of each of the cognitive controls.

In considering these age studies, finally, we should recall from our discussion in Chapter 4 that although numerous developmental data have been reported concerning cognitive styles (especially the style of field dependence-independence), very little developmental information has been reported about cognitive controls. Therefore we have no empirical base from which to hypothesize whether developmental changes are or are not defined by cognitive controls. We do have a theoretical base from which we could hypothesize that each control follows a developmental course from global to more differentiated functioning. The following discussion of age studies assumes that the reader has detailed familiarity with the assessment methods and the results presented in Chapters 5 and 6.

I. CROSS-SECTIONAL AGE STUDIES

Public School, Orphaned, and Brain-Damaged Children

Preliminary information concerning stages of cognitive control development is provided by our examining the relation between age and cognitive control test scores produced by the public school, orphaned, and brain-damaged populations of children who participated in the first three factor analytic studies discussed in Chapter 5 (see also a discussion of the relation between IQ and the cognitive control test scores of these children; Chapter 6). The 44 public school children (23 boys and 21 girls) ranged in age from 7 to 12 years (mean age, 10 years; SD = 2.4). The 36 orphaned children (18 boys and 18 girls) ranged in age from 6 to 13 years (mean age, 9-6 years; SD = 2.7). The 44 braindamaged children (32 boys and 12 girls), enrolled in a private special-education center, ranged in age from 6 to 13 years (mean age, 11 years; SD = 2.0).

These children were administered a battery of cognitive control tests (Table 1, Chapter 5), and the 29 test scores (including IQ and age) of each population were intercorrelated and factor analyzed. The main findings of these three factor analyses are discussed in Chapter 5. Here we consider only the data pertaining to the issue of the relation between age and cognitive control test performance. Since each group consisted of children ranging in age from 6 years to early adolescence, the correlation of age and cognitive control test scores and factors in which age played a role should provide clues about the development of cognitive controls.

When factor analyzing the test scores, both the public school and orphaned children produced a factor in which age played an appreciable role. The brain-damaged children produced a factor in which IQ played a dominant role and age a minor role (Table 1).

Table 1. Age and Cognitive Control Factors: Public School, Orphaned, and Brain-Damaged Children

	Factor Loadings		
Test	Public School Children	Orphaned Children	Brain-Damaged Children
(Age)	.62	.78	.47
IQ (WISC)	.05	.03	.85
Leveling-Sharpening A	–.13	–.22	—
Leveling-Sharpening B	.35	.40	—
Leveling-Sharpening C	.00	–.10	—
Fruit Distraction A	–.68	–.61	–.14
Fruit Distraction B	–.51	–.58	–.13
Fruit Distraction C	–.02	–.09	.00
Fruit Distraction D	–.44	–.73	–.06
Fruit Distraction E	–.20	–.18	.02
Circles A	–.26	–.60	–.20
Circles B	.49	.25	.26
Circles C	.09	.29	.21
Stromberg A	.14	.33	.38
Stromberg B	–.40	–.34	–.07
Stromberg C	–.52	–.47	–.38
Continuous Attention A	–.63	–.58	–.50
Continuous Attention B	–.65	–.38	–.18
Continuous Attention C	–.71	–.76	–.61
Fine Motor Delay A	.12	.30	.42
Fine Motor Delay B	.14	.40	.27
Fine Motor Delay C	.00	.32	.09
Autokinetic Test	.00	–.17	–.18
Memory for Spatial Orientations of Designs	.45	.73	.61
Benton Visual Retention	.38	.69	.84
Exploded Block Design A	–.16	–.30	.12
Exploded Block Design B	.48	.87	.93
Incomplete Figures	.65	.51	.85
Marble Board	.38	.90	.95

Let us first examine the age factors produced by the public school and orphaned children, noting in particular the direction and magnitude of the loadings of the four cognitive control tests included. The direction of the loadings indicates that older children (the factor loading listed for age is positive) detected the first change in the series of wagon scenes earlier (Leveling-Sharpening Test A is negative), and they detected more changes (Leveling-Sharpening Test B is positive). On the other hand, the younger children detected the first change later in the series, and they detected fewer changes. The leveling-sharpening ratio does not produce a meaningful loading in this age factor.

In terms of the Fruit Distraction Test of field articulation, the older children took less time (the loadings are negative) to name the colors of each of the distraction cards versus the respective control cards (Test A, Cards II-I; Test B, Cards IV-I; Test C, Cards IV-II; Test D, Cards III-II), indicating they tended to ignore irrelevant information. The younger children took more time to name the colors of each distraction card versus the control card, indicating that they paid attention to the irrelevant information. In both populations, moreover, older children recalled fewer peripheral pictures incidentally (Test E, Card III), and younger children recalled more; this finding supports the postulated age trend that the younger child tends to be indiscriminate in attention deployment and the older child more selective.

With the Circles Test A of focal attention, the higher the score, the more errors in size estimation, and the more narrow and passive the scanning. The loadings indicate that older children (age is positive) showed broad, systematic scanning (the negative loading indicates few errors). Younger children showed narrow, unsystematic scanning when judging the pairs of circles. With Circles Tests B and C, the higher the score, the more strongly the context circle influences the perception of the inner circle, giving rise to the illusion that the standard is larger than *its actual size.* The loadings of Tests B and C suggest the same age trend: that older children scan more broadly than younger children.

The loadings of the Fine Motor Delay Test suggest several age trends. The younger child delays moving a pencil over a pathway very little during a slow trial versus a trial that requires “regular” tempo (Test A) and also delays little when emotionally toned words are spoken by the examiner. The older child delays much more when moving a pencil during a slow trial and when emotionally toned words are spoken. Although the other tests listed in Table 1 are not viewed as measures of cognitive controls, a number of them played meaningful roles in supporting the construct validity of cognitive controls (see Chapter 5). In all cases the factor loadings of these tests support the age trends defined by cognitive control measures. For example, the Benton Visual Retention Test played a major role in the factor defined by leveling-sharpening test measures in which leveling-sharpening was designated as a basic cognitive principle. In Table 1 the loading of the Benton test indicates that older children drew designs accurately from memory, and younger children drew designs containing many errors and omissions. This relation between the Benton test and age agrees with the age trend defined by the leveling-sharpening measures that also reveal the exactness and stability of memory images maintained over time.

It should be noted that with both the public school children and the orphaned children, IQ appears in this age factor with near zero loadings. This finding agrees with the studies discussed in Chapter 6, which suggest that cognitive controls define a domain of cognitive activity that is independent of the intellectual activity measured by intelligence tests. That is, a child with a high IQ could show a preference, for example, for narrow scanning or for broad scanning, as could a child with a low IQ.

The age factor produced by the braindamaged children, however, is dominated by the WISC IQ score, and age has a secondary role (Table 1). An inspection of the factor produced by the brain-damaged children shows relations between IQ plus age and each cognitive control that are the same as those produced by public school and orphaned children between age alone and cognitive controls. This observation suggests that with the condition of brain damage, stages of cognitive maturity are defined by both intellectual efficiency and age, and that accordingly stages of cognitive control preferences are related to both IQ levels and age. Further study of this finding is in order.

To appreciate the significance of these age or "developmental" factors, recall that the total factor space produced by each of these populations with the measures listed in Table 1 defined cognitive organizations that met the definitions of cognitive control principles (see Chapter 5). It now appears that in addition to producing these cognitive control factors, the public school and orphaned populations produced an age "developmental" factor, and the brain-damaged children an IQ — age "developmental" factor. Based on this factor analytic result, it may be hypothesized that the cognitive controls defined are organized in terms of age levels. The following age trends or directions of developmental change are suggested by these preliminary data: the young child shows a cognitive preference to scan narrowly and passively, to direct attention at relevant and irrelevant information, to form global images in memory of information, and to impose little delay on motility; the older child shows a cognitive preference to scan broadly and actively, to direct attention selectively at relevant information, to form differentiated memory images of information, and to impose more delay on motility.

The same developmental trends are suggested by the correlations between cognitive control test scores and age for each of the three populations. The coefficients are presented in Table 2 for the reader who may have use for the relationship between a particular cognitive control test score and age.

Table 2. Correlations Between Cognitive Control Test Scores and Age of Public School, Orphaned, and Brain-Damaged Children

Score	Public School Children, N = 44	Orphaned Children, N= 38	Brain-Damaged Children, N = 44
Fine Motor Delay II-I	.21	.32*	.26
Circles (9 mm)	–.20	–.46**	–.31*
Circles (9/12 mm)	–.49**	–.38*	–.02
Circles (9/45 mm)	.02	–.29	.10
Fruit Distraction III-II: time (seconds)	–.47**	–.50**	.16

Fruit Distraction III-II: errors	–.03	–.17	.04
Fruit Distraction IV-II: time (seconds)	–.19	–.10	.20
Fruit Distraction IV-II: errors	–.04	.40*	–.14
Fruit Distraction: food recalls	.02	.09	–.16
Fruit Distraction: nonfood recalls	–.12	–.39*	–.25
Fruit Distraction: total recalls	–.10	–.18	–.28
Leveling-Sharpening Wagon, Elements Omitted: first stop	–.13	–.43**	—
Leveling-Sharpening Wagon, Elements Omitted: number correct changes	.39**	.54**	—
Leveling-Sharpening Wagon, Elements Omitted: ratio	–.31*	–.57**	—
Leveling-Sharpening Wagon, Elements Added: first stop	–.08	–.42**	—
Leveling-Sharpening Wagon, Elements Added: number correct changes	.52**	.66**	—
Leveling-Sharpening Wagon, Elements Added: ratio	–.60**	–.59**	—
Leveling-Sharpening Circles: first stop	–.30*	–.28	—
Leveling-Sharpening Circles: number correct changes	.46**	.15	—
Leveling-Sharpening Circles: ratio	—.45**	.20	—

*p = . 05.

**p = .01.

Typical Public School Children, 6, 9, and 12 Years Old

In addition to the relations suggested by the factor and correlational analyses between cognitive controls and age, a study (Santostefano and Paley, 1964) comparing public school children aged 6, 9, and 12 years also examined age differences in cognitive control functioning. There were 20 children (10 boys and 10 girls) in each age group. The 60 children were selected randomly from a public school serving a middle to lower SES area of a large Midwestern city. All children showed normal visual acuity as measured by the standard visual acuity chart (American Optical Company), and all children were judged by teachers to be average in school performance and typical in social adjustment. The age groups were matched approximately for intelligence by means of the California Test of Mental Maturity.

Mean IQ

	6 Year Olds	9 Year Olds	12 Year Olds
Boys	115	105	107
Girls	114	105	103
Total	114	105	105

In individual sessions, each child was administered the Circles Test of focal attention (Appendix B), the Fruit Distraction Test (Cards II and III), and three tests of leveling-sharpening used in the early phase of our work: the Wagon Test, Elements Omitted, the Wagon Test, Elements Added, the Leveling-Sharpening Circles Test (Appendix B for a description of these methods). We consider here only the observations made of age differences; Chapter 6 covers differences in test performance between boys and girls (section on sex differences in cognitive control functioning).

In the Circles Test of focal attention, the child is asked to examine pairs of circles and judge which is the larger. With each presentation, a standard circle with a radius of 9 mm is paired with one of 11 variable circles; the radii range in half-millimeter increments from 7 to 12 mm. The left-right location of the standard is randomized, as is the order of variables. As discussed in Appendix B and in the presentation of factor analytic studies (Chapter 5), a high score indicates poor performance in size estimation, and this is interpreted as narrow, passive scanning. A low score indicates accurate performance, which is interpreted as broad active scanning.

The 6 year olds showed least accurate size estimation (mean = 12.78, SD = 7.62). The 9 year olds showed more accurate size estimation (mean = 8.65, SD = 4.91), and the 12 year olds showed the most accurate size estimation (mean = 7.15, SD = 2.66). When examined by analysis of variance, these age differences were found to be significant ($F = 5.67$; $p = .01$). Both boys and girls showed the same age progression. Interpreting performance with the Circles Test of focal attention in terms of factor analytic findings, these age means suggest that the cognitive control principle of focal attention undergoes stages of development. Narrow-passive scanning characterizes the younger child (cognitive immaturity). With an increase in age and presumed cognitive maturity, the control of focal attention reorganizes and differentiates through stages characterized by more active and broad scanning.

In the Fruit Distraction Test of the field articulation cognitive control, a time difference score was obtained for each child by subtracting time taken to name the colors on Card II (baseline card) from time taken to name the colors on Card III (containing peripheral, distracting, irrelevant pictures). A large difference is interpreted as indicating that attention is not withheld from the irrelevant pictures and selectively directed at the colors; a small difference is interpreted as indicating that attention is selectively deployed at the information designated as relevant (colors). The 6 year olds showed the largest time difference (mean = 7.8 seconds, SD = 7.6), the 9 year olds the next largest (mean = 7.3 seconds, SD = 4.5); and the 12 year olds the smallest (mean = 3.8 seconds, SD=1.3). An analysis of variance revealed that these age differences are significant ($F = 4.74$; $p = .05$). Both boys and girls exhibited the same progression.

Errors made with each card in naming colors were also compared. The 6 year olds produced the largest error difference score (mean =1.6, SD = 2.1), the 12 year olds next largest (mean = 0.9, SD = 1.5), and the 9 year olds the smallest (mean = 0.6, SD = 1.5). These differences are not significant.

The number of irrelevant pictures recalled after Card III is removed is also taken as a measure of the extent to which attention is directed toward or withheld from these peripheral distractions. Because the distributions of recalls of irrelevant pictures for each group were not normal, a nonparametric median test was employed to examine age differences. The 6 year olds recalled the largest number of irrelevant pictures (median = 2.8), the 9 year olds were next (median = 2.1), and the 12 year olds recalled the fewest (1.5). These differences fall short of significance.

When the content of the objects recalled is examined by age, an interesting observation becomes available. The peripheral, distracting objects displayed on Card III are of two types: food-related (e.g., bottle of milk, spoon) and non-food-related (e.g., chair, car) items. The 6 year olds recalled the largest number of food objects (median = 1.4), the 9 year olds the next (median = 1.1), and the 12 year olds the fewest (median = 0.6), differences that are significant with a chi square analysis (x^2=6.40; p = .05). Nearly the same age progression was observed with nonfood objects recalled, but the differences are not significant (6 year olds' median = 1.3; 9 year olds' median = 0.8; 12 year olds' median = 1.0).

In summary, with the Fruit Distraction Test the 6 year olds showed a significantly greater time delay in naming the colors on Card III versus Card II; they made more errors, and they recalled more irrelevant, peripheral objects (significantly more of those that were food related). The 12 year olds were delayed least by peripheral distractions in naming colors on Card III, made fewest errors, and recalled fewer peripheral, irrelevant objects. The means of the 9 year olds fall between the older and younger groups. These age differences suggest that the field articulation cognitive control defines stages of development with age. The more or less indiscriminate deployment of attention at relevant and irrelevant information appears to be a stage of field articulation functioning characteristic of the young child (or cognitive immaturity). With age, this cognitive control reorganizes and differentiates, and the older child, more and more, deploys attention selectively at relevant information and withholds attention from irrelevant information.

In the studies of the leveling-sharpening cognitive control, performance with the Wagon Test, Elements Omitted, the Wagon Test, Elements Added, and the Circles Test of leveling-sharpening by each age group was evaluated in terms of the three standard scores used in the leveling-sharpening assessment method: first stop score, number of correct changes reported, and leveling-sharpening ratio. As described in Chapters 5 and 6, detecting the first change late in the series of displays, detecting few correct changes, and calling them out only after they have been present in a number of displays, are behaviors indicating that global memory images are being formed of information and present information is being fused with memory images of past information. On the other hand, if the first change is detected early in the series of displays, and if many changes are detected, and reported soon after they first occur, differentiated memory images are being constructed and present information is being articulated from memory images of past information. (Chapter 6 discusses the relation among these three tests of leveling-sharpening and between these procedures and the Leveling-Sharpening House Test, which was modeled after them.)

In terms of the first stop score, on the Leveling-Sharpening Wagon Test, Elements Omitted, the 6 year olds reported perceiving the first change latest in the series of presentations (mean: 14th display), the 9 year olds earlier (mean: 12th display), and the 12 year olds earliest (mean: 11th display), but these differences fall short of significance.

However 6 year olds reported fewest correct changes (mean = 2.8), 9 year olds more (mean = 3.4), and 12 year olds most (mean = 5.0), and these age differences are significant *(p* = .01). With regard to the leveling-sharpening ratio, as noted in Chapter 5, a high ratio means that few changes were detected, and these were reported many displays after the change was introduced (leveling process). A low ratio means that many changes were detected, as soon as they first appeared or only a few displays later (sharpening process). The 6 year olds had the highest ratio (mean = 10.2), the 9 year olds a lower one (mean = 9.7), and the 12 year olds the lowest (mean = 8.2), differences that reach significance *(p* = .01).

The age differences obtained with the Leveling-Sharpening Wagon Test, Elements Added, were replicated when the test method introduced changes in ongoing information by adding elements to the information. The 6 year olds reported their first change later (mean: 8th display), detected fewer changes (mean = 2.8), and showed the highest ratio (mean = 17.8). The 12 year olds reported their first change earliest (mean: 5th display), reported more changes (mean = 6.2), and showed the lowest ratio (mean = 2.0). The 9 year olds fell between, the respective means are: 7th display, 4 correct changes, 5.8 ratio. An analysis of variance of each of these test scores showed that all age differences are significant at the .01 level of confidence.

When the task required that the child detect small increases in the size of a circle gradually introduced over time (Leveling-Sharpening Circles Test), essentially the same results were obtained. Again the youngest children reported a change later in the sequence of presentations, reported fewer changes in size, and showed the highest ratio score (changes were detected some time after they first occurred). The oldest children reported a change in size earliest in the sequence of displays, noticed the most changes, and identified them as soon as they appeared. The 9 year olds fell between these two groups in performance. Although the age differences observed with the Circles Test parallel those obtained with the Wagon Test, only the first stop score age difference with the Circles Test reached significance*(p* = .05); as noted in Chapters 5 and 6, this is one of the findings that suggested that the stimulus of familiar objects is more effective than geometric shapes in assessing leveling-sharpening.

Taken together, the results obtained with each test strongly support a leveling-sharpening developmental trend: the younger child (cognitive immaturity) is characterized by the tendency to form global images of information and to fuse present information with past. With age, there appears to be a gradual change toward constructing more sharply articulated memory images of information and differentiating present information from memory images of past information, permitting the detection of subtle changes.

The Object Sort Test was also administered to each child to explore developmental trends in the equivalence range principle. (These results were not included in the original reports of this cross-sectional age study.) Each of the scores provided by the Object Sort Test was evaluated by means of an analysis of variance (Chapters 5 and 10 discuss Object Sort Test scoring). The means and standard deviations for each age group are presented first, for each score, followed by an interpretation of the age differences observed.

Total Number of Groups Constructed. 6 year olds =13.4, SD = 3.8; 9 year olds=11.1, SD = 3.2; 12 year olds =12.4, SD = 3.6 *(F*= 2.16; *p*= 12). The difference between 6 and 9 year olds is significant; the other age contrasts are not. These results suggest a U-shaped developmental function from many groups (narrow category width) characterizing the younger child, to fewer groups (broad category width) characterizing the middle latency child, to many groups (narrow category width) characterizing the late-latency child.

Total Number of Typical Groups Constructed. 6 year olds =11.4, SD = 3.1; 9 year olds = 9.8, SD = 4.1; 12 year olds =10.0, SD = 3.1 *(F*= 1.30; *p = .21).* The difference between 6 and 9 year olds approaches significance *(p* = .09). In terms of number of groups constructed that reflect logical, realistic categorizing, the trend is toward fewer groups with age. The trend should be examined along with those shown by the other types of grouping designated by the scoring system (i.e., atypical and miscellaneous groups).

Total Number of Atypical Groups Constructed. 6 year olds =1.0, SD = 1.4; 9 year olds = 0.7, SD = 0.9; 12 year olds = 0.8, SD = 0.8 (F=.38, *p = .*68). None of the separate age contrasts reached significance. With this population of age groups, there does not appear to be an age trend in number of atypical groups formed.

Number of Miscellaneous Groups Constructed. 6 year olds = 0.9, SD = 1.2; 9 year olds = 0.5, SD = 0.7; 12 year olds=1.7, SD = 2.5 (F= 2.28; *p* = .10). The difference between the 9 and 12 year olds approaches significance *(p* = .07).

In considering these results, we should recall that the scoring category “miscellaneous groups” identifies clusters of objects that reveal incomplete, conceptual thinking but no evidence of illogical conceptualizing. The various miscellaneous scores (see Chapter 10) are assigned to aspects of equivalence range functioning that could be viewed as early or immature stages of logical, conceptual thinking. The developmental function generated by the results is U-shaped. There is a decrease in miscellaneous groupings from ages 6 to 9 years, followed by a sharp increase at age 12, This trend raises the question of whether the increase in miscellaneous thinking at 12 years of age represents preparation for a major reorganizing of the equivalence range principle, which occurs in a subsequent stage. That is, do we observe a sharp developmental advance, with realistic thinking occurring at a higher conceptual level, after the age of 12 years? We revisit this question when we discuss longitudinal studies reported later in this chapter.

Number of Additional Atypical Scores. 6 year olds = 4.2, SD = 1.8; 9 year olds = 3.4, SD = 0.9; 12 year olds = 3.5, SD = 1.6 *(F*= 1.87; *p* = .16). The difference between 6 and 9 year olds approaches significance *(p* = .08).

The “additional atypical” score is assigned to a minor part of a cluster of objects which reflects atypical thinking, whereas the cluster, as a whole, reveals logical, realistic thinking (e.g., placing real and toy tools into one group and labeling them as “to fix things”). The results of this cross-sectional age study suggest a developmental trend of a decrease in additional atypical scores with age.

Mean Developmental Typical Score. 6 year olds = 4.6, SD = 0.6; 9 year olds = 4.9, SD = 0.6; 12 year olds = 5.1, SD = 0.6 *(F*= 2.22; *p* = .11). The difference between the 6 and 12 year olds is significant *(p* = .03).

The "mean typical" score reflects the average level of abstraction represented by the labels a child assigns to each cluster of objects (judged to be realistic or typical) to explain or conceptualize how they belong together. In the seven-point scale used, a score of 1 is assigned to the most concrete conceptualization, and a score of 7 to the most abstract.

The results suggest a developmental function: with an increase in age there is an increase in level of abstraction when conceptualizing information.

Mean Breadth Score in Categorizing Information. 6 year olds= 1.6, SD= 1.2; 9 year olds = 3.0, SD = 2.9; 12 year olds = 2.2, SD=1.4 *(F*= 2.37; *p* = .10). The difference between the 6 and 9 year olds approaches significance *(p* = .06).

The "mean breadth" score was devised to assess the breadth or width of categories a child imposes on information when conceptualizing it. As noted in Chapters 4 and 5, other workers have typically used the number of groups a child imposes on the 44 objects that make up the Object Sort Test as an index of category width. Forming many groups with the objects has been taken to indicate the use of "narrow" categories, whereas forming few groups has been taken to indicate the use of "broad" categories.

The mean breadth score goes a step further in an attempt to assess this aspect of equivalence range (see Chapter 10). In brief, the mean number of objects placed in each typical group constructed is multiplied by the mean level of abstraction (mean developmental score) represented by the typical groups formed. This value is then divided by the total number of typical groups constructed. The breadth score as a ratio, then, takes into account not only the number of groups imposed on the 44 objects but also the number of objects placed in each group, and the level of abstraction represented by each group. A low breadth score indicates narrow categorizing; a high score, broad categorizing.

An inverted U-shaped developmental function is suggested by the results obtained here. Relatively narrow categorizing is associated with the 6 and 12 year olds, and broader categorizing with the 9 year olds.

In summary, the results of this first cross-sectional age study of children 6, 9, and 12 years old suggest the same age trends, as did the factor analytic and correlation studies, for the principles of focal attention, field articulation, and leveling-sharpening. The younger (cognitively immature) child is characterized by narrow scanning when sampling information, by attending to relevant and nonrelevant information in the face of distractions, and by constructing global images of information in memory when required to hold information over time. The older child (more cognitive maturity) is characterized by broad scanning, by selectively attending to relevant information and withdrawing attention from nonrelevant information, and by constructing more differentiated images of information in memory.

In addition, the present study explored developmental trends for each of the components of the equivalence range principle as articulated by the factor analytic studies discussed in Chapter 5: (*a*) the width of categories used when forming realistic concepts, (*b*) the level of abstraction revealed by a realistic category, (*c*) the use of unrealistic, atypical categories, and (*d)* the use of preparatory, incomplete levels of realistic categorizing.

In terms of the issue of category width, the number of typical groups formed a U-shaped function. This function is inversely related to the trend observed with the breadth score, which defined an inverted U-shaped function. Therefore the two functions are internally consistent and if taken together suggest that the use of narrow categories characterizes the 6 year old; following this stage, breadth of categorizing reorganizes, and more broad categories are used by 9 year olds; this is followed by another change in function, and narrow categories again dominate among 12 year olds.

In describing level of abstraction assigned to groups constructed, the trend with age is from concrete to more abstract labels used to explain how objects go together.

The use of illogical, unrealistic categories did not reveal a developmental trend. Categorizing behavior that is rated as incomplete, and preparation for more fully formed realistic conceptualizing (miscellaneous groups), showed a U-shaped developmental function, and more of this type of cognitive behavior characterized 6 and 12 year olds than 9 year olds.

Kindergarten, First, and Second Grade Public School Children Experiencing Academic and School Adjustment Problems

Another cross-sectional study compared cognitive control test performances among three groups of elementary school children who were experiencing academic and school adjustment difficulties. The children were attending kindergarten, first, or second grade at three public schools located in a large Eastern city and serving a middle to low SES area. The total sample consisted of 40 boys and 56 girls (16 black and 80 white). The 96 children ranged in WISC IQ from 64 to 121 (mean IQ = 94.8, SD = 12.2). Three age levels were represented; 5.5 years, 6.5 years, and 7.5 years. Table 3 presents demographic information for each age group (cognitive control test performance differences associated with IQ and sex in this population were considered in Chapter 6).

Table 3. Demographic Characteristics of Elementary Public School Children Experiencing Academic and School Adjustment Problems

	Age Groups		
Variable	I	II	III
Number of Children	31	32	33
Girls	19	14	20
Boys	12	18	13
Age range (months)	64-72	73-84	85-101
Mean age (months)	67.9	77.7	91.7
Age SD	3.3	3.4	5.2
Mean IQ	93.3	95.9	95.0

IQ, SD	10.9	11.4	14.3

In individual sessions, the children were administered four tests of cognitive controls: the Fine Motor Delay Test, the Circles Test of focal attention, the Fruit Distraction Test, and the Leveling-Sharpening House Test. The testing was done by three female examiners in rooms provided by the schools.

Table 4. Age Differences in Cognitive Control Test Scores of Public School Children Experiencing Academic and School Adjustment Problems

	Age Group I		Age Group II		Age Group III							
Score	Mean	SD	Mean	SD	Mean	SD	F(1 x 2)	*p*	F(1 x 3)	*p*	F(2 x 3)	*p*
Fine Motor Delay I: time (seconds)	28.4	13.3	27.9	15.0	33.6	21.90	1.26	NS	2.69	.01	2.14	.05
Fine Motor Delay II-I: time (seconds)	12.1	11.0	14.8	14.3	21.3	23.09	1.68	.08	4.39	.01	2.62	.01
Circles (9 mm), no illusion	4.7	3.1	4.2	2.9	4.3	3.0	1.15	NS	1.09	NS	1.06	NS
Circles (9/12 mm), positive illusion	6.2	5.8	5.5	3.9	6.2	3.7	2.09	.05	.43	NS	1.16	NS
Circles (9/45 mm), negative illusion	-5.7	7.4	-4.0	6.4	-1.4	7.0	1.36	NS	1.11	NS	1.23	NS
Fruit Distraction I: time (seconds)	94.3	28.6	100.8	46.2	61.1	19.3	2.61	.01	2.19	.01	5.73	.01
Fruit Distraction II: time (seconds)	99.5	30.4	100.2	46.1	61.3	21.5	2.30	.02	2.00	.05	4.58	.01
Fruit Distraction II-I: time (seconds)	5.2	18.0	-0.7	42.4	0.2	17.11	5.53	.01	2.11	.05	6.14	.01
Fruit Distraction III-II: time (seconds)	11.8	22.2	2.5	34.5	7.1	17.23	2.42	.02	1.66	.08	4.01	.01
Fruit Distraction IV-II: time (seconds)	79.8	53.2	56.8	34.8	61.9	36.8	2.33	.02	2.09	.05	1.12	NS
Fruit Distraction II-I: errors	0.8	5.2	1.2	6.4	-0.2	2.8	1.54	NS	3.33	.01	5.12	.01
Fruit Distraction III-II: errors	-0.3	4.5	-0.7	5.9	0.9	2.85	1/74	.06	2.50	.01	4.35	.01
Fruit Distraction IV-II: errors	2.1	6.7	3.1	8.3	3.3	5.02	1.55	NS	1.79	.06	2.78	.01
Fruit Distraction: recalls	1.4	1.6	1.3	1.6	1.3	1.17	1.01	NS	1.78	.06	1.77	NS
Leveling-Sharpening: first stop	17.9	11.2	19.8	12.4	19.5	10.26	1.22	NS	1.19	NS	1.45	NS
Leveling-Sharpening: number correct changes	7.3	2.9	7.2	3.3	7.5	3.00	1.25	NS	1.09	NS	1.14	NS
Leveling-Sharpening: ratio	20.6	4.4	21.2	3.9	20.4	3.85	1.21	NS	1.28	NS	1.06	NS

Table 4 gives the means and standard deviations of each test score for each age group and the *F* ratios and *p* values associated with each age group comparison. On the Fine Motor Delay Test the youngest age group took the least time to draw a line through the maze at their regular tempo (showing a rapid, regular tempo); the older age groups took progressively more time (showing slower regular tempo). However when asked to draw the line as slowly as possible, while always maintaining forward movement, in the second trial, the oldest group showed the most delay, the youngest the least delay, and the 6 year olds fell between. These age differences are statistically significant. In terms of a developmental trend, the results suggest that when measured with a task of fine motor movement, motility changes from a rapid “regular tempo” characterizing the cognitive control preference of the 5 year old, to the increasingly slower “regular tempo” apparently characterizing the control preference of the 6 and 7 year olds. Delay of fine motor movement, however, changes from little delay to greater delay within this age range.

On the Circles Test of focal attention, only the negative illusion subtest revealed the same age trend observed in the previous study. The 5 year olds showed narrow, passive scanning, with the 6 and 7 year olds giving evidence of progressively broader and more active scanning. The results with the positive illusion condition generate a U-shaped trend. The 5 year olds showed narrow, passive scanning with this subtest; the 6 year olds showed more broad and active scanning; but the 7 year olds shifted back to more narrow and passive scanning.

On the Fruit Distraction Test, the time the children took to name the colors on Card I (rectangles) and Card II (fruit colored correctly) generates inverted U-shaped trends. The 6 year olds took more time than the 5 year olds to name the colors on Cards I and II, and the 7 year olds took the least time. When distractibility scores are computed by comparing time taken to name the colors on one of the distraction cards with that of the respective baseline card, U-shaped trends are revealed (Cards II-I, Cards III-II, and Cards IV-II). The 6 year olds tended to give less attention than did the 5 year olds to the shapes of the fruit on Card II, to the peripheral, irrelevant pictures on Card III, and to the incorrect colors on Card IV (i.e., they were less distracted); but the 7 year olds gave more attention than did the 6 year olds to irrelevant information (i.e., they took longer to name the colors on Cards II, III and IV).

When errors made in naming colors are used as the measure of field articulation cognitive control functioning, linear age trends are observed. Table 4 shows that when managing irrelevant information on Card III (peripheral pictures) and Card IV (incorrect colors), the 5 year olds made fewest color-naming errors, and the 6 and 7 year olds committed progressively more errors. Last, no meaningful trend was observed in the number of peripheral pictures recalled by each group after Card III was removed. Each group recalled about the same number.

To summarize, the Fruit Distraction Test *time* scores show an inverted U-shaped trend reflecting a tendency to attend to, then ignore, and then attend to irrelevant information. The Fruit Distraction Test *error* scores show a linear trend with age, from few to many errors made in naming colors. These age trends in field articulation functioning disagree with those shown by the typical public school children in the previous study discussed. There we observed that both time and error scores defined linear developmental trends, from the young child who is characterized by indiscriminate attention deployment to the cognitively more mature child, who shows a preference for selectively attending to relevant information only. A comparison between these age trends is not appropriate, however, because the age levels involved differ. In the present study, the age levels (5, 6, and 7 years) cover a time span surrounding one age group (6 year olds) of the previous study. We consider the possible significance of the age trends in field articulation shown by the children, who were experiencing academic and social difficulty, in the critique at the close of this chapter and after we have reported other observations at the same age levels.

These 5 to 7 year olds did not show the same age trend on the Leveling-Sharpening House Test observed in the previous study with the performance of 6 to 12 year olds on the related Leveling-Sharpening Wagon and Circles Tests. The three age groups detected the first change at about the same point in the series of house scenes; they detected about the same number of correct changes, and after about the same lag.

To summarize this study of three age groups, from 5 to 7 years, of public school children experiencing academic and adjustment problems, fine motor delay showed the same developmental progression observed in the previous study: from a rapid to a slower "regular" tempo and from little to more delay imposed on fine motility. Field articulation error scores (associated with the regulation of affect) displayed a developmental progression opposite that of the typical children discussed previously: an increase with age in attending to affective tensions as relevant information. Field articulation time scores indicated a developmental progression concerning the management of irrelevant information that was U-shaped rather than linear. There was some further evidence that focal attention development moves through stages from narrow-passive scanning to broad-active scanning; and leveling-sharpening failed to show age trends in the groups studied. These results are related to those of other studies in the critique at the close of this chapter.

Hospitalized Children

The next study examines age differences observed in the cognitive control test performance of 164 children, ranging in age from 4 to 17 years and representing all admissions to a psychiatric hospital for children over a 2 year period. The cognitive control test performance of these children was the subject of a factor analytic study (see Chapter 5, seventh factor analytic study); Chapter 6 covers the relations they showed between cognitive controls and measures of intelligence. An examination of their test performance in terms of age differences provides another opportunity to explore the development of cognitive controls in a psychopathological group. Moreover, this study enables us to examine age trends with two procedures that make up the basic battery of cognitive control tests (Scattered Scanning and Object Sort) which were not employed in the earlier age studies just discussed.

The children were admitted to the hospital primarily for diagnostic study. The hospital stay ranged from 2 to 9 months; the average stay was about 4 months. For the most part the subjects' psychological disturbances represented various character and borderline disorders, and the most typical diagnosis was tension-discharge disorder. Table 5 presents various demographic characteristics of the five age groups into which the total sample was divided. Only about half the children were administered the WISC, but intelligence levels of each group are believed to be representative of all the children. The 81 children who took the WISC ranged in IQ from 61 to 125 with a mean IQ of 97.9 (SD = 16.2).

Table 5. Demographic Characteristics of Hospitalized Children

	Age Groups				
Variable	I	II	III	IV	V
Number of children	14	16	32	59	43
Girls	5	2	10	22	24
Boys	9	14	22	37	19
Age range (years-months)	4-6 to 7-11	8-0 to 9-11	10-0 to 11-11	12-0 to 13-11	14-0 to 17-6
Mean age (years-months)	6-5	9-0	10-11	13-2	15-3
Age SD (months)	11.1	6.2	7.2	6.9	5.9
WISC verbal IQ					
Number of children	4	11	19	28	19
Mean verbal IQ	101.0	97.0	98.9	97.5	94.6
SD	14.0	11.8	16.5	15.1	19.0
WISC performance IQ					
Number of children	4	12	18	26	20
Mean performance IQ	99.8	98.3	103.8	100.8	93.6
SD	7.2	18.5	12.2	18.1	17.9

As part of the diagnostic work-up on admission, each of the 164 children was administered the five tests of cognitive controls described in Chapter 10, which became the basic battery used in our studies: the Fine Motor Delay Test, the Scattered Scanning Test (with the Motor Tempo Test), the Fruit Distraction Test, the Leveling-Sharpening House Test, and the Object Sort Test II. The tests were administered by about 10 different psychologists, trainees, and staff members. A list of the scores from each test can be found in Chapter 5, Table 9.

Before considering the age differences observed, it may be useful to note that the factor analytic study conducted of the same test scores (discussed in Chapter 5) did not produce an age factor. Rather, as was the case with the brain-damaged population discussed earlier, an age x IQ factor appeared, with these two variables producing loadings of 49 and 43, respectively. The factor loadings of the 25 cognitive control test scores on this age x IQ factor were quite small, ranging from 0 to 15. Only six of the variables produced a loading exceeding 10. From the point of view of factor analysis, then, age did not appear to be a significant dimension, with this population, around which cognitive control test performance was organized.

To pursue further the issue of the relation between age and cognitive controls in this sample of hospitalized children, the total group was divided into five age groups, and the age differences in each test score were examined by means of an analysis of variance. The age trends observed are presented in Figures 1 *A-Y.* Let us discuss each cognitive control in turn.

Fine Motor Delay Test (Figures 1 *A, B*)

When drawing a line at one's regular tempo, there is a significant linear progression with age from slow to rapid tempo, with the older adolescents showing a slight trend back toward a slower tempo. When the task involves drawing a line through the maze as slowly as possible, while maintaining continuous forward movement, there is a trend from little delay (characterizing the younger group) toward increased delay with age. The older adolescents showed a shift toward less delay. There appears to be an inverse relationship in this hospitalized group between regular tempo and delayed tempo. A slow, regular tempo is associated with little delay, whereas a more rapid regular tempo is associated with greater delay. This trend could be viewed as a progression from less differentiation in the function of motility and delay to more.

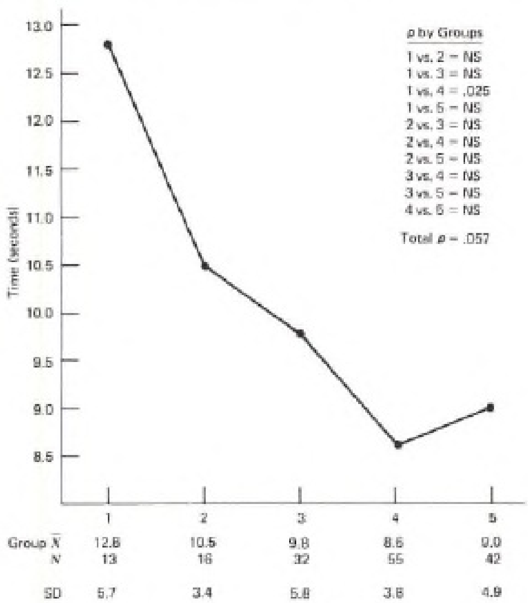


Figure 1A Fine Motor Delay Test I: time

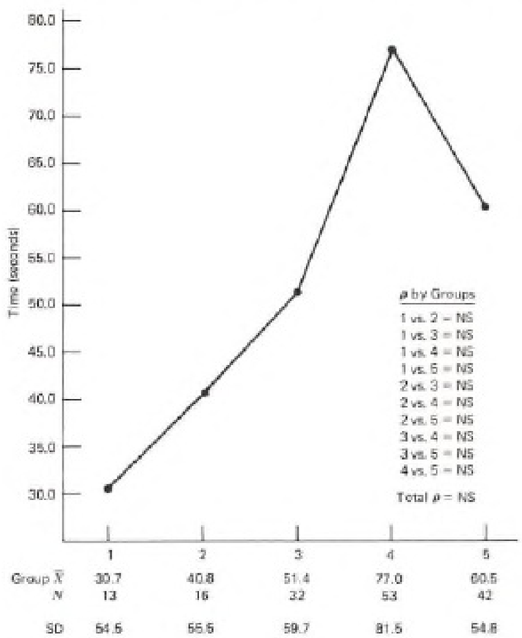


Figure 1B Fine Motor Delay Test II-I: time

Motor Tempo Test (Figure 1C)

The Motor Tempo Test (time taken to mark two rows of geometric shapes) is used partly to parcel out the motoric component of the Scattered Scanning Test. The results are essentially the same as those obtained with Fine Motor Delay I. The youngest group worked at the slowest tempo, and the older groups at increasingly faster tempos. Again the oldest group (late adolescents) showed a shift back toward a slow tempo.

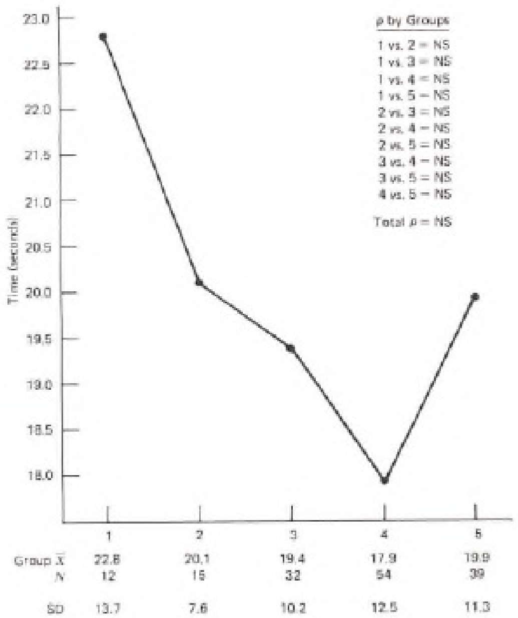


Figure 1C. Motor Tempo Test: time.

Scattered Scanning Test (Figures 1 *D–H*)

With age these children marked progressively more circles and crosses scattered randomly among other geometric shapes, and the distance covered by connecting the shapes that were marked also increased in a more or less linear fashion. The greatest change occurs between the 9 and 10 year olds; the groups older than 10 years gave similar performances, and the two groups under 9 years also gave similar performances.

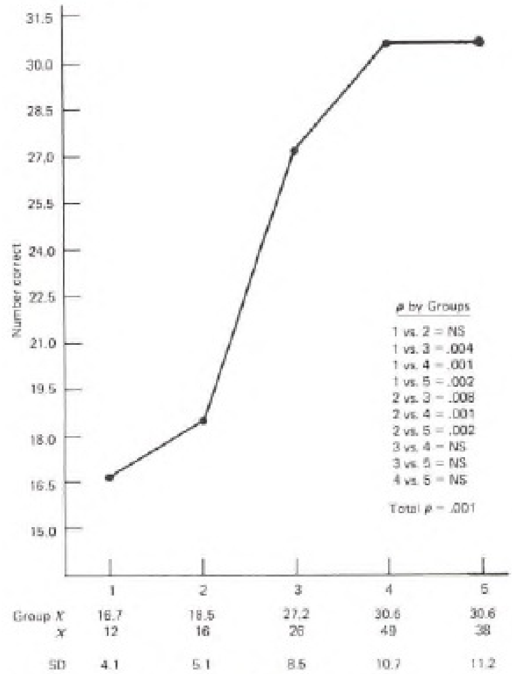


Figure 1D Scattered Scanning Test: number correct

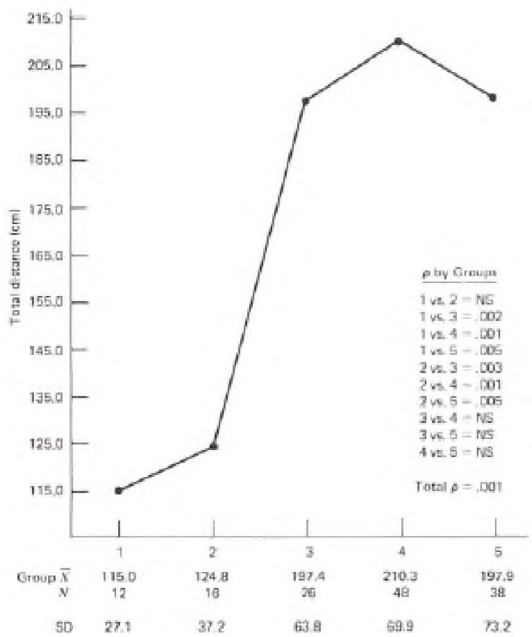


Figure 1E Scattered Scanning Test: total distance

The average distance between one circle or cross and the next one marked (the average breadth of one visual scan or sweep) shows an S-shaped trend (Figure IF). For both the 9-year-old group and the 15-year-old group the average single scan is narrow, whereas for the 6, 10, and 13 year olds the average single scan is broader.

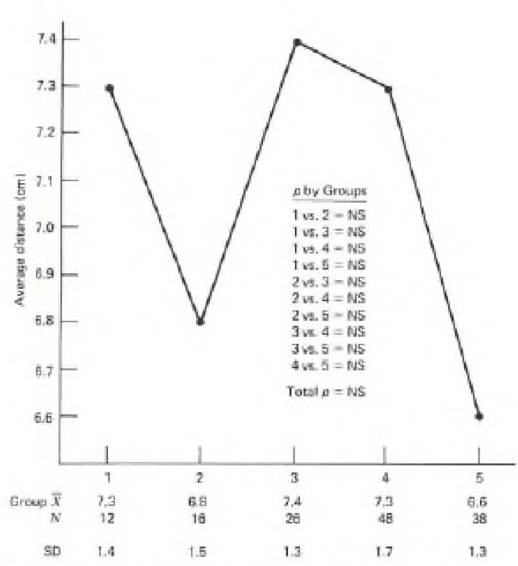


Figure 1F Scattered Scanning Test: average distance

When the number of circles and crosses marked and the total distance transversed take into account a child's motoric tempo in marking geometric shapes with a pencil (Figures 1*G, H*), the trends obtained are essentially the same as those of Figures 1 *D, E.*

These findings suggest that the developmental trends observed concern primarily visual scanning, the vigor or degree of activity in visual scanning (number of shapes marked), and the breadth of visual scanning (total distance traversed).

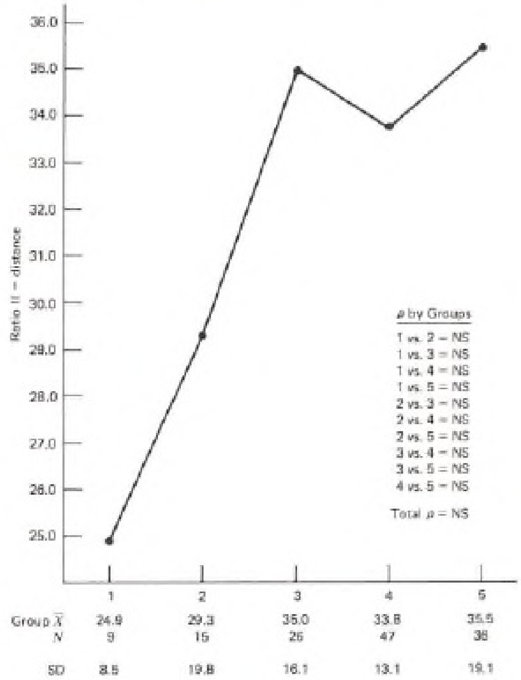


Figure 1G Scattered Scanning Test: ratio I (number correct)

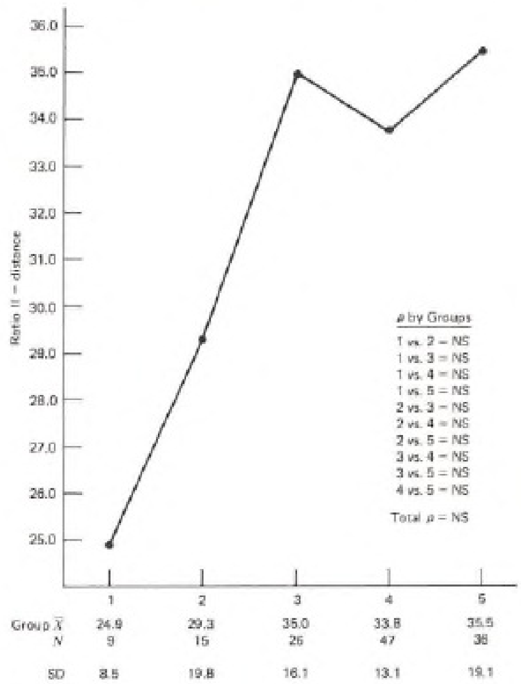


Figure 1H Scattered Scanning Test: ratio II (distance)

The performance of these hospitalized children with the Scattered Scanning Test suggests the same developmental trend indicated by the performance of typical public school children (study 2) and problem public school children (study 3) with the Circles Test of focal attention. This trend appears to follow a progression from a global to differentiated organization of focal attention. Passive, narrow scanning characterizes the scanning preference of the younger child, as opposed to the increasingly broader and more active scanning preferred by the older child.

Among these hospitalized children, however, the breadth of a single visual sweep shows an S-shaped trend. Although the youngest group (6 year olds) marked fewest circles and crosses and covered the smallest total distance when sampling the information presented on the sheet of paper, the average distance covered by a single visual scan or sweep from one piece of information to the next was as broad as that shown by two of the older groups (10 and 13 year olds), who marked many more circles and crosses and covered a larger total area. Similarly, although the oldest group (15 year olds) marked many circles and crosses and covered a large total distance, the average width of a single visual scan was as narrow as that of the 9-year-old group, which also showed a narrow, average scan, although they marked fewer circles and crosses over a small total distance of the informational field.

Fruit Distraction Test (Figures 1 I-O)

With Card II, the control card containing no distractions, there is a significant trend toward the more rapid naming of the colors with age. The distractibility scores obtained by comparing time taken to manage Card II versus Card III (peripheral irrelevant pictures) and Card IV (irrelevant incorrect colors) generate U-shaped trends that are suggestive of those observed with the public school children experiencing academic and emotional problems. With Card III, there is a trend to ignore the irrelevant pictures (smaller time difference) among the 10-year-old age group, then a slight shift back to devoting more attention to the irrelevant information. This trend is also suggested with the results of Card IV, except the shift toward attending to irrelevant information occurs with the adolescents.

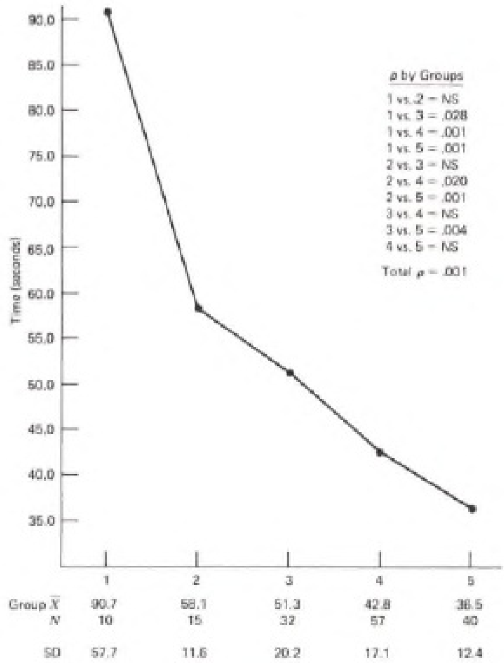


Figure 1I Fruit Distraction Test II: time

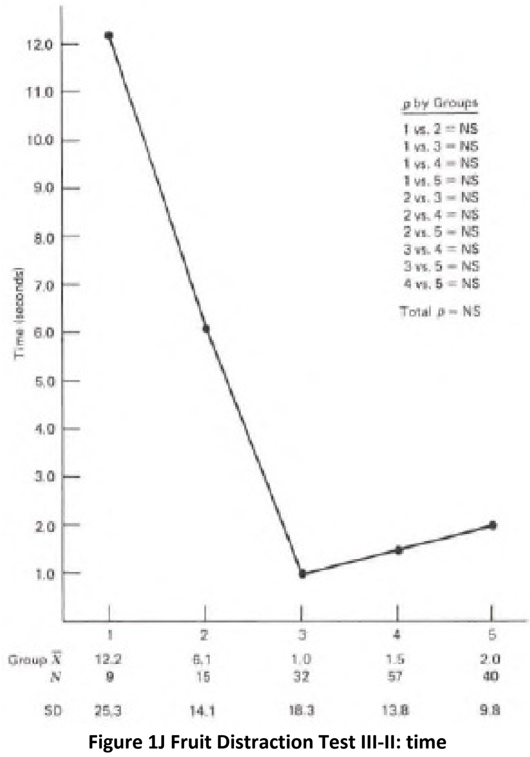


Figure 1J Fruit Distraction Test III-II: time

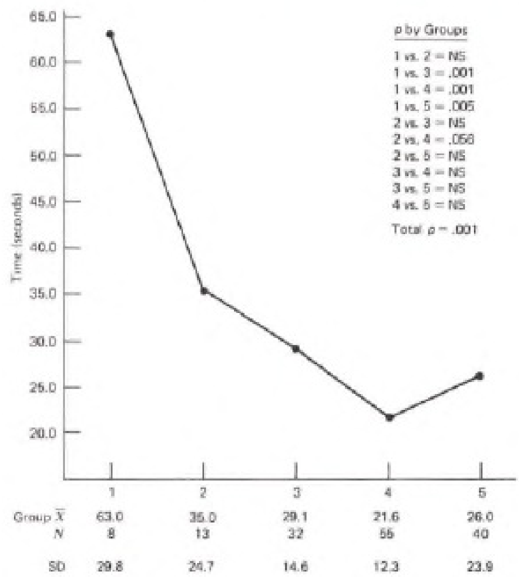


Figure 1K Fruit Distraction Test IV-II: time

In terms of the error scores, a decrease in color-naming errors is observed with age when the children manage the control Card II (Figure 1*L),* but the number of errors increases with age when the children manage irrelevant, distracting information (Figures 1 *M, N).* There is a very sharp rise in errors produced by the 9-year-old group, and the other three groups show a more gradual increase in errors with age. This trend of an increase in color-naming errors with age parallels that exhibited by the public school children with academic and emotional problems (study 3) and is the opposite of the trend demonstrated by typical public school children (study 2). Further studies are needed to explore the significance of an increase with age in naming errors in psychopathological groups and the relations between this trend and the regulation of affects. Last, the groups show no age trend in number of irrelevant pictures recalled after Card III is removed, except for the sharp rise that persists beginning with the 9 year olds.

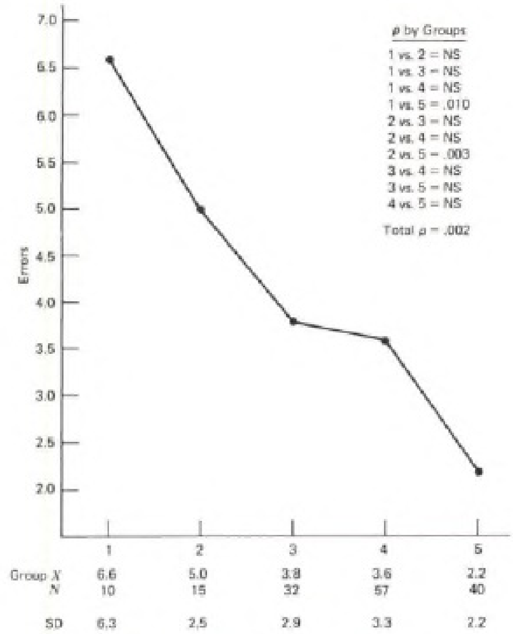


Figure 1L Fruit Distraction Test II: number of errors

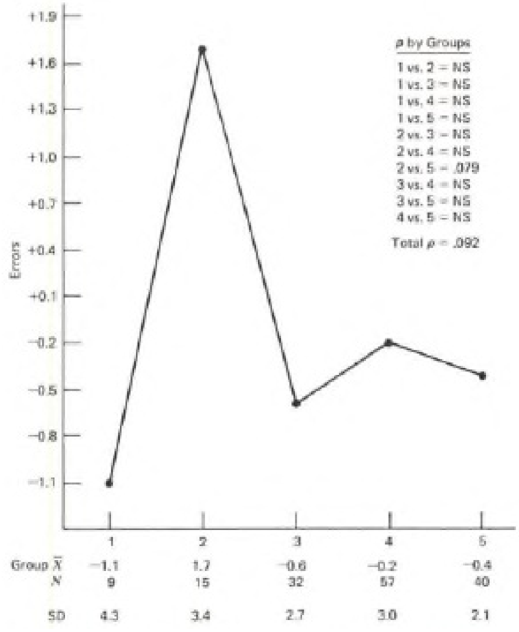


Figure 1M Fruit Distraction Test III-II: number of errors

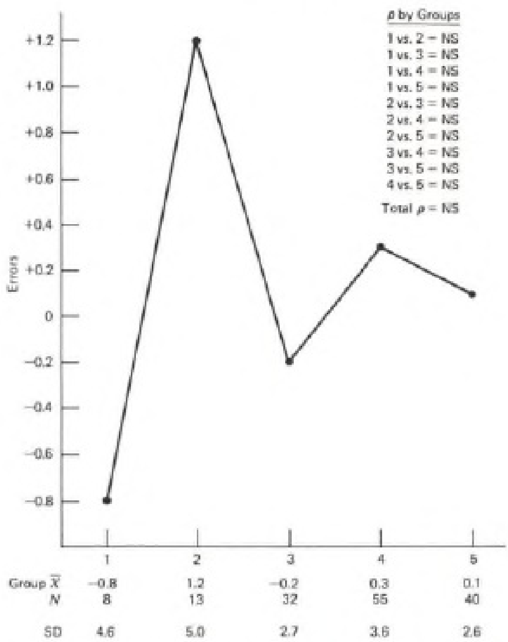


Figure 1N Fruit Distraction Test IV-II: number of errors

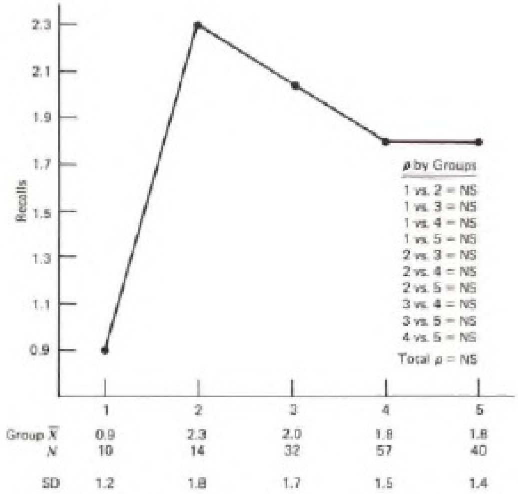


Figure 1O Fruit Distraction Test III: number of recalls

In summary, the results with this hospitalized group of children suggest that from the ages of 6 to 13 years the field articulation cognitive control undergoes a developmental progression paralleling that shown by the nonclinical children discussed thus far: from attending to both relevant and irrelevant information to attending selectively and ignoring irrelevant information. Beyond late latency through adolescence, the developmental course shifts toward more indiscriminate attention deployment. When irrelevant information is in the form of affects (as inferred from color-naming errors), there is an increased tendency with age for affects to be attended to and to distract cognitive functioning. This progression is opposite to that shown by the typical public school children (study 2).

Leveling-Sharpening House Test (Figures 1 P-U)

The three basic scores of this test (first stop, number correct, and ratio) do not reveal the age trends we observed with the typical public school children (study 2). There we saw a progression with age toward detecting the first change sooner, detecting more changes, and with little or no lag. Only the number of correct changes of these hospitalized children shows a trend with age (from few to many); but the trend fails to reach significance. Both the first stop score and the leveling-sharpening ratio suggest U-shaped trends. The younger and older age groups detect the first change later in the series, and lag in detecting changes (construct global images of information), whereas the middle age groups detect changes earlier in the series and do not lag in perceiving them. These trends are not significant, but they suggest directions for future study which are discussed in the critique at the close of this chapter.

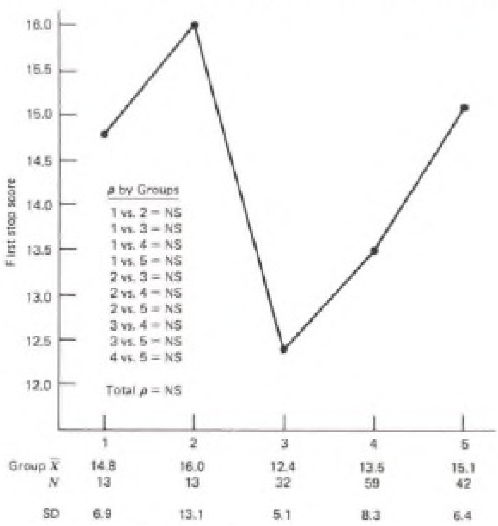


Figure 1P. Leveling-Sharpening House Test: first stop score.

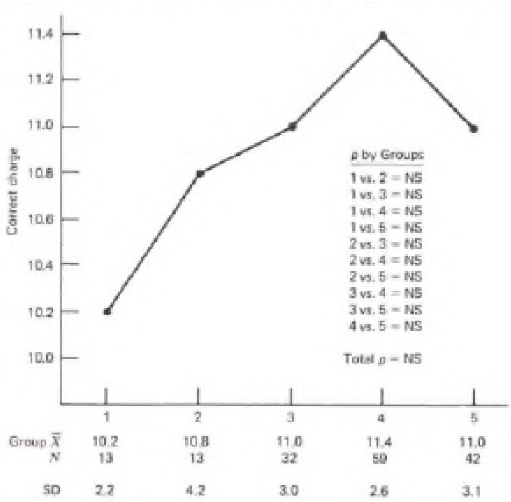


Figure 1Q. Leveling-Sharpening House Test: number of correct changes.

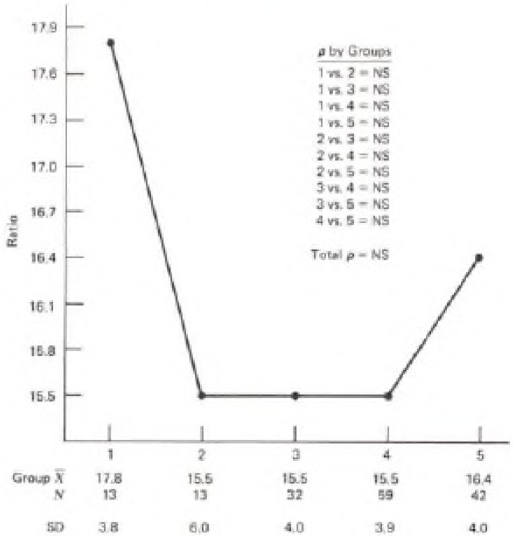


Figure 1R. Leveling-Sharpening House Test: ratio.

The number of A changes perceived (i.e., involving information that is contained in the house scene but in fact does not change) increases with age, but the trend is not significant (Figure 15). No systematic trends are suggested by the number of B changes perceived (involving information not contained

in the house scene) or by the total number of incorrect changes perceived. In considering the results involving incorrect changes perceived in the house scene, we should recall that the children in this study were hospitalized because of severe emotional disturbances and that the factor analytic study of their test performance suggested that they were uniquely characterized by the tendency to construct fluid memory images of information (A and B changes).

Therefore the role of this cognitive control preference in their psychopathological functioning may override any developmental progression characteristic of the component of leveling-sharpening concerned with constructing stable versus fluid memory images. We address this issue again in the next section, which reports longitudinal age studies.

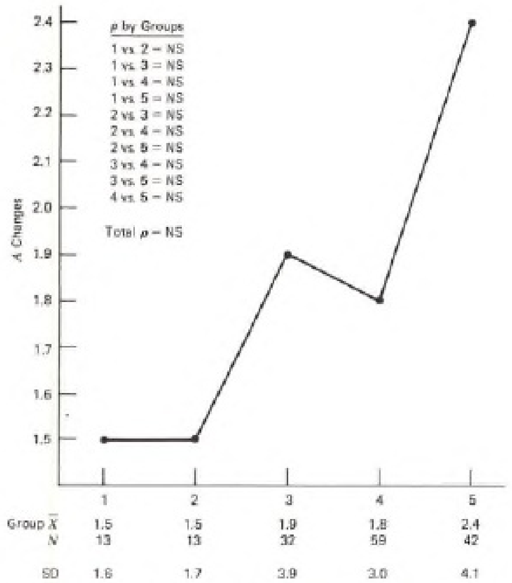


Figure 1S. Leveling-Sharpening House Test: number of A changes.

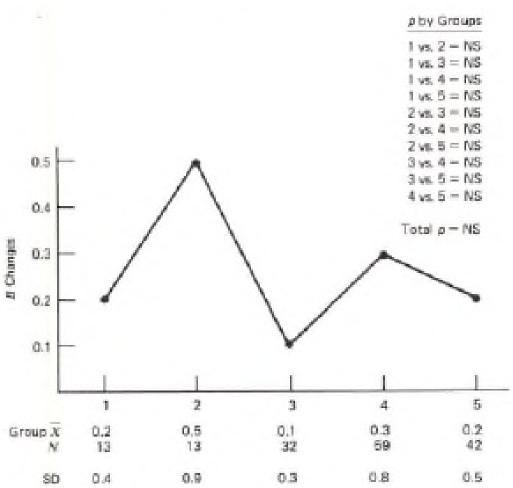


Figure 1T. Leveling-Sharpening House Test: number of B changes.

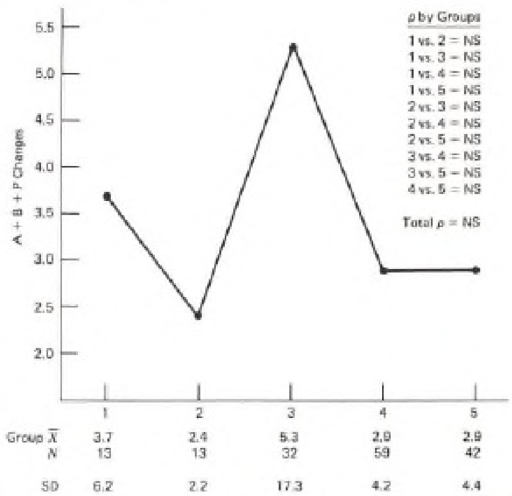


Figure 1U. Leveling-Sharpening House Test: number of A+B+P changes.

Object Sort Test (Figures 1 V-Y)

Chapters 5 and 6 disclosed that the equivalence range control, as measured by the Object Sort Test, consists of three dimensions when the test performance is evaluated by the scoring system reported in Chapter 10. The scoring system takes into account the number of groups the child constructs, which is the test score most frequently used by investigators (e.g., Wolitzky and Wachtel, 1973). In addition, the scoring system assesses the number of groups constructed that reveal illogical or disordered categorizing (atypical groups), the number that reveal realistic categorizing that is lacking some aspect of a complete response (miscellaneous groups), and the degree of abstraction that is revealed by the concept (verbal label) assigned by the child to groups that are rated as typical (i.e., realistic and reasonable).

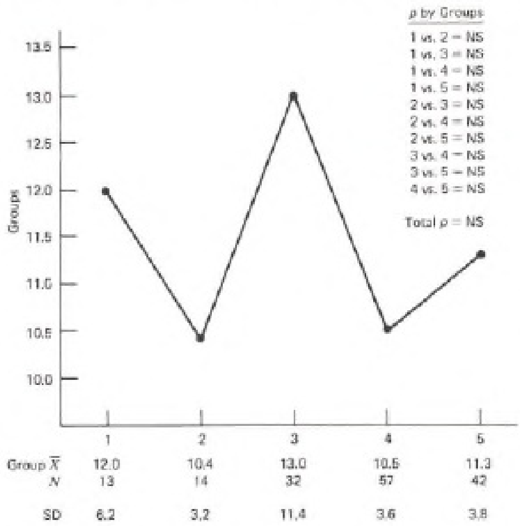


Figure 1V. Object Sort Test: total number of groups.

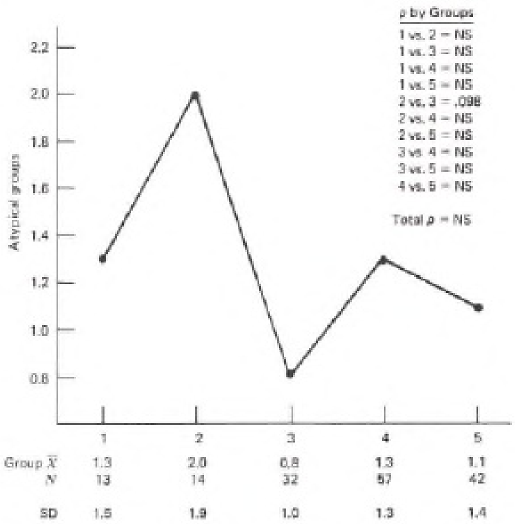


Figure 1W. Object Sort Test: number of atypical groups.

A significant age trend is observed in the level of abstracting represented by the concepts a child verbalizes when explaining why the objects grouped belong together (Figure 1*Y).* With age, there is a progression from the children using concrete concepts to more abstract ones. In terms of the number of groups the children constructed that fall in each of the categories designated by the scoring system, S-shaped functions seem to characterize these hospitalized children. Moreover if we examine Figures 1*W* and 1*X* together, we observe an inverse relationship with age between the total number of miscellaneous groups constructed and the number of atypical groups constructed. At the ages of 6, 10, and 15 years, more realistic but incomplete and immature groupings are constructed (miscellaneous) and fewer illogical groupings (atypical). At the ages between these levels (9 and 13 years), the reverse holds. Since the hospitalized children all represented major personality disorders, discerning the psychological meaning of these age-related shifts in preparatory and illogical conceptual thinking requires more data than are now available, to determine whether the critical dimension is age, some aspect of pathology represented by each age group, or the chance sampling of these age groups.

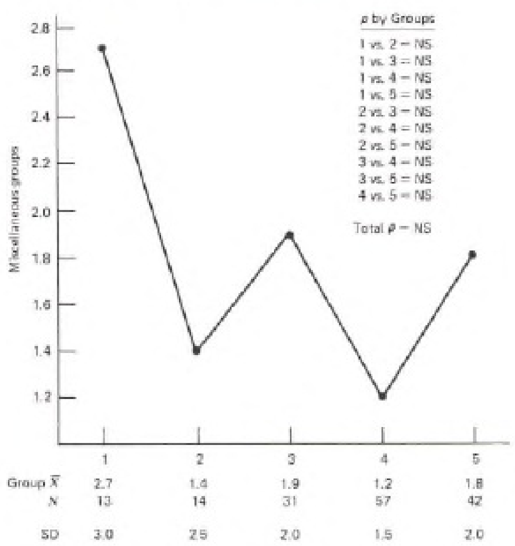


Figure 1X. Object Sort Test: number of miscellaneous groups.

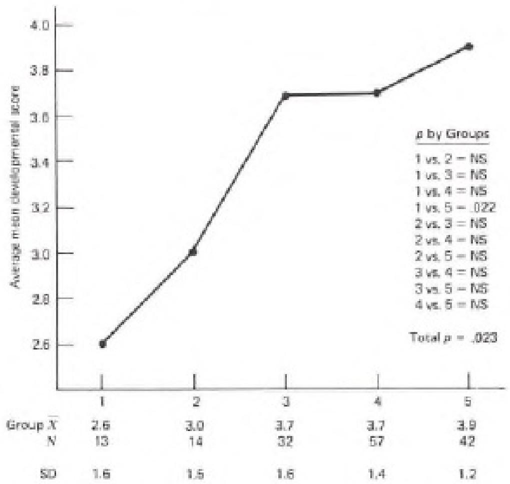


Figure 1Y. Object Sort Test: average mean developmental score.

Although the number of atypical and miscellaneous groups formed shifts from age to age, nonetheless a developmental trend was observed in the level of abstraction (from concrete to abstract) used to explain the membership of objects placed into typical groups (Figure 1Y), suggesting that typical and atypical conceptual thinking follow different courses of development.

Adolescents and the Fruit Distraction Test

In one study 50 adolescent boys and girls (age range, 14 to 16 years; mean age, 15 years) attending public schools were administered Cards II and IV of the Fruit Distraction Test as part of a larger study (see Chapter 6). Reading time difference scores and reading error difference scores were correlated with age in months. Although reading time difference produced a low correlation with age ($r = -.14$), reading error difference correlated at the .06 level of significance ($r = -.26$). It should be noted that the direction of both correlations indicates that the younger the adolescent, the greater the time taken, and the greater the number of reading errors with Card IV versus Card II, or the more likely the tendency to direct attention at both relevant and irrelevant information. The older the adolescent, the more likely the tendency to direct attention at relevant information and withhold attention from irrelevant information. The finding is noteworthy because a nearly significant relation is formed, within a very narrow age range, that supports the developmental progression of the field articulation principle from indiscriminate attention deployment characterizing cognitive immaturity to selective attention deployment characterizing cognitive maturity.

II. LONGITUDINAL AGE STUDIES

With the developmental trends for each of the cognitive controls and correlational studies discussed in the previous section, let us now ask whether the same developmental changes are observed when a group of children are followed over several years. As we noted at the start of this chapter, longitudinal analysis is by far the best method that enables the investigator to explore the developmental functions that describe the changes taking place with age for any behavioral dimension (Wohlwill, 1970). Of the three separate longitudinal studies I have conducted, one involved annual assessments of cognitive controls in a small group of children over a 5-year period (from ages 5 to 10 years), the second involved two assessments of cognitive controls in another small group of children, made at ages 5 and at 8 or 9 years, and the third consisted of annual assessments of a group of children at ages 5, 6, and 7 years.

Each of these longitudinal assessments was made of children attending public schools, providing information about changes in cognitive control functioning that characterize normal development. In addition, one part of each of the groups, followed longitudinally, consisted of children considered to be "at risk" with respect to developing a learning disability; despite having adequate intelligence, these children had been designated by teachers as having difficulties in meeting classroom demands. Therefore our longitudinal data also provide some information concerning changes in cognitive control functioning that is characteristic of the developmental course of cognitive controls in learning-disabled children.

Before discussing the results of these longitudinal studies, it may be helpful to review the changes that take place with age in each cognitive control as suggested by the crosssectional studies. (1) *fine motor delay,* from a rapid to a slower regular tempo, and from little to more delay in fine motor movements; (2) *focal attention*: from narrow, passive scanning to more broad, active scanning; (3) *field articulation*: from attending to relevant and irrelevant information to selectively attending to relevant information and ignoring irrelevant information; (4) *leveling-sharpening:* from constructing global, fluid memory images of past information that is fused with present information to constructing more differentiated, stable memory images of past information that is articulated from present information; (5) *equivalence range:*our factor analytic studies indicated that the equivalence range principle is multidimensional, involving the breadth of categories used to group information, the level of abstraction used to explain why certain bits of information have been placed into the same category, and the number of groupings that reveal unrealistic, illogical thinking. The literature (e.g., Kogan, 1976) suggests a developmental progression for the first equivalence range dimension, from younger children employing many categories to older children employing fewer broader categories.

Our results thus far suggest that different types of groupings follow different age patterns. The progression proposed by the literature was observed in the performance of public school children with only one type of object sort grouping—that is, the logical (typical) group. Groups designated as preparatory and incomplete (miscellaneous), and total number of groups, showed U-shaped functions, whereas illogical (atypical) groups showed no consistent age pattern. Yet hospitalized children showed consistent, inversely related S-shaped age patterns between miscellaneous and atypical groups constructed. Moreover, in terms of level of abstraction used to conceptualize realistic groupings, both public school and hospitalized children showed a monotonic progression with increasing age from the use of concrete to abstract concepts.

As we consider each longitudinal study we attempt to learn whether these several developmental functions are supported.

Kindergarten Children Assessed Annually Over a 5-Year Period

In the first longitudinal study to be considered, 46 kindergarten children were administered the following procedures: the Fine Motor Delay Test, the Scattered Scanning Test, the Fruit Distraction Test, the Leveling-Sharpening House Test, and the Object Sort Test. The tests were readministered to these children on four subsequent occasions: in first, second, fourth, and fifth grades, from 1969 to 1974. The initial sample consisted of two sets of children. The first was a group of 24 children (18 boys and 6 girls) judged by kindergarten teachers to be having difficulties coping with classroom tasks (i.e., possible candidates for difficulties in future grades). This group is referred to as “suspects.” The second set of subjects in the initial sample consisted of 22 children (17 boys and 5 girls) attending the same classrooms and were selected randomly from among students designated by the same teachers as “typical” kindergarten learners. All the children were of at least average intelligence, Caucasian, and from families in the middle to upper-middle socioeconomic range. Since a number of the families moved from the area during the 5-year period covered by the study, the sample for the final age level (fifth grade) numbered 31 children. With each evaluation, the children were tested individually in a room located in the child’s school. The examiners differed from year to year and were both male and female. Table 6 gives demographic characteristics of the children followed.

Table 6. Demographic Characteristics of Public School Children Judged To Be Typical Learners and at Risk, Followed Over a 5-Year Period

	Grade Levels				
	Kindergarten	First	Second	Fourth	Fifth
Total number of children	46	46	44	34	31
Number of typical learners	22	22	21	19	16
Girls	5	5	5	4	4
Boys	17	17	16	15	12
Number of suspect learners	24	24	23	15	15
Girls	6	6	6	5	5
Boys	18	18	17	10	10

Test scores obtained in each of the five evaluations were examined by means of a 2x5 analysis of variance to assess age differences. The results (Table 7; Figures 2*A-V)* should aid the reader in examining and comparing the developmental functions defined by each cognitive control principle. For a discussion of the stability observed in the test performance of these children from one year to the next, see Chapter 6.

In terms of the Fine Motor Delay Test (Figure 2*A),* the number of seconds taken to draw a line through a maze at one's regular tempo (trial 1) decreases with age *(p* = .01). Except for the kindergarten grade assessment, the suspects consistently show a slower regular tempo. If we compare time taken to draw the line at one's regular tempo (trial 1) with time taken to draw the line slowly (trial 2), a trend is observed among children showing less motor delay at kindergarten and greater delay at the fifth grade (Figure 2*B) (p* = .01). From the second grade, the suspect learners showed more delay of fine motor movement. These results suggest monotonic developmental change in motoric regulation with age, from a slow to a quicker "regular" tempo and from little delay to more delay of fine motor movement.

The Motor Tempo Test was administered during the first, second, and fifth grades only. Time taken to mark two rows of geometric shapes decreased with age (Figure 2C), paralleling the developmental change from a slow to a quicker tempo in fine motor movement revealed by the Fine Motor Delay Test, trial 1. At each grade level the suspects performed at a slower tempo than the typicals, also paralleling the difference observed with the Fine Motor Delay Test, trial 1.

Since the form of the Scattered Scanning Test administered in kindergarten was not the same as that used for the older grades, the results of the kindergarten year are not included in the analyses. The assessments made from the first to the fifth grades, however, show an increase with age in the number of circles and crosses marked among those scattered randomly within other geometric shapes (Figure *2D).* Interpreted in terms of our factor analytic findings, this result suggests a developmental progression from passive to active scanning. At all age levels the suspects marked fewer shapes, indicating that the initial lag may persist in the development of scanning activity.

There is also a progressive increase with age in the average distance covered by a single visual sweep or scan from one circle or cross to the next (Figure *IE)* and in the total distance covered by the total circles and crosses marked (Figure 2*F).* These observations suggest a developmental progression in focal attention from narrow to more broad visual scanning when a child samples information displayed. Although the average breadth of a single visual sweep from one bit of information to the next appears to be about the same for typicals and suspects, the suspects covered a smaller total distance when scanning, in the time allowed, at all age levels except the second grade.

Table 7. Longitudinal Age Differences in Cognitive Control Functioning Observed in Typical and Suspect Public School Children Over a 5-Year Period: Group Mean Scores

	Grade Levels											
	Kindergarten		First		Second		Fourth		Fifth			
Score	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	p
Fine Motor Delay I: time (seconds)												
Typicals	16.1	1.79	11.0	0.98	10.8	0.89	9.2	0.61	10.3	1.34	5.11	.01
Suspects	14.9	1.01	15.5	1.86	11.4	1.22	11.3	1.39	12.4	1.50	1.93	.10
Total Ss	15.5	0.99	13.3	1.12	11.2	0.76	10.1	0.69	11.3	1.00	5.13	.01
Fine Motor Delay II-I: time (seconds)												
Typicals	34.5	5.21	32.2	5.16	45.2	9.79	43.2	4.45	40.5	5.54	0.79	NS
Suspects	20.6	3.05	23.2	6.77	50.7	11.64	53.4	17.26	52.0	6.53	3.29	.01
Total Ss	27.2	3.10	27.5	4.31	48.1	7.59	47.5	7.65	46.1	4.32	3.93	.01
Motor Tempo: time (seconds)												
Typicals	—	—	16.8	0.94	17.4	1.31	—	—	12.7	1.11	4.47	.0
Suspects	—	—	17.1	1.10	17.5	1.23	—	—	14.4	0.89	1.75	NS
Total Ss	—	—	17.0	3.65	17.5	0.73	—	—	13.8	0.92	0.13	NS
Scattered Scanning: number correct												
Typicals	—	—	17.3	0.55	20.3	1.08	27.9	1.28	29.6	2.18	20.61	.01
Suspects	—	—	15.3	0.72	20.1	0.70	25.2	2.38	26.1	2.02	13.72	.01
Total Ss	—	—	16.3	0.48	20.2	0.62	26.8	1.25	27.9	1.50	34.08	.01
Scattered Scanning: mean distance (cm)												
Typicals	—	—	6.3	2.20	6.4	1.61	6.5	2.42	7.2	3.55	2.32	.08
Suspects	—	—	6.7	2.61	6.6	1.57	7.0	3.55	7.6	3.82	2.48	.06
Total Ss	—	—	6.5	1.74	6.5	1.11	6.7	2.09	7.4	2.59	4.39	.01
Scattered Scanning: total distance (cm)												
Typicals	—	—	109.0	5.31	127.8	5.23	177.9	7.36	196.3	8.90	37.79	.01
Suspects	—	—	104.5	6.85	132.3	4.90	173.1	17.66	183.2	10.47	15.01	.01
Total Ss	—	—	106.7	4.35	130.1	3.55	175.9	8.45	189.9	6.82	46.51	.01
Scattered Scanning: ratio I												
Typicals	—	—	3.5	5.26	3.2	2.48	—	—	3.6	2.25	0.25	NS

Suspects	—	—	2.5	0.15	3.3	0.23	—	—	3.5	0.16	8.01	.01
Total Ss	—	—	2.9	0.27	3.2	0.17	—	—	3.5	0.13	1.75	NS
Scattered Scanning: ratio II												
Typicals	—	—	22.4	2.65	21.1	1.14	—	—	24.6	0.95	0.81	NS
Suspects	—	—	28.5	5.10	20.5	1.55	—	—	24.0	1.51	1.50	NS
Total Ss	—	—	16.8	1.26	21.5	1.69	—	—	25.3	1.16	7.92	.01
Fruit Distraction II: time (seconds)												
Typicals	89.1	5.46	58.9	3.18	54.7	2.03	43.1	2.08	38.3	1.87	33.66	.01
Suspects	104.7	6.46	62.8	3.51	56.8	2.47	48.1	2.95	42.7	2.59	33.56	.01
Total Ss	97.2	4.37	60.9	2.37	55.9	1.60	45.2	1.76	40.4	1.60	65.09	.01
Fruit Distraction III-II: time (seconds)												
Typicals	14.6	4.41	9.3	2.54	0.8	1.32	3.7	1.48	1.4	1.20	4.93	.01
Suspects	15.5	6.19	12.3	2.30	6.7	3.20	-1.5	1.41	0.3	1.31	3.13	.01
Total Ss	15.0	3.81	10.8	1.70	3.9	1.82	1.5	1.12	1.2	0.77	6.71	.01
Fruit Distraction IV-II: time (seconds)												
Typicals	57.7	6.28	42.5	4.62	35.3	4.70	24.8	2.05	17.9	1.44	11.34	.01
Suspects	79.9	10.51	64.0	9.14	39.3	4.52	22.8	3.21	22.3	2.44	9.96	.01
Totals Ss	69.3	6.40	53.7	5.44	37.4	3.23	24.0	1.78	20.0	1.42	18.95	.01
Fruit Distraction: recalls												
Typicals	1.9	0.23	2.0	0.25	2.6	0.20	2.1	0.33	1.9	0.21	1.49	NS
Suspects	1.5	0.28	1.9	0.27	2.0	0.26	1.9	0.40	1.9	0.31	0.45	NS
Total Ss	1.7	0.18	1.9	0.19	2.3	0.17	2.0	0.25	1.9	0.19	1.43	NS
Leveling-Sharpening: House Test: first stop												
Typicals	15.5	1.40	10.2	0.95	10.7	0.80	11.7	1.52	7.6	0.80	6.08	.01
Suspects	18.3	2.40	11.3	1.36	13.6	1.41	9.1	0.87	9.7	1.45	4.61	.01
Total Ss	16.9	1.41	10.7	0.83	12.2	0.84	10.6	0.97	8.6	0.82	9.15	.01
Leveling-Sharpening: number correct changes												
Typicals	9.5	0.54	12.4	0.36	12.1	0.28	12.9	0.42	14.4	0.42	17.58	.01
Suspects	6.9	0.76	10.5	0.62	11.2	0.43	12.9	0.37	13.1	0.68	15.61	.01
Total Ss	8.2	0.50	11.4	0.39	11.6	0.27	12.9	0.28	13.8	0.41	29.02	.01
Leveling-Sharpening: ratio												
Typicals	18.1	0.69	13.1	0.62	14.0	0.55	13.1	0.81	9.7	0.89	17.18	.01
Suspects	22.0	1.04	16.0	0.89	15.5	0.61	13.0	0.74	12.1	1.24	17.24	.01
Total Ss	20.1	0.69	14.6	0.59	14.8	0.42	13.1	0.56	10.8	0.78	30.66	.01
Leveling-Sharpening: number A Changes												
Typicals	1.5	0.44	1.6	0.38	0.6	0.26	0.8	0.49	0.6	0.25	1.59	NS
Suspects	0.9	0.26	0.9	0.24	0.6	0.22	0.8	0.26	0.3	0.15	0.90	NS

Total Ss	1.2	0.25	1.2	0.22	0.6	0.16	0.8	0.30	0.5	0.15	2.25	.06
Leveling-Sharpening: number B Changes												
Typicals	0.1	0.06	0.1	0.07	0.1	0.04	0.2	0.08	0.6	0.25	2.93	.02
Suspects	0.1	0.04	0.2	0.10	0.2	0.10	0.0	0.00	0.4	0.16	2.17	.07
Total Ss	0.1	0.04	0.2	0.06	0.1	0.06	0.1	0.05	0.5	0.15	4.31	.01
Leveling-Sharpening: number A + B Changes												
Typicals	1.5	0.44	1.7	0.38	0.7	0.27	0.9	0.48	1.1	0.30	1.31	NS
Suspects	1.1	0.27	1.1	0.25	0.8	0.25	0.8	0.26	0.7	0.22	0.32	NS
Total Ss	1.2	0.25	1.4	0.22	0.7	0.18	0.9	0.29	0.9	0.19	1.47	NS
Object Sort: total groups												
Typicals	8.1	0.66	10.8	0.88	10.2	0.65	11.1	0.66	10.9	0.61	3.08	.02
Suspects	8.0	0.76	11.1	0.95	10.6	0.69	9.3	0.48	9.4	0.84	2.64	.04
Total Ss	8.1	0.52	11.0	0.64	10.4	0.47	10.3	0.45	10.2	0.52	5.50	.01
Object Sort: typical groups												
Typicals	7.2	0.55	10.0	0.80	9.4	0.69	10.0	0.66	9.8	0.64	3.16	.01
Suspects	6.7	0.89	8.4	0.90	9.6	0.73	8.4	0.55	8.5	0.75	1.80	NS
Total Ss	6.9	0.53	9.2	0.61	9.5	0.50	9.3	0.45	9.2	0.49	4.73	.01
Object Sort: atypical groups												
Typicals	0.3	0.18	0.1	0.04	0.4	0.14	0.6	0.19	0.1	0.06	2.72	.05
Suspects	0.8	0.25	0.8	0.18	0.7	0.24	0.7	0.22	0.2	0.14	1.00	NS
Total Ss	0.5	0.16	0.4	0.11	0.6	0.14	0.7	0.14	0.1	0.07	1.82	NS
Object Sort: miscellaneous groups												
Typicals	0.6	0.24	0.7	0.28	0.4	0.15	0.5	0.20	1.0	0.36	0.73	NS
Suspects	0.5	0.18	1.9	0.41	0.2	0.10	0.1	0.09	0.7	0.21	8.66	.01
Total Ss	0.5	0.14	1.4	0.27	0.3	0.09	0.3	0.12	0.8	0.21	5.97	.01
Object Sort: additional atypicals												
Typicals	1.5	0.23	2.8	0.35	3.0	0.22	3.0	0.30	2.8	0.40	4.87	.01
Suspects	1.7	0.32	3.1	0.35	3.0	0.36	3.4	0.25	3.7	0.25	5.42	.01
Total Ss	1.6	0.19	3.0	0.25	3.0	0.21	3.2	0.20	3.2	0.25	10.31	.01
Object Sort: Mean concept score												
Typicals	4.9	0.13	4.6	0.18	5.1	0.13	5.0	0.31	5.3	0.11	1.79	NS
Suspects	4.2	0.32	4.5	0.26	4.8	0.14	5.3	0.12	5.6	0.15	4.55	.01
Total Ss	4.5	0.20	4.6	0.16	4.9	0.09	5.2	0.10	5.5	0.09	7.43	.01

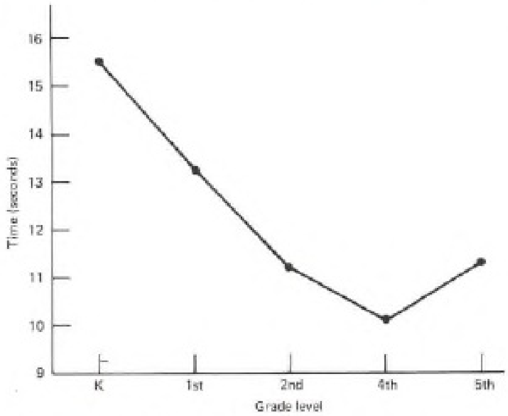


Figure 2A. Fine Motor Delay I: time.

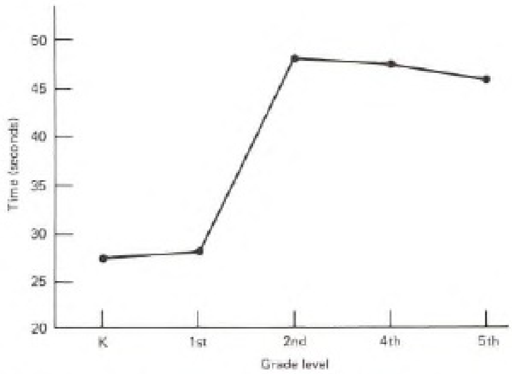


Figure 2B. Fine Motor Delay II-I: time.

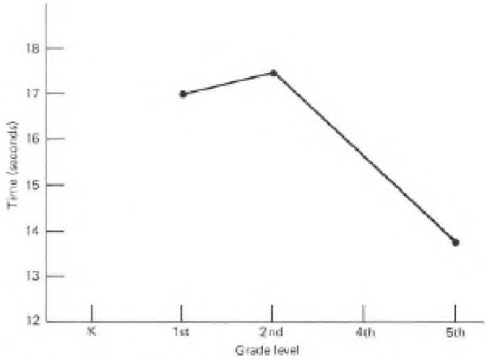


Figure 2C: Motor Tempo Test: time

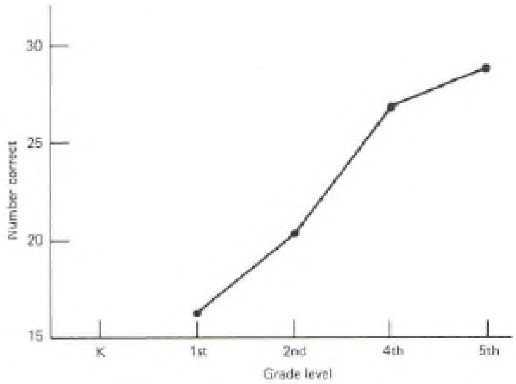


Figure 2D: Scattered Scanning Test: number correct

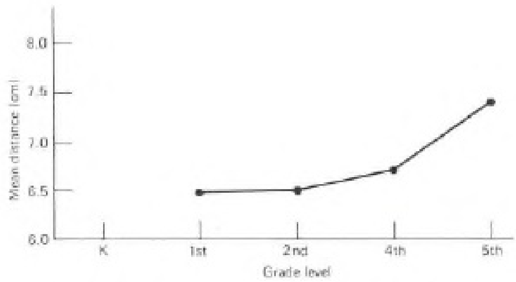


Figure 2E. Scattered Scanning Test: mean distance.

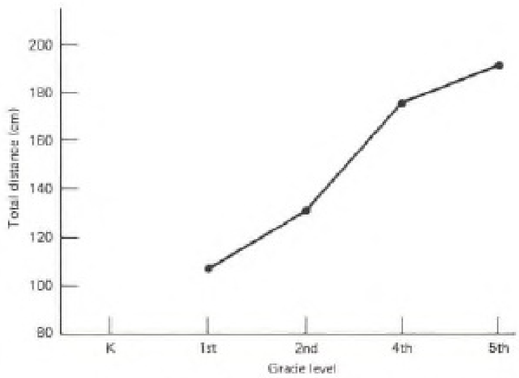


Figure 2F. Scattered Scanning Test: total distance.

When the motor component of the response required by the Scattered Scanning Test is parceled out by relating Motor Tempo Test time score to number of correct circles and crosses marked, and to total distance covered by the markings (ratio I and ratio II, respectively), the same age trends are observed. As discussed in Chapter 10, the higher the ratio value, the more active (ratio I) and the broader (ratio II) the visual scanning. Graphical support (Figures 2G, H) is added to the finding that focal attention (visual scanning) undergoes change from passive and narrow to active and broad scanning independent of the motor response required by the scattered scanning task (marking shapes with a pencil). There appears to be no obvious pattern to the ratio differences observed between typicals and suspects.

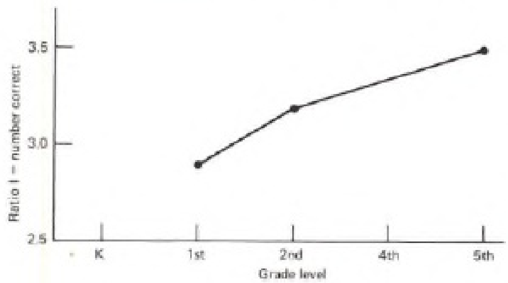


Figure 2G. Scattered Scanning Test: ratio I (number correct).

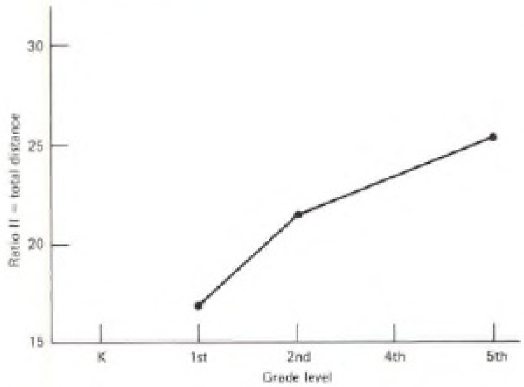


Figure 2H. Scattered Scanning Test: ratio II (total distance).

Taken together, the results obtained with the Scattered Scanning Test define a developmental, monotonic function for the focal attention principle in which the tendency to scan and sample information changes from narrow, single visual sweeps that passively survey a small total area to broader, single visual sweeps that survey, more actively, a larger total area. The course of developmental changes appears to characterize the visual scanning activity required by the test and to be relatively independent of the motor element of the response (marking circles and crosses with a pencil).

With the Fruit Distraction Test, the children show a significant decrease, with age, in time taken to name the colors of the control card (correctly colored fruit, Card II; Figure 2I). At all age levels the suspects named the colors more slowly than did the typical learners.

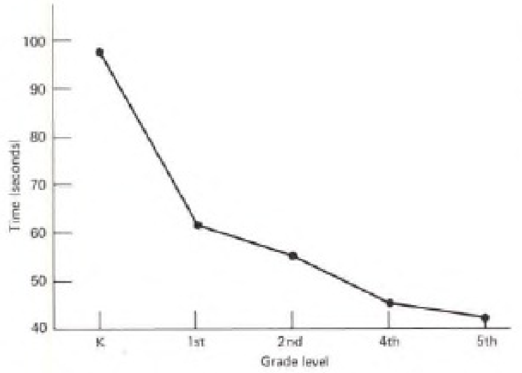


Figure 2I. Fruit Distraction Test: II (time).

If the time taken to name the colors on Card III (correctly colored fruit, surrounded by peripheral distractions) and Card IV (fruit colored incorrectly), are compared with the control card results, significant age trends are observed (Figures 2J, K). With each comparison, children take longer at early ages to name the colors of both distraction cards versus the control card. By the fifth grade, however, Card III, with its peripheral pictures as distractions, is managed almost as quickly as the control card, whereas Card IV, with its incorrect colors as distractions, creates an average delay of 20 seconds. The suspects were more distracted by Card III during the first three years and by Card IV at all age levels except the fourth grade.

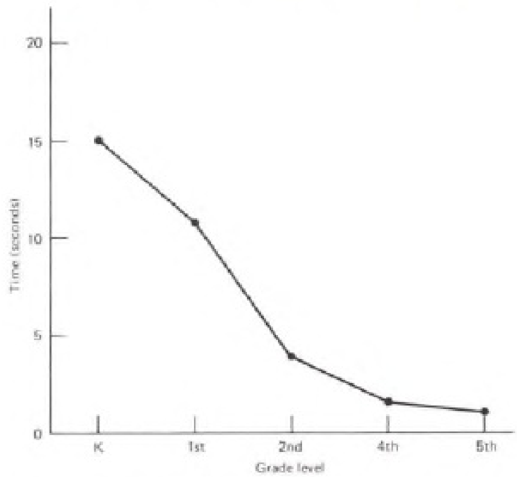


Figure 2J. Fruit Distraction Test III-II: time.

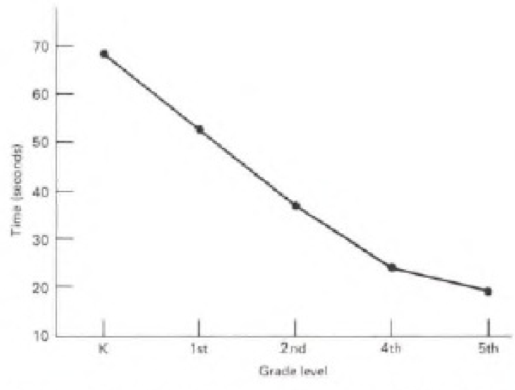


Figure 2K. Fruit Distraction Test IV-II: time.

These findings suggest that the field articulation cognitive control follows a monotonic course of change. At early ages children tend to give attention to both relevant and irrelevant information and to be delayed and distracted by the irrelevant information. With development, children tend to ignore irrelevant information more and more and to direct attention selectively at only relevant information.

In terms of number of peripheral, irrelevant pictures recalled after Card III is removed, Figure 2L suggests an inverted U-shaped function. There is an increase from kindergarten to the second grade in the number of peripheral pictures recalled, then a continuous decrease in the fourth and fifth grades. The second half of this trend agrees with that observed in the cross-sectional age study already discussed in which children 6, 9, and 12 years old showed a decrease in number of recalls with age. The present findings suggest a continuous increase in incidental recall from about the fifth to the seventh year, which is followed by a continuous decrease (also observed in the cross-sectional study). In considering these trends, it may be helpful to recall that our factor analytic studies indicated that this component of the Fruit Distraction Test was related both to the process of forming memory images and to the regulation of affects and needs, especially those involving nurture. If we reflect on these age trends with previously discussed studies in mind (in particular, the study involving orphaned children; Chapter 6), we could wonder how this cognitive preference to be dependent on, to attend to, and to retain incidental, irrelevant information during the first years of latency relates to emotional and personality developments also occurring at that time. This interesting direction for future studies is discussed further in the critique at the close of this chapter. Finally, except for the fifth grade assessment, the suspects consistently recalled fewer peripheral objects; the psychological significance of this observation, however, can be determined only after future study.

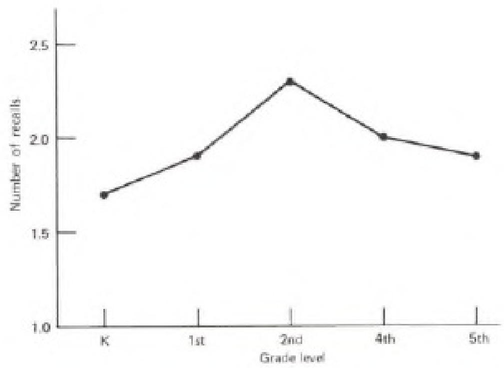


Figure 2L. Fruit Distraction Test: III: number of recalls.

Results with Leveling-Sharpening House Test also reveal significant developmental trends. At kindergarten age the children detected their first change late in the series of pictures displayed (Figure 2M), they detected few changes (Figure 2*N),* and they noted these changes several displays after they first appeared (Figure *2O).* With an increase in age, the children detected their first change earlier, detected more changes, and noticed the changes soon after they first appeared. Again with a few exceptions, the suspect learners, though showing the same age trend, lagged behind the typicals along each dimension of the leveling-sharpening process. At each age level they tended to detect the first change later, they detected fewer changes, and they needed to view more displays before detecting these changes.

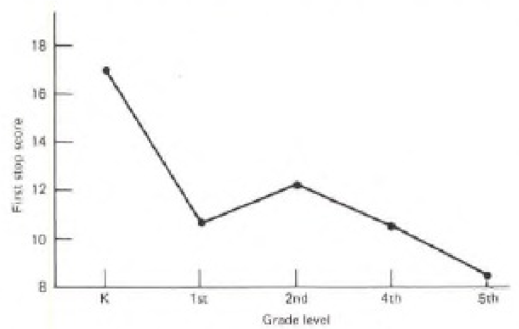


Figure 2M. Leveling-Sharpening House Test: first stop score.

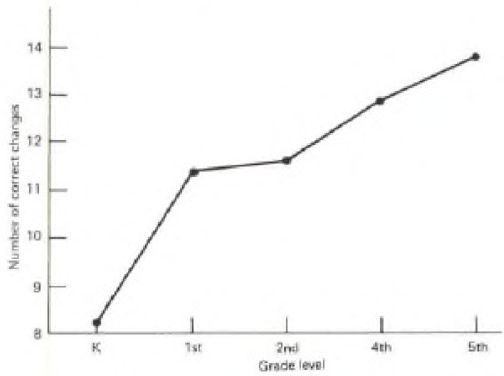


Figure 2N. Leveling-Sharpening House Test: number of correct changes.

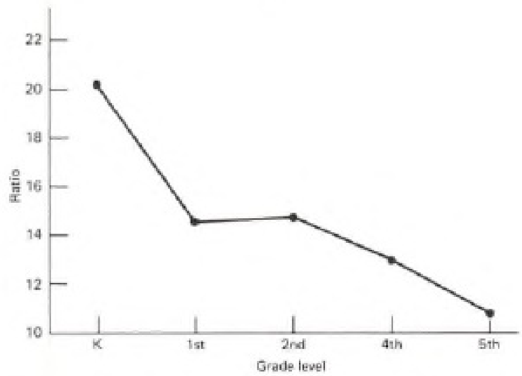


Figure 2O. Leveling-Sharpening House Test: ratio.

In terms of changes perceived that are incorrect, several trends emerge from the data. First, there is a tendency, although not significant, for total incorrect changes perceived to decrease with age (Figure 2 *Q).* However if we examine the two types of incorrect change perceived, as evaluated by the scoring system, it becomes apparent that the incidence of type A changes (seeing changes in existing information that do not occur) decreases with age; yet at the same time B changes (fabulating information that is not part of the test stimulus) show a slight increase at the fifth grade level (Figure *2P).* This finding suggests an inverse relation at about 11 or 12 years of age between the tendency to modify memory of existing information (a decrease) and the tendency to invent or fabulate information in memory (an increase). These trends point to the need for future studies concerning the relation between developmental changes in the tendency to tabulate memory images and changes in personality dimensions, such as the increase in drive tensions, especially at 11 or 12 years of age.

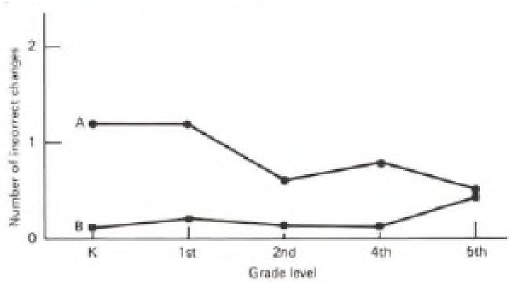


Figure 2P. Leveling-Sharpening House Test: types of incorrect (A and B) change.

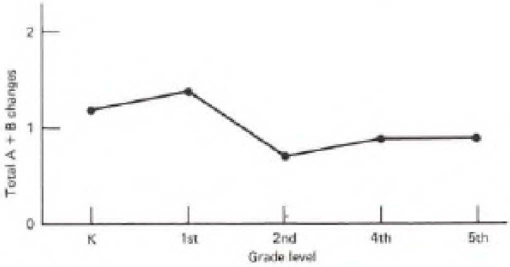


Figure 2Q. Leveling-Sharpening House Test: total incorrect changes.

These results obtained with the Leveling-Sharpening House Test parallel those observed in the cross-sectional study reported earlier with the Leveling-Sharpening Wagon Tests and the Circles Test; that is, the leveling-sharpening cognitive control appears to follow a developmental course that defines a monotonic function. Early in development children tend to construct global, fluid memory images of information so that present information is fused with past, and changes go undetected or are introduced into existing information. With age, children tend to construct more differentiated, stable memory images of existing information, with present information articulated from past. There is also the suggestion that at approximately the age of 11 or 12 years there occurs a phase during which memory images are fabulated; that is, invented information is introduced into memory images of existing information.

Developmental functions are also observed with each of the dimensions of the equivalence range principle as measured by the Object Sort Test. Kindergarten children constructed the smallest number of total groups when categorizing the objects in terms of concepts, they constructed fewer groups designated as typical (appropriately logical) by the scoring system, and they tended to use concrete concepts when explaining how the objects belong together (Figures *2R-T).* With age, they constructed increasingly more groups overall, they constructed more typical groups, and the concepts used to explain why the objects belonged together became more abstract. The major change (increase) in number of typical groups constructed occurs between kindergarten and first grade. The developmental functions defined by the components of equivalence range concerned with realistic, conceptual thinking appear to be monotonic (number of typical groups formed and level of abstraction of concepts).

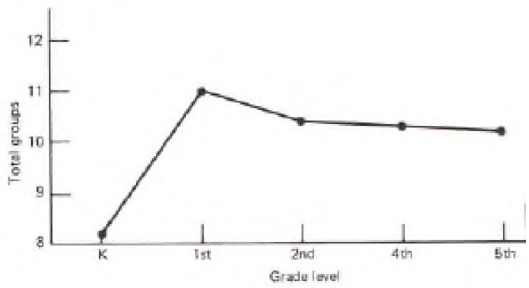


Figure 2R. Object Sort Test: total number of groups.

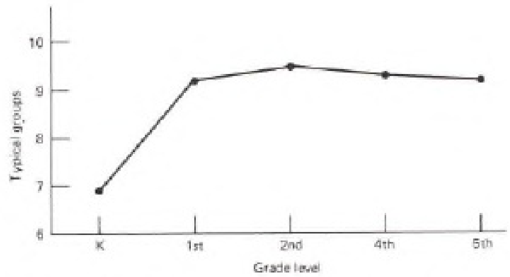


Figure 2S. Object Sort Test: number of typical groups.

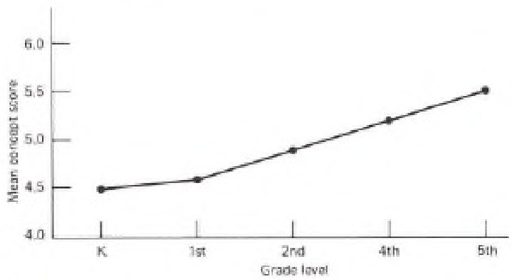


Figure 2T. Object Sort Test: mean concept score.

In contrast, the developmental functions defined by the components of the equivalence range control that involve unrealistic, conceptual thinking (atypical and miscellaneous groups) appear to be S-shaped (Figure *2U)* and inversely related. It should be recalled that the miscellaneous groups category is reserved for groupings that reveal no illogical conceptual thinking as such and show preparatory incomplete categorizing behavior. The various miscellaneous scores (see Chapter 10) identify aspects of equivalence range functioning that could be viewed as incomplete and as immature forms of the equivalence range process. For example, the child constructs a group of objects judged by the examiner to be realistic but is unable to form a verbal label that explains the membership of the objects in the group. Or the child groups objects in terms of properties that represent opposites or differences rather than similarities. In the age function generated by the miscellaneous group category, increases occur at the first and fifth grade levels.

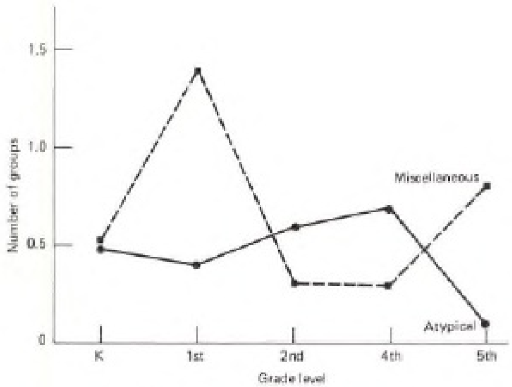


Figure 2U. Object Sort Test: number of atypical and miscellaneous groups.

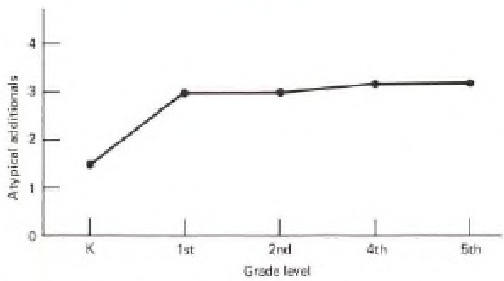


Figure 2V. Object Sort Test: number of atypical additionals.

If we now relate the developmental function of miscellaneous groupings with that of atypical groupings, a vicarious relationship is suggested. At the first and fifth grade levels, where we observe the highest incidence of miscellaneous groupings, we find the lowest incidence of atypical groupings; but the reverse holds true for the kindergarten, second, and fourth grade levels (higher number of atypical groupings and lower number of miscellaneous groupings).

At this point it is useful to introduce observations produced by the study that intercorrelated these repeated evaluations, about which we puzzled in Chapter 6. There we noted that based on the pattern of test-retest correlations, the equivalence range control appeared to be in a state of flux at the second grade level, and then stabilized at the fifth grade level. The age functions observed with miscellaneous and atypical groupings, when joined with the pattern of test-retest correlations, strengthens the hypothesis that the component of the equivalence range control concerned with unrealistic thinking undergoes critical reorganizing between the second and fourth grades. Our age functions indicate that this is the stage during which the use of atypical groupings (illogical thinking) dominates the use of miscellaneous groupings (preparatory conceptual thinking), a phase that comes after the sharp rise in miscellaneous groups observed in the first grade.

In the concluding section of this chapter, after examining other findings, we consider the heuristic value in shaping questions about this inverse S-shaped relationship between atypical and miscellaneous groupings in terms of the psychoanalytic view that the latency period consists of two phases.

In summary, our data suggest two broad developmental functions that define changes occurring with age in the equivalence range control. One concerns the developmental course of realistic conceptual thinking, the other the developmental course of unrealistic and preparatory conceptual thinking. The progression of realistic conceptual thinking appears to be more or less monotonic, from few categories that are explained in concrete terms, to facilitate conceptualization of information, to many categories that are explained in more abstract terms. Unrealistic and preparatory conceptual management of information appears to follow inversely related S-shaped functions.

Kindergarten Children Reassessed at the Third or Fourth Grade

Age differences in cognitive control test performance were also examined longitudinally in two groups of children by comparing assessments made in kindergarten with assessments made in the third or fourth grade. The children were selected for reevaluation from two larger kindergarten populations considered in Chapter 6. As we noted in that earlier discussion, in two successive years (1970-1971 and 1971-1972) the entire kindergarten population to enter a suburban public school serving primarily middle-class, Caucasian children were administered a battery of cognitive control tests. The 1970 population consisted of 150 children judged by teachers to be typical learners and 34 to be at risk or “suspect” in terms of developing difficulties with learning. In the 1971 group, 108 were designated by teachers as typical learners, and 56 as suspects. During the 1974-1975 academic year, the two populations were attending the fourth and third grades, respectively. To study age changes in cognitive control functioning, 16 children attending the fourth grade and 17 attending the third grade, who initially had been designated typical learners, were reevaluated, along with 13 attending the fourth grade and 14 attending the third grade who were designated “suspects.” Because of the relatively small number of children in each grade, the typical learners were combined (total sample of 33) and the suspects were combined (total sample of 27), to permit the study of changes in the test performance of each group from the ages of about 5.5 years to 8 and 9 years.

Table 8. Age Differences in Cognitive Control Measures of 33 Typical Learners at Kindergarten and at Third and Fourth Grades

	Kindergarten		Third and Fourth			
Score	Mean	SD	Mean	SD	t	p
Fine Motor Delay I: time (seconds)	15.8	6.5	12.4	5.2	2.33	.01
Fine Motor Delay II-I: time (seconds)	32.9	49.5	74.3	66.6	3.12	.01
Motor Tempo: time (seconds)	25.5	8.4	20.2	7.4	3.05	.01
Scattered Scanning: number correct	15.2	3.6	26.4	10.0	6.51	.01
Scattered Scanning: mean distance (cm)	6.6	1.61	7.3	1.6	1.92	.01
Scattered Scanning: total distance (cm)	102.8	30.3	178.5	57.8	7.32	.01
Scattered Scanning: ratio I	3.9	1.6	5.2	2.9	2.34	.01
Scattered Scanning: ratio II	25.9	11.2	35.3	17.2	2.61	.01
Fruit Distraction II: time (seconds)	80.3	25.0	47.2	12.0	8.33	.01
Fruit Distraction III-II: time (seconds)	19.3	30.1	0.9	7.6	3.24	.01
Fruit Distraction IV-II: time (seconds)	91.3	69.3	31.6	27.1	4.85	.01
Fruit Distraction: recalls	1.7	1.2	2.1	1.3	1.15	NS
Leveling-Sharpening: first stop	21.6	13.9	11.5	6.1	4.10	.01
Leveling-Sharpening: number correct changes	8.0	3.9	12.1	1.9	6.19	.01
Leveling-Sharpening: ratio	20.4	5.6	13.9	3.3	6.83	.01
Leveling-Sharpening: number A + B changes	1.1	1.8	1.2	1.6	0.30	NS
Object Sort: total groups	12.3	5.3	10.5	2.9	1.58	.06
Object Sort: typical groups	10.8	4.8	9.0	2.9	1.70	.05
Object Sort: atypical groups	0.7	1.1	0.4	0.7	1.24	NS
Object Sort: miscellaneous groups	0.9	1.4	1.2	1.6	0.61	NS
Object Sort: developmental mean	4.2	1.3	5.2	0.5	4.11	.01

Table 8 presents the findings observed with the typical learners at kindergarten and three to four years later, and Table 9 gives those observed with the suspects. Except for scores representing number of groups formed, the mean scores and the age trends recorded with both groups parallel those observed in the longitudinal study discussed previously, involving five annual assessments.

Table 9. Age Differences in Cognitive Control Measures of Suspect Learners at Kindergarten and at Third and Fourth Grades

	Kindergarten		Third and Fourth			
Score	Mean	SD	Mean	SD	t	p
Fine Motor Delay I: time (seconds)	16.5	6.7	13.7	4.3	1.58	NS
Fine Motor Delay II-I: time (seconds)	16.4	12.2	55.8	41.1	4.47	.01
Motor Tempo: time (seconds)	29.0	13.4	20.7	7.4	2.68	.01

Scattered Scanning: number correct	14.5	3.9	22.2	7.1	4.56	.01
Scattered Scanning: mean distance (cm)	6.9	1.2	7.3	1.3	1.27	NS
Scattered Scanning: total distance (cm)	105.5	28.3	150.9	34.6	4.84	.01
Scattered Scanning: ratio I	3.9	1.5	4.6	2.3	1.20	NS
Scattered Scanning: ratio II	29.0	12.0	30.7	15.2	0.43	NS
Fruit Distraction II: time (seconds)	97.8	42.9	48.5	9.4	6.10	.01
Fruit Distraction III-II: time (seconds)	27.0	47.8	0.7	6.4	2.72	.01
Fruit Distraction IV-II: time (seconds)	101.4	64.7	28.6	14.2	5.88	.01
Fruit Distraction: recalls	1.1	1.2	1.9	1.1	2.38	.02
Leveling-Sharpening: first stop	18.9	13.9	11.9	5.6	2.62	.01
Leveling-Sharpening: number correct changes	9.1	10.7	11.7	2.4	1.30	NS
Leveling-Sharpening: ratio	20.8	5.2	14.8	4.0	5.76	.01
Leveling-Sharpening: number A + B changes	1.3	1.6	1.5	1.7	0.54	NS
Object Sort: total groups	9.6	6.3	12.5	3.7	1.97	.05
Object Sort: typical groups	7.8	6.1	10.5	2.9	2.02	.05
Object: atypical groups	0.8	0.9	0.3	0.5	1.89	NS
Object Sort: miscellaneous groups	1.1	1.9	1.7	1.6	1.31	NS
Object Sort: developmental mean	3.6	1.9	5.0	6.2	3.78	.01

With an increase in age, both typical and suspect learners show the following changes in cognitive controls.

1. *Fine Motor Delay.* Regular tempo in drawing a line quickens, and delaying in drawing a line as slowly as possible increases.

2. *Motor Tempo and Scattered Scanning.* Speed in marking geometric shapes increases, there is an increase in the number of circles and crosses detected and marked from among the geometric shapes scattered about the page, the breadth of a single visual scan increases, the distance scanned in detecting the shapes increases, and the increase in number of circles and crosses detected and the increase in distance covered in surveying the page holds with age, even when the child's motor tempo in marking shapes with a pencil is taken into account, as revealed by the ratio scores.

3. *Fruit Distraction Test.* Time taken to name the colors on Card II decreases, as does the time taken to name the colors on both distraction cards, thus with age, the peripheral objects (Card III) and the incorrect colors (Card IV) have less intrusive, delaying influence.

4.> *Leveling-Sharpening House Test.* The first change is detected earlier, more changes are detected, and these changes are detected more quickly after they first appear in the series of pictures. There are no age trends in the number of incorrect changes perceived and reported.

5. *Object Sort Test.* The typical learners and suspects reveal several differences. With age, the typical learners constructed fewer groups overall to categorize the objects and fewer groups designated by the scoring system as "typical" (i.e., as revealing realistic logic). This trend, which is opposite that

> observed with the 5-year study, appears to be a function of the larger number of groups constructed by the children in the present study at the kindergarten evaluation. The mean scores at the third to fourth grade level are very similar to those observed at that age level in the 5-year study. The kindergarten performance then may be a function of sampling. The typical learners do show the same trend observed in other studies in the level of abstraction of concepts used to explain the membership of objects in a group. With age, the level of abstraction increases (developmental mean). The suspects show age trends toward the construction of more groups that are assigned increasingly more abstract concepts.

In terms of groupings designated by the scoring system as atypical and miscellaneous, both typical and suspect learners made a decrease in atypical categories and an increase in miscellaneous categories. The absolute values of means do not parallel those observed in the 5-year study, but the inverse relationship between these two types of categorizing behavior does parallel the inverse relationship observed and discussed earlier.

Prekindergarten (Youngest and Oldest) Children Assessed Annually Over a 3-Year Period

The third longitudinal study involved the youngest and oldest children who were enrolled to enter the kindergarten program of the same public school system attended by the children of the two previously discussed longitudinal studies. In June 1972, a roster of about 160 children who were scheduled to begin kindergarten classes in September was examined, and the 25 youngest and 25 oldest children were identified. The parents were contacted, and permission was obtained to administer the battery of cognitive control tests to the children selected. One of our main interests was whether and how freshman kindergarteners who were the youngest in chronological age differed in cognitive control functioning from children entering the same kindergarten classes who were the oldest in chronological age. Another major interest was in determining the course of cognitive control development for each of these populations through the first grade. We wondered whether the experience of separating from home at a young age and participating in kindergarten derailed cognitive control development in any way.

All parents gave permission for their children to participate. For a variety of reasons, complete data were eventually obtained from 20 of the youngest children (Young Group) and 24 of the oldest (Old Group).

The children were first administered the battery of cognitive control tests during June and July 1972—that is, about three months before they were to enter the kindergarten program. During this evaluation the mean ages of the Young Group and the Old Group were 55.04 months (4.5 years) and 63.89 months (5.3 years), respectively.

The tests were readministered during the close of kindergarten year. At the time of the second evaluation, the mean ages were 66.71 months (5.5 years) and 75.00 months (6.3 years), respectively. The tests were administered a third time during the close of the first grade year, and the respective mean ages were 78.65 months (6.5 years) and 87.16 months (7.2 years).

There were 12 boys and 8 girls in the Young Group, and 14 boys and 10 girls in the Old Group. All tests were administered to the children in the school setting and by different examiners each year (two males and two females).

Table 10 gives group means and standard deviations obtained. In addition, Figures 3 *A-0* plot the means for the Young and Old groups, to facilitate our examination of the developmental functions defined. The scores obtained from the three assessments were subjected to a linear trend analysis and to a quadratic trend analysis by comparing the means for each test score of the Young and Old groups across the three assessments and by comparing the mean scores with all subjects combined, across the three assessments. Since all but three test scores (Scattered Scanning, mean distance; Fruit Distraction, number of recalls; and Object Sort, number of groups) defined linear functions, linear trend analysis proved to be the most effective in examining the significance of the differences observed. Therefore the *F* ratios listed in Table 10 derive from linear trend analyses except when the letter *Q* precedes the *F* value.

Table 10. Longitudinal Age Differences in Cognitive Control Measures of Youngest and Oldest Children Entering Kindergarten

	Grade Levels							
	Prekindergarten		Kindergarten		First			
Score	Mean	S D	Mean	S D	Mean	S D	F*	*p*
Fine Motor Delay I: time (seconds)								
Young	19.05	10.54	16.05	3.32	13.15	4.66	—	—
Old	19.29	5.94	16.17	4.83	10.46	4.02	0.90	NS
Total	19.17	—	16.11	—	11.80	—	25.13	.001
Fine Motor Delay I: time (seconds)								
Young	14.35	15.56	31.90	22.78	30.35	27.70	—	—
Old	20.50	22.44	33.08	29.96	39.46	26.05	0.09	NS
Total	17.42	—	32.49	—	34.90	—	11.09	.002
Scattered Scanning: number correct								
Young	12.10	2.75	16.70	2.41	18.00	1.70	—	—
Old	14.75	2.04	17.08	1.62	18.37	2.26	3.94	.05
Total	13.42	—	16.89	—	18.18	—	78.82	.001
Scattered Scanning: total distance (cm)								
Young	82.50	20.99	109.20	28.13	119.40	20.49	—	—
Old	94.50	20.11	120.70	19.77	116.60	24.30	2.70	.10
Total	88.5	—	114.95	—	118.00	—	48.20	.001
Scattered Scanning: mean distance (cm)								
Young	6.83	17.09	6.48	14.55	6.50	8.27	—	—
Old	6.40	10.28	7.05	12.14	6.29	9.42	(Q)3.42	.07
Total	6.61	—	6.76	—	6.39	—	(Q)1.65	NS
Fruit Distraction II: time (seconds)								

Young	119.80	40.09	99.60	30.49	63.10	17.48	—	—
Old	93.50	57.29	80.83	26.61	59.54	17.58	3.42	.07
Total	106.65	—	90.21	—	61.32	—	49.50	.001
Fruit Distraction III-II: time (seconds)								
Young	44.35	36.18	8.9	21.78	6.5	9.63	—	—
Old	5.8	30.14	8.8	17.41	4.6	8.47	12.06	.001
Total	25.0	—	8.8	—	5.0	—	13.20	.001
Fruit Distraction: recalls								
Young	2.35	160.65	2.20	1.25	1.80	1.85	—	—
Old	1.45	1.27	2.20	0.88	1.50	1.07	(Q)1.75	NS
Total	1.90	—	2.20	—	1.65	—	(Q)4.56	.03
Fruit Distraction IV-II: time (seconds)								
Young	79.35	27.10	45.05	31.07	37.50	27.18	—	—
Old	57.00	56.37	60.29	28.24	44.46	22.13	10.42	.002
Total	66.17	—	52.67	—	40.98	—	5.50	.02
Leveling-Sharpening : first stop								
Young	25.50	14.70	21.90	13.29	2.7	5.80	—	—
Old	20.33	16.20	18.79	11.22	13.33	7.34	1.98	NS
Total	22.91	—	20.34	—	13.04	—	13.43	.001
Leveling-Sharpening : number correct								
Young	4.35	2.27	6.05	4.26	10.05	2.86	—	—
Old	5.25	3.16	6.58	2.66	9.78	2.71	1.05	NS
Total	4.80	—	6.31	—	9.91	—	75.54	.001
Leveling-Sharpening : ratio								
Young	24.18	2.53	21.60	4.63	16.61	4.18	—	—
Old	19.61	7.38	21.47	3.40	17.40	3.22	11.48	.001
Total	21.89	—	21.53	—	17.00	—	25.74	.001
Object Sort: total groups								
Young	10.60	5.14	13.65	5.26	12.05	3.75	—	—
Old	11.33	6.17	13.46	4.32	12.37	4.00	(Q)0.04	NS
Total	10.96	—	13.55	—	12.21	—	(Q)5.40	.02
Object Sort: atypical groups								
Young	1.85	1.90	1.50	2.02	1.15	1.38	—	—
Old	0.91	1.19	0.66	0.56	0.54	0.84	0.46	NS
Total	1.38	—	1.08	—	0.84	—	3.20	.08
Object Sort: developmental mean								
Young	2.86	10.70	3.93	9.01	4.12	8.44	—	—

Old	2.72	12.10	3.98	8.13	4.41	4.65	2.31	NS
Total	2.79	—	3.95	—	4.26	—	73.77	.001

*A (Q) preceding an *F* ratio indicates that the result was not derived from linear trend analysis.

In reviewing the developmental functions obtained, we should keep two broad considerations in mind. First, we can compare the developmental functions defined by the total group (young and old children combined) with the functions defined by the children of the 5-year longitudinal study and note whether the patterns are similar. This comparison is appropriate because the children in the present study came from the same geographic area and school system as the population involved in the 5-year longitudinal study begun in 1969 (study 1, above). In addition, the kindergarten and first grade assessments in both studies were obtained during the same time of year, that is, the close of the school year in question. By comparing the developmental functions obtained from the present study (Figure 3) with those of the 5-year study (Figure 2), we are able to explore whether the kindergarten and first grade assessments agree with those observed among the 1969 population during the same grade years. If there were agreement, we would have additional support for the developmental level of cognitive control functioning that characterizes kindergarten and first grade children. In addition, we could accept the prekindergarten assessment as representative of cognitive control functioning during that stage of life (4.5 to 5 years).

The second broad consideration when examining the developmental functions obtained concerns possible differences between the Young and Old groups. Such information could provide clues about questions of interest to primary school educators: namely, is the chronologically immature kindergartener poorly equipped cognitively to handle school demands, and is the cognitive development of the young child affected negatively in some way by starting school too soon?

FINE MOTOR DELAY (FIGURES 3A-B)

When drawing a line over an S-shaped maze (Fine Motor Delay I), the total population exhibited an age trend toward using a progressively quicker regular tempo. Not only is the monotonic function of the first study replicated (Figure 2 *A),* but the children in the present study used the same tempo at kindergarten (about 16 seconds) and at first grade (about 13 seconds). The Young and Old groups did not differ in regular tempo of fine motor movements during any of the evaluations.

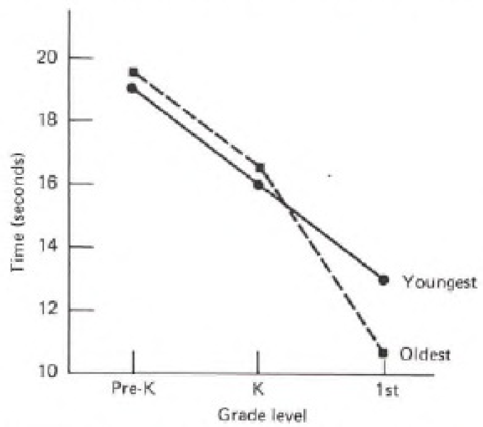


Figure 3A. Fine Motor Delay Test: I: time.

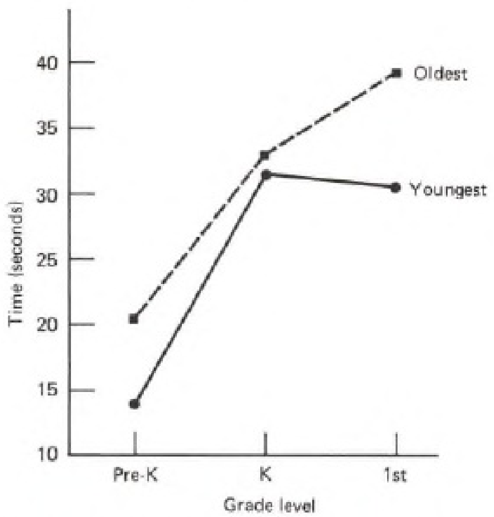


Figure 3B. Fine Motor Delay Test: II-I: time.

When asked to impose delay on fine motor movements, however, the younger children delayed less than the older children (*F*= 5.21, *p* = .05) during the prekindergarten assessment. Following this, the younger children continued to lag in the capacity to delay. This observation suggests a question for future study. Does entering kindergarten when one is chronologically “young” retard the development of fine motor delay?

FOCAL ATTENTION (FIGURES 3 C-E)

With all subjects combined, the same monotonic functions we observed in the first study were defined by two of the components of focal attention: vigor of scanning (number correct) and extensiveness of scanning (total distance). From the ages of 5 to 7 years, there is a progressive increase in the activity and extensiveness of scanning. Moreover, the level observed at first grade, in both studies, was the same; from 16 to 18 circles and crosses marked, and a distance covered of 110 to 120 cm.

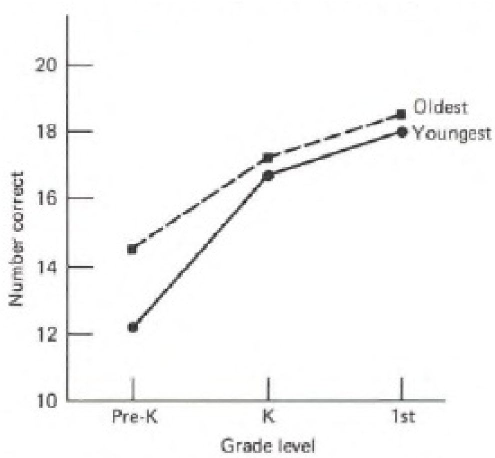


Figure 3C. Scattered Scanning Test: number correct.

Differences emerge from a comparison of the Young and Old group differences. The Young Group marked significantly fewer circles and crosses during the prekindergarten assessment(F = 12.57, p = .01), and they covered a smaller total distance over the surface of the test from(F = 6.58, p = .05). These results indicate that before entering kindergarten, the Young Group was characterized by more passive and less extensive scanning when sampling information. Although they continue to lag both in vigor and in extensiveness of scanning through the kindergarten assessment, they reach the developmental level of the Old Group by the first grade. In general, then, although the Young Group showed that they functioned at significantly lower levels in vigor and extensiveness of scanning before kindergarten, these components of focal attention reached the stage of typical development by the first grade.

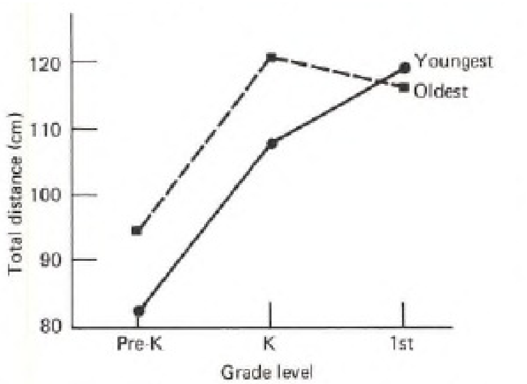


Figure 3D. Scattered Scanning Test: total distance.

The component of focal attention defined by the average width of a single visual scan followed U-shaped trends for both groups. This pattern differs from the monotonic function observed in the first study from the ages of 7 years (first grade) to 11 years (fifth grade). In considering the U-shaped trends observed between 5 and 7 years, we should note that the combined subjects showed an average single visual scan (6.4 cm) by the end of the first grade that is very close to that assessed at the same level in the first study (6.5 cm). The prekindergarten and kindergarten assessments then supply clues about the development of this component of focal attention before the seventh year of life. Before kindergarten the Young Group showed a broader single visual scan than the Old Group, but the difference is not significant. By the close of the kindergarten year the Young Group shifted to a more narrow single scan, and this width was maintained to the end of the first grade. The Old Group showed a more narrow single scan at prekindergarten, shifted to a broader mean scan at the end of the kindergarten year, then returned to a more narrow scan by the end of the first grade. Further study is required to determine whether these trends are chance characteristics of the children sampled or are psychologically meaningful.

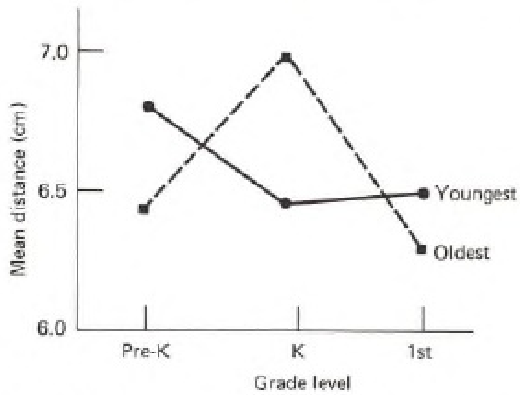


Figure 3E. Scattered Scanning Test: mean distance.

In any event, if we take the Young and Old children together, and combine Figures 3*E* and 2*E,* we see that the average breadth of a single visual scan *narrows* progressively from the age of 5 years (before kindergarten) to the age of 7 years (end of first grade) to a level of about 6.5 cm. The level persists to the fourth grade, after which the average breadth of a single visual scan broadens again. The developmental course followed by the width of a single visual scan suggests an interesting speculation. One major aspect of formal education is the requirement that a child more and more limit visual attention to an area defined by a desk top and by the expanse of a page in a workbook. The developmental function observed suggests the possibility that the breadth of a single visual scan narrows in the primary grades, accommodating to this environmental requirement, and remains relatively narrow to the fourth grade. However we should keep in mind that while the breadth of a single visual scan remains relatively narrow, the activeness and extensiveness of scanning progressively increases.

FIELD ARTICULATION (FIGURES 3F-I)

The combined subjects showed a significant monotonic decrease in time taken to name the colors on Card II, a trend identical with that produced by the children in the first study (Figure 2I). Moreover, time scores reached by the end of kindergarten (90.2 seconds) and the first grade (61.3 seconds) closely paralleled the results obtained from the first longitudinal study.

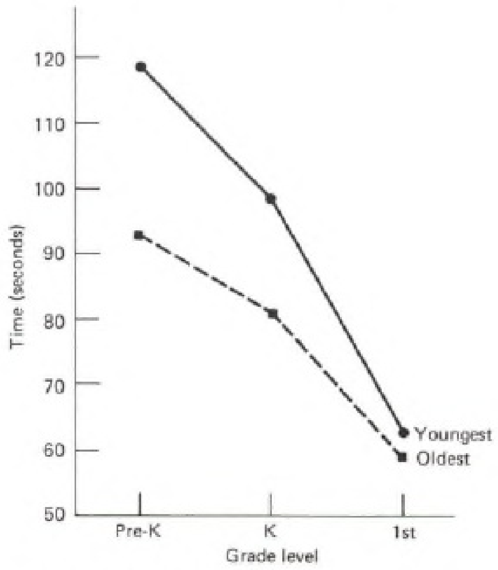


Figure 3F. Fruit Distraction Test: II: time.

In terms of group differences, before kindergarten, the Young Group was significantly slower in naming the colors than the Old Group (F= 4.28, p = .05). The younger subjects continued to lag in color-naming speed until the first grade, when they approached the performance of the Old Group.

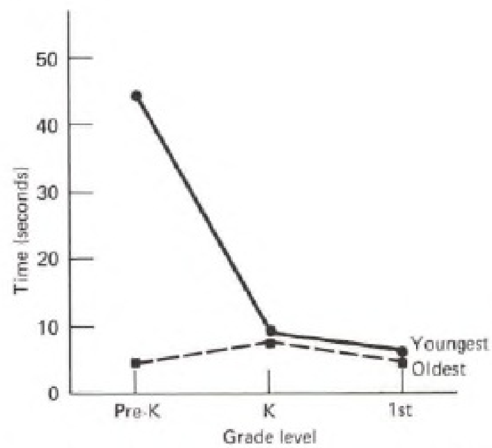


Figure 3G. Fruit Distraction Test: III-II: time.

Turning to the disrupting influence of the peripheral, irrelevant pictures of Card III in color-naming speed, the total sample of children showed a trend toward naming the colors on the distraction card progressively more quickly with age. This pattern replicates the monotonic function observed in the first study (Figure 2J), but as a group, the children in the present study showed less distractibility with Card III during the kindergarten and first grade measures than the children in the first study.

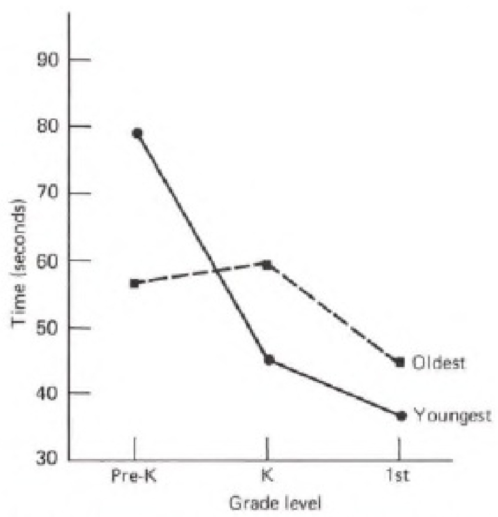


Figure 3H. Fruit Distraction Test: IV–II: time.

The Young Group was distracted significantly more by the peripheral pictures on Card III during the prekindergarten assessment (F= 12.26; p = .01). However by the end of the kindergarten grade their performance was nearly the same as that of the Old Group and was sustained to the first grade.

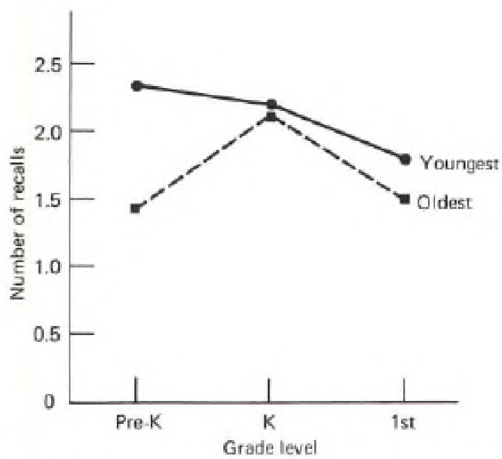


Figure 3I. Fruit Distraction Test: III: number of recalls.

When the irrelevant information to be ignored is in the form of incorrect colors (Card IV), again the total sample named the colors of the distraction card increasingly rapidly with age. This trend indicates that with age there is tendency to ignore irrelevant information and selectively attend to relevant information. The level of performance revealed at the kindergarten and first grade assessments is slightly more advanced developmentally (smaller time difference scores) than that of the other children.

A comparison of the performance on Card IV of the Young and Old groups suggests a question for further study. During the prekindergarten assessment, the Young Group took significantly more time to name the colors on Card IV, indicating that they were more distracted by the incorrect, contradictory colors ($F = 10.23$, $p = .01$). During the kindergarten assessment, however, and again during the first grade assessment, they took less time (were less distracted) than the Old Group, and these group differences reached significance. We know from our previous discussion that the task of managing incorrect colors relates to the regulation of affects. The critique at the close of the chapter considers the possibility that this finding suggests an association between entering kindergarten at a young age and the progressive tendency to isolate inner affects and feelings more than is typical.

The number of peripheral pictures remembered incidentally when dealing with Card III showed a more or less level trend for the total group during kindergarten and first grade assessments, that is, close to the number observed in the first study (about two recalls, Figure 2 *L).*

LEVELING-SHARPENING (FIGURES 3 J-L)

Over the three assessments, the total group showed trends toward detecting the first change earlier in the series of presentations, detecting more changes, and reporting these with less delay from the display in which the change is introduced. All trends are monotonic and statistically significant. These functions indicate that from 5 to 7 years, the leveling-sharpening control changes reflect increasingly more differentiated and articulated images of information formed in memory. Although these children tended to level information more than the population of the first study during the kindergarten evaluation, the stages defined by the respective populations at the first grade (as indicated by each measure) are the same.

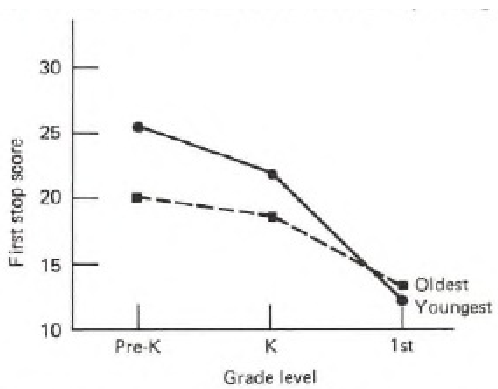


Figure 3J. Leveling-Sharpening House Test: first stop score.

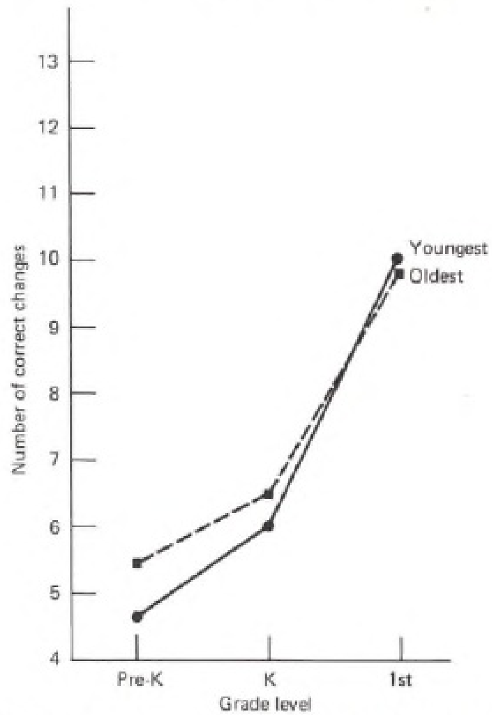


Figure 3K. Leveling-Sharpening House Test: number of correct changes.

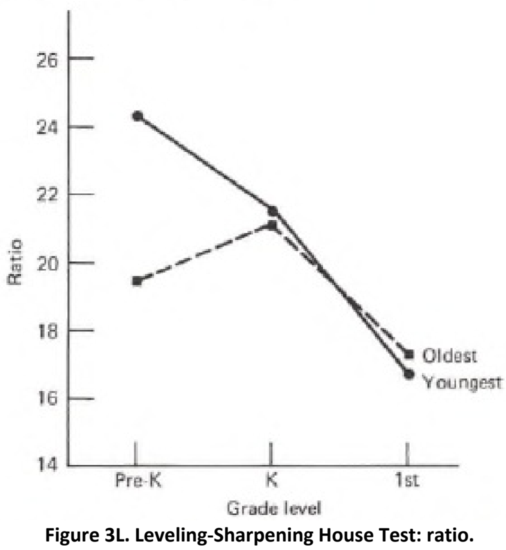


Figure 3L. Leveling-Sharpening House Test: ratio.

Comparing the Young Group with the Old Group, the younger children leveled information significantly more before entering kindergarten. They detected the first change later in the series of displays (the difference falls short of significance), they detected fewer correct changes (F = 5.37, p = .05), and they lagged more in detecting changes (F=5.16, p = .05). Over the course of the next two years, however, these differences essentially disappeared, and the young children exhibited leveling-sharpening functioning that was essentially the same as that of the older children.

EQUIVALENCE RANGE (FIGURES 3M-0)

The total population defined an inverted U-shaped distribution for the number of groups constructed when categorizing the items of the Object Sort Test. The number of groups increased from age 5 to 6 years, then decreased at 7 years. The number of groups constructed by this sample during the prekindergarten and kindergarten evaluations was greater than the number constructed by the children in the first study. However by the end of the first grade both populations constructed an average of 12 groups. The younger and the older children did not differ in the number of groups constructed.

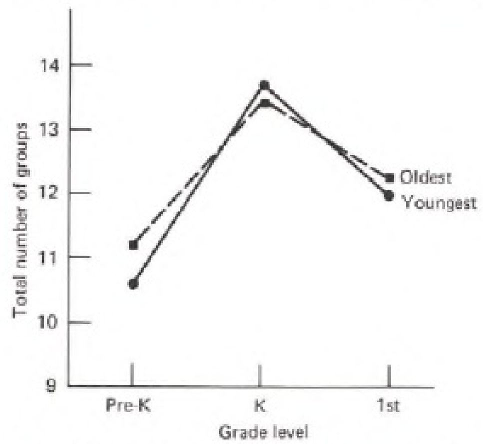


Figure 3M. Object Sort Test: total number of groups.

The number of groups constructed that reveal unrealistic, illogical thinking (atypical groups) decreased over the three evaluations approximately to the level observed in the first study during the first grade. As a group, however, the present sample constructed a slightly greater number of atypical groups during the kindergarten assessment. Furthermore, the Young Group formed more atypical sortings than the Old Group throughout the two years.

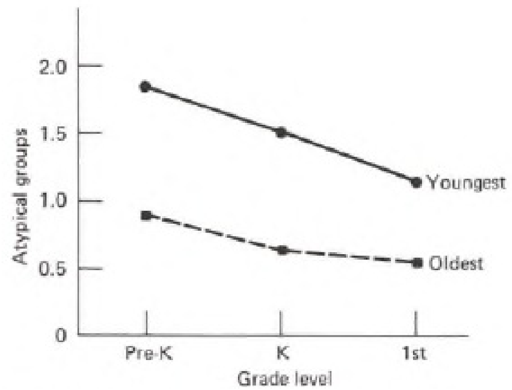


Figure 3N. Object Sort Test: number of atypical groups.

The level of abstraction used to explain the relationship among the objects placed into the realistic, logical groups increases monotonically. At 5 years of age more concrete concepts are used to explain why the objects grouped belong together, and at 7 years more abstract concepts are used. The levels of abstraction observed during kindergarten and first grade closely approximated those observed in the first study. The Young and Old groups did not differ appreciably in this aspect of their test performance.

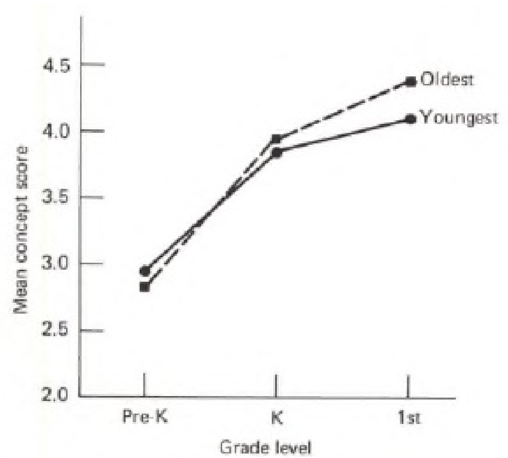


Figure 30. Object Sort Test: mean concept score.

Taken together, the results indicate monotonic progressions from ages 5 to 7 years toward more abstract conceptualizing and less illogical conceptual thinking. Category width (number of groups formed) is more narrow before kindergarten, then it broadens.

III. CRITIQUE OF DEVELOPMENTAL STUDIES

We have considered a number of investigations into the question of whether children from the ages of 5 years to adolescence display differences in cognitive control functioning. We elected to examine these differences through Wohlwill's concept of developmental function, which requires us to determine the *form* of the relationship between an individual's age at different points in time and the changes that occur in his response to cognitive control tests over the course of some period of time.

In employing this concept, we agreed to follow a particular plan. Our first task is to determine the form of the developmental function of each cognitive control; that is, we are to establish whether changes in the functioning of each cognitive control define some consistent pattern. If a pattern is observed, we then ask whether this pattern or developmental function could be interpreted in terms of the biodevelopmental proposition of differentiation, namely: that whenever behavioral development occurs, it follows a course from global, undifferentiated functioning to articulate, differentiated, and integrated functioning. When this proposition is applied to our interest, the question becomes, does the developmental function observed suggest that the organization and process of a cognitive control are global and differentiated in younger, cognitively immature individuals, becoming progressively more differentiated and integrated in older, cognitively mature individuals? A pattern of change interpreted in these terms would need to define a monotonically increasing developmental course.

Although the biodevelopmental proposition of differentiation is our main theoretical guide, we recognize that other functions could describe the developmental course of a particular cognitive control or of some component of its process. We have no basis on which to form hypotheses because before our studies relatively little information was available about the developmental changes of the several cognitive controls formulated by Klein. Therefore we should also ask whether a particular cognitive control, or some component of its process, follows a developmental course different from one of progressive differentiation (e.g., U-shaped, inverted U-shaped; S-shaped). These functions would suggest that a cognitive control moves through a course of development characterized by successive stages of differentiation and dedifferentiation.

Having determined the overall course of change for each cognitive control, our plan takes us one step further. We should next examine the functions more closely in terms of two broad interests. We need to learn whether a function shows characteristics that might be psychologically meaningful. For example, is there a point of inflection, a period during which the control undergoes a rapid rate of change? Does the function contain a point (an age level) when the development of a control reaches an asymptote? Do these points of inflection and asymptotes suggest hypotheses for future study about the interplay between cognitive control development and personality development?

The next broad interest that guides our examination of the developmental functions observed concerns the differences between the courses of development defined by normal and by clinical populations. Cognitive control developmental functions were obtained from several population of both types, and our comparisons of these present the opportunity to pursue two questions. Is the general shape of a developmental function of each cognitive control the same or appreciably different for normal and clinical populations? For example, do normal and clinical populations define, respectively, a monotonic function and a U-shaped function for a particular cognitive control? If the functions are the same, broadly speaking, the developmental course of cognitive controls is fundamental in the general development of all children. The second question to be pursued in comparing functions defined by normal and clinical populations concerns whether subtle characteristics of the function (e.g., rate of change, inflection points) help us to plan new studies of cognitive controls and psychopathology.

Let us reexamine the studies discussed in this chapter, with this plan as a guide. Given relatively intimate familiarity with the results of each study, the reader can use this critique to integrate the findings in terms of the foregoing considerations. We first review the developmental functions defined by normal populations, noteworthy variations in these functions, and significant departures revealed in the developmental functions defined by clinical populations. We conclude with speculations and hypotheses that emerge when all these observations are related.

A quick aside is in order before proceeding with the critique. Since (with only a few exceptions) the same procedures were used in our studies to assess cognitive controls at the various age levels, we can examine and compare the developmental functions obtained free of the caution raised by Saarni and Kogan (1976). They appropriately pointed out that when studies measure a cognitive style or control with different tests at different age levels, care is necessary in inferring developmental trends, since the changes observed could be due as much to the makeup of a test used at a particular age level as to fundamental developmental changes in the psychological process assessed. Finally, the reader is reminded not to impute value ("good" or "bad") to one or another phase of a developmental trend. Describing the cognitive control organizations that characterize early and later development (less maturity and more maturity) concerns *only* the issue of the course of change in that control over time. Whether a particular organization of cognitive control functioning characteristic of developmental immaturity is "good" or "bad" can be answered only in terms of the question "good or bad in the service of what?" and the principle of adaptation, which is addressed in Chapter 9.

SUMMARY OF COGNITIVE CONTROL DEVELOPMENTAL FUNCTIONS DEFINED BY NORMAL POPULATIONS

Do children of different ages show differences in cognitive control functioning? What is the developmental function defined by the differences observed for each cognitive control? The studies we have conducted thus far convincingly demonstrate that children of different ages show different forms of cognitive control functioning. In general, the pattern of change with each cognitive control observed over time defines an increasing monotonic function. Moreover, each function can be interpreted in terms of the biodevelopmental proposition of differentiation. Our data suggest that in developing, the organization of each cognitive control changes toward increasing differentiation over the course of childhood (from the ages of about 5 to 12 years). Several exceptions were observed to this general finding in the developmental trends defined by components of the principles of field articulation, leveling-sharpening, and equivalence range.

The developmental functions defined by each cognitive control can be summarized by integrating the findings of the several correlational, cross-sectional, and longitudinal studies discussed thus far. Although many of these functions were observed in populations of normal and clinical children, the trends noted were revealed by normal children. Departures from these normal developmental courses by clinical groups are discussed in a later section.

1. *Body Ego Tempo Regulation.* The "regular" or typical tempo a child uses in performing fine motor movements is slow early in development (Fine Motor Delay I and Motor Tempo Test) and quickens progressively with age. At the same time, relatively little delay is imposed on fine motor movements (Fine Motor Delay II-I) early in development; with age, progressively more delay and regulation are imposed. Taken together, the results suggest that the principle of body ego-tempo regulation follows a developmental course of increasing differentiation from a slow "regular" tempo with little delay imposed on fine motor movements to a quick, regular tempo and much delay imposed in fine motor movements, whenever delay is required.

2. *Focal Attention.* When scanning the environment to sample information, the child early in development scans passively, scans a narrow segment of the field of information, and prefers to use a single, narrow visual sweep from one bit of information to the next. With age, progressive changes occur in each of these components. The child scans more actively, scans more extensive segments of the field of information, and uses broader, single visual sweeps from one bit of information to the next. Taken together, the course of change of these components suggests that when the focal attention cognitive control develops, it goes in the direction of increasing differentiation.

3. Field Articulation. When asked to manage information that contains both relevant and nonrelevant details, and if the time taken to manage that information is used as a measure of selective attention deployment, the child early in development gives attention to nonrelevant details, which serves to distract him and slow him down in attending to the relevant details. With age, the child progressively ignores nonrelevant details, attending to and handling the relevant information more quickly.

If the number of naming errors made in the face of distracting and contradictory information is used as a measure, some data suggest a decrease in the number of errors to about the age of 9, followed by an increase. Naming errors appear to be related to the regulation of inner affects and emotions interpreted as irrelevant to the cognitive task at hand.

If the number of nonrelevant bits of information remembered incidentally is used as a measure, some data suggest an increase in the number remembered to the age of 9 years, followed by a decrease.

Taking these trends together, we can hypothesize that the several components of the field articulation principle define either a monotonic function or a U-shaped function. Speed with which relevant information contained in the environment is handled, while nonrelevant information is ignored, follows a monotonic function. Inversely related U-shaped functions define the process of managing inner affects and emotional tensions as information irrelevant to the cognitive task at hand, and the process of retaining incidentally irrelevant bits of information displayed in the outer environment.

4. Leveling-Sharpening. When the child early in development is attending to and remembering ongoing information and relating present information with past, he notices his first change late in the sequence of information, detects few changes, and lags in detecting a change after it has been introduced. With age, the child notices the first change earlier in the sequence, detects more changes, and reports them soon after they are introduced. Taken together, these observations define a monotonic course of change for the component of the leveling-sharpening control involving the degree of differentiation or detail imposed on memory images constructed. In early development there is a preference for forming global, undifferentiated memory images and fusing present information with past. This tendency undergoes a gradual change with development toward forming increasingly more articulated memory images and differentiating present information from past.

As for the component of leveling-sharpening that concerns the stability and fluidity of memory images constructed, there is a decrease with age in the tendency to maintain fluid images (i.e., to modify information contained in the original reality perception). The tendency to fabulate or invent details and to inject them into the memory image of the original reality perception is nearly negligible in normal development until late childhood, when an increase is recorded. These observations suggest a broad developmental course from a tendency to maintain fluid images, characteristic of early development, to a disposition to maintain stable images, characteristic of later development. However images become slightly more fluid again in late childhood.

For the most part, the several components of the leveling-sharpening control define monotonic developmental functions.

5. Equivalence Range. Of the five cognitive controls studied, equivalence range appears to follow least the principle of monotonically increasing differentiation in the course of development. Components of this control concerned with realistic and fully formed categorizing behavior define increasing monotonic functions. Components involving partial, realistic conceptualizing and unrealistic conceptualizing define S-shaped functions that appear to be interrelated. An index of the width of categories used to conceptualize information follows a U-shaped function.

In terms of reality-related, logical conceptualizing, the child early in development forms a small number of typical groups with the test objects; that is, the objects placed in a group contain physical or functional properties that can be realistically related. With age, the child constructs an increasing number of such groups. At the same time when labels are assigned to the typical groups, or when the child attempts to explain why the objects form a category, concrete similarities and identities represented by the objects are relied on early in development. With age, the child gradually uses labels and explanations that rely more on functional, then on abstract relationships, revealing broad classifications.

These components of the equivalence range principle that pertain to realistic, complete conceptual thinking, then, show changes from few to many typical groups and from concrete to abstract explanatory labels, suggesting a progression from global to more differentiated and integrated functioning.

Categorizing behavior that is incomplete or preparatory (miscellaneous groups) increases before the age of 8 years, while at the same time illogical categorizing behavior (atypical groups) is infrequent and decreases slightly. After the age of 8, illogical conceptualizing increases, then decreases again, in concert with incomplete conceptualizing, which decreases in incidence, then increases. These components of the equivalence range principle then follow a course of successive stages of differentiation and dedifferentiation that are related.

Investigators have used number of groups constructed with the objects of the Object Sort Test as an index of preference for category width, interpreting many and few groups as indicating preferences for narrow and broad categories, respectively. In one study we computed an index that combines the number of objects placed in each group and the level of abstraction represented by each group, along with number of groups formed, in an effort to refine a measure of category width. For example, if one child constructs five groups with two objects in each, and another also constructs five groups but with five objects in each, we felt that this variation in number of objects per group should participate in any consideration of category width. Similarly, variations in level of abstraction from the narrow domain ("they are all exactly the same") to the broader domain ("they are all tools") should also be considered.

This index of category width in one cross-sectional study defined an inverted U-shaped function. In early development children show a preference for narrow category width, in middle childhood (age 9 years) for broader categories, and in preadolescence they shift again toward more narrow category width.

Unique Characteristics of Normal Developmental Functions of Cognitive Controls

Having noted the broad course of development defined by each cognitive control, we can now examine each developmental function more closely in search of unique characteristics that might serve to shape future studies. This discussion relies on characteristics revealed by the functions defined by the normal populations studied. As our main source of information, however, we use the assessments of public school children tested and followed longitudinally. These children were tested in late spring of each school year listed. At prekindergarten the children were 5 years old, at the kindergarten testing, 6 years old, at first grade, 7 years old, at second grade, 8 years old, at fourth grade, 10 years old, and at fifth grade, 11 years old. The possible meaning of the characteristics observed is discussed in a concluding section, after we have also reviewed characteristics of cognitive control developmental functions revealed by the clinical populations studied.

1. *Body Ego-Tempo Regulation.* At the age of 11 years, following a gradual, progressive quickening of tempo, there is a noteworthy shift toward a slower regular tempo in performing fine motor movements. The capacity to delay fine

motor movements increases from the age of 5 to 6 and remains about the same during the ages 6 and 7. At the age of 8 there is a very sharp increase in the capacity to delay to a level that maintains with a slight decrease occurring at the age of 12 years (Figures 2*A,* 3*A-B).*

2. Focal Attention. The breadth of a single visual sweep shows noteworthy inflection points (Figures *2E,* 3*E).* These characteristics appear to be psychologically meaningful, especially when considered in terms of the developmental functions defined by the degree of activity of visual scanning (Figures *2D,* 3 C) and by the extent of the informational field sampled (Figures 2*F,* 3 *D).* Whereas from the ages of 5 to 10 years visual scanning becomes progressively more active and the breadth of the field sampled more extensive, the average breadth of a single visual scan increases from prekindergarten to the end of the kindergarten year, then narrows from that point to the end of first grade, and remains relatively narrow to the end of fourth grade. From this point to the end of the fifth grade there is a noticeable increase in the breadth of a single visual sweep, but activity and extensiveness of scanning continue to show the same steady increase.

3. *Field Articulation.* The several components of this cognitive control define monotonic functions exhibiting no noteworthy variations. The exception is in the number of irrelevant, peripheral bits of information held in memory through incidental learning. From prekindergarten (5 years), there is a steady increase in the number of bits of information retained incidentally up to the age of 8 years, followed by a decrease (Figures 2*L, 31).* The age trend of the cross-sectional study (a decrease in number of recalls) roughly fits the second half of this inverted U-function.

4. *Leveling-Sharpening.* The process of constructing increasingly more detailed memory images (as defined by first stop, number correct, and ratio scores) reveals a moderate spurt from the end of kindergarten to the end of first grade (Figures 2M-O, and 3 *J-L).* In addition, although the fluidity of memory images of existing information steadily declines from age 6, almost no invented (fabulated) information is introduced into memory images until age 11, when an increase occurs (Figure 1P).

5. *Equivalence Range.* The number of typical groups used to conceptualize information in realistic terms increases noticeably at the age of 7 years to a level that sustains to the eleventh year (Figure 2*S).*

At the same time, the number of groups that disclose incomplete but realistic conceptual thinking, and the number of groups that reveal unrealistic, illogical conceptual thinking follow the S-shaped, inversely related courses described earlier.

Having summarized cognitive control developmental functions defined by normal populations and noteworthy characteristics of these functions, let us review the developmental functions and characteristics defined by the clinical populations studied. Then the two sets of observations can be compared, and we can present speculations and a hypothesis that should be helpful in suggesting questions for future study.

COGNITIVE CONTROL DEVELOPMENTAL FUNCTIONS UNIQUE TO CLINICAL GROUPS

Two broad clinical populations were studied, yielding some data about the shape of cognitive control developmental functions in psychopathology: public school children experiencing difficulty in learning and adjusting, and children hospitalized because of severe emotional disturbances.

Three studies involved public school children and afford the opportunity to examine possible derailments in the course of cognitive control development associated with learning difficulties. One study compared the developmental functions, obtained longitudinally over a 5-year period (kindergarten to the fifth grade) from grade-adequate learners and poor learners judged to be at risk academically. A second study also involved both adequate and at-risk learners assessed at two points in time: kindergarten and third or fourth grade. A third study examined three cross-sectional age groups (5, 6, and 7 years old), presented as having learning and adjustment problems.

The longitudinal study (comparing the youngest and oldest entering kindergartners from prekindergarten to the end of first grade), could also be viewed as a study of a clinical population. It seems appropriate to consider the Young Group, representing the youngest 20 children of a total population of 160, as less mature cognitively and emotionally than the majority of entering kindergarteners. This study then allows us to explore the issue of whether engaging the demands of a public school when a child is chronologically immature (cognitively as well as emotionally) results in derailed cognitive control development.

We conducted one study of children hospitalized because of severe emotional disturbances. The subjects ranged in age from about 4 to 17 years. This work made it possible to investigate whether and how cognitive control development is derailed in association with major personality disturbances and mental illness.

Although some of our data are longitudinal and some cross-sectional, and only two types of clinical population are represented, relating characteristics of the developmental functions defined by these groups to those of nonclinical groups should furnish valuable clues for future study.

Public School Children with Learning and Adjustment Problems

We should note at the start that the samples of public school children judged to be at risk academically during kindergarten (longitudinal studies 1 and 2) defined developmental functions that were essentially the same as those defined by typical learners in the same school system. On the other hand, the learning-disabled children of the third (crosssectional) study defined functions for field articulation and leveling-sharpening that are appreciably different. There are several possible explanations for this finding. Both groups of "at-risk" children followed in the longitudinal studies came from middle to upper SES families and attended a suburban school. Moreover, they were presented as showing difficulty in learning during kindergarten and, for the most part, as evidencing relatively minor adjustment problems. The children in the cross-sectional study came primarily frorri middle to lower SES families and attended an urban school system. In addition, all these children had given evidence of fairly severe difficulties in learning and relatively major adjustment problems. Therefore these populations could represent different levels of psychopathology. Moreover, one set of functions was defined by longitudinal and the other by cross-sectional observations.

Because of the differences in the populations and the method of observation, we shall examine the two sets of findings separately.

COGNITIVE CONTROL DEVELOPMENT IN CHILDREN WITH MODERATE LEARNING AND ADJUSTMENT DIFFICULTIES

Let us first consider the two longitudinal studies of children judged to be "at risk" academically while attending kindergarten in a suburban school. Tables 7, 8, and 9 present the mean scores obtained during each assessment for these children, who were referred as "suspects," and for the controls, referred to as "typical learners." In all cases the developmental functions defined by the suspects have the same form as those defined by the typical learners. This finding suggests that in the context of relatively moderate psychopathology (moderate learning and adjustment difficulties), the broad course of cognitive control development is not derailed.

If we next compare the performance of suspects and typical learners at each assessment point, we observe that for the most part the rate of development of cognitive controls for suspects lagged behind that of typical learners from kindergarten to the fifth grade. Moreover, in the case of a few cognitive control components, the suspects showed a faster rate of development. The following review of the differences observed between suspect and typical learners is based on Table 7.

Tempo Regulation. During kindergarten the suspects showed a quicker regular tempo when drawing a line through the S-shaped maze. From first grade on, however, they showed a slower regular tempo than did typical learners. At the same time, the suspects imposed less delay on fine motor movements than did typicals during kindergarten and first grade. Then, beginning with the second grade, they imposed *greater* delay, a cognitive control preference that sustained to the fifth grade.

In summary, although among suspects, regular tempo of fine motor movements was more rapid and delay of that tempo less during kindergarten, by the first and second grades, regular tempo became *slower*, and delay greater than that of typical learners.

Scores obtained with the Motor Tempo Test corroborated this finding. At the three points assessed (first to fifth grades), suspects showed a slower motor tempo time score than typical learners.

These results raise interesting questions for future study. A learning disabled child is often observed to be restless and hyperactive in terms of gross motor movement. This was also the case with our suspect children (see

Chapter 6). However our suspects showed that they eventually developed a slower regular tempo and greater delay. Is this constriction of the fine motor system a function of emotional stress and frustration with continuous academic failure and difficulty? Is the increased delay at the age of 9 implicated as one of the mechanisms used to regulate aggressive tensions, which have increased because of frustration with academic demands?

Focal Attention. When sampling a field of information, suspects at kindergarten level showed more passive scanning (fewer number correct) and less extensive scanning (smaller total distance covered). They continued to lag behind the typical learners in both these components of local attention to the fifth grade. The exception occurred in second grade, when the activity and extensiveness of scanning were essentially the same as for typical learners. Second grade was the very time period when suspects developed a slower regular tempo and greater delay! Is the slowing down of tempo related to the rapid but short-lived growth in active and extensive scanning? Why does focal attention lag again after this period of advance?

When we examine data about the average breadth of a single visual scan from one bit of information to the next, we are struck by a most curious finding. The suspects showed a tendency to use a *wider* single visual scan than did typical learners from first to fifth grade. If we relate this finding to the foregoing discussion of the observation that the breadth of a single scan narrows by the first grade, can we say that suspects fail to accommodate (decrease) the width of a single visual scan to the distance that is adaptive for managing information on a printed page? Is this developmental lag due primarily to the child's cognitive organization, or are emotional-personal factors involved?

In summary, although suspects lagged behind typical learners in the degree of activity with which they sampled a field of information and in the extent of the field they covered, they tended to use a wider single visual scan than did typical learners from the first to the fifth grade.

Field Articulation. When time to manage information in the face of distractions is taken as the measure of field articulation, suspects showed a more immature level of field articulation functioning during kindergarten. They attended more to nonrelevant information, which disrupted their performance with relevant information. Suspects took longer to name the colors of the baseline card (Card II) and took longer with each distraction card (time difference scores with Cards III and IV). From kindergarten to the fifth grade they sustained this lower level of field articulation functioning, except for only a few assessment periods. Therefore the process of selective attention deployment lagged in development with these learning disabled children throughout childhood.

When the number of irrelevant bits of information incidentally remembered is taken as the measure (Card III, number of recalls), we see that the suspects recalled fewer bits than did typical learners, and they maintained this relative position throughout the year period. The suspects parallelled typical learners in defining an inverted U-shaped function with this aspect of their test performance. We consider the possible significance of remembering nonrelevant information in a later section.

Leveling-Sharpening. In terms of the degree to which differentiated versus global memory images are constructed, kindergarten-level suspects tended to level information more than did typical learners. Suspects perceived the first change later in the series (higher first stop score), perceived fewer changes (smaller number of correct changes), and lagged more when detecting changes in ongoing information (higher ratio score). Moreover they continued to form more global images of information throughout the 5-year period (with the exception of two assessments), suggesting that this component of leveling-sharpening, though following the same course, continued to lag behind in development from that of typical learners.

Suspects showed less fluidity (fewer A changes) of memory images throughout childhood, although they defined the same monotonically decreasing function as did typical learners. With age, images of information contained in the original perception became increasingly more stable. However suspects did not show the moderate rise in number of invented or fabulated changes (B changes) at age 11 that was revealed by the typicals.

Equivalence Range. During kindergarten suspects formed fewer realistic groups (typical groups) and more illogical groups (atypical groups) in the Object Sort Test than did adequate learners. Moreover, the development of these components follows a different course with suspects. Suspect learners showed a progressive increase in the number of realistic, logical groups constructed to the second grade, then a gradual decrease. The typical learners maintained a steady level of about 10 realistic groups from the first to the fifth grade.

The suspects produced a relatively high number of illogical groups (about 0.8) from kindergarten to the fifth grade. In contrast, the number of illogical groups by typical learners generated an S-shaped function, discussed earlier, which is inversely related to the number of partial, preparatory realistic groups constructed (miscellaneous). The number of miscellaneous groups constructed by the suspects follows the same S-shaped course, but this course is not synchronized with the developmental course of illogical groups. Again, a possible hypothesis relating these observations appears in a section to follow.

COGNITIVE CONTROL DEVELOPMENT IN CHILDREN WITH SEVERE LEARNING AND ADJUSTMENT DIFFICULTIES

The cross-sectional age study of public school children aged 5, 6, and 7 years with severe learning and adjustment difficulties (crosssectional study 3) can be related to the kindergarten, first, and second grade assessments of the longitudinal study of typical and suspect learners (longitudinal study 1), to the longitudinal study of “young” and “old” kindergarteners (longitudinal study 3), and to the early trends of the normal 6,9, and 12 year olds (cross-sectional study 2). The results suggest that the principle of tempo regulation (Table 4) follows the same course of development shown by the children with moderate learning disabilities. That is, regular tempo of fine motor movements becomes progressively slower, while the delaying of fine motor movements increases. (Recall that public school children with no learning difficulty showed a progressive increase in the speed of regular tempo with an increase in delay.) Although exhibiting the same trends as children with moderate learning problems, children whose learning difficulties were severe showed an exaggeration of these trends. Their regular tempos were much slower at the kindergarten, first, and second grade assessments (i.e., 28, 28, and 33 seconds) than were those of the children with moderate learning difficulties (15, 15, and 11 seconds). At the same time their delay of fine motor movements was much less: severe learning difficulties—12, 15, and 21 seconds; moderate learning difficulties—20, 23, and 50 seconds.

Because different procedures were used to assess focal attention (Circles Test), a comparison is not appropriate. However the Fruit Distraction Test was used to assess field articulation. The time difference scores of the children with severe learning difficulties showed U-shaped functions. When the nonrelevant information consisted of peripheral pictures, the 6 year olds were more distracted than the 5 or 7 year olds. When the nonrelevant information consisted of incorrect colors, the 6 year olds were less distracted than the 5 and 7 year olds (Table 4). Data from the learners with moderate difficulty and from the normal children in cross-sectional study 2 showed that with age, both types of irrelevant information were less distracting, causing time difference scores to post a gradual monotonic decrease.

The same derailed course of development is suggested by the results of the Fruit Distraction Test error difference scores. The children with severe learning disabilities showed an increase in naming errors with age, whereas the other children showed a decrease.

Finally, the functions defined by the three Leveling-Sharpening House Test scores involving the differentiation of memory images were essentially flat (Table 4). The other population showed progressive change toward increased differentiation of memory images in all these measures.

Taken together, these results suggest that in the context of severe learning and adjustment difficulties, the courses of development of cognitive controls are derailed. Tempo of fine motor movements is exceptionally slow, and the capacity to delay these movements is much less as opposed to the higher capacity to delay of children whose learning and adjustment difficulties are only moderate. The management of information in the face of nonrelevant distractions follows derailed courses. There is a tendency to attend increasingly to internal irrelevant information (affects) from kindergarten to first grade, and the development of the control required for constructing images of information appears to be arrested.

COGNITIVE CONTROL DEVELOPMENT IN THE VERY YOUNG KINDERGARTEN CHILD

Our discussion of the longitudinal study that compared the youngest entering kindergarteners with the oldest, from prekindergarten to the end of the first grade pointed out that with all cognitive control functions, the young children lagged behind the older children before entering kindergarten. For the most part, however, the control functioning of young children nearly had reached the developmental levels of the older children by the end of the first grade. We can conclude then that the developmental course of cognitive controls is not derailed if a child enters kindergarten at the youngest chronological age and has to deal with school demands over the next two grades.

A few exceptions to this broad conclusion deserve further study. By the end of the first grade the young children showed less delay of fine motor movements. Is this tendency the result of dealing with the stresses of school demands that are too great for the young child ? Does it forecast an emotionally based (neurotic) difficulty with impulse control?

Another exception was observed in the young children showing a progressive tendency to ignore more irrelevant information in the form of incorrect colors. We can assume, based on the factor analytic studies (Chapter 5), that the incorrect colors (Card IV) of the Fruit Distraction Test represent inner affects to be ignored as irrelevant information. These initial results raise an issue for future study. To cope with the experiences of entering a school system and meeting its social-emotional and academic demands, the very young child may be obliged to isolate and repress inner affects more. This issue could be investigated, as well as the related question of whether entering kindergarten at a young age, if associated with greater isolation of affects, results in emotional constriction (neurotic inhibition) or in an obsessive-compulsive personality style in later childhood.

We conclude this section with the reminder that although these exceptions raise questions for further study, the main finding is that the bulk of cognitive control development per se is not derailed by entering kindergarten at a very young age. In only two years, moreover, the lags observed nearly disappear, suggesting that the convergence of school experiences with a state of cognitive control immaturity fosters a rapid rate of cognitive control development. Whether there is a “sleeper effect” (i.e., whether the very young child shows in later childhood some significant compromise in cognitive or emotional functioning as a result of entering school early in life) must await longitudinal observations over more years than we followed the children.

Children Hospitalized with Severe Emotional Disturbances

Cross-sectional study 4, employing children hospitalized because of character disturbances and tension-discharge disorders, permits us to explore the course of cognitive control development in the context of severe psychopathology. There were five age groups from about 6 to 15 years. Therefore two age groups in this study (13 year olds and 15 year olds) extend beyond the age range covered by the longitudinal study of public school children.

We observed that the regulation of fine motor movements followed the normal course of development: from a slow to a rapid regular tempo until the age of 13 years, which was followed at age 15 by a slower regular tempo; and from little delay of fine motor movements to progressive increase in delay to the age of 13 years, followed by less delay at age 15.

Two components of focal attention, activity and extensiveness of scanning, also followed the normal course of development. However the developmental course of a width of a single visual scan appeared to be derailed. Age 9 years was the turning point. Unlike normals who showed a slow increase in the width of a single scan to the age of 9 years, these hospitalized children showed a progressively narrowing single scan to the age of 9 years, then the scan broadened until age 15, when it narrowed again appreciably to the 9 year level.

The age of 9 years appeared to be a critical point also in the derailed course of development observed in field articulation and leveling-sharpening. There was an increase to this point in the disruptive influence of color (affects) as nonrelevant information, followed by a decrease and then another increase, in contrast to normals, who show a continuing decrease beyond age 9. Leveling-sharpening also showed an abrupt change at age 9, especially in the first display at which a change was detected and the lag in detecting a change in ongoing information. After the age of 9 this population showed a marked tendency to construct global images of information.

In terms of the stability and fluidity of memory images, hospitalized children also gave evidence of trends opposite to those of public school children. They showed a progressive increase with age (rather than a decrease) in the number of changes (A changes) introduced in the details of the original reality perception. And unlike normals who, before the age of 9, invented a negligible number of details that were injected into the original perception of reality information (B changes), hospitalized children invented many. After the age of 9 years, moreover, especially in adolescence, they showed a higher incidence of this type of memory distortion.

Finally, although like normals, hospitalized children showed an inverse relationship between number of illogical groups constructed (atypical groups) and number of partial, preparatory realistic groups constructed (miscellaneous groups), the time courses of these components of equivalence range were quite different. At age 10 the hospitalized children showed a high incidence of illogical, conceptual groups and a low incidence of preparatory, logical groups, a relation opposite to that of normals.

HYPOTHESIS:
The Relation Between Managing Inner and Outer Information and Emotional Forces and Normal Development of Cognitive Controls and Personality

We have before us now a wide array of observations that concern the developmental courses followed by cognitive controls in normal development and the unique characteristics of these courses. Our observations also include developmental derailments defined by clinical groups. But is there a concept or point of view that could assist us in organizing and relating these diversified observations? In turning to answer this question, let us not lose sight of certain requirements: the organizing concept we select must satisfy our main interest, which stems from the biodevelopmental framework, and concepts that explain and diagnose cognition should connect with those pertaining to personality. The concept we select should help us to embed these observations of cognitive controls within a psychodynamic, developmental view of personality and emotional development.

Our observations of cognitive control development cover a period from 5 to 12 years. Is there a concept of this phase of life that facilitates the integration of emotional and cognitive factors? Psychoanalytic theory proposes a view of this time span called the latency period that embraces psychodynamic, developmental, cognitive, and adaptive considerations. I have found the psychoanalytic concept of latency to be a useful one around which to organize the observations reported here of cognitive control development in normal and clinical children. Moreover, the concept of latency not only suggests a way of organizing our observations but helps us to form a broad hypothesis about the interplay of cognitive control development and personality development. From this broad hypothesis, other lower level hypotheses could be deduced, rendered operational, and investigated.

Essentially psychoanalytic theory views latency—the period from ages 5 to 12 years—as a developmental phase during which aggressive and sexual tensions and drives are transformed and redirected to serve adaptation with outer reality (Alpert, 1941; Freud, 1946, 1965; Erikson, 1950; Bornstein, 1951; Fries, 1959).

The child is viewed as moving into the latency phase from the preceding oedipal phase, which is characterized by egocentricity and a relative lack of reality relatedness. The child is dominated by fantasies and incestuous wishes and by a tendency to expect immediate gratification of needs. Furthermore, the child is intolerant of the prohibitions, limits, and expectations of the environment. Drive expressions tend not to be delayed or redirected into alternative means and ends that accommodate to changing environmental situations.

At the start of the latency period the child begins the tasks of repressing and redirecting the incestuous wishes of the oedipal period by using mechanisms of defense and by developing inner standards for conduct based on adult models (superego). At the same time the child moves increasingly away from the immediate family and enters the wider environment of school and peer contact. As drive tensions are mastered, the child is more able to adapt to the new demands that are placed on him by an emerging, enlarging social context, and he is more able to engage in academic pursuits. In the management of drives and affects, conceptualized as the bedrock of this process, the capacity to delay and postpone motility and action is emphasized. With a steady increase in the capacity to delay and control the expression of impulses, the child gradually becomes a worker and develops a sense of industry. The need to play progressively becomes dominated by the need to complete a productive situation.

A quotation from Anna Freud (1946) illuminates this view of the latency period:

> The latency period sets in, with a physiologically conditioned decline in the strength of the instincts, and a truce is called in the defensive warfare waged by the ego. It now has leisure to devote itself to other tasks and it acquires fresh contents, knowledge, and capacities. At the same time it becomes stronger in relation to the outside world. . . . Complete dependence on parents ceases and identification begins to take the place of love-objects. More and more the principles held up by parents and teachers—their wishes, requirements, and ideals—are introjected. In [the child's] inner life the outside world no longer makes itself felt solely in the form of objective anxiety. [The child] has set up within his ego a permanent institution in which are embodied the demands of those about him and which we call the superego, (pp. 157-158)

Alpert (1941) and Bornstein (1951) have gone a step further in differentiating this broad view of the latency period. They have proposed, based on observations of spontaneous behavior of normal children and children in child analysis, that the latency period be considered as two discrete phases, with age 8 or 9 years representing the dividing line. These authors consider only the task that pertains to taming drives. In the first phase, from the ages of about 5 to 8 years, the ego is still buffeted by impulses and threatened by new and foreign internal standards (superego), which are severe in their requirements. In the second phase, from about 9 to 12 years, the ego is exposed to less severe conflicts as a result of decreased pressures from inner drives and the development of a more flexible superego.

Now let us take this view of latency and superimpose on it our observations about the characteristics unique to the development of each cognitive control. We can then determine how the concept helps us to explain our observations and form an hypothesis about the interrelation between cognitive control and personality development.

Recall first that the broad developmental course of each cognitive control defines an increasing monotonic function. We reviewed evidence supporting the proposition that the general course of development for each control follows a progression throughout latency from global functioning to more differentiated and integrated functioning. However we also observed a number of unique characteristics within each of the functions obtained (i.e., points of inflection, asymptotes, nonmonotonic features). The question we are now addressing is whether these unique characteristics, which represent subtle variations in the major course of development, are related to the psychoanalytic view of latency in a way that suggests a broad hypothesis about the interplay between emotional and cognitive development. We are immediately impressed by the finding that the various characteristics observed pivot around the age of 8 or 9 years, the very age proposed by psychoanalytic theory as dividing latency into two phases.

Figure 4 presents a capsule of the main psychoanalytic propositions of personality development during latency and a summary of the major unique variations observed in the developmental functions of each cognitive control. By fitting these two sets of considerations together, we arrive at the following broad hypothesis, which relates cognitive control and personality development.

Figure 4. Scheme of Unique Characteristics in Normal Cognitive Control Development During the Latency Phase.

Age span	5 Years — 8 Years	12 Years
Psychoanalytic view of latency	Increasing delay in managing impulses: mechanisms of defense elaborated.	Impulses and drive tensions mastered.
	Increasing identification with parents and teachers; their standards of conduct assimilated (superego).	Internal standards of conduct progressively stable and flexible.
	Decrease in need to play, with an increase in need to work and seek information from environment.	Academic tasks pursued and completed; need for industry and competence increases.
Dominant orientation of cognitive controls	Toward outer environment.	Toward inner and outer environments.
Cognitive control characteristics		
Fine-motor movements	Regular tempo quickens progressively; delay increases sharply at 8 years.	Regular tempo slows at 11 years; delay decreases at 11 years.
Focal attention	Single visual scans remain narrow.	Single visual scan widens at 11 years.

Field articulation	Inner emotions ignored as nonrelevant information (progressive decrease in color-naming errors).	Inner emotions attended to as relevant information (progressive increase in color-naming errors).
	Nonrelevant external information incidentally remembered progressively more.	Nonrelevant external information ignored progressively more.
Leveling-sharpening	Rapid increase in constructing articulate images of perceptions of reality information.	Slower increase in constructing articulate images of perceptions of reality information.
	Progressive increase in constructing stable images of perceptions of reality information.	Images of reality perceptions stable.
	No invented details injected into images of perceptions of reality information.	Invented details injected into images of perceptions of reality information at age 11 years.
Equivalence range	From narrow to broad logical categories.	From broad to narrow logical categories.
	From more to less illogical categories.	From less to more illogical categories (less again at 11 years).
	From less to more preliminary logical categories.	From more to less preliminary logical categories (more again at 11 years).

Cognitive control development during latency can be considered in terms of the orientation maintained by cognitive controls toward information in the external and internal environments. That is, do cognitive controls primarily seek or insulate information in the external environment, and do they primarily seek or insulate information from the internal environment of fantasies, wishes, and affects? The orientation of cognitive controls, whether primarily outer or inner directed, serves several lines of personality development (e.g., mastery of drives, superego formation, pleasure in work, and competence). And personality development serves to promote the increasing differentiation and flexibility of cognitive controls as mechanisms that play a role in adaptation and learning. Thus the two "systems"—cognitive controls and personality—are symbolically expressed as being on either end of a seesaw, maintaining a reciprocal relationship and delicate balance throughout latency.

During the first half of latency, while drives are being delayed, identifications assimilated, and a work attitude established with a widening environment of home and school, cognitive controls seek primarily to obtain information from outer environment and to avoid information from the inner environment of fantasies, affects, and drive tensions. During the second half of latency, as the outer environment is stabilized in the form of internal standards for conduct (superego), as drive tensions are mastered, and as academic pursuits bring more pleasure, the major orientation of cognitive controls is to seek, perceive, remember, and categorize information selectively, not only from the outer environment but also from the resources of the inner environment.

This hypothesis seems to fit together in a meaningful way the psychoanalytic observations of development with our observations of cognitive control changes during latency. As Figure 4 summarizes, we observed that though all cognitive controls were developing toward increasing differentiation and hierarchic integration, the following changes in cognitive control functioning took place *before* the age of 8 or 9 years.

1. The delay of fine motor movements increased sharply. This development could be viewed as reflecting major

gains in the ego's capacity to postpone the expression of drive tensions in action.

2. The average width of a single visual scanning (mean distance on the Scattered Scanning Test) changed at a slow rate (remained relatively narrow), while the degree of activity and the extensiveness with which information in the environment was sampled increased at a high rate. Within the context of all the findings, maintaining a narrow single scan could be seen as an accommodation to the many bits of information the outer environment presents for the child to register. Earlier we also speculated about the role of formal education, and the physical size of a book page, in sustaining a narrow scan.

3. Color-naming errors with Card IV of the Fruit Distraction Test progressively decreased. This suggests (from the standpoint of our factor analytic findings) that inner emotions are progressively ignored as nonrelevant information.

4. At the same time, the number of peripheral figures recalled from Fruit Distraction Test Card III increased. Our interpretation would be that more *external*, nonrelevant information is attended to and retained in memory, as well as relevant information.

5. The first stop and ratio scores of the Leveling-Sharpening House Test decreased rapidly. This suggests the occurrence before the age of 8 years of rapid growth in the component of leveling-sharpening that pertains to the construction of differentiated images of information perceived in reality. Images are being constructed that are increasingly more articulate, and present information is being sharply separated from past information. Constructing increasingly sharp images of external information would serve in retaining and relating information from one reality experience to the next.

6. The number of details (in the original memory image of information) that were modified in some way decreased progressively (i.e., A changes declined), suggesting that memory images of external information are becoming increasingly stable.

7. At the same time, almost no details were invented and injected into memory images of perceived information (B changes). This suggests that information from the inner environment of fantasies and feelings is excluded from memory images of information presented by the external environment.

8. The width of logical, reality-related categories used to classify information shifted from narrow to broad. This may indicate that in using more narrow categories, the child is responding to and recognizes specific parts of concepts and standards represented by the information in the environment. Gradually these parts are integrated into broader categories. It should be recalled that while a shift from narrow to broad categories is taking place, the level of abstraction used to explain a category becomes progressively more abstract.

9. The number of unrealistic, illogical categories remained low and decreased, while the number of preparatory,

partial, but realistic categories increased sharply. Thus it may be that when conceptualizing information in the outer environment, the child ceased to rely on idiosyncratic rules from the inner world of wishes and feelings. Furthermore, the child may be heavily engaged in experimenting with forming reality related categories of information.

All these cognitive control developments, occurring before the age of 8 years, point to the hypothesis that the child is oriented toward seeking information contained in the outer environment and processing information in terms of the rules of reality (secondary process thinking). The outer orientation of cognitive controls could serve the child in the several tasks of latency: moving from a position of egocentricity toward a position of reality relatedness, articulating and identifying with the standards represented by the behavior and expectations of parents and teachers, internalizing a stable set of standards (superego), and registering external information that indicates what the environment permits, prohibits, and expects.

At the same time developments in the child's inner emotional world are freeing cognitive controls to seek information and stimulus nutriment from the outer world. Drives are being delayed, regulated, and transformed with mechanisms of defense. The regulation of drives is becoming more economical. As the superego develops, the child does not have to learn anew the standards required in each situation; instead, he relies on internalized rules to serve as guides in various environments.

Cognitive control changes after the age of 8 years suggest that cognitive controls begin to achieve some autonomy from information in the outer environment. Cognitive controls seem to be less bound to external stimuli. The orientation maintained to the outer world lessens as cognitive controls make flexible use of information from both the outer and inner environments. We observed the following changes *after* the age of 8 years:

1. There is no further gain in delay over fine motor movements. It is as if inner tensions are now sufficiently delayed and managed to permit industrious cognitive activity.

2. The width of a single visual scan broadens. In sampling the environment, the child is now less bound to the requirement of registering each specific bit of information.

3. More attention is paid to inner affects as information. The number of color-naming errors increases.

4. Less external information is remembered incidentally. The number of recalls of peripheral features on Card III of the Fruit Distraction Test decreases.

5. There is a tendency to invent details based on inner tensions and fantasies, and these details are injected into memory images of information perceived in outer reality. The number of B changes perceived with the Leveling-Sharpening House Test increases moderately from the ages of 10 to 11 years.

6. The width of categories used to conceptualize information in realistic terms begins to decrease. In considering

this change we should recall that even though the child is now using categories that are progressively more narrow, the explanations given to account for the information categorized become increasingly abstract. The child then is constructing more articulate and differentiated categories, which at the same time define highly abstract domains.

7. The number of unrealistic groupings increases and the number of partially formed, preparatory realistic groups decreases. The child is now making more use of inner fantasies and feelings as a source for conceptualizing information.

Finally, several changes were observed to occur at the age of 11 years: regular tempo slowed down, delay of fine motor movements decreased, the breadth of single scan increased, and partially formed preparatory categories again dominated atypical categories. Whether these changes signal reorganizations of cognitive controls that relate to the coming of adolescence, with its increase in drive tensions, is a question for further longitudinal observations.

Cognitive Control Deviations in Clinical Populations Viewed Through the Hypothesis

The proposed hypothesis also helps us organize the several deviations in cognitive control development observed among clinical populations. A review of these derailments shows that the age of 8 or 9 years is also pivotal with the clinical groups studied, adding further support to the heuristic value of the biphasic latency hypothesis.

Before the age of 8 years the children with moderate learning difficulties and adjustment problems (longitudinal studies 1 and 2) showed a faster tempo and less delay of fine motor movements than did typical learners. Yet after the age of 8 they showed a slower tempo and a greater degree of delay, which could be viewed as excessive relative to normal development. With respect to our hypothesis, this finding raises the question of whether these children reached the second half of latency without having constructed mechanisms of defense that adequately master drive tensions, forcing them to rely on excessive delay. In contrast, normal children, who have accomplished the developmental task of mastering drive tensions by the ages of 8 or 9 years, rely less on motor delay. Thus they are freer cognitively to pursue information and academic tasks.

Again, at age 8 years, children with moderate learning disabilities showed a brief phase when focal attention components, which had been lagging, developed rapidly to the level of typical learners. However after age 8 these processes fall behind that of normals in their rate of development. Once more we could speculate that the developmental tasks of constructing flexible, inner standards and of regulating drive tensions are incomplete, preventing the gains in focal attention during the eighth and ninth years from being sustained during the second phase of latency. Last, in terms of equivalence range, there is a suggestion that in the first half of latency the learning-disabled children use inner information of fantasies and feelings in the categories they form with objects, whereas typical learners are outer oriented in this function. Before the age of 8 the learning-disabled children produced more illogical (atypical) than preparatory (miscellaneous) groupings, and trends are opposite to those shown by adequate learners.

The children who presented more severe learning and adjustment problems (cross sectional study 3) ranged in age from 5.5 to 7.5 years, therefore were within the first half of latency. They showed the following unique deviations from normal cognitive control development: *(a)*regular tempo of fine motor movements became slower, (*b*) increased attention was given to inner affects as information reflected in the progressive increase in color-naming errors, (*c*) the leveling-sharpening process remained at an immature stage, failing to undergo the rapid growth (shown by normal children) toward constructing articulate images of information perceived in external reality.

Viewed in conjunction with our hypothesis, these findings suggest that the cognitive controls of these children were inner rather than outer oriented in the first half of latency. Accordingly, we would speculate that these children were failing to assimilate nutriment from stimuli in the environment, information that would ordinarily assist in accomplishing the personality tasks that are imposed during the first part of latency.

The children who were hospitalized because of severe emotional disturbances showed a number of the same cognitive control characteristics representing deviations in development when viewed in terms of observations made of normal development.

1. The 6 year olds employed a very wide single visual scan, suggesting a limitation in registering specific bits of information in the environment.

2. *Before* the age of 9 there was a sharp increase in the number of color-naming errors, indicating that inner affects and emotions were increasingly attended to, at the price of dealing effectively with information in the external environment.

3. Also *before* the age of 9 years, the leveling-sharpening process regressed sharply to a stage in which global images were constructed of information perceived in reality, and present and past information were fused. Moreover, leveling-sharpening remained fixated at this stage to the age of 13 years. The hospitalized children then tended to limit severely the details of information from external environments.

4. The number of changes introduced into memory images of perceptions of reality information increased sharply to the age of 9 years and continued to increase throughout the second half of latency. This trend is opposite that of normals. Hospitalized children then showed a tendency with age to construct increasingly fluid images of information perceived in reality. When information acquired from one experience is transported over time to the next, the information is modified and distorted when related to other reality perceptions.

5. From the ages of 5 to 9 years these children invented progressively more details based on fantasy and wishes and injected these details into memory images of information perceived in reality. They persisted in this tendency into the second half of latency, but to a lesser degree.

6. Although the numbers of illogical and preparatory categories used to conceptualize information were inversely related throughout latency, as was the case with normals, the dominance of one type of logical category over the other was out of phase among hospitalized children, who before the age of 9 produced increasingly more illogical groups and fewer preliminary logical groups. After the age of 9 they produced fewer illogical groups and more preliminary groups, and these relationships shifted frequently to the age of 15 years.

The foregoing deviations suggest that during the first half of latency the cognitive controls of hospitalized children are more inner oriented. Controls appeared to be dominated by drives and affects and organized to ensure that only global, unstable units of external information were registered, remembered, and processed. We would infer, then, that these children were not in a position to use information made available by external environments—that is, information that would serve the lines of personality development involved in mastering drive expressions by perceiving their consequences, and the environment's expectations, and by internalizing the standards of adults.

The hospitalized children showed some cognitive control behavior that was indicative of a slight tendency to become oriented more toward the outer environment in the second half of latency. The total picture, however, is one of cognitive control functioning that is derailed and fails to flexibly gather stable information from both the inner and outer environments.

Before leaving this discussion of the deviations in cognitive control functions observed thus far in clinical groups, we pause to recognize that in addition to viewing cognitive controls as being derailed or disrupted by psychopathology, future investigation may benefit from studies of deviations in cognitive controls that in fact serve to manage psychopathology. Before the age of 8 years, for example, both the public school children with severe learning and emotionally disabilities and the hospitalized children gave evidence of reorganizing the leveling-sharpening control in the direction of increased leveling. Ongoing information perceived in external environments was registered and organized into global images. Using our biodevelopmental framework, it is appropriate to ask what adaptive value this stage of cognitive control functioning has for the emotionally disturbed child. It could be that if reality information is registered in differentiated terms, this, in turn, arouses affects and drive tensions. But these children have not yet developed mechanisms that allow them to regulate and manage drives successfully. Therefore one way for them to keep drive tensions in check is to insulate themselves from detailed information in external environments. We could approach the study of cognitive control development and psychopathology more comprehensively if we remain alert to the disruptive and derailing influences of psychopathology on cognitive control development on the one hand, and to the role played by deviant cognitive controls in managing the emotional disturbance and in contributing to the adaptation of the patient, on the other.

CONCLUDING REMARKS

A number of studies have provided cross-sectional and longitudinal observations of cognitive control development in normal and clinical populations. In developing, cognitive controls were found to define primarily monotonic functions. Within these broad courses of development, however, certain variations and characteristics were observed, such as noteworthy changes in the rate of development, and several U-shaped functions. These characteristics suggested a hypothesis according to which cognitive controls change during development in their orientation to information contained in outer and inner environments. In the first half of latency (5 to 9 years) cognitive controls are oriented primarily toward seeking information and stimulus nutriment from the outer environment, while at the same time insulating information from the inner environment of fantasies and feelings. In the second half of latency (9 to 12 years) cognitive controls are oriented primarily toward flexibly seeking information and stimulation from both outer and inner environments. This view of cognitive controls enabled us to relate and fit cognitive control development with the psychoanalytic view of personality development during the same period of time—namely, that drives are transformed and regulated to match reality expectations, standards of parents and teachers are internalized, and academic work is pursued with increasing industry.

By relating and connecting cognitive control development and the psychoanalytic view of personality development, we were able to stamp each as a different side of the same coin. Our goal, which we formulated in Chapters 2 and 4, was to gather observations and develop concepts and technology that integrated the domains of cognition and personality. With the hypothesis proposed in this chapter, we have taken the first major step in interrelating cognition, drives, affects, and adaptation, so that they are fibers in the same fabric rather than separate fields of psychological study. Our hypothesis proposed that throughout development, cognitive controls and the regulation of drives and affects are in a delicate, reciprocal balance, with cognitive controls seeking and avoiding information to keep affects from rising to levels that cripple adaptation; in addition, affects are regulated to give cognitive controls flexible autonomy— now from the outer environment and now from the inner, with information gathered from each.

From this initial formulation of the relation between cognitive controls and affects, Chapter 8 elaborates a developmental-adaptational model of cognitive controls. Following this theoretical discussion. Chapter 9 presents a series of studies attempting to explore more directly changes in cognitive controls in response to changing environments, the role of cognitive controls in adaptation to stress, and the relationship of cognitive controls, drive, and anxiety.

8

A DEVELOPMENTAL-ADAPTATIONAL MODEL OF COGNITIVE CONTROLS

The factor analytic findings discussed in Chapter 5, and the population and age differences discussed in Chapters 6 and 7, suggested to me a developmental-adaptational model of cognitive controls that could have heuristic value for the practitioner in shaping questions and observations concerning the role played by cognition as an individual develops and copes with changing environments. We learned from the factor analytic studies that although the factors defining each control were independent, a measure of one cognitive control would contribute in a subordinate way to the definition of another. When we examined these relations among controls, we observed a pattern. Measures of focal attention played a subordinate role in the cluster of tests that defined the process of field articulation ; a measure of field articulation played a subordinate role in clusters of procedures defining the process of leveling-sharpening; and measures of leveling-sharpening were subordinate in clusters defining the process of equivalence range. Thus it began to appear that a developmental principle governs the relationships *among* cognitive controls. On the other hand, the changes in cognitive control functioning observed with age strongly suggested levels of cognitive control organization *within* a given cognitive control.

To account for these several findings, to facilitate planning studies that might elaborate the laws of perceivers first set out by Klein to establish his concept of cognitive controls, and to provide the clinician with a dynamic framework of cognition, a model was constructed, with two biodevelopmental propositions as major planks: (*a*) hierarchically related levels, each defining an organization of cognitive behavior, and (*b*) mobility of structures, as the individual negotiates an adaptive fit between himself and the environment.

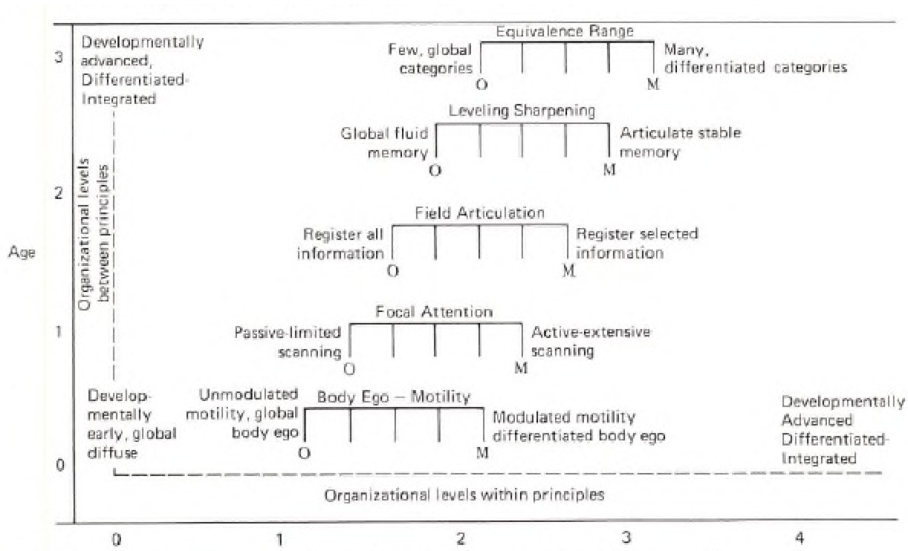
In employing the concept of levels, the model includes the genetic point of view held by psychoanalytic ego psychology (Rapaport, 1960b). A similar viewpoint is proposed by the developmental psychologies of Heinz Werner (1957) and Jean Piaget (see Flavell, 1963). The genetic point of view states that early forms of functioning are not replaced during the process of development but become subordinated by and hierarchically integrated with higher forms. Moreover, although subordinated, early forms remain potentially active; thus at each point in development they codetermine all subsequent structures that develop.

DEVELOPMENT OF COGNITIVE CONTROLS

In the proposed model, cognitive controls are viewed as forming a hierarchy (Table 1). It is assumed that the principle of body ego-body motility dominates in early development. This cognitive control principle involves the construction of cognitive schemata that represent body experiences with stimulation and information ; capacities of delaying and regulating motility are also involved. With development, focal attention emerges as dominant. This principle subordinates and integrates body motility and involves visually scanning the environment, actively directing attention at stimuli, and sampling the information available.

With further development field articulation emerges, subordinating and integrating body motility and focal attention, as another distinct cognitive control process becomes dominant. With field articulation motility is subordinated, attention is directed actively, and properties of objects are registered; however attention is now directed at both relevant and nonrelevant information, withdrawn from nonrelevant information, and selectively sustained on relevant information. In responding to information as relevant and nonrelevant, the individual is presumed to perceive and to be guided by the "central" requirements represented by the task and his own adaptive intentions.

Table 1. Developmental Model of Cognitive Organizing Principles



Key = O = onset; M = maturity; "age" designates passage of time (arbitrary units).

The next genetic level is represented by the control principle of leveling-sharpening, which is assumed to subordinate and integrate components of the processes of body motility, focal attention, and field articulation. With this cognitive control process motility is delayed, and information is registered and organized with respect to relevance. The distinguishing mark of the leveling-sharpening control process is that the organization of relevant and irrelevant information is maintained in memory in the form of a stable, differentiated image that is subsequently related and compared to perceived information.

The equivalence range control appears at the next developmental level: the individual delays motility, directs attention to the information at hand, articulates relevant versus irrelevant properties (subordinating the latter), relates the configuration of information contained in one object (often represented by a memory image) with that in another, and assigns a verbal label linking conceptually objects and information. The equivalence range principle, therefore, is distinguished by the following functions: various bits of information are related and rendered equivalent, and a verbal label is introduced to explain how the information is related, allowing the information to be handled in terms of categories or classes.

Chapter 2 discussed the principle that is viewed as governing this hierarchical relationship among cognitive controls. The principle of directiveness of behavior states that whenever development occurs, it proceeds from a state of relative globality and lack of integration to a state of increasing differentiation, articulation, and integration. Thus the process of field articulation (i.e., distinguishing relevant from nonrelevant, part from whole) is viewed as more differentiated than that of focal attention, which involves primarily surveying and sampling properties of information. The process of leveling-sharpening represents a greater degree of cognitive differentiation because the activity of constructing and maintaining memory images is included. And the process of equivalence range represents a still greater degree of differentiation, with information now managed in terms of the conceptual relationships they generate, in addition to all the preceding cognitive control processes. Thus when a child forms a group of objects and explains that they belong together because they are all toys, it is assumed that in addition to the dominant process of equivalence range, he has engaged in subordinate but requisite cognitive control processes: that is, motility was regulated and delayed; the available objects were surveyed and registered, with relevant and irrelevant attributes of each articulated; and the perception of a given object was related to memory images of other objects perceived among the objects on the table, as well as to objects encountered outside the immediate situation in the recent and distant past. It would follow from this model that progression or regression from one cognitive control to another along this developmental hierarchy defines a transition from global to more differentiated cognitive control functioning, or vice versa.

In terms of levels of organization *within* each control, the same formulation of directiveness toward increasing differentiation and integration is applied by the model. In terms of body ego and motility, the developmentally immature individual functions at a level of organization that is characterized by global body schemata and little delay of motility. With development, this organization undergoes change in that body schemata are increasingly articulated and motility increasingly subjected to delay. Similarly, early levels of focal attention involve scanning that is passive, is characterized by a narrow, single visual sweep, and is directed at narrow segments of the environment. As development proceeds, this organization of cognitive control behaviors moves steadily through succeeding levels that symbolize a gradual shift toward more active and more extensive scanning. The development of field articulation proceeds from early stages of indiscriminate deployment of attention to all information toward more differentiated and integrated stages in which attention is directed at irrelevant and relevant information, attention is withdrawn from irrelevancies, and sustained attention is directed at relevant information. Similarly, the developmental progression of leveling-sharpening defines a series of organizations from the construction of global, fluid memory images of information typical of the immature cognitive state, toward increasingly stable and articulate memory images characterizing the mature cognitive state. The developmental stages of equivalence range cognitive control move from the use of few and concrete categories to conceptualize information, a stage characteristic of the cognitively immature individual, to the use of many differentiated and abstract categories. Again, this hierarchical model proposes that progression or regression from one level *within* a given cognitive control to another within the same control defines a transition from global to more differentiated cognitive functioning, or the reverse.

In this model's conception of ideal development, the cognitively mature individual has available to him all controls forming this hierarchy and all levels within each control. Moreover, the individual's cognitive functioning could shift from the dominant operation of one control to that of another, or from one level within a control to that of another level within the same control. To illustrate, let us imagine an individual about to enter a room for the first time with the intention of registering its contents. As he walks into the room and then stands still, the principle of body ego-motility is dominant. As he actively scans broad segments of the room, the principle of focal attention dominates his cognitive control functioning. If he is now guided by the intention to locate a light switch, however, his cognitive control functioning is taken over by the principle of field articulation. Now he withdraws attention from and ignores large sections of the room and various objects (e.g., lamps, pictures) and selectively sustains his attention on the wall space and objects around the door. Once he registers the attributes of each object fixed to the wall by the door, his cognitive activity is next dominated by the leveling-sharpening principle as he compares the various objects bolted to the wall with memory images of light switches encountered in earlier experiences. If he begins to label or conceptualize each object (e.g., "this is an air conditioner switch, this a thermostat, and this a light switch"), we would say that the equivalence range principle is dominating cognitive control functioning. When he leaves this room and walks into another for the first time, he may scan and sample its contents, now shifting (regressively) to the focal attention principle.

These levels of cognitive control functioning, it should be emphasized, signify only the genetic status of a particular organization of cognitive activity and do not denote values of "good" and "bad" independent of environmental circumstances and the perceiver's intentions. As noted in the subsequent discussion of cognitive controls in adaptation, an individual functioning at, for example, an early stage of leveling-sharpening (e.g., constructing global memory images) should not be viewed as "inadequate" or "failing," nor is an individual functioning at a developmentally higher stage, automatically to be regarded as successful. In a particular situation, a developmentally earlier cognitive control, or an early level within a control, may be an adaptive cognitive strategy for an individual to employ, given his adaptive intention. Yet in another situation a developmentally higher level of cognitive control functioning may serve adaptation better. Along the same line, suppose that two individuals are in the same situation but are guided by different adaptive intentions: one may be characterized by a global level of cognitive organization and the other by a higher, more differentiated level. For example, one child sitting in a classroom for the first time, and guided by the intention to insulate himself from what to him is unfamiliar and complex information, may direct his attention at the environment passively and narrowly (a developmentally lower stage of focal attention). Another child in the same classroom may direct his attention actively and broadly as he adapts in terms of his intention to find out what is going on.

Finally, the model distinguishes cognitive controls from other organizational principles that do not have the same conceptual status as the construct of cognitive controls. These general cognitive characteristics are viewed as lines of development that could be traced independently of cognitive controls. They could also be investigated in terms of the extent to which they influence or relate to the functioning of a particular cognitive control. Examples of these characteristics are reflectivity-impulsiveness (Chapter 6) and tolerance for ambiguity.

The proposed model of cognitive controls helps us account for the factor analytic finding discussed earlier, namely, that a measure of focal attention played a subordinate role in defining the factor of field articulation, that a measure of the latter contributed in turn to the definition of the leveling-sharpening factor, and that measures of each of these were found to contribute to the definition of the equivalence range control. The model also proves to be heuristically valuable in suggesting interpretations of population differences discussed in Chapter 6 and in guiding future studies. For example, we reported the observation that brain-damaged children functioned at the earliest level of focal attention, and orphaned children at the earliest level of field articulation, when compared to each other and with public school children. The model would lead us to ask the following questions. Does the experience of processing information and demands with the handicapping limits of brain damage uniquely compromise the formation of the early cognitive principle involving the directing of attention actively and over wide segments of the environment? And do the experiences of emotional deprivation, separation, and rejection uniquely compromise the formation of a more advanced cognitive control—that concerned with rejecting and selecting information in terms of relevance? Are there emotional and adaptational advantages to these compromises? Is the brain-damaged child protected from stress by a cognitive strategy that insulates him from registering many pieces of information, and is the orphaned child regulating an emotional need by overincluding bits of information when articulating the field?

The proposed model also contributes to a clarification of research findings that appear to be contradictory. For example, Wallach (1962) cautions us about the “slippery” quality of the concept of cognitive styles. He points out that the same style (global-differentiated) was offered by both Kagan and Witkin when these investigators found different relationships between measures of cognitive style and assessments of verbal intelligence. Using Wallach’s caution with respect to our model, we would note that Kagan’s picture test of the global-analytic style asks the child to label the groups into which pictures of human figures are placed; Witkin’s Rod and Frame Test does not require verbal labeling. Therefore the former may represent a higher developmental level of cognitive functioning (aspects of equivalence range) than the latter, accounting for the different relationships observed with measures of verbal intelligence.

It is recognized that the model does not propose the age of onset of each cognitive control, nor does the model presume, for example, that the process of focal attention is not operative in the first stages of body motility, or that the process of field articulation is not operative in the first stages of focal attention. Recent infant research (Kessen, Haith, and Salapatek, 1970) provides many interesting clues and suggestions for future study of the onset and developmental progression of cognitive controls. For example, infants have been observed to decrease body activity when the intensity of a light is increased—behavior that could be viewed as the subordinating of motility by the process of scanning (focal attention). That infants in the first weeks of life direct their heads and eyes toward a visual stimulus, and later show a preference for a striped over a plain figure, could be regarded as a progression from focal attention to field articulation. Furthermore, studies of infants' responses to "discrepant" stimuli could be related theoretically to the process of leveling-sharpening. For example, if a stimulus an infant has encountered several times before is presented at the age of 4 months in a discrepant way (e.g., a face with one eye), this stimulus will elicit behaviors believed by some workers to indicate that the infant has constructed a memory image of the stimulus which is being related to the contemporary display of that stimulus.

It seems reasonable to speculate in light of recent infant investigations that all cognitive controls are functioning during the first year of life. Further studies of this period may shed light on the dominance of one or another information management strategy (cognitive control) and whether a developmental progression defines this dominance. The hierarchical model proposed here addresses itself to the relationships among cognitive controls and the stages within cognitive controls, once these ego structures are more or less organized and have become habitual modes of managing information. At the present time, I speculate that consistent cognitive preferences (the forerunners of cognitive controls) may be identifiable in the first year of life, with cognitive controls gaining full organization by 30 months of age. (See Chapter 2.)

COGNITIVE CONTROLS IN LONG-TERM AND SHORT-TERM ADAPTATION

Up to this point we have considered propositions of the model pertaining to levels and stages and the development of cognitive controls. Following the biodevelopmental framework discussed in Chapter 2 and the goal of constructing a dynamic scheme of cognition that could be of use to the practitioner, we should also consider the aspects of the model that relate to cognitive controls and adaptation.

Before conceptualizing the role of cognitive controls in adaptation, let us review the concept of adaptation, as used here (see also Chapter 2).

In our view of psychological adaptation which derives from organismic theorists such as Hartmann (e.g., 1958) adaptation is an active, sensitizing process as well as a desensitizing, insulting process. Therefore it is assumed that adaptation permits the organism both cognitive quiescence and autonomy from stimulation, as well as exposure to stimulation, change, and novelty. The adaptive process then involves reciprocal relating between an individual and his environment (e.g., parent, family situation, school) with each of these systems attempting to influence the others to achieve a mutually agreed-upon degree of coordination and reciprocation.

Adaptation as a process is also considered with reference to the environmental situation with which the individual is dealing and in which he is attempting to satisfy his various cognitive and emotional needs. Environmental situations are characterized as average and expectable (i.e., typical or usual for an individual) or not average and expectable (i.e., atypical or unusual situations for an individual).

Long-Term Adaptation and the Stability of Cognitive Controls

Over the course of his development, the individual phases in and presents to the environment an evolving series of average and expectable behavioral organizations (e.g., cognition, affectivity) that more or less match environmental expectations, opportunities, and limitations. The environment, in turn, presents the individual with a continuous, evolving series of average and expectable organizations of stimulation (i.e., the stimulation more or less fits the sensing and responding equipment of the individual). Since stimulation always impinges on an individual who is already adapted to what has gone before, stimulations activate cognitive structures already available to the individual and suited (preadapted) to new confrontations. In the course of this give and take, over a relatively long period of time, cognitive structures (controls or cognitive preferences) are organized that enable the individual to "fit" himself into his average environments and to satisfy his needs for review and repetition of stimulation and for a particular rate of novelty and change in stimulation. The cognitive controls formed in this process are relatively enduring and slow to change, and they characterize the individual's management of information in a wide variety of environments that are, for him, expectable and usual (e.g., care-taking styles of mother, family situations, familiar school settings and neighborhoods).

Short-Term Adaptation and the Mobility of Cognitive Controls

The environment is never perfectly matched with the individual's cognitive organization throughout development, and it can shift more or less abruptly from representing usual to unusual stimulation. Examples of these shifts would be a mother's depression, leading to an abrupt change in caretaking style; sudden hospitalization of the child; a move to a very different community and type of housing; and entering a kindergarten classroom for the first time, with no preschool experience. These major shifts in the environment present an intensity, rate, and kind of stimulation that are atypical for the individual, given his long-term adaptative experiences. In coping with these temporary but marked environmental fluctuations, the individual shifts from a more recently acquired level of cognitive organization to earlier levels, or he evolves new levels that depart significantly from typical modes employed.

For convenience, I refer to the temporary reorganizing of cognitive controls (regressively and progressively) in response to atypical environments as *cognitive control plasticity.* The degree of plasticity evidenced by an individual determines the degree of coordination he achieves between his cognitive preferences and the new adaptational requirements; accordingly it is related to the degree of success with which he manages the psychological disruption caused by the atypical environment. Furthermore, individuals are presumed to differ in plasticity, that is, in the breadth or range of levels through which their cognitive controls can potentially become recognized. Individual differences in plasticity are assumed to be due in part to *(a)* constitutional givens (e.g., temperament, activity level, sensory thresholds); (*b*) the frequency, types, and timing of atypical environmental changes experienced by the individual during his first five or six years of life; and (*c*) the emotional tasks the individual is negotiating, the stage in emotional development that has been reached, and the mechanisms of defense that have been organized to assist in this negotiation.

Several factors are seen as relating to the direction (progression or regression) and the degree of cognitive reorganization that occurs in response to atypical stimulation. These are (*a*) the extent to which the atypical environment requires passivity and restricts opportunity for active control of stimulation and outcome, (*b*) the degree to which the new environment is atypical given the individual's life history, (*c*) the degree to which the individual experiences an intent to adapt to the confrontation before him, and *(d)* the levels of drive tension and affects that are optimal, given his stage of emotional development.

In summary, in short-term adaptation the degree and direction of cognitive reorganization are presumed to result in that level which allows a more adaptive fit between the individual's cognitive status and adaptive intentions, on the one hand, and the situation's demands, opportunities, and limitations, on the other. Furthermore, the fit enables the individual to regulate and express affects and drives aroused by the situation and information, in ways that serve adaptive management of the unusual environment.

Relating Long- and Short-Term Adaptation and Cognitive Controls

With respect to both long-term and shortterm adaptation, levels of organization and adaptation are coordinate terms. Every state of adaptation corresponds to a given level of cognitive organization, and every organized level of cognition signifies a particular state of adaptation.

Combining these considerations of cognitive controls in long-term and short-term adaptation, the model proposes that *the cognitive control functioning of a given individual* (in terms of each control principle) *is represented both by a single level of that continuum and by a range of levels.* The single level defines the particular organization characterizing the individual's functioning as he deals with environments that for him are average and expectable. This level represents a stabilized structure that is relatively invariant over many usual situations and is modified slowly by the process of long-term adaptation. On the other hand, the range of levels defines a series of organizations within a control principle through which the cognitive functioning of an individual temporarily moves (either regressively or progressively) as he deals with relatively brief changes in the environment that are for him *unusual* (i.e., not average and expectable). When the environment returns to its average and usual status, the new organization is relinquished and cognitive activity is again reorganized, returning to the habitual level that is characteristic of the individual in long-term adaptation.

A hypothetical instance involving a patient who has been brought into an emergency room, and the surgeon attending him, may illustrate the interrelated concepts of longterm and short-term adaptation, hierarchical levels, and stability and mobility of cognitive controls.

When in his typical home and work environment, the person who becomes a patient may have directed his attention actively and at many bits of information. When brought into the emergency room, however, he may direct his attention passively and at narrow segments of the environment (e.g., a picture on the wall, one piece of hospital equipment). This change in information-processing strategy would be viewed as a regressive reorganization of the focal attention principle that serves to insulate the individual from an atypical context and its stressful information, over which he has relatively little control. For the surgeon, on the other hand, the emergency room is an average and expectable environment. When approaching the patient, the surgeon may direct his attention actively and at broad arrays of information (i.e., the patient's skin color, emotional state, location and type of wound) and actively withhold attention from irrelevant stimulation (e.g., the picture on the wall, music playing in the background). This organization of attention deployment by the surgeon would be viewed as the outcome of long-term adaptation over many experiences in situations like the emergency room.

PATHOLOGY AND THE REGULATION OF AFFECTS IN COGNITIVE CONTROL DEVELOPMENT

The proposed developmental-adaptional model of cognitive controls also includes several propositions concerning pathology in cognitive control functioning. Cognitive controls are viewed as representing pathology if one or both of the following conditions holds.

1. In average and expectable environments the individual habitually manages information at a level within a cognitive control principle that is developmentally lower or higher than that expected in typical development. For example, a 10-year-old child habitually directs attention at both relevant and irrelevant information and does not withhold attention from irrelevant information to the degree expected of his stage in ideal development. An example from our developmental data (Chapter 7) is offered by the children with learning difficulties, who showed stages of cognitive control functioning developmentally lower than those of typical learners over a 5-year period.

2. When coping with a short-term environment that is not average and expectable, the individual shows a low degree of cognitive control plasticity: that is, he fails to shift progressively or regressively from a level habitually used, to achieve a more adaptive fit with the changed environment. Or the individual shifts regressively when a progressive shift is observed to be more adaptive, or shifts progressively when a regressive shift is more adaptive. One example could be a child who shifts regressively when he enters the kindergarten classroom, from a developmental level of

focal attention habitually used at home to a lower level. The child shifts from broad, active scanning to narrow, passive scanning when the school situation calls for scanning that is more broad than, or as broad as, the preference used at home. Another example would be a child who as a patient in an emergency room scans as actively and broadly as he usually does, or more so, when experience shows that a regressive shift to passive and narrow scanning would be more adaptive.

Several types of mismatch or "inappropriate fit" between an individual's cognitive status and his environment are proposed as accounting for both forms of pathology. In one an atypical environment, initially introduced more or less abruptly, persists over a long period of time. In another the atypical environment is introduced during a critical period when the individual's cognition is more or less vulnerable. For example, relying on developmental observations discussed in Chapter 7, a child who is hospitalized for surgery at age 6 undergoes this experience when the control of leveling- sharpening is about to change rapidly in the direction of increased articulation of information. Here then, the main considerations are variables concerning the state of the child. In a third type of mismatch the content and form of the atypical environment are uniquely ill suited, given the child's developmental status. Here the major considerations are variables pertaining to the state of the environment.

In each of these instances, if the atypical environment persists, the long-term adaptive process discussed earlier gradually takes hold. Accordingly, a level of cognitive control functioning is "structured" and "fixed," and endures, resulting in a lag in the development of that cognitive control or in the development of plasticity. The enduring structures that become organized in response to a persistent atypical environment would now be viewed as deviant in terms of ideal development. Although the deviant cognitive organization is not appropriate for optimal development of cognitive structures and skills, it serves the child in adapting to the atypical stimulation at hand.

A related assumption is that the deviant cognitive organization could persist long after the disappearance of the unusual condition that initially evoked the deviant but adaptive cognitive solution. The deviant control becomes autonomous. For example, if during the first two years of life a child is confronted continuously with stimulation from a vigorous caretaking style that is excessive and ill-timed in terms of the child's developmental status and unique makeup, the child might learn to avoid directing attention at information, to attenuate the stimulation and thereby maintain an adaptive fit with the situation. In this way a level of focal attention control, characterized by deploying attention passively and by scanning narrow segments of the environment, would gradually be structured, becoming a slowly changing, habitual cognitive strategy for the child. This strategy would then be employed years later in average and expectable situations (e.g., first grade), where it would fail to coordinate the child's cognitive attitude with the requirements he is now expected to meet.

THE ORIGINS OF COGNITIVE CONTROL PATHOLOGY

In our formulation to this point we have proposed two broad forms of cognitive control pathology or pathological compromises in cognitive control organization: the persistence of a cognitive preference throughout development when the control should be differentiating, and inappropriate mobility of cognitive control functioning in response to changing environments. It was hypothesized that these forms of pathology result from several types of mismatch between the individual's cognitive control status and the makeup of the environment. The model takes a further step and proposes that mismatches occurring before the age of 3 years be distinguished from those occurring after the age of 3 years. The point in time when the mismatch occurs is presumed to be significant in the specific form taken by the cognitive control deviation and in conceptualizing psychological stress or conflict experienced by the child and the role played by the regulation of drives and affects in the cognitive control disorder. For convenience, cognitive control pathology formed during the earlier developmental period (before the age of 3 years) is referred to as Type I, and cognitive control pathology formed during the later developmental period (after the age of 3 years) is designated Type II.

In the first critical period the mismatch or psychological "conflict" is viewed as existing between innate, ego-cognitive givens and the child's unique environment. To maintain the emotional stress and tension resulting from this mismatch at a level that ensures adaptation, the earliest forms of cognitive control functioning in the proposed hierarchy are compromised and fixated, and higher forms of cognitive controls fail to emerge with sufficient (developmental) organization.

Thus when this hypothesis is used to examine the pattern of cognitive control functioning of children, a unique pathological profile (Type I) of cognitive controls is revealed. Cognitive controls conceptualized as developmentally early in our hierarchy are appropriately organized given the child's stage of development, and later controls are severely compromised. For example, a child may show appropriate cognitive control functioning in body ego-tempo regulation and in focal attention, and severe compromises in each of the developmentally higher controls (i.e., field articulation, leveling-sharpening, and equivalence range). Or a child may function adequately in the first three controls of the hierarchy, yet his leveling-sharpening and equivalence range functioning may be compromised. Or another child may show compromised cognitive controls from the first control (body ego-tempo regulation) to the most advanced (equivalence range).

Using the metaphor of a ladder to represent the cognitive control hierarchy, these cognitive control compromises, hypothesized as originating during the first critical period, are viewed as representing "incomplete ladders," developmentally speaking. Development of cognitive controls has occurred appropriately to some point in the ladder or developmental hierarchy, and after that point development has been incomplete, derailed, or compromised. Our observations to date suggest that the cognitive control test profile of an "incomplete ladder" is associated with children who show general clinical functioning characterized as personality trait disorders or developmental deviations.

During the second critical period, after the age of 3 years, the mismatch or psychological conflict is also viewed as existing between cognitive controls and information, but in this instance the information is connected with the child's neurotic conflicts that exist between psychic agencies; for example, between the standards and prohibitions internalized (superego and ego ideal) and the individual's wishes and impulses (id). Here compromised controls are considered to be recruited within a complex network of mechanisms of defense and to serve the management of information on the one hand and on the other, the regulation of anxiety that stems from neurotic conflict. Perhaps we can use as an example the clinically familiar child who shows upon evaluation that "looking" is one aspect of a neurotic conflict that concerns guilt over wanting to see the forbidden oedipal object. Since the conflict with looking recruits the control of focal attention, the child scans passively and narrowly. Narrow and passive scanning, in turn, serves to keep anxiety at a level that is not unbearable or crippling. But of course narrow, passive scanning could result in a learning disability.

Our developmental data (Chapter 7) suggested that for cognitive controls to undergo appropriate growth, it was necessary for the child to step from the oedipal phase into latency and begin several tasks: repress, delay, and detour aggressive and sexual drive tensions that require immediate expression; internalize from the example of parents and teachers standards that flexibly and economically guide behaviors in many situations; and orient cognitive controls to facilitate the active gathering of information from external environments. The child who develops cognitive control pathology in the second phase, then, enters latency with the emotional task of the oedipal phase unaccomplished. Accordingly, environmental information is injected with conflicted feelings because of the child's emotional egocentricity and poorly managed drives. Moreover, one or another cognitive control is compromised to aid in providing insulation from information.

Type II cognitive control pathology, associated with the second critical period, is unique in that usually one cognitive control is selectively recruited into the neurotic organization and is severely compromised. Using again the metaphor of the ladder, cognitive control compromises occurring in the second critical period represent a "broken rung." Such children show adequately organized cognitive controls at one or two levels, then a compromised control, then adequate cognitive control functioning at higher levels.

The two most commonly observed profiles are (1) stage-adequate body ego-tempo regulation and focal attention; severely compromised field articulation; and stage-adequate leveling-sharpening and equivalence range functioning; (2) stage-adequate body ego-tempo regulation, focal attention, and field articulation; severely compromised leveling-sharpening, and adequate equivalence range functioning.

Our observations to date suggest that the first "broken rung" profile (selective compromising of field articulation) is associated with neurotically conflicted children who are making inefficient use of obsessive-compulsive mechanisms to isolate and regulate disrupting affects and anxiety. The second type of profile (selective compromising of leveling-sharpening) is associated with children who are making major use of regression to manage anxiety and hysterical neuroses of various types.

In closing this discussion of the origins of cognitive control pathology, we should note that of course Type I cognitive control disorders persist beyond the age of 3 years. The hypothesis offered here alerts the clinician to determining whether, for example, a first grader shows little or no evidence of neurotic conflict and whether his school failure and adjustment problems could be understood as a function primarily of a conflict between the pace, amount, and type of information presented by the classroom program, and the unique makeup of his cognitive controls.

If an evaluation indicates a major neurosis, a treatment program of psychotherapy or behavior modification would be designed to resolve the emotional turmoil. Treatment of the derailed cognitive control would be secondary and supplementary and would occur within the working-through of the neurosis. However if the evaluation shows no significant neurotic conflict, but major cognitive control deficits in the form of an incomplete ladder, the treatment program considered could be one that primarily treats and fosters the development of the deviant cognitive controls. The emotional stress and anxiety would be worked through as they relate to the child's handicap in processing information. We return to this consideration in Parts IV, V and VI.

The proposal that cognitive control deviations that predate the formation of neuroses be distinguished from those formed in the service of neuroses broadens the psychoanalytic concept of conflict, as suggested by Hartmann (1958). He pointed out that it is not very useful to think of every disruption or mismatch between the individual and his environment as representing psychological conflict. In Hartmann's formulations ego apparatuses of perception, thinking, memory, language, and motor functioning develop outside conflict and in adaptations with the environment, as well as in the matrix of psychic conflict and in adaptations between one agency of the personality and another. The term "conflict" could be reserved for the traditional psychoanalytic view of intrapsychic conflict—for example, when wish and impulse clash with internalized standards and prohibitions. The term "stress" could be reserved for the clash between the developmental status of a particular cognitive structure (in our case, cognitive controls) and the complexity and tempo of information the structure is attempting to manage.

Our discussion of pathology and cognitive controls should conclude with a consideration of the conceptual relations between cognitive controls and psychological drives and between cognitive controls and mechanisms of defense. In addressing the first issue, Klein (1958) has proposed that cognitive controls relate to and coordinate with drives in two ways: (*a*) cognitive controls "recruit" particular information that contributes to the direction in which drives organize and push behavior, either toward or away from certain objects and events; and (*b*) cognitive controls contribute to the process by which the attractions and repulsions of drive behavior accommodate to environmental limitations and opportunities, by providing information about the realistic objects and events in the environment.

Our developmental observations discussed in Chapter 7 fit both these proposals by Klein and, at the same time, extend them. In recruiting information that is used in directing drives and accommodating them to environmental limitations, we have noted that cognitive controls during the first half of latency (5 to 8 years) are oriented primarily toward the external environment. In moving from the oedipal phase, cognitive controls gain autonomy from the influence of drives. During the first half of latency, then, cognitive controls have the quality of being stimulus bound, and they turn away from information contained in fantasies and drive tensions. In the second half of latency cognitive controls gain autonomy from the environment as well as from drives. They now are oriented toward both the external and internal environments, gathering information to help direct drives and to evaluate environmental reactions—and this information is perceived and interpreted in terms of both the external makeup of information and the meanings derived from the realm of fantasy and feelings.

In this view, cognitive controls are conceived to be ego mechanisms that are separate from, but function in concert with, mechanisms of defense. Effective functioning by mechanisms of defense requires effective functioning by cognitive controls, and the reverse. Each has a defensive purpose: in the case of mechanism of defenses, resolving the clash between drives and limitations and prohibitions; and in the case of controls, resolving the clash between the configurations and demands of information and the information load that can be assumed by the individual at a given developmental state. Each has an adaptive purpose: in the case of defenses, by disguising and displacing the need; and in the case of controls, by articulating or insulating information. Wolitzky (1973) and Gardner et al. (1959) discuss various concepts of defense-control relationships.

The proposed developmental-adaptational model of cognitive controls conceptualizes these strategies as stable developmental levels in long-term adaptation on the one hand, and, on the other, as levels through which an individual moves progressively and regressively during short-term adaptation to changing environments. I have also depicted cognitive controls as being delicately balanced with the regulation of drives—insulating and avoiding as well as articulating and approaching, the amount and pace of information from outer and inner environments that result in a level of anxiety and affect arousal conducive to successful adaptation and further development. Next we review studies designed to investigate aspects of cognitive controls in long-term and short-range adaptation.

9

CLINICAL STUDIES OF THE DEVELOPMENTAL-ADAPTATIONAL MODEL OF COGNITIVE CONTROLS

This chapter considers several studies illustrating the potential utility for practice of the cognitive control tests devised and use of the developmental-adaptational model of cognitive controls outlined in the preceding chapter. In one set of studies, which evaluated longterm predictions of academic performance based on cognitive control test performance, we explore the notion of cognitive controls in long-term adaptation. In another set of studies which evaluated changes in cognitive control organization in response to environmental changes, cognitive controls are investigated in terms of adaptation over the short range. A third set of studies evaluates cognitive controls as related to reading disabilities, intoxication by glue sniffing, and the regulation of aggression and anxiety as measured by test procedures. Consideration is also given to the clinical relevance of cognitive control profiles in the diagnostic evaluation of children who might be presented to the practitioner.

EARLY DETECTION AND LONG-TERM PREDICTION OF LEARNING DISABILITIES

During the academic year 1969-1970 two elementary school principals were discussing a problem of interest to many public school systems, namely, the detection of children who are at risk in developing cognitive disabilities and learning problems. The schools administered by these principals served a suburban area of primarily middle-class families. Although the children who entered the kindergarten program came from relatively stable and ''advantaged" homes, a number of them each year showed significant difficulties in managing the demands of the kindergarten program. Moreover, at the higher elementary grades learning disabilities and the need for special services were observed among an appreciable number of children.

The principals invited me to join their discussions. We wondered whether children who showed difficulties in kindergarten developed learning problems in future grades. We also wondered whether some children, who appeared to teachers to manage kindergarten demands adequately, nonetheless showed problems in learning when faced with the more complex demands of third or fourth grade. In this context we raised the question of whether the cognitive control tests devised, and the developmental model on which they are based, provided a means by which we could detect, during kindergarten, children who were at risk in developing cognitive and learning disabilities in subsequent grades. Based on our findings discussed in Chapter 6, it seemed reasonable to assume that cognitive control structures (i.e., tempo regulation, breadth of scanning, selective deployment of attention, stability of memory images of information, and conceptual management of information) represented the cognitive substrate on which academic functions rely for their operation. Therefore the developmental status of these cognitive structures, observed during kindergarten, should bear a relation to future academic performance. Furthermore, if a testing program were successful in detecting kindergarten children who are at risk academically, a “diagnostic base” would be available from which cognitive training procedures could be prescribed during kindergarten and first grade in an attempt to prevent future school failure.

To approach the first question—namely, the usefulness of developmentally guided, cognitive control assessments in detecting children at risk academically—the following longitudinal, predictive study was designed. Kindergarten teachers would be asked to observe which children were not achieving classroom demands adequately. These children, whom the teachers also suspected might develop learning problems in future grades, would be referred to as “suspects.” Children not so designated would be viewed as typical kindergarten learners (referred to as “typicals”), not likely to have difficulty learning in future grades. All children would be administered the basic five tests of cognitive controls. Then, as the children moved through subsequent grades, their academic performance and management of classroom demands would be rated by teachers. By correlating the kindergarten assessments of cognitive controls with subsequent academic and classroom performance, it would be possible to determine whether the developmental status of cognitive control functioning during the fifth year of life predicts success in academic performance in the elementary grades. If cognitive control assessments obtained during kindergarten proved successful in predicting further academic functioning, the next issue of detecting early and prescribing remediation for children could be approached, in an effort to prevent the development of learning difficulties.

The First Predictive Study

This research design of the first study was implemented during the spring of the 1969-1970 academic year. In the school system where the work was done, all kindergarten children attend a program conducted in the same school by six teachers, each of whom operates a morning and an afternoon class. (The kindergarten children attend half-day session.) In the first study teachers were asked to select 30 children whom they viewed as “suspects.” They were also asked to select 30 “typical” kindergarten learners. The two groups were then administered the five basic tests of cognitive control functioning (the Fine Motor Delay Test, the Scattered Scanning Test, the Fruit Distraction Test, the Leveling-Sharpening House Test, and the Object Sort Test II). Because of scheduling problems and school absences, 24 suspects and 27 typicals were tested.

Once the testing was completed, we had to determine the statistic that would be most effective in handling the data, given the predictive goal of the study. When two groups are being compared in terms of many variables, the simple and intuitively appealing approach is to take each variable individually and describe the differences observed in the performance of the two groups. This was done, and the group differences were analyzed (discussion in Chapter 7; see Table 6). As Chapter 7 noted suspects as a group tended to show cognitive control preferences that represented lower *developmental* levels than did the typicals. This finding indicated that cognitive control assessments agreed with the teachers' judgments. Therefore the cognitive control tests and the teachers were more or less equally effective in detecting suspects, when cognitive controls were analyzed one at a time.

However when cognitive control assessments were examined in terms of the developmental model, we were able to make two observations. First, suspects as a group seemed to be lagging more, developmentally, with regard to fine motor delay, focal attention, and field articulation. From this we might speculate that at the kindergarten grade (age 5 years), the developmentally higher controls of leveling-sharpening (memory functioning) and equivalence range (conceptual thinking) are not yet fully organized, therefore do not discriminate as powerfully between suspects and controls as do the earlier emerging controls of fine motor delay, scanning, and attending selectively. The second observation was the result of a developmentally oriented examination of individual protocols. We noticed that although suspects as a group lagged, for example, in focal attention, it was not unusual for one suspect to lag more than another. Both these observations suggested that developmentally ordered cognitive control assessments might go beyond teachers' judgments, making possible more refined discriminations between suspects and controls that might serve in the prediction of learning disabilities.

A recently developed statistical tool, discriminant analysis (Tatsuoka, 1970), helps us capture the differences noted between the two groups from one cognitive control to another and among children within a group. Rather than examining one test score at a time, the discriminant analysis statistic takes all the test scores of a given child, who is a member of one or another group, and finds the combination of test scores that maximally separates one group from another and separates one child within a group from another child in that group. Thus the discriminant analysis statistic is ideally suited for a predictive study.

When two groups are administered a number of tests, and the total performance of each child in both groups is analyzed with the procedure of discriminant analysis, each child in each group is assigned a "discriminant score." This score is an index of that child's *total* performance on the several tests given—that is, an index of his pattern of test performance, which discriminates that child maximally from other children whose performance were included in the same analysis. The discriminant score assigned to each child is associated with a probability: the chances out of 100 that a child could be a member of the group designated as the point of reference.

In our study the cognitive control test scores of the 24 suspects and 27 typical learners selected by the kindergarten teachers were analyzed with the discriminant function statistic. Based on the 51 patterns of test performances obtained from the total sample, a discriminant score was assigned to each child. Because the cognitive control tests are scored in terms of developmental levels, this discriminant score could be called a developmental index with regard to cognitive control functioning. In our analysis the typical learners were used as the referent group. Therefore the probability associated with each discriminant score told us the chances out of 100 any one child had of being a member of the typical learners group, given his performance on the tests and its relation to the performance of the total population of 51 children.

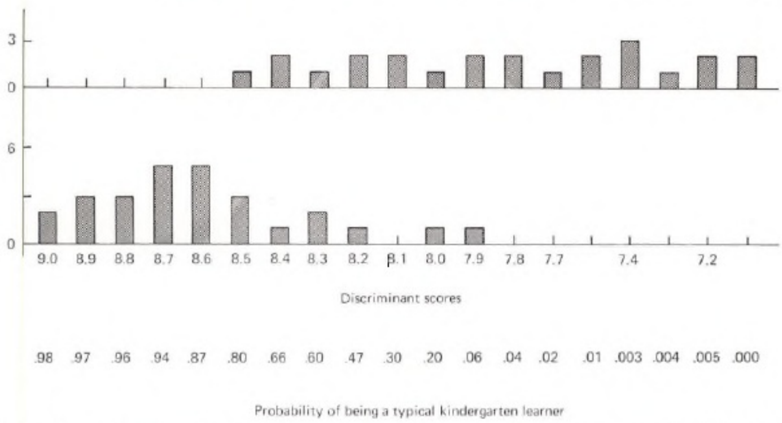


Figure 1. Early detection of cognitive disabilities in kindergarten children (1969-1970): above, suspects (N = 24); below, typicals (N = 27).

Figure 1 plots the results of the first discriminant function analysis with the 51 children tested in 1969-1970, giving frequency distributions of the discriminant scores for the typical and suspect groups. The probability of being a typical kindergarten learner, associated with each discriminant score, is also presented. These distributions show that all children judged as typical learners by teachers did not function at the same cognitive control developmental level. Rather, these children represented a range of levels from those who were most advanced (with respect to the other members of the group) to those who lagged behind. The same consideration holds for children who were judged as suspect.

The discriminant scores of the children designated by the teachers as typical learners range from 9.0 to 7.9. The probability of each of these children being a typical learner (with the performance of *all* 51 children as the frame of reference) ranges from the very high probability 98 chances out of 100 to the very low probability of 6 chances out of 100. The discriminant scores of the 27 children designated by teachers as suspects ranged from 8.5 to 7.0, and the probability of each of these children being a typical learner ranges from 80 chances out of 100 to zero.

Thus with the help of a discriminant analysis, we can distinguish among suspects and among typicals, as well as between them. We can go beyond the general finding that cognitive control tests, when treated in terms of group differences, agreed with the teachers' judgments, and we can prepare for a more selective predictive study. In our predictive study, if we correlate the developmental level of cognitive control functioning a child revealed in kindergarten (as reflected by the discriminant score and related probability) with subsequent academic performance, we transcend the global designations of "suspect" and "typical" and preserve a child's cognitive control uniqueness.

One other consideration revealed by Figure 1 deserves our attention. Although the two groups differ significantly, with typicals showing more advanced cognitive controls, there is overlap in the developmental levels of cognitive control functioning exhibited by each group. This overlap allows us to determine where there is concordance and discordance between the teacher's designation and assessed cognitive control functioning. For example, three of the 27 typical children had discriminant scores, respectively, of 7.9, 8.0, and 8.2, which represent functioning at the same developmental levels as those characterizing the average suspect. These children also have a probability of 47 chances in 100 or less of being typical learners. Similarly, four of the suspects had the following discriminant scores; 8.5, 8.4, 8.4, and 8.3, and these represent functioning at the same developmental levels characteristic of the average typical learner (with probabilities ranging from 60 to 80 chances in 100 of being typical learners).

In terms of our predictive study, we would be especially interested in the future academic performance of these children, where discordance is observed between a teacher's judgment of kindergarten performance and the observed developmental status of cognitive control functioning. If ratings by third and fourth grade teachers of these "discordant" children agree more with cognitive control assessments than with observed kindergarten performance, we would have further support for the value of using assessments of cognitive control development as predictors of academic risk.

Because of this initial success in discriminating between and among children designated during kindergarten as typical learners and suspects, it was decided to replicate the study on a larger scale in the following two academic years. In these replications the entire kindergarten population was evaluated with cognitive control tests. This was done to ensure a more comprehensive study of the predictive and discriminative value of cognitive control tests and also to avoid the bias that might have operated when teachers selected only small numbers of typical and suspect learners from a large population.

The Second and Third Predictive Studies

In the spring of the academic year 1970-1971 the same six kindergarten teachers were again asked to identify children whom they suspected as not performing adequately on classroom demands. Thirty-four children were so designated. The entire kindergarten population of 184 children then took the basic battery of cognitive control tests. In the spring of the academic year 1971-1972 the same procedure was followed, and this time the teachers designated 56 children as suspect. The cognitive control test scores were again analyzed by means of a discriminant function. Figures 2 and 3 present the distributions of discriminant scores and related probabilities of being a typical learner for the 1970-1971 and 1971-1972 evaluations, respectively. With these much larger populations, tests of cognitive controls were again successful in discriminating between typical and suspect children, and the suspects as a group showed developmentally lower cognitive control functioning. Moreover, suspect children again revealed a range of developmental levels of cognitive control functioning, from performance much like that of typical children to levels of functioning well below that of the mean of the suspect group. Similarly, typicals revealed a range of developmental levels of functioning, with some children showing developmentally advanced cognitive functioning relative to their group, and others showing functioning at the same level as the average suspect. In both replications concordance and discordance between teachers' judgment and assessments of cognitive controls was again observed, providing the opportunity to notice the future academic performance of these particular children, to be able to assess the predictive power of cognitive control assessments versus judgments based on classroom observation.

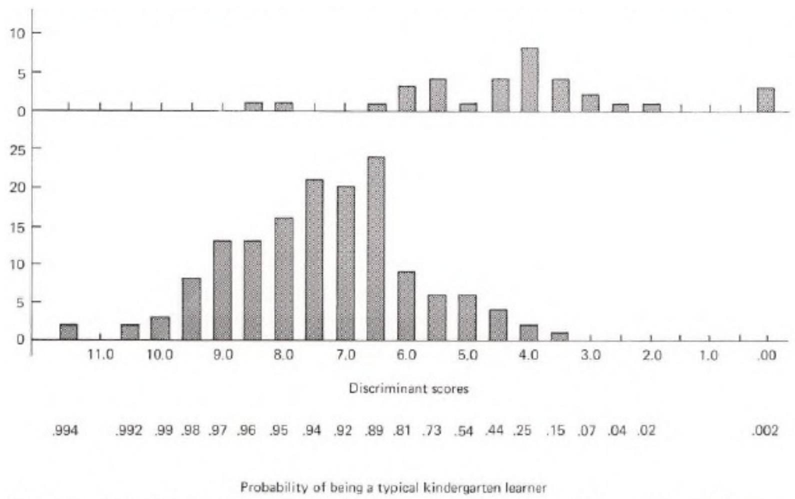


Figure 2. Early detection of cognitive disabilities in kindergarten children (1970-1971): above, suspects (N =34); below, typicals (N = 150).

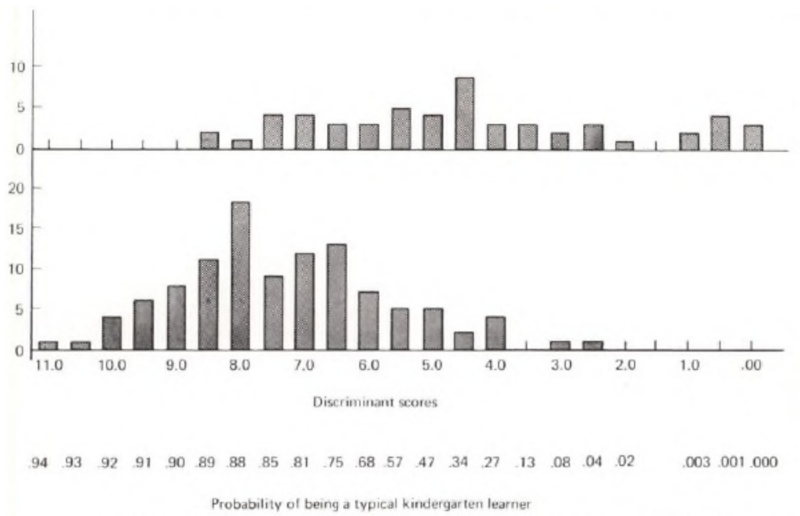


Figure 3. Early detection of cognitive disabilities in kindergarten children (1971-1972): above, suspects (N = 56); below, typicals (N = 108).

The distributions of discriminant scores of these two larger populations of kindergarten children reveal several other features that deserve mention. First, it should be noted that although the children represented a relatively narrow range of chronological ages (64 to 75 months), they revealed a wide range of developmental levels or stages of cognitive control functioning. The individual differences that appeared between the two groups and within each group are striking, given the age spread of only 11 months. Moreover, the developmental levels of cognitive control functioning produced by both typical groups generated bell-shaped distributions. This finding adds further support to the effectiveness of the tests devised to measure cognitive control functioning. The distributions of the two suspect groups show a much wider range of levels, and more variability. The form of these distributions may be partly related to the various and different behaviors used by teachers to determine that a child is a suspect, and to the heterogeneity that may be attributed to "clinical" populations. An analysis of the group differences revealed by these suspects and typical learners is discussed in Chapter 6 (Tables 7 and 8). As with the first predictive study begun in 1969-1970, it was decided to use the discriminant score of each child, rather than group differences, as the basis for evaluating future academic performance.

FOLLOW-UP TEACHER RATINGS FOR THE THREE PREDICTIVE STUDIES

In the spring of each academic year following the kindergarten testing of these three populations, teacher ratings were obtained for each child. The 51 kindergarten children of the first study (1969-1970 sample) were rated by first, second, third, fourth, and fifth grade teachers. Ratings of the 184 kindergarten children of the second study (1970-1971 sample) were made by first, second, third, and fourth grade teachers, and the 164 kindergarten children of the third study (1971-1972 sample) were assessed by first, second, and third grade teachers.

Twelve variables make up the rating scale (Figure 7 in Appendix B). Four concern academic skill areas: reading, mathematics, verbal language, and written language. Five variables involve coping and emotional skills used in managing the demands of a classroom: perceptual-motor coordination, paying attention, knowledge of the daily routine of the class, use of time to pursue intellectually stimulating activities during classroom periods of free time, and extent to which the child perseveres with academic tasks and projects. Three of the variables pertain to the regulation of affects and tensions: degree of body restlessness and activity, physical aggression, and verbal aggression. All variables were selected with the advice of teachers.

The teachers were interviewed individually and were asked to rate every child in the class on each of the 12 variables using a five-point scale. To facilitate obtaining ratings, the teacher was given a deck of cards, on each card was typed the name of a pupil in her class. Five boxes, numbered 1 through 5 were placed before the teacher, and she was asked to place in box 1 the names of five or six children who represented the lowest level of the dimension being rated, in box 5 the five or six children who represented the highest level, in box 3, those representing the average, in box 2, those below average but not the lowest, and in box 4, those above average, but not the highest.

These five levels were usually clear to teachers in terms of academic skills rated, but each of the other variables was discussed, for clarification. In terms of paying attention, the children placed in category 1 were those who tended to show scattered attention; the teacher had to work extra hard during class to get the attention of these children. Children placed in category 5 were those who gave their attention easily, immediately, and effectively when the teacher requested it as a prelude to introducing work or discussing some topic. In terms of body activity, category I was reserved for the children who were most restless and moved about a great deal while performing academic tasks, and category 5 included children who sat relatively still for long periods of time. Similarly, with each of the other dimensions, category 1 was reserved for children who showed the most awkward, poorly coordinated perceptual motor functioning with scissors and other materials, who showed the most confusion with classroom routine and needed reminders of it, who used free time to pursue nonintellectually oriented tasks or no task at all, who could not stick with a task for long, who often pushed, punched, or fought other children, and who often called other children names, swore, and so on. Category 5 was assigned to the children who were best coordinated motorically, who anticipated and prepared for classroom routine, who used free time to pursue intellectually stimulating games, who devoted long periods of time to working on a project, and who were not physically or verbally aggressive.

When the teacher had sorted her children in terms of reading, the first variable, the name cards were gathered and shuffled. The next dimension was explained, and the teacher again sorted her students. This procedure was repeated until all 12 dimensions had been rated. In their rating, the teachers were urged to use as a frame of reference both the range of behaviors displayed by the current class and the range that they would expect for that grade level in terms of their own teaching experience. They were also encouraged to distribute the class along the five-point scale. However if a particular teacher felt in terms of her overall teaching experience that no child in the current class could be assigned, for example, to category 5 with regard to physical activity (because the class was made up of many hyperactive children), she was permitted to assign more than 5 children to categories 1 or 2. Similarly, the teacher was permitted to place more than five children in each of categories 4 and 5 if she judged that none of the children was excessively restless, given expectations for, and experience with, that grade level. When rating their students, teachers were not aware of the outcome of the children's kindergarten test performance.

To study the predictive power of cognitive control assessments obtained, teacher ratings assigned to a child at each grade level were correlated with that child's discriminant score based on kindergarten test performance. The results obtained with these correlational analysis are presented in Tables 1, 2 and 3 for the 1969-1970, 1971-1972, and 1972-1973 samples, respectively.

Table 1. Correlation of Kindergarten Cognitive Control Testing Discriminant Scores with Teacher Ratings: 1969 1970 Sample

Variable Rated	First Grade, N= 46	Second Grade, N = 44	Third Grade, N= 44	Fourth Grade, N= 39	Fifth Grade, N= 31
Reading	.83	.81	.36	.21	.30
Mathematics	.85	.89	.39	.27	.27
Language, verbal	.82	.80	.19	.20	.17
Language, written	—	.85	.32	.38	.31
Perceptual-motor	.86	.85	.32	.44	.05
Paying attention	.82	.80	.37	.21	.12

Knowledge of routine	.85	.84	.33	.32	.24
Use of free time	—	.84	.31	.25	.23
Perseverance with academic	—	.77	.31	.16	.11
Body activity	.86	.85	.12	.13	.05
Aggression, physical	.90	.75	.05	.01	.12
Aggression, verbal	—	—	–.04	.02	.12
		df=45		df=30	
		r = .37;	*p* = .01	r = .45;	*p* = .01
		r = . 28;	*p* = .05	r = .34;	*p* = .05

Table 2. Correlation of Kindergarten Cognitive Control Testing Discriminant Scores with Teacher Ratings: 1970-1971 Sample

Variable Rated	First Grade , N = 164	Second Grade, N= 157	Third Grade, N= 146	Fourth Grade, N= 144
Reading	.34	.34	.31	.36
Mathematics	.32	.32	.28	.37
Language, verbal	.22	.22	.31	.33
Language, written	.37	.38	.36	.31
Perceptual-motor	.30	.21	.34	.31
Paying attention	.30	.21	.34	.31
Knowledge of routine	.34	.21	.15	.24
Use of free time	.31	.31	.26	.23
Perseverance with academic tasks	.35	.26	.27	.18
Body activity	.18	.32	.18	.23
Aggression, physical	.17	.23	.07	.17
Aggression, verbal	.11	.12	—	.08
	df = 150		df = 125	
	r > .20;	*p* = .01	r >. 22;	*p* = .01
	r >. 16;	p=. 05	r >.17;	*p* = .05

Table 3. Correlation of Kindergarten Cognitive Control Testing Discriminant Scores with Teacher Ratings: 1971-1972 Sample

Variable Rated	First Grade, N = 150	Second Grade, N= 124	Third Grade, N= 122
Reading	.31	.29	.39
Mathematics	.21	.41	.26

Language, verbal	.33	.19	.31
Language, written	.27	.07	.37
Perceptual-motor	.24	.25	.22
Paying attention	.33	.29	.40
Knowledge of routine	.22	.19	.35
Use of free time	.26	.15	.36
Perseverance with academic tasks	.28	.31	.33
Body activity	.13	.15	.24
Aggression, physical	.04	.20	.21
Aggression, verbal	.06	.12	.13
df = 150		df = 125	
r >. 20;	*p* = . 01	r >. 22;	*p* = . 01
r >.16;	*p* = .05	r >.17;	*p* = .05

Overall with each sample, the discriminant scores maintain the largest degree of correlation with ratings of academic skill performance observed in subsequent grades (e.g., reading, mathematics, and language). The correlations between discriminant scores and behavioral dimensions that relate to managing classroom demands (e.g., paying attention, perceptual motor functioning, knowledge of classroom routine, perseverance with academic tasks) are lower over the years, although some correlations reach significance. Relatively speaking, discriminant scores show little or no correlation over the years with body activity and expressions of aggression.

The correlations observed with each of the three predictive studies lend strong support to the hypothesis that the developmental level of cognitive control functioning observed in the kindergarten year relates more to subsequent performance in academic skill areas and less to other behaviors observed in the classroom. These results also support the utility of cognitive control assessments in the early detection of children who run the risk of developing future difficulties in learning academic skills.

Since different teachers performed the ratings at each grade level, it is necessary to determine to what extent teachers agreed in judging the level of reading or mathematics, for example, demonstrated by a child from grade to grade. If the teachers did not agree from year to year, their ratings would not be effective independent criteria against which the predictive power of the cognitive control tests could be tested. However intercorrelations among the ratings by teachers from year to year (Table 4) show that different teachers over several grade levels tended to assign the same rating to a child for each of the variables rated. Given this high degree of agreement among teachers, the ratings obtained proved to be effective and meaningful criteria of classroom performance with which to correlate kindergarten test performance. The agreement among teachers on the other two studies was equally high.

Table 4. Range of Correlations Among Teachers' Ratings of Same Children at Five Grade Levels: 1970-1971 Sample

Range of Correlations* from Matrix of K x 1st x 2nd x 3rd x 4th Grades

Variable Rated	Lowest Correlation	Highest Correlation
Reading	.55	.82
Mathematics	.44	.74
Language, verbal	.47	.65
Language, written	.58	.66
Perceptual-motor	.40	.60
Paying attention	.33	.60
Knowledge of routine	.31	.52
Use of free time	.43	.53
Perseverance with academic tasks	.37	.55
Body activity	.32	.51
Aggression, physical	.36	.62
Aggression, verbal	.33	.45

* All coefficients significant at .01 level.

The Fourth Predictive Study

Follow-up assessments were made of children whose cognitive control performance and teacher designation were discordant during kindergarten. From the results of the predictive studies, let us consider the children whose performance on tests of cognitive controls during kindergarten disagreed with the kindergarten teachers' judgments of them to be typical learners or suspect. As we noted when discussing the distributions of discriminant scores, despite considerable agreement between a child's test performance and a teacher's designation of the same child to be a typical learner or a suspect, a small number of children designated as typical learners showed cognitive control functioning characteristic of the suspect group. Similarly a small number of children labeled as suspect showed cognitive control test performance characteristic of the typical learner group. The predictive studies just discussed related a child's kindergarten test performance (discriminant score) with teacher ratings in subsequent grades, regardless of whether the child was initially designated a typical learner or a suspect.

Although these studies provided considerable support for the contention that cognitive control test performance predicts academic classroom performance in future grades, it seemed clear that the predictive power of cognitive control tests could be explored further if follow-up data were obtained specifically about the children whose kindergarten test performance and teacher designation disagreed. That is, whenever a child's kindergarten test performance disagreed with the teacher's designation, we had the opportunity to study whether observations made several years later agreed more with the initial assessment of cognitive control functioning or with the teacher's designation of a child as suspect or typical. Accordingly we set about to gather two types of follow-up data: one involved readministering tests of cognitive controls several years after the kindergarten year; for the other, we conducted interviews several years later with the teachers who were working then with the children.

FOLLOW UP TESTING OF DISCORDANT CHILDREN

What would be the cognitive control functioning in future grades of the children who represented a "mismatch" or showed discordance, during kindergarten, between their test performance and the teacher's designation? A follow-up study was conducted to address this question during the 1974-75 academic year, when the children in the 1970-1971 predictive sample were attending the fourth grade, and those in the 1971-1972 predictive sample were in the third grade. Children were selected for follow-up testing from the extremes of both discriminant function distributions. To represent the "concordant typicals," we selected children from both samples who were designated as typical learners and whose performance on cognitive control tests resulted in high discriminant scores. The test scores of these children produced discriminant scores that indicated a probability of 97 out of 100 or greater that their cognitive control functioning was like that of typical learners and therefore agreed with the teacher's designation of them as typical learners. Children designated as typical learners whose test performance resulted in the lowest discriminant scores were selected as "discordant typicals." The test performance of these children resulted in discriminant scores that indicated a probability of 40 out of 100 or less that their cognitive control functioning was like that of typical learners, signaling disagreement with the teacher's designation of them as typical learners.

The same procedure was followed in selecting children from the extreme ends of the distribution of suspects. Some children were chosen representing "concordant suspects." Their test scores resulted in discriminant scores with a probability of 20 out of 100 or less that their cognitive control performance was like that of typical learners, thus agreed with the teacher's designation of them as suspect. The "discordant suspects" selected produced test scores indicating a probability of 80 chances out of 100 or greater that their cognitive control performance was like that of typical learners. The cognitive control functioning of these children, then, disagreed with the teacher's designation of them as suspect.

Table 5 gives the breakdown of children selected from the 1970-1971 and 1971-1972 samples who met the foregoing criteria. Of the 33 children selected who had been initially designated as typical learners, 17 showed a test performance concordant with this designation (the highest discriminant scores) and 16 showed a test performance that was discordant (the lowest discriminant scores of typical learners). Of the 27 children selected who had been initially designated as suspects, 15 showed a concordant test performance (the lowest discriminant scores of the suspects) and 12 showed a discordant test performance (the highest discriminant scores of the suspects).

Table 5. Children Reevaluated in Third or Fourth Grade Who Represented a Mismatch in Kindergarten Between Cognitive Control Test Performance and Teacher Designation

Original Kindergarten Sample	Grade at Follow up	Concordant Typicals			Discordant Typicals			Concordant Suspects			Discordant Suspects		
		Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total

1970-1971	Fourth	5	5	10	5	1	6	3	3	6	6	1	7
1971-1972	Third	4	3	7	7	3	10	5	4	9	2	3	5
Number of children				17			16			15			12

These 60 children, attending the third and fourth grades as indicated, were readministered individually the battery of cognitive control tests. The data of the kindergarten testing and the follow-up testing were examined in two ways. In the first analysis the test performance of the children was examined in terms of the designation assigned to them by their respective kindergarten teachers. That is, the children designated as typicals were compared with the children designated as suspects. The second analysis involved the examination of the test performances of the children in terms of kindergarten test performances and the resulting discriminant scores. That is, concordant typicals were combined with discordant suspects. The kindergarten test performances of both these subgroups resulted in the highest discriminant scores of their respective distributions. Similarly the discordant typicals were combined with the concordant suspects because both these subgroups showed kindergarten test performances that resulted in the lowest discriminant scores of their respective distributions. It should be noted that although these combinations of subjects contain children who came from the same ends of their respective sample distributions, they were not at the same level of cognitive control functioning. For example, although the discordant suspects produced the highest discriminant scores relative to other suspects in the sample, their test performance is more like that of the average typical learner (see Figures 2 and 3).

Table 6 displays the means and significance of the differences when the children are grouped and compared in terms of the teachers' designations of typical and suspect. Table 7 gives the means of test scores and the significance of the differences when the children are combined and compared in terms of their kindergarten discriminant scores.

In comparing the two analyses, we rely on group differences and age trends presented in Chapters 6 and 7. Let us first examine the kindergarten testing. When the children were compared in terms of teacher designation, as typicals and suspects, they showed few significant differences in the predicted direction (Table 6). The typical group delayed fine motor movement longer, marked geometric shapes at a quicker tempo, named the colors of Card II of the Fruit Distraction Test more quickly, and were less disrupted in color naming by the peripheral, irrelevant objects (Cards III-II). In terms of the Leveling- Sharpening House Test and the Object Sort Test, the two groups revealed no significant differences except for two Object Sort Test scores: the developmental score assigned to concepts and the number of miscellaneous groups. The typicals showed a significantly higher degree of abstraction in their categorizing behavior and the suspects formed a higher number of miscellaneous groupings.

Table 6. Cognitive Control Test Performance of Typical and Suspect Learners at Kindergarten and at Third and Fourth Grades

	Kindergarten		Third and Fourth Grades	
	Typicals, N = 33	Suspects, N = 27	Typicals N = 33	Suspects N = 21

Score	Mean	S D	Mean	S D	F	P	Mean	S D	Mean	S D	F	P
Fine Motor Delay I: time (seconds)	15.8	6.5	16.5	6.6	1.04	NS	12.4	5.2	13.7	4.3	1.46	NS
Fine Motor Delay II-I: time (seconds)	32.9	49.5	16.4	12.2	16.84	.01	74.3	66.6	55.8	41.1	2.63	.01
Motor Tempo: time (seconds)	25.6	8.4	29.0	13.4	2.59	.01	20.2	7.4	20.7	7.4	1.01	NS
Scattered Scanning: number correct	15.2	3.6	14.6	3.9	1.16	NS	26.4	10.1	22.2	7.1	1.99	.05
Scattered Scanning: mean distance (cm)	6.6	16.1	6.9	12.7	1.16	NS	7.4	1.7	7.4	1.3	1.33	NS
Scattered Scanning: total distance (cm)	102.8	30.3	105.5	28.3	1.15	NS	178.5	57.8	150.8	34.6	2.79	.01
Scattered Scanning: ratio I	3.8	1.6	3.9	1.6	1.01	NS	5.2	2.9	4.6	2.3	1.59	NS
Scattered Scanning: ratio II	25.9	11.2	29.0	12.0	1.17	NS	35.3	17.2	30.7	15.1	1.28	NS
Fruit Distraction II: time (seconds)	80.3	25.0	97.8	42.9	2.93	.01	46.2	12.3	49.5	10.7	1.32	NS
Fruit Distraction III-II: time (seconds)	19.3	30.0	2710	47.7	2.52	.01	0.9	7.5	0.7	7.2	1.00	NS
Fruit Distraction IV-II: time (seconds)	91.3	69.3	101.4	64.7	1.15	NS	29.3	28.6	28.0	13.9	4.21	.01
Fruit Distraction: recalls	1.7	1.3	1.1	1.2	1.12	NS	2.0	1.3	2.0	1.1	1.00	NS
Leveling Sharpening: first stop	21.6	13.8	19.0	13.9	1.02	NS	11.5	6.1	11.9	5.6	1.19	NS
Leveling-Sharpening: number correct changes	8.0	3.9	9.0	10.7	1.10	NS	12.1	1.9	11.7	2.4	1.58	NS
Leveling-Sharpening: ratio	20.4	55.6	20.8	52.3	1.13	NS	13.9	3.3	14.8	4.0	1.46	NS
Leveling Sharpening: A + B changes	1.1	1.8	1.3	1.6	1.20	NS	1.1	1.5	1.5	1.8	1.23	NS
Object Sort: total groups	12.3	5.3	9.6	6.3	1.40	NS	10.5	2.9	12.5	3.7	1.63	NS
Object Sort: typical groups	10.8	4.8	7.8	6.1	1.57	NS	9.0	2.9	10.0	2.9	1.00	NS
Object Sort: atypical groups	0.6	1.2	0.7	0.9	1.63	NS	0.3	0.6	0.3	0.5	0.75	NS
Object Sort: miscellaneous groups	0.9	1.1	1.4	1.9	2.10	.05	1.1	1.6	1.7	1.6	1.08	NS
Object Sort: Mean developmental score	4.3	1.3	3.5	1.9	2.28	.01	5.2	4.7	4.8	6.2	1.76	NS

A comparison of the children's kindergarten test scores in terms of concordance or discordance between teacher designation and discriminant score (Table 7) indicated many more significant differences, as well as meaningful trends that agreed with expectations based on differences observed between various populations of adequate and inadequate learners discussed in Chapter 6. With all measures the concordant typicals and the discordant suspects showed developmentally higher levels of cognitive control functioning. This is to be expected, since the children combined in this group were those from the high ends of their respective discriminant score distributions. The combination of concordant suspects and discordant typicals represents children whose test performance located them at the developmentally lower ends of their respective distributions.

Table 7. Cognitive Control Test Performance of Concordant and Discordant Typical and Suspect Learners at Kindergarten and at Third and Fourth Grades

	Kindergarten						Third and Fourth Grades					
	Concordant Typicals, Discordant Suspects		Concordant Suspects, Discordant Typicals				Concordant Typicals, Discordant Suspects		Concordant Suspects, Discordant Typicals			
Score	Mean	SD	Mean	S D	F	P	Mean	S D	Mean	S D	F	P
Fine Motor Delay I: time (seconds)	15.4	5.7	16.8	7.2	1.57	NS	13.5	5.3	12.5	4.4	1.42	NS
Fine Motor Delay II-I: time (seconds)	28.6	44.2	22.5	32.1	1.89	.05	75.5	66.9	55.9	42.6	2.46	.001
Motor Tempo: time (seconds)	25.0	10.9	29.0	10.9	1.01	NS	19.9	7.7	20.9	6.9	1.23	NS
Scattered Scanning: number correct	15.8	3.0	14.0	4.1	1.91	.05	25.1	10.2	23.0	7.9	1.66	.08
Scattered Scanning: mean distance (cm)	6.8	1.4	6.7	1.5	1.13	NS	7.6	12.9	7.0	16.8	1.69	.08
Scattered Scanning: total distance (cm)	111.0	28.3	97.4	28.8	1.84	.05	169.1	46.7	62.7	54.4	1.35	NS
Scattered Scanning: ratio I	3.8	1.4	4.0	1.7	1.59	NS	5.0	2.1	4.9	3.0	2.03	.05
Scattered Scanning: ratio II	26.7	10.6	27.9	12.5	1.39	NS	35.1	14.3	31.3	18.3	1.62	NS
Fruit Distraction II: time (seconds)	80.0	20.3	95.1	43.0	4.47	.01	43.7	9.2	51.4	12.5	1.82	.05
Fruit Distraction III-II: time (seconds)	7.3	16.6	36.1	47.0	7.97	.001	0.3	5.0	0.8	8.9	3.14	.001
Fruit Distraction IV-II: time (seconds)	75.4	39.1	113.5	80.4	4.22	.001	24.1	16.1	32.9	27.5	2.89	.001
Leveling-Sharpening: first stop	20.0	11.7	21.0	15.7	1.80	.06	11.2	6.7	12.1	4.9	1.84	.05
Leveling-Sharpening: number correct changes	9.9	10.1	7.1	4.2	5.69	.001	12.1	1.9	11.6	2.31	1.35	NS
Leveling-Sharpening: ratio	20.0	5.1	21.0	5.6	1.23	NS	14.0	3.7	14.6	3.7	1.03	NS
Object Sort: total groups	11.7	5.3	10.5	6.4	1.42	NS	11.7	3.5	11.1	3.3	1.18	NS
Object Sort: typical groups	10.4	5.5	8.4	5.6	1.01	NS	10.1	3.3	9.2	2.7	1.51	NS
Object Sort: atypical groups	0.5	0.8	0.8	1.2	1.85	.05	0.4	0.7	0.2	0.4	3.40	.001
Object Sort: miscellaneous groups	0.8	1.0	1.2	2.1	4.33	.001	1.2	1.8	1.6	1.3	2.06	.05
Object Sort: mean developmental	4.2	1.3	3.7	1.9	2.18	.01	5.1	5.5	5.1	5.4	1.04	NS

score

Given this comparison at kindergarten, we now want to find out whether one variable or the other (teacher designation or kindergarten test performance) discriminates better in the follow-up testing.

When compared in terms of the initial teacher designation of typical and suspect, test results obtained from these children in the third and fourth grades showed four significant differences in cognitive control functioning (Table 6). The children designated as typicals retained a significantly greater delay of fine motor movements (Fine Motor Delay II-I), and they scanned more actively and broadly (Scattered Scanning Test number correct and total distance). With the Fruit

Distraction Test, typicals differed only in being less distracted by the incorrect colors. Two significant differences were observed on the Leveling-Sharpening House Test. With respect to the Object Sort Test the typical group differed only in employing more abstract concepts when categorizing the various objects.

If the follow-up testing is compared in terms of the children's kindergarten test performance, the differences between the concordant typicals plus the discordant suspects versus concordant suspects and discordant typicals reveal a higher degree of statistical significance and more suggestive trends that converge with findings of studies reported in Chapter 6. In general, when grouped in terms of discriminant scores, the children who showed advanced (or lagging) cognitive control functioning in kindergarten, regardless of whether the teacher designated them as typical or suspect, showed similar functioning three and four years later (Table 7). The concordant typicals plus the discordant suspects, children at the developmentally high ends of these two kindergarten distributions, showed more delay of fine motor movements, more active and broader scanning (Scattered Scanning Test number correct, mean distance, and ratio I), quicker tempo in naming colors of the Fruit Distraction Test baseline card (Card II), and less distractibility (Cards III-II and Cards IV-II) in the face of irrelevant information. They also maintained their tendency to construct differentiated, stable memory images of changing information, although only the first stop score (Leveling-Sharpening House Test) differences approached statistical significance.

On the Object Sort Test the concordant typicals and discordant suspects continued to construct a larger total number of groups, and they constructed "typical" (logical) groups, a trend that is in keeping with the age changes discussed in Chapter 7. No difference was observed, however, in the mean level of abstractions assigned to groups. In terms of the number of atypical and miscellaneous groups, they now constructed more of the former and fewer of the latter. This finding is especially noteworthy because it too agrees with age trends discussed in Chapter 7, where we noted that in a 5-year longitudinal study, public school children shifted from the second to the fourth grade toward producing *more* atypical groups and *fewer* miscellaneous groups, following a phase at the kindergarten and first grade level during which they produced fewer atypical and more miscellaneous groups.

The children we are now considering were in this very phase of development (third and fourth grade). First, we have noted that the children who were at the higher developmental levels of these distributions (concordant typicals and discordant suspects) produced fewer atypical groups and more miscellaneous groups *during* kindergarten (Table 7). Now, at the third and fourth grade level, this group is observed to shift toward producing more atypical groups and few miscellaneous groups, developmental changes that agree with expectations based on the longitudinal data discussed in the previous chapter. The children who at kindergarten represented the developmentally lower ends of their distributions (concordant suspects and discordant typicals) showed a developmental change in equivalence range functioning that was opposite the trend suggested by longitudinal observation. These children tended to use many atypical groupings and few miscellaneous groupings in kindergarten, but they shifted to a tendency to use few atypical groupings and many miscellaneous groupings, a trend opposite to that suggested by longitudinal data. Relying on the discussion in Chapter 7 of the possible significance of the age changes observed in this part of equivalence range control (involving the role of illogical conceptual thinking), we would speculate that the concordant typicals and the discordant suspects revealed normal development in conceptual thinking and that they were making stage-appropriate use of illogical thinking to experiment and explore in preparation for a vertical shift by the fifth grade to the use of more abstract concepts.

Let us briefly summarize the results of these two analyses of follow-up test data. If the children are grouped three or four years later in terms of their kindergarten test scores, rather than a teacher's designation of typical or suspect, their follow-up test performances show more significant differences in expected directions. Perhaps more important, the changes in cognitive control functioning that appeared with age agree more with the age functions discussed in the previous chapter. The concordant typicals and the discordant suspects revealed and sustained normal cognitive control development, whereas the discordant typicals and the concordant suspects sustained lags in cognitive control development and revealed abnormal changes in one control (equivalence range).

FOLLOW UP TEACHER INTERVIEWS OF DISCORDANT CHILDREN

In addition to the value of obtaining follow-up cognitive control assessments of discordant children, it seemed that anecdotal observations of these children by teachers obtained in later grades should also test whether future functioning agreed more with the status of cognitive controls assessed at kindergarten or with teacher designations. This study involves the 1969-1970 sample (Figure 1).

During the 1973-1974 academic year, the 1969-1970 sample was attending the fourth grade. We examined classroom lists to determine whether two or more discordant or concordant children were attending the same fourth grade class. When such children were located, we conducted semistructured interviews with the individual classroom teachers focusing on the children designated by the interviewer.

All the teachers had already rated each child in the classroom along several dimensions using a five-point scale (see the first predictive study), and they understood that we were gathering follow-up data to explore the predictive power of testing conducted during kindergarten. During this interview, held after the ratings were completed, each teacher was told that we were interested in obtaining anecdotal observations of two or three of the children in her classroom to elaborate the numerical ratings. The teacher was not aware of the child's research designation (concordant or discordant) when answering the questions.

To begin the interview, the teacher was asked to think about two or three children (named by the interviewer) comparatively, and to give her impressions as candidly as possible. The teacher then was guided in commenting about each of the children along several lines. First she was asked to make general comments (whatever came to mind), characterizing each child as she observed and experienced the individual in the classroom. When she had completed her remarks, she was asked to comment about each child with regard to the following areas: performance in mathematics, reading, and science; distractibility; and remembering classroom routine within a given day and from day to day. Last, she was asked if any one of the children named showed evidence of having a learning problem. The teachers were not aware of the kindergarten designations (typical or suspect) or of the cognitive control testing results of any of the children.

Fifteen teachers were interviewed in two schools within the school system that provided fourth grade classes. Eight of the teachers had in their classrooms pairs of children who were concordant at kindergarten in terms of being suspects or controls: that is, one child who had tested as a typical and was so designated, and one child who had tested as a suspect and was so designated. One teacher had three concordant children in her classroom (two typicals and one suspect). Five teachers had as students two discordant children: that is, one child who had tested as a suspect or a typical learner but had been designated the opposite by the kindergarten teacher. One teacher had three discordant students: during kindergarten, two of these children had been designated as suspects, but they performed in cognitive control tests as typical learners, and one had been designated as a typical learner but had produced suspect results on cognitive control tests.

Typed notes from these interviews were given to two judges, who were asked to determine whether each child described had tested as a typical learner or as a suspect during kindergarten. Both judges were correct in all cases in deciding the test performance of each child.

To illustrate the anecdotal observations made by the teachers, two tables have been prepared, and the observations are representative of those recorded from all teachers. Table 8 summarizes a fourth grade teacher's comments about two concordant children in her class, made in response to each of the areas evaluated.

Table 8. Follow-up of 1969-1970 Kindergarten Children: Interview with Fourth Grade Teacher of Two Concordant Children

Variable Rated	Typical Subject #09 Probability of Being Typical = .84	Suspect Subject# 14 Probability of Being Typical = .01
General	popular. . . doesn't always work to capacity . . . academically very good . . . sense of humor	quiet . . . sweet. . . needs attention . . . hyperactive . . . academically low . . .

Mathematics	at grade level—no problems	in lowest math group ... can grasp basic concepts and apply them but retains little. . . seems all is forgotten . . . difficulty with problem solving . . .
Reading	above grade level. . . word attack skills good . . . handwriting and punctuation need improvement....	below grade level . . . can't really interpret what's read . . . word attack skills and spelling are okay for group. . .
Science	inquisitive . . . takes things further than presented . . . does reading on own . . . turned on by projects . . . doesn't like writing down experiments . . .	understands basic material but doesn't go beyond . . . not inquisitive . . . science doesn't excite . . .
Distractibility	pays fairly good attention; will listen and follow assignments . . . keeps mind on work but can be distracted if his mind on afternoon ball game. . . .	pays attention and listens but does seem to daydream a great deal, especially during free time and when there is no direct lesson . . . .
Remembering	academic memory very fine . . . recalls and uses concepts . . . remembers to bring things from home	academically memory is fair to good . . . memory for concrete good but for abstract things it's poor ....
Learning problem	no problem at all.	school will never be easy for this child, but should make it. .. some reversals of b's and d's . . . I don't know if definite learning disability . . . .

One child had been designated a typical kindergarten learner and showed cognitive control functioning associated with a high probability of being a typical learner. The other fourth grader had been designated a suspect in kindergarten and had shown cognitive control functioning associated with a very low probability of being a typical learner (i.e., was at risk academically). An examination of the comments reveals a high degree of agreement between the teacher's anecdotal observations and the probability statement made in the kindergarten year.

Table 9 presents the comments of another fourth grade teacher who happened to have three discordant children in her class. Two had been designated as suspect during kindergarten, but their cognitive control evaluations predicted a better than 50% chance that they would perform as typical learners in future grades. The other subject, designated as a typical kindergarten learner, showed a level of cognitive control functioning associated with a very low probability of being a typical learner in future grades (at risk academically). As Table 9 shows, the fourth grade teacher's anecdotal observations, and her opinion of an existing learning problem, support the predictions made in kindergarten based on cognitive control functioning. These observations may suggest a "sleeper effect." Children who are able to handle kindergarten demands may be designated as typical learners at that time, but their cognitive control organization may influence classroom performance in areas that are observable only in later years when the complexity of classroom demands increases.

Table 9. Follow-up of 1969-1970 Kindergarten Children Interview with Fourth Grade Teacher of Three Discordant Children

Variable Rated	Suspect Subject # 17, Tested in K as "Typical" Probability of Being a Typical Learner = .78	Suspect Subject # 18, Tested in K as "Typical" Probability of Being a Typical Learner = .41	Typical Subject # 04, Tested in K as "Suspect" Probability of Being a Typical Learner = .05
General	quiet ... worries . . . works slowly and diligently, methodically	quick . . . needs limits . . . living on reputation of being worst kid in class . . . when does work, works well	in high gear . . . always moving, singing . . . delightful but can drive you up a wall . . . low average . . .
Mathematics	at grade level	at grade level	below grade level ....
Reading	below grade level	at grade level	below grade level ....
Science	at grade level	above grade level	below grade level ....

Distractibility	very attentive and focused ... but seems to be afraid of making mistakes	not distractible ... can zero in on things ... knows what's going on	highly distractible ... pays attention to everything around him ... seems to be occupied with fantasies too ....
Remembering	remembers well and works on it ... very focused on what we are to do tomorrow or next week	automatically remembers ... knows when project due . .. organizes and recalls easily	is most forgetful of the three ... gets a lot of help at home to remember assignments or whatever ....
Learning problem	does not have a block in learning, but does expend a lot of effort	no difficulty in learning ... definitely not	yes, has a learning problem because very distractible ....

Let us now consider the four predictive studies together. We noted that the cognitive control tests successfully revealed different levels of cognitive control functioning of children attending a single grade level (kindergarten) and representing an age range of only 11 months. Moreover, these developmental levels of cognitive control functioning related significantly to academic performance in subsequent grades and to the likelihood of a learning disability emerging. These findings indicate that the test procedures are valuable screening devises for school programs aimed at the early detection of learning disabilities, and they support the heuristic value of the proposed developmental model of cognitive controls. It was the biodevelopmental point of view that led us to look beyond the differences shown by typical and suspect kindergarteners in cognitive control functioning and brought our attention to evidence given by children in each group that they had entered kindergarten having reached various levels or stages of cognitive control development, some advanced and some lagging. By using an index of these developmental levels (discriminant score), we were able to predict future learning difficulties with a promising degree of success.

Interesting conclusions were also suggested with respect to the children who were discordant at kindergarten, insofar as cognitive control testing results disagreed with teachers' designation. Our preliminary follow-up data (reevaluation of cognitive controls and teachers' anecdotal observations of academic performance and classroom behavior) indicate that a child's level of cognitive control functioning as assessed during kindergarten is a better predictor of his level of control functioning and classroom performance as observed several years later than is the kindergarten teacher's designation. This finding supports further the potential utility of using cognitive control tests in addition to teachers' judgements as screening devices to select children in need of special help. The results should also alert readers who might use the cognitive control battery to screen kindergarten children to pay particular attention to the children whose test performance is discordant with a teacher's designation.

The Predictive Power of Each Cognitive Control Test

Before leaving this discussion of studies of prediction, we are able to comment on the predictive power of each cognitive control test. When the discriminant function analysis statistic is used to discriminate between two populations with respect to their scores on several test variables, the statistic provides for each test variable a numerical value that tells the degree to which a variable contributes to the discrimination achieved. This value is called a *standardized discriminant function coefficient.*

The coefficient, or contribution, of a particular test score is influenced by the type and number of other test scores included in the analysis. Recall that the discriminant function statistic takes all the test scores of a given child, who is a member of one group, and finds the combination (or pattern) of test scores that maximally separates one group from another and separates one child within a group from another child in the same group. It would follow then that the contribution of a particular test score to the pattern of scores and to the discrimination would be influenced by the presence of other test scores in the pattern. The coefficients of a particular test score would also be affected by the characteristics of cognitive control functioning unique to a given population of children.

Two of the predictive studies permitted us to address the question of whether the contribution of a particular cognitive control test score, in discriminating between children and groups (suspects and typical learners), remained more or less the same from one population to the next. If the contribution of a score were reasonably stable, we would have further support for the utility of using cognitive control test scores as predictors of future academic performance.

Since the same test procedures were used in both the 1970-1971 and the 1971-1972 studies, the relative contributions of all the cognitive control test scores could be compared. Moreover, as we noted, the populations of children were obtained from the same public school system. The children who participated in the 1969-1971 predictive study, also attended the same public school system, but a different form of the Scattered Scanning Test was used; thus a comparison with this group would not be appropriate.

Table 10 presents the standardized discriminant function coefficients for each cognitive control test score recorded during the 1970-1971 and 1971-1972 discriminant studies. To interpret these coefficients, the larger the magnitude, the greater the contribution by that test score. If we examine the magnitudes of the discriminant coefficients of each test score, we note that they differ from one analysis to the next. This difference would be understood as related to characteristics of cognitive control functioning unique to each population.

Table 10. Relative Contributions of Cognitive Control Test Scores to Two Discriminant Function Analyses

	Standardized Discriminant Function Coefficients		Rank Order of Coefficients	
Score	1970-1971 Sample	1971-1972 Sample	1970-1971 Sample	1971-1972 Sample
Fine Motor Delay II-I: time (seconds)	.08	.03	14	14
Motor Tempo: time (seconds)	.48	.12	1	2
Scattered Scanning: number correct	.05	.06	16	10
Scattered Scanning: total distance (cm)	.23	.06	6	9
Scattered Scanning: ratio I	.14	.21	12	1
Scattered Scanning: ratio II	.27	.12	4	3
Fruit Distraction II: time (seconds)	.36	.06	2	8
Fruit Distraction III-II time (seconds)	.19	.00	9	17

Fruit Distraction IV-II: time (seconds)	.22	.03	8	13
Fruit Distraction: errors	.01	.04	17	12
Leveling-Sharpening: first stop	.07	.05	15	11
Leveling-Sharpening: number correct changes	.24	.09	5	6
Leveling-Sharpening: ratio	.28	.09	3	5
Leveling-Sharpening: A + B changes	.14	.00	11	16
Object Sort: total groups	.09	.00	13	15
Object Sort: atypical groups	.22	.08	7	7
Object Sort: mean typical score	.15	.10	10	4

Although the absolute magnitude of the coefficients (contribution) differed from one sample to the next for each score, however, we were chiefly interested in determining whether the relative contribution of each test score remained more or less the same in discriminating between suspect and typical learners from one sample to the next. To find out, the magnitudes of the coefficients for each study were rank ordered. The rankings obtained from both samples were examined by means of Spearman's correlational analysis of ranked coefficients. Table 10 also gives the ranking associated with each test score for each sample. The correlation obtained between rankings was .50, which is significant at the .05 level of confidence.

This finding suggests that although the absolute amount of discrimination contributed by a test score differed from one population of kindergarten children to the next, the relative contribution made by that test score from one population to the next remained reasonably stable.

If we examine the rankings associated with each study, we observe that the Motor Tempo Test made the largest contribution in discriminating between suspect and typical learners, and among the children within each group. The relative contributions made by the other cognitive control tests range as follows, from most to least: Scattered Scanning Test, Fruit Distraction Test, Leveling-Sharpening Test, Object Sort Test, and Fine Motor Delay Test.

Moreover, a closer inspection of the rankings shows that particular scores yielded by each of three tests made the greatest contribution to discriminating among the children. Of the several scores yielded by the Scattered Scanning Test, the most useful is ratio II (the combination of a child's Motor Tempo time score with the total distance covered on the test form when marking circles and crosses). From among the several test scores produced by the other cognitive control procedures, the following indices make the greatest contribution: the time score of Card II of the Fruit Distraction Test, the ratio score of the Leveling-Sharpening House Test (i.e., lag in detecting changes), and the level of abstraction used to conceptualize typical groups formed in the Object Sort Test, as well as the number of atypical groups constructed.

It is interesting to note that with a population of 5 year olds, the relative contribution of each cognitive control test in discriminating typical and suspect kindergarten learners follows the developmental hierarchy proposed in Chapter 8. The regulation of motor functioning makes the largest contribution, followed by focal attention, field articulation, leveling- sharpening, and equivalence range controls, in that order. This observation brings our attention to the relation between the developmental level of the children being studied and the relative contribution of one or another control in discriminating among the children. Would further studies show that the equivalence range control conceptualized as developmentally the highest, makes the largest contribution in discriminating among 15 year olds?

Overall, these findings support the utility of using cognitive control tests in programs designed to detect at an early stage children who are likely to develop learning disabilities in future grades. The predictive studies reported here, and the respective contributions of each cognitive control test in discriminating among children at risk in developing learning disabilities, are based on evaluations obtained from children designated as typical or suspect learners. Future studies are needed to explore the relative contribution of these cognitive control tests in discriminating among other clinical populations of children (e.g., nonreaders, hyperkinetic, underachievers). One would expect the contribution of a particular cognitive control test to vary in terms of the population being evaluated and its unique cognitive control characteristics.

Again, we must explore more extensively the relative contributions of the cognitive controls in discriminating among children at different age levels. One would expect the contribution of a particular cognitive control test administered to 5 year olds, like the children in our studies, to differ from that of the same test administered to 8 or 12 year olds. The stability observed in the contribution made by each cognitive control test when 5 year old typical and suspect learners are evaluated should encourage clinicians and investigators to use the procedures in selection programs designed for other age groups and clinical populations.

Comment on Long-Term Adaptation and the Predictive Studies

Chapter 8 discussed a developmental-adaptational model of cognitive controls and the relation between cognitive controls and the concept of long-term adaptation—that is, a process in which the environment presents the individual with a continuous, evolving series of organizations of stimulation which activate cognitive control structures already available to the individual. We also suggested that in this give-and-take process, over a long period of time, cognitive control structures are organized which enable the individual to "fit" himself into his average environment and to regulate the review and repetition of stimulation that suits his uniqueness. Cognitive controls formed in this process are relatively enduring and slow to change, and they characterize the individual's management of information in a wide variety of situations that are usual and expectable.

The results of the predictive studies discussed earlier, coupled with the cognitive control age trends generated by three populations of children over several years (see Chapter 7), relate to the concept of cognitive controls in long-term adaptation. First we observed that the cognitive control functioning of children designated as suspect learners lagged behind that of typical learners during the kindergarten year.

Longitudinal observation revealed gradual developmental changes and growth in cognitive control functioning among both suspect and typical learners, but the suspect learners continued to lag in this growth process. Then we observed that the developmental status of cognitive controls observed in kindergarten for both suspect and typical learners predicted the academic performance of these children in each of several successive grades. Together, these findings support the proposal that over a relatively long period of time, cognitive controls are relatively enduring structures that change slowly and maintain their uniqueness (i.e., at stage expectation or lagging) as the individual manages information presented by usual environments. Next we consider short-term changes in cognitive controls, made in response to managing information by environments that are not usual and average.

STUDIES OF MOBILITY IN COGNITIVE CONTROL FUNCTIONING IN SHORT-TERM ADAPTATION

In proposing a developmental-adaptational model of cognitive controls, we noted that although cognitive controls are viewed as enduring and slow to change when operating over the long term in a series of usual environments, they also appear to change significantly in organization (regressively or progressively) whenever they operate within an environment that is appreciably unusual, relative to the environments that have typified the individual's long-term adaptation. The reorganizing of cognitive controls was regarded as serving the individual in short-term adaptation. Let us briefly review the basic hypotheses associated with this concept.

The changes in cognitive control organization are temporary, and the regressive or progressive organization is relinquished when the environment returns to an average-expectable status. The degree and direction of cognitive control reorganization that occur are presumed to result in the level of cognitive control functioning that permits an adaptive fit between the individual's cognitive status and his adaptive intentions and is related to three broad variables: (*a*) the extent to which the atypical environment requires passivity and restricts opportunity for the control of information and the outcome of the situation, (,*b*) the degree to which the new environment is atypical, given the individual's history of long-term adaptations, and (*c*) the level of affect and stress that is optimal for successful adaptation to the particular unusual environment.

The concept of "cognitive control plasticity" is applied to the temporary reorganizing of cognitive controls, regressively or progressively. This concept defines a series of levels, or a range of cognitive organizations, through which an individual moves in response to significant changes in the environment. Individuals are presumed to differ in plasticity. That is, they differ in the breadth or range of levels through which their cognitive controls can potentially reorganize. In this sense then, cognitive control plasticity is an organismic characteristic.

This section discusses three studies designed to explore some aspect of this conceptualized relation between cognitive control functioning and short-term adaptation. Each attempted to make use of a situation occurring *in natura* and representing an environment that was not average or typical, given the individual's history of long-term adaptation. Since plasticity is assumed to be operative only in response to experiences that implicate the individual's adaptation in a significant way and are significantly different from the average-expectable stresses the individual deals with in long-term adaptation, the studies in this section attempted to employ potent real-life stresses in our first explorations of the concept of mobility in short-term adaptation.

First Study: Short-Term Changes in Leveling-Sharpening Functioning in the Environment of Parachute Jumping

Guthrie (1967) collaborated with me in conducting a study designed to explore directly the concept of cognitive control plasticity and short-term adaptation. He asked the basic question, If a cognitive control is observed when an individual is dealing with an average and expectable situation, and then again when the individual is dealing with a situation that is not average, given his history of long-term adaptation, would systematic changes in the organization of the control be observed? Leveling-sharpening was selected as the cognitive control to be studied, and the environment of parachute jumping was the situation representing a shift for the individual from an average to an unusual environment.

Following the concept of cognitive control plasticity, Guthrie hypothesized that since the environment of parachuting permits the individual to actively employ information in managing the situation, novice parachutists who are about to execute a jump will show a reorganizing of leveling-sharpening progressively, that is, they will shift to a stage that is characterized by greater differentiation of memory images than is typical of the individual's functioning in average-expectable environments.

SUBJECTS

The subjects were 44 sport parachutists, members of parachute clubs, who were at an early, novice state in their jumping activity. All subjects had made at least one jump but fewer than eight. Guthrie reported data from other investigators indicating that aside from the face validity of parachute jumping as a stressful situation, there is a considerable increase in anxiety with approach of jump time. Moreover, these findings indicated that the experience of having made the first jump increased apprehension at the following jumps. Guthrie selected the cutoff point of eight jumps because after the eighth the individual usually performs his first free-fall jump (without the aid of a static line to automatically open the parachute). Guthrie reasoned, therefore, that individuals who are within the phase of the first eight jumps are under heavy stress, because the experience is new and because they are anticipating the first dangerous test of their ability.

Half the subjects were placed in the experimental group and the others in the control group. The 22 members of the experimental group planned to jump at the end of a 2 week period. Members of the control group made no plans to jump at the end of a 2 week period. The data of a subject were used only when he carried through his stated intention concerning jumping plans. Guthrie was able to form two groups comparable in age (19 years), education (13 years), and experience in number of jumps (2).

PROCEDURE

Two tests of the leveling-sharpening control were administered individually to all subjects at two times and to the experimental in two environments. The first testing for all subjects took place in the subject's home or living quarters (for those who lived at a school). This environment was accepted as representing an average and expectable situation for each subject. Accordingly, the measure obtained was viewed as representing the organization of leveling-sharpening functioning that was characteristic for the subject in long-term adaptation and in average environments.

The leveling-sharpening tests were readministered individually to the experimentals in the jumping area at the airport within an hour of the subject's jump, and to the controls again in their familiar surroundings. The second administration for each control took place one week or more before he planned a jump. The interval between the first and second testing was either 6 or 7 days for all subjects. The second evaluation of the controls was viewed as representing leveling-sharpening functioning in an average environment (the same environment that existed during the first evaluation). For the experimentals, the second evaluation was taken to represent leveling-sharpening functioning in an environment that was not average and expectable.

Given the latter assumption, it is appropriate to describe the general procedure involved in jumping and to indicate the point at which Guthrie administered the tests. In the jumping procedure, the individual signed up for a flight, then packed his parachute. About 15 minutes before the flight, he was called to the flight line, where he "suited up." At this point the individual became quite active in checking equipment. The jumpers then lined up and were formally inspected by the jump-master. Finally all jumpers boarded the plane, and it took off. Since it was impossible for Guthrie to have time with the jumpers once inspection began, he administered the tests just after a jumper was called and before he "suited up." In practice, this meant that all jumpers were tested within an hour of takeoff.

ASSESSMENT METHODS

One of the tests administered by Guthrie in both sessions was the Leveling-Sharpening House Test described in this book. In addition, Guthrie constructed a test that made use of a parachute-jumping scene as the content of information to be organized in memory over time. The general makeup of the test and the procedure paralleled those of the House Test. The parachute jumping test was devised because of the interest in whether differences in leveling-sharpening functioning would be observed when the information managed (i.e., house scene) was not related to the unusual environment and when the information managed was related (i.e., a scene of a parachute jumper).

Two forms of the Leveling-Sharpening Parachute Test were constructed to provide alternate tests for sessions 1 and 2 (Figures 4 and 5). With one test form, the information to be held in memory over time consisted of a picture of a parachutist falling through the air with his parachute beginning to deploy (Form A). The information in the other form consisted of a picture of a parachutist descending with parachute fully deployed (Form B). The makeup of each form paralleled that of the House Test. The scene was printed on 61 cards, and 20 details were omitted throughout the series. Beginning with Card 4, a detail was omitted from the scene and was absent during all the remaining presentations. After the fourth card, 19 additional details were omitted accumulatively, one after every three cards. As with the House Test, the sequence in which details were omitted was from the least frequently detected to the most, as determined by pilot studies.

Figure 4. Form A of the Leveling-Sharpening Parachute Test and list of details that drop out (Guthrie, 1967).

Card	Details	Card	Details
4	Mountain on left	34	Target
7	Pilot-chute lines	37	Hangar
8	Top buckles	40	Reserve rip cord
13	Line under arm	43	Auto
16	Middle pin of rip cord	46	Line of arm
19	Line on leg	49	Rip cord
22	End of runway	52	Mountains
25	Chest buckle	55	Harness
28	Part of chinstrap	58	Pilot chute
31	Pins on reserve	61	Goggles

Figure 5. Form B of the Leveling-Sharpening Parachute Test and list of details that drop out (Guthrie, 1967).

Card	Details	Card	Details
4	Boot soles	34	Target ends
7	Shroud lines	37	Shoelaces
10	Risers	40	Chest buckle
13	Chinstrap	43	Airplane
16	End of rip cord	46	Crotch creases
19	Buttons	49	Rip cord handle
22	Left runway	52	People
25	Back pack	55	Reserve flap
28	Crotch line	58	Risers and shrouds
31	Helmet line	61	Leg lines

The Parachute Test incorporated two features that did not form part of the House Test. Since the scene used had relevance for the experimental situation, it was possible to omit details from the scene that were maximally relevant for the activity in question, as well as details that were irrelevant. Examples of changes introduced involving the omission of elements that have relevance for jumping are rip cord, shroud lines, chest buckle, and reserve rip cord. Examples of changes introduced that have little or no relevance to the activity are crease lines in the trousers, line of the arm, mountain line, and hangars in the distance.

Furthermore, the irrelevant changes were introduced both in the center of the picture and in the periphery. The order of relevance and nonrelevance was counterbalanced and controlled along with the dimension of central and peripheral as follows: five relevant-central changes (RC); five relevant-peripheral changes (RP); five nonrelevant-central changes (NRC); five nonrelevant-peripheral changes (NRP). Pilot studies of these forms (A and B) indicated that the two were equivalent.

Let us now consider the assessments made available by the House Test and the Parachute Test of leveling-sharpening in terms of the question asked by the study. The Leveling-Sharpening House Test permitted Guthrie to explore whether changes in leveling-sharpening functioning occurred when the information organized in memory was not particularly relevant to the unusual environment under investigation. Observation of a consistent change in the functioning of the control when airport and home measures were compared would suggest that a fundamental change in the leveling-sharpening control had occurred—a change that is related to the way any and all information is differentiated and managed over time in memory.

The Leveling-Sharpening Parachute Test permitted Guthrie to explore leveling-sharpening functioning in terms of the type and location of information to be held in memory. If systematic changes occurred in remembering details that were relevant and nonrelevant with respect to the stress situation, these data would be significant with respect to type. And if there were systematic changes in leveling-sharpening functioning with respect to whether the information held in memory lay in the center or on the periphery of the configuration, conclusions could be drawn regarding location.

Our discussion of Guthrie's findings would be facilitated by considering the Parachute Test from the point of view of the hierarchy of cognitive controls, discussed in Chapter 7. Recall that the management of relevant and irrelevant information is unique to the process of field articulation. Therefore the systematic introduction into ongoing information of changes that are either relevant or irrelevant permits us to study the operation of the process of field articulation *within and subordinate* to the main process of leveling-sharpening. The management of information that is located in the center of a field or in its outer edges is uniquely a function of the process of focal attention. Thus the systematic introduction into ongoing information of changes that are located in the center or on the periphery of the configuration makes possible the investigation of the operation of the process of focal attention *within and subordinate to* the dominant process of leveling-sharpening.

To control the order in which test forms were administered, half of each group (experimentals and controls) received Form A of the Parachute Test (parachutist in free fall) in session 1 and Form B (parachutist descending) in session 2, and the other half received the reverse sequence. In both the first and second sessions, the House Test was administered to all subjects immediately after one of the forms of the Parachute Test.

The scoring procedure designed to evaluate the House Test served also to evaluate both forms of the Parachute Test; it yields three scores: first stop score, number of correct changes detected, and ratio score (degree of lag in detecting changes). The scores obtained were examined by means of a group x test x sessions analysis of variance.

EFFECTS ON LEVELING SHARPENING OF AIRPORT VERSUS HOME ENVIRONMENTS

Let us first consider the results Guthrie obtained with the Parachute Test. The experimentals showed a significant shift toward a greater degree of sharpening with the first stop score, the number of correct changes detected, and the ratio score when assessed at the airport as compared to the assessment obtained at home. That is, when the test was administered at the airport the experimental subjects detected the first change sooner, they detected a greater number of correct changes, and there was little or no lag in detecting a change once it had been introduced in the series of pictures. Interpreted in terms of the factor analytic findings discussed in Chapter 5 and the developmental findings presented in Chapter 7, these data indicate that in constructing and maintaining memory images of information related to parachute jumping, the leveling-sharpening cognitive control reorganized progressively, when the subject was at the airport, from the stage typically operating in average-expectable environments toward a stage of functioning in which the memory images of information constructed are more differentiated and stable.

The results obtained with the Leveling-Sharpening House Test parallelled those of the Parachute Test. The experimentals showed a significantly greater shift, relative to the measure obtained at home, toward sharpening. That is, when responding to the House Test at the airport they detected the first change sooner, they detected more correct changes, and they did not lag in detecting changes once they had been introduced in the series of pictures. This finding supports the hypothesis that the environmental change from one’s home (average and expectable) to the prejump atmosphere at the airport (not average-expectable) results in a fundamental reorganization of the leveling-sharpening control, with the effect that information of any type is organized in more differentiated and stable memory images.

Taken together, the results obtained with the house and parachute tests lend support to the concept of mobility of cognitive controls in short-term adaptation. In this study the control of leveling-sharpening shifted significantly in a progressive direction—from the stage typically employed in long-term adaptation with average environments to a stage characterized by the construction of more differentiation and stable memory images of information.

EFFECTS OF PSYCHOLOGICAL TESTS AS CHANGES IN THE ENVIRONMENT

Two unexpected findings obtained by Guthrie from the Parachute Test deserve our attention because they provide further information about the concept of mobility of controls and short-term adaptation: namely, the significant differences observed when the two test forms of the Parachute Test were compared, and the differences observed in the types of change detected when the subject was in his home environment versus at the airport.

Recall that half of each group was administered Form A, and half Test Form B, in session 1 at home; then the other test form was presented in session 2 (at the airport for experimental and at home for controls). The analysis revealed a test form effect for the experimentals. The experimentals who received Form A at the airport showed a significantly greater shift toward sharpening than those who had received Form B. Guthrie had not expected this finding, since no difference in forms was observed with pilot subjects (who, however, were not parachutists). One possible explanation lies in the content of the two forms. In Form A the parachutist is portrayed in a free-falling stage of the jump with the chute just beginning to come out of the backpack. There appears to be a more dynamic, suspenseful quality to the situation. Moreover, the picture depicts a phase of the jump that none of the subjects had experienced yet, that is, a free-fall jump in which the rip cord is pulled by the jumper, not by a static line that is attached to the plane. In Form B the parachutist is depicted in a slow descent with the parachute fully deployed, all the subjects had experienced this stage of the jump, which represented a less imminent threat to a parachutist's survival.

The difference obtained with these test forms suggests that for a novice parachutist, a picture itself of a jumper in free fall represents "an environment that is not average or expectable" that is powerful enough to trigger a change in leveling-sharpening functioning. That is, the experimentals tested at the airport showed a greater shift toward sharpening with this test form than with the "more benign" scene of Form B.

This possible explanation is supported by several related observations made by Guthrie. First, the form effect was not obtained with the controls. Therefore when a novice parachutist is in his home environment and views a series of pictures of a jumper in free-fall, and another of a jumper descending with the full chute deployed, he imposes the same degree of differentiation and stability on the memory image constructed of each scene. But when a parachutist views these scenes at the airport, the picture of a jumper in free fall results in a greater degree of mobility in leveling- sharpening.

A second source of support for the inferred impact of Form A comes from the meaningful difference Guthrie observed in the types of incorrect change perceived with the two test forms. He grouped incorrect changes into two types (1) dynamic incorrect changes, or changes indicating that the jumper was perceived as having moved with respect to the environment (e.g., "He's closer to the ground"; "His body is arched more"); and (2) content incorrect changes in which the reported change concerned a perceived addition or deletion of a detail (e.g., "The rip cord has been added"; "a cloud disappeared"). Guthrie reported that 49% of the incorrect changes observed with Form A (jumper falling) were of the dynamic type, and only 28% of those with Form B.

A third source of support for the hypothesis that the two forms of the parachute test aroused different "emotional attitudes and adaptive intentions," which trigger different degrees of mobility in leveling-sharpening, came from a most interesting observation made with the House Test. Recall that the House Test was administered immediately after one of the forms of the Parachute Test had been administered in both sessions 1 and 2. When examining the effect of test sequence, Guthrie found the same trends with the House Test. That is, the subjects who performed with the House Test after they had first experienced Form A (parachutist falling) of the parachute test showed a significantly greater shift toward sharpening *with the House Test* than did the subjects who handled the House Test following the experience of Form B (parachutist descending). This result with the House Test, along with the other observations, suggests the following formulation. The Parachute Test forms (A and B) represented "environments" for the subjects. The pictures of a jumper descending with chute fully deployed was regarded as average and expectable, but the jumper falling represented an environment that was not average and expectable. Moreover, experiencing Form A was an "environmental change" sufficiently powerful to result in the mobility of the leveling-sharpening cognitive control in the form of a progressive reorganization toward increased sharpening with the House Test. Guthrie concluded from these performances observed with the two forms of the Parachute Test, and from the differential influence they exerted on performance with the House Test, that for a parachutist the scene of a jumper in free fall represented an experimental condition not unlike the real-life situation of the airport.

INDIVIDUAL DIFFERENCES IN THE PLASTICITY OF LEVELING SHARPENING

Aspects of Guthrie's findings also relate to the part of the concept of plasticity of controls that emphasizes individual differences. As discussed earlier, the concept of plasticity includes the notion that individuals differ in the degree to which they shift, regressively or progressively, along a particular control in response to changing environments. Moreover, this degree of shiftedness, or breadth of levels through which an individual moves or reorganizes, is viewed as a characteristic of that person's cognitive control functioning (an organismic variable.) Although Guthrie ignored individual differences in analyzing his data, some of his correlational findings bear on this concept of individual differences in breadth of mobility. First, to examine the stability of the leveling-sharpening cognitive control over the week-long period covered by the study, Guthrie correlated the test performance of the controls in sessions 1 and 2 (both in the home environment). The two measures of the House Test ($r = .67$, $p = .01$) and the Parachute Test ($r = .85$, $p = .01$) correlated significantly, indicating that the test measures of the leveling-sharpening control were stable.

The experimentals also showed a high degree of consistency with the House Test from session 1 (home environment) to session 2 (airport), revealing that each subject tended to maintain his position with respect to the rest of the group on both administrations ($r = .70$, $p = .01$). This finding merges with that of the controls and further supports the stability of the measure provided by the House Test.

In contrast to this finding and to the significant consistency the controls showed with the Parachute Test, the experimentals showed only a low correlation from the first to the second session with the Parachute Test ($r=.35$, $p = .06$). This difference in consistency between experimentals and controls with the Parachute Test suggests that the experimentals as individuals changed their positions within the group with the Parachute Test from session 1 (home situation) to session 2 (airport) to a greater degree. That is, they showed a greater degree of variability in the breadth or range of change in leveling-sharpening than did controls. This finding adds some support to the validity of the concept of plasticity.

GENERAL CONCLUSIONS OF THE STUDY

Guthrie's results provide support for the concept of mobility of cognitive controls in short-term adaptation. The leveling-sharpening cognitive control was observed to reorganize progressively, toward a higher degree of sharpening, in response to a change in environment from one that was average and expectable (the subject's home) to one that was not average and permitted active use of information to manage the stress (the airport before a jump). Moreover, evidence for the concept of mobility of controls in short-term adaptation was obtained unexpectedly from observations made regarding two different tests forms, which appeared to be experienced by the novice parachutists as if they represented two environments. The picture of a jumper descending with chute fully deployed was experienced as an average environment and did not result in a change in cognitive control functioning. The other test form, a jumper in free fall, was experienced as an atypical environment and produced a significant change in leveling-sharpening toward a stage of more sharpening of information in memory. Finally, correlations between performances in sessions 1 and 2 suggest that individuals differ in the degree to which their cognitive controls are reorganized in the face of changing environments.

COMMENT ON THE SIMULTANEOUS FUNCTIONING OF SEVERAL COGNITIVE CONTROLS IN SHORT-TERM ADAPTATION

In addition to providing data about the mobility of leveling-sharpening in response to environmental change, Guthrie's study gives us an opportunity to explore the functioning and mobility of several cognitive controls in short-term adaptation.

As noted earlier, the Leveling-Sharpening Parachute Test was constructed to introduce into a series of pictures changes that were either relevant or nonrelevant to parachuting and were located either in the center of the picture or on the periphery, resulting in four possible combinations of type and location of change: relevant-central (RC); relevant-peripheral (RP); nonrelevant-central (NRC); and nonrelevant-peripheral (NRP).

By constructing the test in this way, we intended primarily to refine further the method of the House Test, in which changes are introduced gradually in a series of pictures but are not systematically located centrally or peripherally in the picture. Moreover, a scene of a house does not readily permit designating details as relevant or nonrelevant. In contrast, the content of the Parachute Test and the experimental condition of parachute jumping permitted us to designate details in the test picture as relevant to parachuting or not.

In addition to our interest in refining the leveling-sharpening test method by systematically designating details in terms of relevance and location, we felt the Parachute Test might provide clues about the role of relevance of information in the construction of memory images. We speculated that a change in the environment from average to unusual might result not only in reorganizing the cognitive control of leveling-sharpening toward greater articulation and stability of memory images, but in a greater increase in articulating information that was relevant to the unusual, stressful environment. We did not speculate about the importance of location of information (i.e., in the center or periphery of the field). Again, at that time, we saw this feature as resulting only in a more systematic test method.

Since collaborating with Guthrie on the study, and having benefited from observations made in the meantime, it has occurred to me that by constructing a test that systematically locates changes in a series of pictures in terms of relevance and physical position, it is possible to study the simultaneous functioning of three cognitive controls: leveling-sharpening, field articulation, and focal attention.

The leveling-sharpening control dominates if the task, as with the Parachute Test, asks the subject to view a sequence of pictures and determine whether anything changes or looks different from one picture to the next. The cognitive control activated by this task is leveling-sharpening, since the individual must construct and maintain a memory image of the first scene and of each scene thereafter, relating the image of past scenes to the scene now being viewed, to determine whether a change has occurred. By including changes that are relevant or irrelevant in terms of some adaptive consideration (in our case parachute jumping), however, the task also activates the field articulation control, which uniquely manages information in terms of relevance. And by locating changes in the center of the picture and in the periphery, the task further activates the focal attention control, which uniquely concerns sampling information in the field by strategies that range from narrow to broad scanning.

Thus if we examine the response process of the Parachute Test from the viewpoint of the hierarchical model of controls discussed in Chapter 7, it seems reasonable to propose that with this task, the focal attention and field articulation controls operate in a subordinate way, in the service of leveling-sharpening, supplying an opportunity to observe all three controls operating simultaneously. Let us determine whether this conceptual view of the cognitive control process involved in the Parachute Test is helpful in understanding the observations made by Guthrie of content and location of change.

Guthrie ranked the frequency of each type of change perceived by experimentals and controls with each test form and during each assessment (Table 11). The comparisons in rankings discussed below were subjected to Friedman’s two-way analysis of variance for ranks.

Table 11. Ranking of Frequency of Types of Correct Change Detected with Leveling-Sharpening Parachute Test Administered at Home and at the Airport (Guthrie, 1967)

Test Form	Frequency Rankings*			
	1	2	3	4
A (free fall)				
Session 1				
Controls (home)	RP	RC	NRP	NRC
Experimentals (home)	RP	RC	NRP	NRC
Session 2				
Controls (home)	RP	RC	NRP	NRC
Experimentals (airport)	RP	RC	NRP	NRC
B (descending)				
Session 1				
Controls (home)	NRP	RP	NRC	RC
Experimentals (home)	NRP	NRC	RP	RC
Session 2				
Controls (home)	RP	NRP	RC	NRC
Experimentals (airport)	RP	RC	NRP	NRC

*Types of correct changes: R*p* = relevant-peripheral, RC = relevant-central, NR*p* = nonrelevant-peripheral, NRC = nonrelevant-central.

First let us examine the results obtained with Form B (jumper in slow descent). Since evidence discussed previously suggested that Form B was experienced by all subjects as representing a more average and expectable situation and that Form B itself did not have an effect on cognitive control organization, the patterns of type and location of changes detected in Form B would more appropriately reflect the influence of the airport situation, as a real-life environment, on cognitive control functioning. As we proceed, we should bear in mind the main finding—that with a task that presents ongoing information changing over time, the experimentals shifted from their typical mode of constructing memory images to a stage characterized by the construction of more differentiated and stable images. When we now begin to examine patterns in the type and location of changes detected, we should not lose sight of what we are examining—the processes of field articulation and focal attention as they occurred within the dominant process of leveling-sharpening.

During the assessment obtained in the home environment (session 1) with Form B, controls and experimentals showed nearly the same ranking of changes detected, detecting most often the nonrelevant peripheral changes and least often the relevant central changes. Comparing the pattern of changes observed in session 1 with the pattern of session 2, the controls revealed nearly the same frequency rankings, which are not statistically different. Thus from one home assessment to the next, the controls managed the location and relevance of changing information in about the same way.

However the experimentals showed a significant shift in the frequency of type and location of changes detected when functioning at home versus the airport. We first discuss the type of changes. Since the controls and experimentals did not differ in their performances in the home environment, all subjects detected both relevant and nonrelevant details with almost equal frequency (Form B, session 1). We have conceptualized attending to relevant and nonrelevant information as a developmentally lower stage of field articulation functioning (Chapter 7). When functioning at the airport, the experimentals shifted toward detecting relevant changes most often and nonrelevant changes least (Form B, session 2).

We have suggested that selectively attending to relevant information is a developmentally higher stage of field articulation. This shortterm shift in field articulation control is a progressive one from attending to both relevant and nonrelevant information in the home environment (average and expectable) to selectively attending to relevant information and ignoring irrelevant information in the airport (not average and stressful).

This reorganizing of the field articulation control is conceived of as occurring within, and in the service of, the process of leveling-sharpening, which dominates, given the makeup and requirements of the task (managing ongoing information by relating images of past information with present information). Figure 6 schematizes the proposed sequence of changes in each control and the relations among them. As the leveling-sharpening control reorganizes progressively from that stage characteristic of the average-expectable environment (home) toward increased sharpening in response to an unusual, stressful environment (airport), field articulation, in serving leveling-sharpening, also reorganizes progressively toward a greater tendency to attend to relevant information and to ignore nonrelevant. Field articulation functioning then is conceptualized as moving through two broad stages simultaneously with leveling-sharpening, which dominates and also moves through two broad stages (Figure 6).

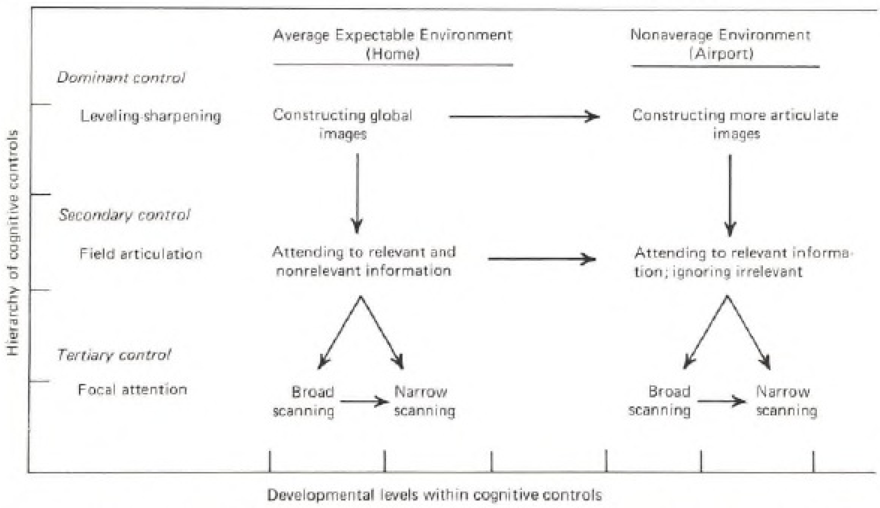


Figure 6. Scheme of mobility of three cognitive controls in short-term adaptation to environment of parachute jumping.

The location of changes in information detected also exhibited a pattern. It seems reasonable to assume that detecting changes in the center of the picture reflects narrow attention deployment, whereas detecting changes in the periphery reflects broad scanning and attention deployment. Chapter 7 presented considerable data indicating that narrow scanning represents a developmentally earlier stage of focal attention functioning than does broad scanning behavior.

The controls showed no consistent shift in the location of changes detected from one home assessment to the next. In both assessments, details in the periphery, whether relevant or nonrelevant to parachuting, tended to be detected more often than those in the center of the field.

The experimentals, on the other hand, showed a shift from the home assessment to the airport assessment suggesting two stages of focal attention functioning in accordance with our developmental model. Moreover, the pattern suggests that stages of focal attention functioning are subordinate to and serve field articulation. When we compare the frequency of central versus peripheral changes detected by experimentals in sessions 1 and 2, a pattern appears *within* the dimension of relevance-nonrelevance. That is, at the same time that detecting relevant changes dominates the process at the airport, peripheral changes are being detected most and central changes next. The pattern repeats itself when detecting nonrelevant details is taking place; that is, peripheral changes are detected most and central changes least. This finding suggests, as schematized in Figure 6, that focal attention control reorganizes *regressively* within the field articulation control. Broad scanning is engaged first, followed by narrow scanning.

In summary, examining the location and type of changes detected in Form B of the Leveling-Sharpening Parachute Test in terms of our developmental model of cognitive controls, we can point to simultaneous shifts in the organization of three cognitive controls hierarchically related. In an average environment the individual constructs (relatively speaking) global images of information. This process is served by a stage of field articulation functioning in which both relevant and nonrelevant bits of information are attended to; the latter process in turn is served by a stage of focal attention functioning in which attention is first deployed broadly, then more narrowly. In an environment that is stressful and not average, the individual's cognitive controls reorganize: more differentiated images are constructed of changing information, and the process is served by a stage of field articulation in which relevant information is attended to selectively and nonrelevant information is ignored; the latter process in turn is served by two stages of focal attention in which attention is first deployed broadly, then more narrowly.

If we now examine the frequency ranks observed with Form A of the Parachute Test (Table 11), we immediately notice that the frequency rankings for controls and experimentals in both test sessions (home and airport) are not only identical, but the frequency pattern is identical to that produced by the experimentals with Form B when they were functioning in the real-life environment of the airport. The finding is so striking that it behooves us to grapple with a possible explanation.

We are helped in our task if we recall the considerable evidence already discussed suggesting that for novice parachutists, managing Form A (a jumper in free fall) represents an experience that closely parallels the experience of being at the airport about to board an airplane and execute a jump. That the frequency rankings observed with Form A are identical with the ranking showed by the experimentals at the airport with Form B could be understood in these terms. For all parachutists, experiencing Form A at home and at the airport activated functioning in field articulation and focal attention mobility, which parallels what we observed in the real-life situation.

Coping with Form A is like coping with the stress of an airport and an imminent jump. Therefore when all subjects were coping with Form A the field articulation and focal attention controls were reorganized in the same way as when the experimentals were coping with a real-life situation: attending to relevant details most served the process of constructing more differentiated memory images, and employing broad scanning, then narrow scanning, served the process of articulating relevant information and nonrelevant information.

Before leaving this discussion of trends observed in type and location of changes detected, one particular issue deserves our attention, namely, whether the management of information with cognitive controls is a conscious or unconscious process. The *experimental and control* subjects did not spontaneously reveal awareness that the details they were detecting were located in the center or periphery of the picture or that the details were relevant to parachuting. When asked about this after testing, the comments of some subjects indicated that they had not been aware during testing of thoughts concerning the relevance or location of details in the picture. Most important, both forms the Parachute Test were experienced as "tests having to do with parachuting."

Yet the *experimental* subjects showed systematic patterns in the location and type of information they detected. We can appropriately assume that the observed systematic changes in cognitive control functioning were occurring unconsciously. The subject is not aware that he is attending more to relevant information and that he is scanning broadly first, and then more narrowly. The issue deserves further research; but we have particularly powerful evidence in this study that the subtle process of each cognitive control takes place unconsciously on the average. Once again it would follow theoretically that an individual could be taught to observe the uniqueness of his cognitive control functioning. We return to this topic in Parts IV, V and VI.

I believe that the value of examining the Parachute Test in such detail does not lie in the findings as such. Rather, the Parachute Test offers a methodological guide for constructing other tests to assess the functioning of several cognitive controls simultaneously. The Parachute Test illustrates that tasks can be devised that do permit assessments of more than one control. The simultaneous evaluation of several controls is discussed further in the critique at the close of this chapter.

Second Study: Short-Term Changes in Leveling-Sharpening Functioning in Hospital Environments

Following the first study, it seemed clear that support for the concept of cognitive control plasticity in short-term adaptation could not be established without demonstrating that an adaptive change in the leveling-sharpening control could also occur in the direction of increased leveling, given a stress situation in which leveling would be more adaptive than sharpening. Such a demonstration was necessary because the concept of plasticity proposes bidirectional changes in cognitive controls—either a regressive or a progressive shift in functioning, depending on the requirements of the situation.

The findings of the first study furnished evidence for the hypothesis that a control reorganizes progressively when the environment requires, and this allows the individual to make active use of information in managing the stress. We now needed data to support the complementary hypothesis that a control reorganizes regressively when the environment requires that the individual experience information relatively passively and when the individual has little opportunity to change the stress condition. If the individual had little control over a stress situation and the information it contained, increased availability of information would be disruptive, whereas decreased availability would facilitate adaptation.

One real-life environment that seemed to fit this formulation was a hospital setting and imminent surgery. As an individual faces surgery, he is required to be more or less passive and is not involved in the resolution of the threat situation.

Applied to leveling-sharpening, therefore, increased articulation of information would be of little adaptive use in a hospital environment and in the anticipation of surgery, but increased leveling might serve to insulate the individual from potentially disturbing information in the environment.

Accordingly, as a sequel to the study with parachutists, Guthrie and I mounted a supplementary study to determine whether leveling-sharpening demonstrably reorganizes regressively in a hospital environment and in the context of imminent surgery. The hospital setting and imminent surgery were presumed to represent a short-term unusual environment, given the individual's long-term adaptation.

SUBJECTS

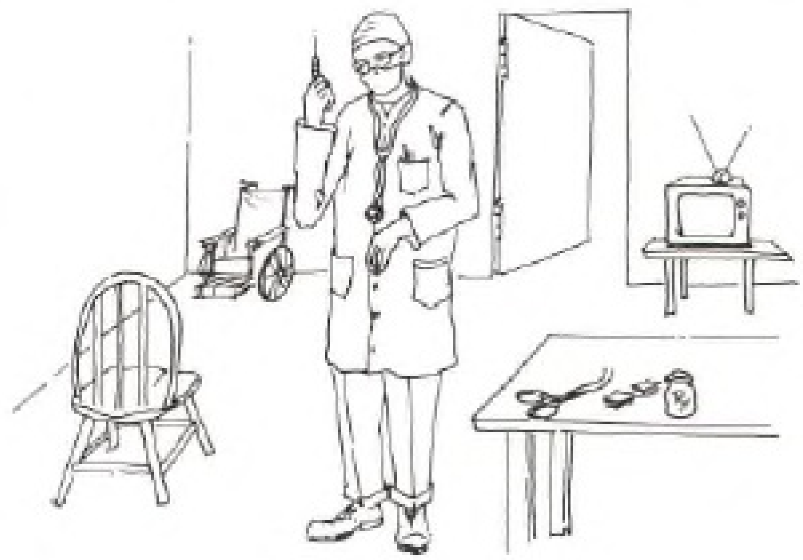
The subjects were 15 hospitalized males (experimentals) scheduled for surgery within 24 hours of the time the cognitive control tests were administered, the severity of the surgical intervention varying among the subjects; 20 males (control group A) who were patients in the same hospital as the experimentals but were not scheduled for any surgical procedure; and 11 nonhospitalized males (control group B) attending a nearby university.

In this preliminary study we were not able to obtain a nonhospital group that was comparable in age with the hospitalized subjects; however the mean ages of the two hospitalized groups were comparable: experimentals =43.2 years, control group A = 47.8 years, control group B = 21.5 years.

ASSESSMENT METHODS

The Leveling-Sharpening House Test was used. In addition we constructed a Leveling-Sharpening Hospital Test, following the guidelines used in constructing the Parachute Test featured in the first study. The basic scene (Figure 7), presented sequentially with 60 cards, consisted of the figure of a doctor standing in a hospital room. Over the course of the 60 presentations, 20 details were omitted accumulatively; the ordering of the types of change was the same as for the Parachute Test (i.e., relevant and nonrelevant, central and peripheral).

Figure 7. Leveling-Sharpening Hospital Test and list of details that drop out (Guthrie, 1967).



Card	Details	Card	Details
4	TV antenna knobs	34	Gauze pads
7	Clamp screw	37	Chair seat
10	Part of stethoscope end	40	Bottom tube of stethoscope
13	Shoulder line	43	TV antenna
16	Wheelchair arms	46	Coat pocket
19	Collar line	49	Wheelchair spokes
22	Back of chair legs	52	TV picture screen
25	Syringe markings	55	Syringe
28	Trouser creases	58	Clamp
31	Rest of stethoscope end	61	Line down coat

PROCEDURE

In this preliminary work we were not able to obtain repeated measures on the same subjects in two different environments. In the basic design of the study then, the three groups represented leveling-sharpening functioning in three different environments symbolizing two levels of stress and atypical conditions (hospital plus imminent surgery and hospital alone) and typical conditions (usual living quarters).

The experimentals and hospitalized controls were tested individually in the hospital, at or near the patient's bed. Each subject understood that the testing was not connected with his medical treatment and volunteered to participate. In a single session the Hospital Test was administered, then the House Test. The nonhospitalized controls, all college students, were tested in their living quarters.

Both tests were evaluated in terms of the ratio score and the number of correct changes. The second score was also examined, as in the first study, in terms of the four combinations of type and location of changes represented (i.e., RC, RP, NRC, NRP).

EFFECTS ON LEVELING-SHARPENING OF HOSPITAL AND SURGERY VERSUS HOSPITAL VERSUS HOME ENVIRONMENTS

When the mean ratio scores of the Hospital Test were compared, Guthrie found group differences in the predicted direction. The experimentals (hospital plus surgery) produced a significantly higher ratio than the nonhospitalized controls (t = 2.96, p = .01), indicating that they lagged most in detecting changes that occurred throughout the series of pictures. The experimentals also produced a higher ratio than did the hospitalized controls, and the difference approached significance (t = 1.87,p = .08). Moreover, the ratio score of the hospitalized controls was higher than that of the non-hospitalized controls (t = 1.98, p = .07).

Taken together, the results with the ratio score indicated that when in the hospital and facing imminent surgery, subjects leveled information on the Hospital Test to the greatest degree; the nonhospitalized controls sharpened information to the greatest degree, and the hospitalized controls fell between these two groups.

The mean number of correct changes detected on the Hospital Test for the three groups showed the same results as the ratio score, with the surgical subjects detecting fewest changes. However Guthrie did not find patterns in the changes detected in terms of relevance versus nonrelevance and central versus peripheral.

Results with the House Test paralleled those with the Hospital Test. The experimentals leveled more, as reflected in the ratio score, than did the hospitalized controls (r= 1.44, p= .10). This result suggested that the regressive reorganizing of the leveling- sharpening control toward an increase in leveling represents a fundamental change in the way any and all information is managed in memory. The House Test was not administered to the nonhospitalized controls.

GENERAL CONCLUSION OF THE STUDY

These preliminary results offer some support for the hypothesis that a cognitive control reorganizes in a regressive direction as an individual negotiates and adapts with an environment that is unusual and stressful, given his long-term adaptation.

Perhaps the most meaningful result of this preliminary study is the difference observed between the experimentals and the hospitalized controls. The former group showed a greater degree of leveling both with hospital-related information (Hospital Test) and with information unrelated to the hospital environment (House Test), suggesting a fundamental regressive reorganization of leveling-sharpening.

Following the formulation proposed earlier, the findings allow us to propose that when in an environment of imminent surgery, which requires passivity, it is more adaptive to insulate oneself from information.

The two studies conducted by Guthrie provide some support for the concept of plasticity—that the organization of a cognitive control changes regressively or progressively in the service of short-term adaptation. Guthrie's studies supply effective evidence to bolster the hypothesis that progressive changes in leveling-sharpening can be adaptive. Since the same parachutists were measured in two environments, mobility of leveling-sharpening was assessed directly. In contrast, repeated measures were not taken of the surgical subjects, and this is a limitation of the second study. A more direct assessment of adaptive regression in leveling-sharpening would have required assessments of the same subjects at home and again in the hospital, as was done with parachutists.

Third Study: Short-Term Changes in Leveling-Sharpening Functioning in the Environments of a Hospital and Dental Office and Their Relation to Psychological Adaptation to Stress

I collaborated with Shapiro (1972) to design a third study in which direct observations would be made of regressive shifts in leveling- sharpening, thus canceling the limitation just described. Moreover, the third study was also designed to include new directions suggested by Guthrie's encouraging findings.

The concept of plasticity proposes that once the short-term, unusual environment is replaced by an average and expectable environment, cognitive controls return to the reorganization typical of long-term adaptation. To address this issue, Guthrie would have had to assess leveling-sharpening a third time—again at the home of the experimentals, some time after the evaluation at the airport.

Furthermore, according to the concept of plasticity, the regressive or progressive change in a cognitive control results in more effective adaptation to and management of the stress and requirements of the unusual situation. With Guthrie's studies we assumed that a shift to sharpening information was adaptive to the situation of preparing for a parachute jump, and a shift to leveling information was assumed to be adaptive to the situation of waiting to undergo surgery. Despite a certain amount of face validity to these assumptions, we felt that the next study should obtain, in addition to measures of changes in cognitive control functioning, independent assessments that would reflect the individual's adaptive success in managing the stressful environment on a short-term basis.

Finally, Guthrie's correlations between leveling-sharpening functioning at home and at the airport encouraged us to focus on individual differences in plasticity.

In the third study, changes in cognitive control functioning were observed in shortterm adaptation to two atypical environments, a hospital and a dental office. Moreover, children served as subjects. In general, the children were administered tests of leveling-sharpening and tests of anxiety and aggression first in their homes, again at a hospital before they were to undergo surgery or at a dentist's office, and again at home, one month later.

SUBJECTS

The subjects were 45 male, white children from ages 7 to 11 years, who were assigned to one of three groups. The main experimental group (surgical group) consisted of 15 boys who were scheduled to be hospitalized for hernia repairs. The names of boys were obtained by maintaining contact with several pediatric surgeons in a large metropolitan area; the investigators were notified by the surgeons when a child was scheduled for elective hernia repair, and the child's parents' agreement to participation on the study was solicited. Over a period of about 6 months 15 boys were located; there were five 7 year olds, one 8 year old, two 9 year olds, six 10 year olds, and one 11 year old.

A second experimental group (dental group) was obtained by maintaining contact with pediatric dentists in the same city who agreed to inform the investigators when a boy of the necessary age was scheduled for dental work to repair tooth decay. In addition to meeting the age requirements defined by the surgical group, the children selected for the second group were visiting a dentist for the repair of cavities for the first time. A third group (control group) consisted of children attending a parochial school whose parents gave permission for their participation in the study. The children of the dental and control groups were selected to match the ages of the children in the surgical group:

	Age (months)	
Group	Mean	SD
Surgical	108.2	16.4
Dental	111.5	15.7
Control	109.8	17.7

The children were also selected to match as closely as possible the intelligence level of the surgical group. Four subtests of the WISC were administered (Similarities, Vocabulary, Picture Completion, Block Design). The surgical group revealed the following respective scale score means: Similarities = 12.8, SD = 2.1; Vocabulary = 11.7, SD = 2.6; Picture Completion = 11.0, SD = 2.3; Block Design = 10.7, SD = 2.8. As these scores suggest, the group represented an average level of intelligence. Prospective subjects for the dental and control Groups were eliminated if their WISC scale scores deviated markedly from the average range. Accordingly, the mean intelligence of these children closely matched that of the surgical children.

	Dental Group		Control Group	
WISC subtest	Mean	SD	Mean	SD
Similarities	12.1	2.7	12.1	2.1
Vocabulary	11.8	3.7	11.8	3.4
Picture Completion	11.2	2.4	10.7	3.2
Block Design	11.4	2.7	10.9	3.3

All children came from middle-class families. The histories available did not suggest any evidence of physical or emotional disabilities that could have bearing on the study. The children of the surgical and dental groups were attending public schools, and as noted, the control group were students in a parochial school.

ASSESSMENT METHODS

Because this study was designed to elaborate on Guthrie's work, it was decided to assess again changes in the leveling-sharpening control. The Leveling-Sharpening House Test and the Leveling-Sharpening Hospital Test were used to obtain measures of this cognitive control.

When we turned our attention to the issues of assessing adaptation to the stress conditions (surgery and dental work), it seemed reasonable to obtain measures of anxiety concerning bodily injury (castration anxiety) and measures of aggression, both as expressed in fantasy. We also felt it would be highly desirable to obtain ratings from mothers of the subjects' behavioral adjustment as observed at home. Two other test procedures were also selected because it appeared that they might provide information about psychological adaptation to the stress environments. One concerned the developmental level of the organization of cognition as revealed in the degree to which the Rorschach inkblots are differentiated. The other concerned a score also derived from Rorschach responses that had been demonstrated to relate to body image.

1. Measures of Fantasied Castration and Bodily Injury. Friedman's (1952) Fables Test was used to obtain a measure of anxiety concerning bodily injury or castration. In this test the examiner reads to the child a brief story describing a monkey who has "a great big pretty tail." The monkey is so proud of his tail and its pretty spots that he often admires it. At the end of the fable, the monkey's owner arrives and notices that his monkey looks very different. The child is asked, "What do you think happened?"

Children's responses include, for example, "the tail was chopped off," "someone stepped on his tail," "the hair was cut off," and "the spots came off." I developed a six-point rating scale designed to rank the responses of children developmentally (Santostefano, 1970 and Appendix B.). A score of 1 is assigned to a response that reflects direct, extensive damage to the tail (e.g., "it was chopped off") and 6 is assigned to a response that reflects indirect, sublimated, and attenuated injury to the tail, (e.g., "the hair was trimmed"). A low score is interpreted as indicating expressions in fantasy of direct, developmentally primitive forms of bodily injury and castration anxiety; a high score is likely to typify a child having developmentally advanced, attenuated forms of castration anxiety.

2. Measures of Fantasied Aggression. Thematic Apperception Test (TAT) picture 18 GF was used to obtain samples of fantasied aggression. Employing the traditional method of administration, the child was asked to tell a story about this picture, which depicts two human figures (usually seen as women) with the hands of one near the head and neck of the other.

As a measure of the level of fantasied act of aggression, I developed a 17-point scale to evaluate in terms of a developmental scheme of aggression the aggressive content of stories told by children (Santostefano, 1970 and Appendix B). The scheme proposes that forms of fantasied aggression can be distinguished with respect to the degree of directness of aggression revealed by the story and the degree of delay imposed on the fantasied aggressive act. A score of 1 is assigned to a story that depicts one of the figures as inflicting relatively violent, direct physical harm on the other (e.g., "This lady is strangling her, killing her"). Higher numerical scores are assigned to stories that depict more indirect and attenuated physical aggression (e.g., "She's shaking her cause she's mad,"); still higher scores are assigned if the story depicts verbal aggression ("She's yelling at her"). Still higher numerical scores go to responses in which one person is depicted as suffering bodily harm from an impersonal force (e.g., "She has a toothache and she's looking at it").

As a measure of the delay imposed on the fantasied aggression, a second score, derived from the number of words the child uses to tell a story to TAT 18GF, is taker as an index (Santostefano, 1970). The examiner determines the point in the story at which the aggressive impulse is discharged. The number of words used to that point in telling the story and the number of total words used to tell the total story become the numerator and the denominator, respectively, of a ratio. Thus if a child begins a story with "She killed her," and continues, producing a total story of 50 words, the ratio value is small (2/50) and is interpreted as reflecting little or no delay before an aggressive act was given expression in the story. In contrast, another child might tell a story of 40 words, describing the background of the picture, the clothing of the individuals, and so on, before saying, "She kills her," and going on to complete the story with 10 more words. The ratio value in this instance would be large (40/50), and it would be said to reflect much delay before the expression in fantasy of the aggressive act.

3. A Measure of Body Image Expressed in Fantasy. Because surgery and dental work involve violation of one's body, it seemed reasonable to assess fantasies concerning body image. Fisher and Cleveland (1958 and 1968) have reported a scoring system capable of evaluating the extent to which Rorschach images reveal references to barriers for, and protection of, body boundaries. They refer to this index as the *barrier score,* which is interpreted as signifying the degree to which the individual represents and experiences the boundaries of his body as definite and delineated from the environment or as inarticulate and fused with the environment. In calculating this index, a score of 1 is assigned to all Rorschach responses depicting articles of clothing worn by animals, to clothing or articles worn by humans if these are unusual in their covering or decorative function, to animals whose skins are distinctive and unusual (e.g., turtle), to overhanging or protective surfaces, to articles that are covered, surrounded, or concealed, and to things that are armored or contain walls for protection. The higher the barrier score, the greater the degree of body image boundaries and guardedness.

4. *Rorschach Genetic Scoring System.* A general index of cognitive differentiation and maturity. Friedman devised a rating scale to assess the level of differentiation-integration, thus the level of cognitive maturity, revealed by Rorschach responses. For example, the response "a pile of rocks" to Card I is rated as global-undifferentiated (assigned a low score) and is taken as an index of genetically immature perceptual organization, whereas "two kids dancing around a pole," as a response to the same card, is rated as a differentiated and integrated articulation of the blot, revealing mature perceptual organization. Many studies (see e.g., Hemmendinger, 1960; Santostefano, 1972) with various clinical and age groups have provided support for this formulation. The Rorschach was also evaluated for the study under discussion, using Friedman's genetic scoring system.

5. *Ratings by Mothers of the Behavior of Children in the Surgical Group.* In individual interviews conducted in the homes of the subjects, the mothers of children in the surgical group were asked to comment about six variables: (*a*) the child's general behavior and adjustment, (*b*) behavior that indicated fear and anxiety, (*c*) difficulty with sleeping, (*d)* moodiness at home, *(e)* moodiness with friends, *(f)* tendency to stay at home versus to go out into the neighborhood. The comments by each mother were assigned a value of 1 to 5. A low score reflected problem behavior in the area evaluated, a high score reflected age-adequate behavior.

In summary, to evaluate adaptation, three test procedures were used to assess the management of anxiety, aggression, and body image (the Fables Test, TAT Card 18GF, and the Rorschach test). TAT Card 18 GF was scored for both level of aggressive content and degree of delay of aggression reflected in a word count score. Rorschach responses were evaluated in terms of concept of the barrier score and the level of maturity of perceptual organization. In addition, behavioral ratings were obtained from mothers of the children in the surgical group. Two judges evaluated each protocol independently in terms of each of the scoring systems; there was approximately 80% or higher agreement with all scores. Discussions were held, arbitrated by me, to resolve differences in scores assigned.

PROCEDURE

Subjects were individually administered the Leveling-Sharpening House Test, the Leveling-Sharpening Hospital Test, the Fables Test of Fantasied Aggression, TAT 18GF, and the Rorschach at three time periods. The surgical children were tested in their homes approximately one week before hospitalization (time I). The procedures were readministered in the child's hospital room at bedside one day before the scheduled surgery (time II). Three weeks after discharge from the hospital, the procedures were readministered to all children, again in their homes (time III). The paradigm was followed for the other two groups. The dental children were tested at home one week before the dental appointment (time I), at the dentist's office (time II), and 3 weeks later at home (time III). The control children were tested in their homes for their time I evaluation, and 1 and 3 weeks later for their time II and III evaluations.

We were able to obtain behavioral ratings only from the mothers of the surgical children. These were solicited one week before the child was to enter the hospital (time I) and again 3 weeks after surgery (time III).

In addition, during time I all children were administered the four subtests of the WISC mentioned earlier.

RESULTS

Changes in Leveling-Sharpening Functioning with Changing Environments. Following the results Guthrie obtained in comparing hospitalized and nonhospitalized adults (second study), we first attempted to learn whether the leveling-sharpening cognitive control was reorganized in response to the stress environments (hospital and dentist's office) to a stage characteristic of increased leveling (i.e., forming global memory images of changing information). We also addressed the related question. Did the leveling-sharpening control reorganize again 3 weeks after the stress environment and return to that stage characteristic of managing typical environments? To find an answer, Shapiro evaluated the scores obtained with each test of leveling-sharpening with a r-test of correlated means comparing time I with II and time I with III.

Analysis of the time I measures showed that the three groups did not differ significantly in leveling-sharpening functioning. Therefore it was meaningful to compare their test performance at times II and III.

When Shapiro compared the leveling-sharpening test scores of each group from time I to time II to time III, she found that all groups showed a tendency to shift toward increased sharpening from time I to time II to time III. With each assessment, the children detected the first change sooner, detected more changes, and detected changes more quickly once they were introduced into the series of pictures. This finding appeared to be the result of practice and increased familiarity in repeated testing with the house and hospital room scenes. It should be noted that in the first study, with parachutists, Guthrie also observed that both experimentals and controls showed more sharpening because of practice effect.

Although all groups shifted toward increased sharpening from the assessment obtained at home (time I) to the second assessment, the degree of change varied among them. The surgical group shifted less toward sharpening from the time I home measure to the hospital measure, therefore showing a more pronounced tendency to level information.

For the dental and control groups, the mean differences of the first stop score, number of correct changes, and ratio between time I and time II revealed a significant shift toward increased sharpening during time II. But for the surgical group two of these mean differences did not reach statistical significance (first stop score and number of correct changes). Therefore although all groups shifted toward increased sharpening from time I to time II because of practice effect, the shift of the dental and control groups was significant and that of the surgical group did not reach statistical significance. We can conclude, then, that relative to the dental and control groups, the surgical group was characterized more by a tendency to level during the stress condition. The direction of this finding, although not statistically significant, parallels that observed by Guthrie with adult hospitalized patients.

To explore these data further with more vigorous statistical procedures, I subsequently conducted several reevaluations. In one analysis the test scores of times I, II, and III were subjected to multivariate analysis of variance (three groups x three assessments). This statistic enabled us to examine simultaneously the differences between groups, the difference between conditions, and the interaction between groups and conditions. We also put the test scores through an analysis of covariance, which allowed us to examine the differences between the surgical, dental, and control groups observed in the stress conditions (time II) by taking into account the child's initial score at time I, and his age and WISC scores. That is, the prestress leveling- sharpening score, the child's age, and his intelligence scores were held constant while we examined leveling-sharpening functioning observed in the hospital, dental office, and/or home environments.

With the multivariate analysis of variance and the analysis of covariance, leveling-sharpening scores of the three groups failed to differ at a level of statistical significance. However these additional analyses further spotlighted the tendency of the surgical children to shift less toward sharpening (i.e., to tend to level information more) when in the hospital environment.

The multivariate analysis of variance and the analysis of covariance were helpful in revealing another clue. The surgical children tended more to level information during time III. This trend suggested that the surgical children had maintained their tendency to level information 3 weeks after being removed from the stress environment.

Finally, the tendency for the surgical group to be characterized more by leveling information than either the dental or control groups was observed with both the House Test and the Hospital Test. No meaningful differences were observed between the results obtained with these two instruments.

Of the several leveling-sharpening test scores analyzed, the number of incorrect changes perceived in the series of pictures seemed to be the most sensitive in distinguishing among the groups, and it illustrates the trends observed with all scores. As discussed in Chapter 10 the leveling-sharpening score of A and B changes refers to changes perceived in the series of pictures that in fact do not occur (e.g., the tree is perceived as smaller, or the cloud is perceived as changing from one side of the scene to the other). The A and B changes are interpreted as reflecting the tendency to maintain fluid, unstable memory images over time (Chapter 5).

Table 12. Fabulated (A + B) Changes Detected by Surgical, Dental, and Control Groups in Leveling-Sharpening House and Hospital Test During Home and Stress Environments

	Time I (home)		Time II (hospital or dental office or home)		Time III (home)	
Test	Mean	SD	Mean	SD	Mean	SD
House Test						
Surgical	1.07	1.06	0.67	1.19	0.53	0.62
Dental	0.80	1.51	0.47	1.02	0.20	0.54
Control	1.47	2.50	0.60	1.74	0.20	0.54
Hospital Test						
Surgical	1.00	0.97	0.60	0.80	0.40	0.61
Dental	0.80	1.22	0.33	1.01	0.40	0.88
Control	0.27	0.99	0.13	0.34	0.00	0.00

Table 12 shows the mean number of A and B changes perceived by each of the groups during the three assessments. With the House Test, the most noteworthy trend was that of the surgical group, which perceived nearly the same number of incorrect changes when at home, 3 weeks after leaving the hospital (time III) as they did when tested in the hospital (time II), suggesting a tendency to continue forming fluid images of information that was more pronounced than that of the dental and control groups.

With the Hospital Test, we first notice that both the surgical and dental groups perceived more incorrect changes during time I (at home). This tendency could be due to sampling. However it is also possible that the surgical and dental groups, just one week away from entering the hospital or the dentist's office, may experience the Hospital Test stimuli as related to the imminent stress and reveal their tendency to level information in the face of being passive recipients of physical and emotional trauma. (See the discussion in the first study of Guthrie's observation that a test picture could be experienced as a stressful environment, producing changes in leveling-sharpening.)

During time II (at the hospital) the surgical group perceived the largest number of incorrect changes. Three weeks later (time III), both the surgical and dental groups maintained some tendency to construct fluid images with the Hospital Test.

The group x condition interaction of A and B changes did not reach statistical significance, but these mean scores are presented to illustrate the findings obtained with both the House and Hospital Leveling-Sharpening Tests which suggest the tendency for the surgical group to level information most, the dental group next, and the control group least over the course of the three evaluations.

In summary, when leveling-sharpening functioning was observed in the home environment, again at the hospital (or dental office), and again at home, all children showed a shift toward increased sharpening because of practice effect, but the surgical children showed the least shift, suggesting they were characterized more by a tendency to level.

Some findings also suggested that the dental group tended to level more during the stress condition than did the Control Group at time II, but not to the extent revealed by the children undergoing surgery.

In terms of group trends then, the data furnish some support to the hypothesis that leveling-sharpening reorganized in the direction of leveling information when the children left their average and expectable environment (home) and coped with a stressful environment that required passivity (hospital). The environment of a dentist's office appeared to have less impact on leveling-sharpening functioning than the hospital environment.

Relations Between Changes in Leveling-Sharpening Functioning and Test Measures of Adaptation. As noted earlier, the model of cognitive controls in short-term adaptation includes the proposition that when cognitive controls reorganize with changes in the environment, the degree and direction of change in cognitive control functioning serve the individual's efforts to adaptively manage affects and stress aroused by the unusual environment.

To explore this proposition, we wondered whether the degree and direction of change a child showed in leveling and sharpening functioning from the home environment to the hospital environment (or dentist's office) would reveal any systematic relation to simultaneous changes displayed by the child in regulating castration anxiety, aggression, and body boundaries when in the same environments. Therefore we wanted to process the data in terms of individual differences, rather than group differences, in the regulation of information and affects.

Accordingly, for each child a difference score was calculated for each of the leveling-sharpening and personality test scores by subtracting the score obtained at time I (home environment) from the score obtained at time II (stress). The leveling-sharpening difference scores for each child, then, represented the degree and direction of change he showed in leveling-sharpening functioning when at home, and later at the hospital or dentist's office. The personality difference scores represented the degree and direction of change from one environment to the other in managing anxiety and aggression, body guardedness, and the articulating of information and affects. Because the test responses concerning these variables were scored in terms of developmental levels, it would be possible to determine whether a child shifted regressively or progressively from time I to time II.

The leveling-sharpening difference scores (times II-I) were correlated with the personality difference scores (times II-I). Having hypothesized on the basis of Guthrie's finding that it is more adaptive to shift toward leveling in managing a hospital environment and imminent surgery, we examined our results with the aim of determining whether the correlations between changes in leveling-sharpening and changes in personality test scores could be interpreted as reflecting more adaptive management of affects and body image, given the psychological context of surgery.

Table 13 presents the correlations obtained between leveling-sharpening and adaptation change scores. It may be helpful to discuss the findings in terms of the four domains measured, which seemed superficially to be related to psychological adaptation to surgery and hospital environments: fantasied anxiety about bodily harm, fantasied aggression depicting injuring persons and things, cognitive images representing body boundaries, and the general level of cognitive organization imposed on a field of information.

Table 13. Correlations Between Changes in Leveling-Sharpening Functioning and in Expressions of Fantasied Anxiety, Aggression, Body Barriers, and Cognitive Differentiation when in Home and Stress Environments

Leveling-Sharpening House Test Score		Other Test Scores	Group		
			Surgical	Dental	Control
First stop	x	Fable Test (anxiety)	–.39	–.14	.02
		TAT (aggression)	.38	.04	.11
		TAT (delay of aggression)	— .50*	–.21	.25
		Body barrier	–.51*	–.33	–.20
		Rorschach genetic score	.09	.24	.10
Number of correct changes	x	Fable Test (anxiety)	.69*	.61*	.11
		TAT (aggression)	–.06	–.43	.40
		TAT (delay of aggression)	.46*	.12	.24
		Body barrier	.20	.07	.16
		Rorschach genetic score	–.46*	.01	.25
Ratio	x	Fable Test (anxiety)	–.66*	–.52*	–.21
		TAT (aggression)	.04	.24	.36
		TAT (delay of aggression)	–.30	.01	–.30
		Body barrier	–.23	.07	–.39
		Rorschach genetic score	.55*	13	–.38

*p = .05 or greater.

First, there is a much higher degree of relationship between changes in leveling-sharpening and changes in adaptation measures within the surgical group. The dental group showed some significant relations, and the control group showed mostly chance variation in their performance with the tests in the two assessments obtained at home. Half the correlations of the surgical group reached statistical significance, and a number were meaningful at the 10% level of confidence. Only two correlations of the dental group reached significance, and none for the control group. Further support for the psychological importance of relationships shown by the surgical group comes from the observation that directions of correlations between a given personality test with each of the leveling-sharpening scores were internally consistent. At no time did an adaptation measure correlate with one of the three leveling-sharpening measures in a direction that disagreed with its correlation with the other leveling-sharpening measures.

Let us now consider each of the domains evaluated. In terms of the measure of anxiety over bodily harm (castration) expressed in fantasy, there were consistent and significant correlations with leveling-sharpening scores among the surgical group. The direction of the correlations indicates that children who shifted the most toward leveling when in the hospital environment (i.e., they detected the first change later, detected fewer changes, and reported these after some lag in presentation) tended at the same time to shift the most in expressing fantasies to the Fable Test that conveyed *more* direct and primitive forms of bodily harm and castration. For example, the child who shifted most toward leveling information in the face of impending surgery tended to complete the fable by stating that the monkey's tail was cut off. With this personality score, the reorganizing of leveling-sharpening control toward a genetically earlier stage (increased leveling) is associated with expressions in fantasy of more direct, primitive forms of castration and bodily harm.

The TAT measure of fantasized acts of aggression correlated only with the first stop score. The direction of this correlation suggests that a shift toward leveling when in the hospital is associated with a shift in the content of aggressive fantasies in that more attenuated, indirect aggressive acts are depicted.

We might consider this finding simultaneously with the result obtained with the word count score. This index correlated significantly with the first stop score and number of correct changes detected, and it approaches significance with the ratio score. The directions of these correlations indicate that the tendency to shift toward leveling information when in the hospital is associated with *less* delay in expressing aggressive fantasies, as revealed by the number of words a child speaks in telling a story before an aggressive act involving the two persons pictured is mentioned explicitly.

If we consider both TAT scores together, we have an indication that a shift toward leveling information in the face of imminent surgery is associated with a tendency to express aggressive fantasies more quickly (less delay), but in a form (content) depicting more indirect (sublimated) aggressive actions.

Only the first stop score correlated significantly with the barrier score, although it should be noted that the signs of the two other coefficients are consistent. The children who tended to shift most toward detecting the first change later in the series of pictures (i.e., to level information) tended to produce fewer Rorschach responses that described some type of barrier.

The Rorschach genetic score correlated significantly with both the number of correct changes and the leveling-sharpening ratio. Children who tended to shift most toward detecting fewer changes and after a lag (leveling) tended to shift in their Rorschach performance, when in the hospital, toward constructing more differentiated responses.

The dental group showed a significant correlation between expressions of fantasied castration and bodily harm and the number of correct changes and ratio scores. These correlations are in the same direction as those of the surgical group. Children who shifted more toward leveling tended to express fantasies that depicted more direct, primitive forms of castration. The results obtained with the control group do not show consistent relationships between changes in leveling-sharpening functioning and changes in the regulation of castration anxiety, aggression, body barriers, and cognitive differentiation.

It may help our discussion to summarize the results obtained correlating individual leveling-sharpening change scores with adaptation change scores. Children who shifted most when in the hospital toward increased leveling from the stage of leveling-sharpening functioning characteristic for them in average environments, tended also to shift in expressing more literal forms of fantasied castration and tended to give more immediate expression to aggressive fantasies; however they also tended to form fantasies that reflected more indirect, sublimated aggressive acts, to produce fewer images that conveyed body barriers and guardedness, and to compose more cognitive differentiation on Rorschach inkblots.

When viewed through the lens of clinical propositions, these findings suggest that a stressful, atypical environment that requires passivity, regressive reorganizing of leveling-sharpening is associated with more successful adaptation, as revealed in the management of affects and personality structures.

The representational world (fantasies) of a child is seen by psychodynamically oriented practitioners as providing the child with an opportunity to express and rehearse concerns and needs. One could argue that when coping with surgery, expressing fantasies of literal castration (i.e., body appendages being cut off) is adaptive: the child is taking the opportunity to discharge in fantasy fear and anxiety about being mutilated or castrated by the hernia repair. Fantasies depicting literal castration bind and organize anxiety.

We also observed that the surgical group showed less delay in discharging fantasies that depict one person aggressing against another. At the same time the content of their fantasies reflected sublimated, indirect forms of aggression. It could also be argued that it is adapative to make ready use of fantasy to express aggressive tensions mobilized by the prospect of having to subject oneself to surgery, and that it is adaptive to tame these aggressive impulses directed toward others with the benefit of fantasies.

To understand the adaptive value of surgical children producing fewer barrier responses on the Rorschach (also associated with a shift toward leveling), we can rely on data reported by Fisher and Cleveland. From their extensive research with this measure they have noted, for example, that women with high barrier scores tended to ignore symptoms suggestive of cancer and to delay seeking professional help. They saw the high barrier scores in this instance as reflecting more guardedness and self-protection from upsetting stress. On the other hand, women with low barrier scores attended to symptoms of cancer and sought help more quickly, suggesting less guardedness.

The surgical children in our study, who shifted most toward leveling when in the hospital, also tended to produce fewer barrier scores when in the hospital. Therefore it could be inferred that a shift toward leveling is associated with a tendency to attend to personal stress and to seek help, a personality stance that would be adaptive in most cases.

In terms of the genetic Rorschach score, we could rely on studies (see references above) reporting that the imposition of more cognitive articulation and differentiation on inkblots is characteristic of personal maturity and less disturbed individuals. Our surgical children who shifted most toward leveling in the face of imminent surgery also tended to shift more toward differentiating and articulating Rorschach inkblots.

In general then, with this study probing the adaptive value of reorganizing cognitive controls when faced with unusual, stressful environments requiring passivity, it could be argued that a shift toward increased leveling is associated with more efficient, adaptive management of the affects and issues relevant to the stress (in this case, surgery). With increased leveling, guardedness between one's inner and outer worlds is lowered, the fantasy system becomes more articulate, fantasies interpreting and rehearsing the surgical experience as castration are more direct, and fantasies expressing aggression toward others are more quick to form, yet also sublimated in content.

Thus far I have interpreted each of the relations observed as suggesting that a shift toward leveling is associated with more effective emotional adaptation. These interpretations seem reasonable, but they do rely on assumptions and argument. Fortunately, we have available observations by mothers to explore the adaptive value of shifting toward leveling when in a hospital. Do ratings by mothers support the interferences we have drawn from the test performance of surgical children?

Relations Between Changes in Leveling-Sharpening Functioning and Behavioral Ratings by Mothers. As noted earlier, ratings were obtained from mothers of children in the surgical group a week before the child entered the hospital (time I) and again 3 weeks after the child left the hospital (time III). We were not able to obtain ratings from the mothers of the children in the dental and control groups. Nevertheless, the results should provide useful clues to the adaptive significance of changes in cognitive control functioning.

Mothers of members of the surgical group were asked to comment about their sons in terms of several behaviors that seemed to relate to how well a child was adjusting and coping with the experience of hospitalization and surgery.

1. General Behavior. The mother was asked to describe specific behaviors that revealed how the child was getting along in general. Was he irritable, aggressive, demanding, moody, and refusing to meet the usual expectations, or was he getting along as usual?

2. *Fear Behaviors.* The mother was asked to describe behaviors specifically suggesting that the child was experiencing fear and anxiety (e.g., of dogs, of the dark, of thunder).

3. *Sleep Patterns.* The mother was asked to describe the child's behavior in preparing for bed and falling asleep. We noted whether he resisted going to bed and had difficulty falling asleep.

4. *Moody Behavior at Home.* The mother was asked to discuss behaviors suggesting that the child was dissatisfied and moody at home.

5. *Moody Behavior with Friends.* The mother was asked to describe behaviors indicating that the child was dissatisfied and moody in his relationships with friends.

6. *Tendency to Stay at Home.* The mother was asked to relate whether the child stayed close to home with other family members or felt free to leave home and enter the neighborhood.

Two judges independently rated the mother's comments on a five-point scale. A value of 1 was assigned if the mother described a poor general adjustment, much fear behavior, difficulty with going to sleep, moodiness at home and with friends, and a tendency to stay near the home. A value of 5 was assigned to behaviors indicating a nonproblematic general adjustment without evidence of fear, difficulty at bedtime, moodiness, or tendency to stay nearby. The judges agreed nearly 80% of the time; discussions resolving differences were arbitrated by me.

The ratings from mother's interviews and the child's leveling-sharpening test scores a week before hospitalization (time f) were intercorrelated. Similarly the ratings from mother's interview and the child's leveling-sharpening test scores obtained 3 weeks after the surgery (time III) were interrelated. Table 14 gives the coefficients obtained.

Table 14. Correlations Between Behavioral Ratings by Mothers and Leveling-Sharpening House Test Scores of Surgical Children at Times I and III

	Time I (Prehospitalization)			Time III (Posthospitalization)		
Variable Rated	First Stop Score	Number of Correct Changes	Ratio	First Stop Score	Number of Correct Changes	Ratio
General behavior	–.23	.56**	–55**	.42	–.31	.35
Fearful behavior	–.35	.33	–.53**	.23	.06	.09
Sleep pattern	.16	.23	–.33	.01	–.12	.07
Moody at home	.19	.60**	–.55**	–.18	.11	.11
Moody with friends	.28	.54**	–.52**	–.24	.10	.06
Close to home	.14	.36	–.37	.03	.08	.08

**p* = . 10 r = .44; *p* = .10

***p* = .05 r= .51; *p* = .05

The leveling-sharpening test scores, in particular number of correct changes and ratio, obtained one week before hospitalization (time I) correlate significantly with nearly all the prehospitalization behavioral ratings by mothers. The directions of the correlations are consistent throughout. The higher the number of changes detected and the smaller the ratio (i.e., less lag in detecting changes), the more the mother tended to see the child as better adjusted generally (e.g., not demanding or aggressive or irritable), as not showing fearful behavior, as having little difficulty sleeping, as not moody at home or with friends, and as venturing outside the home. During the prehospitalization assessment, then, a child's tendency to sharpen information (form articulate stable images of information) correlated with adequate behavioral adaptation and adjustment, and the tendency of another subject to level information correlated with a problematic behavioral adjustment.

Leveling-sharpening test scores and mothers' ratings did not correlate significantly during the assessment conducted 3 weeks after hospitalization (time III). This finding suggests, given the significant and consistent correlations obtained at time I, that the relationships between the tendencies to sharpen and to show adequate behavioral adjustment were disrupted. Moreover, a most striking finding is observed. Although the correlations between general behavior and leveling-sharpening scores fall short of significance, the signs of these low-order relationships are in the *opposite* direction from that observed at time I. That is, 3 weeks after discharge from the hospital the children who tended to perceive the first change late in the series of pictures, who detected few changes, and who lagged in detecting changes (leveling) tended to be viewed by their mothers as not demanding, irritable, moody, or inappropriately aggressive. During the posthospitalization assessment, then, the tendency to managing changing information by leveling is associated with a more adaptive and successful behavioral adjustment.

The finding that the tendency to level is associated with successful postsurgical behavioral adaptation converges with the findings obtained with the test measures of adaptation. There we noted that a shift toward leveling (from the prehospital assessment to the assessment obtained in the hospital) was associated with changes in the management of anxiety, aggression, body boundaries, and cognitive differentiation, all interpreted as being more adaptive. We observed changes in the following directions: toward increased leveling of information, along with more direct expressions of castration anxiety, toward less delay in expressing aggressive fantasies that were, however, now more sublimated in content, toward less guarded and defended body boundaries, and toward the imposition of a higher degree of differentiation on affects and information represented by inkblots. We speculated on clinical grounds that these test changes, associated with a change toward leveling, were adaptive in managing the stress of hospitalization and impending surgery. The data obtained from mothers supports this speculation. The children who had a greater tendency to level after hospitalization were observed by mothers to be coping and adapting without showing behaviors indicative of psychological dysfunction. Finally, it must be reemphasized that the clues provided by the mothers' observations are meaningful ones not because of the size of the correlations between leveling-sharpening scores and observations of general behavior, but more because the direction of the relationship was reversed, with sharpening related to adaptive success before hospitalization and leveling related to adaptive success after hospitalization and surgery.

In summary, if we take together the findings obtained with test measures of anxiety, aggression, and body boundaries and the findings from mothers' observations, we have considerable direct support for the proposition that when dealing with an unusual, stressful environment that requires passivity, a regressive shift (reorganization) of the leveling-sharpening cognitive control toward increased leveling serves short-term adaptation.

Individual Differences in Cognitive Plasticity. Shapiro's study supplies us with some information about the proposition that individuals differ in the degree to which their cognitive controls reorganize, regressively or progressively, in short-term adaptation to changing environments. To explore this issue we viewed the magnitude of the change exhibited by a child in each leveling-sharpening score from the prestress measure (time I) to the stress measure (time II) as an index of that child's plasticity. That is, the larger the difference score obtained by subtracting the time I measure from the time II measure, the greater the plasticity or degree of reorganizing of leveling-sharpening in the face of a change in environments. The smaller the difference score, the less the plasticity in the leveling-sharpening control.

The mean difference scores and mean variability shown by each group (Table 15) constitute one source of information about plasticity. As noted, the three groups did not show significant differences in the mean degree of change revealed in leveling-sharpening. However the surgical group showed larger standard deviations, with each score suggesting that a hospital environment resulted in more variability, or a greater degree of individual differences in the extent to which the subjects changed their leveling-sharpening functioning.

Table 15. Mean Leveling-Sharpening Difference Scores (Time II-Time 1) of Surgical, Dental, and Control Groups

	First Stop Score		Number of Correct Changes		Ratio	
Group	Mean	SD	Mean	SD	Mean	SD
Surgical	–3.0	11.1	1.5	1.9	–2.9	3.9
Dental	–4.3	7.8	2.3	1.8	–3.4	2.6
Control	–1.8	8.2	1.7	1.1	–2.9	2.2

To explore these individual differences further, we asked whether there was a systematic relationship between the degree of leveling-sharpening plasticity (reflected by the difference score) and a child's leveling-sharpening functioning characteristic of average-expectable environments (time I). Our approach was to correlate each difference score of a child with its respective score obtained at time I. We also correlated difference scores with respective scores obtained at times II and III. The latter correlations enabled us to explore the relation between plasticity (degree of change from average-expectable environments to stress environments) with leveling-sharpening functioning during and after stress. Table 16 gives the correlations. The three groups were combined because the focus now is on individual differences in leveling-sharpening plasticity.

Table 16. Correlations Between Difference Scores (Plasticity) and Leveling-Sharpening Scores Obtained at Times I, II, and III

Time	First Stop Score	Number of Correct Changes	Ratio
I (prestress)	–.66*	–.31*	–.43*
II (stress)	.75*	.38*	.45*
III (poststress)	.35*	.24	.29*

*p = .05

Because the results discussed earlier indicated that a shift toward leveling for the surgical and dental groups was associated with effective adaptation to stress, we examine the direction of the correlations from this vantage point. The results for time I revealed that children who showed the greatest degree of change in leveling-sharpening (plasticity) in the direction of increased leveling from time I to II tended during time I to detect the first change sooner, to detect more changes, and to report them with little lag. Children who showed a smaller degree of change toward increased leveling, on the other hand, tended during time I to detect the first change later, to notice fewer changes, and to identify them after some lag. In other words, children who were characterized by sharpening when in the home situation tended to shift most toward leveling (to show the highest degree of adaptive plasticity) when dealing with the stress environment.

The correlations obtained between difference scores and scores obtained at times II and III indicated that children who changed the most from time I to time II tended most to level information when in the stress condition (time II) and to continue leveling information 3 weeks later (time III).

Because other data suggested that a tendency to level when in the stress environments and subsequently is associated with effective adaptation to the stress, these results, overall, indicate that (1) the child who is at a genetically more advanced stage in leveling-sharpening functioning when coping with an average environment, tends to reveal a greater degree of plasticity when faced with a short-term stressful environment requiring passivity; (2) the child who shows the greatest degree of leveling-sharpening plasticity changes more in the direction that is adaptive given the stress at hand (in the present study, this child changed regressively toward increased leveling); and (3) the child who shows the greatest degree of plasticity in leveling-sharpening sustains the tendency to level more (presumably because of its adaptive value) after the stress environment has been removed.

These results require further study, yet we have some support for the concept of individual differences in cognitive control plasticity.

GENERAL CONCLUSIONS

This study attempted to go beyond the first and second studies already reported in (*a*) obtaining a measure of leveling-sharpening functioning 3 weeks after the stress environment was removed (as well as before and during the stress environment), (*b*) relating direct assessments of psychological adaptation to stress with changes in leveling-sharpening, and (*c*) exploring individual differences in cognitive control plasticity as serving short-term adaptation to changing environments.

Some support was observed for the proposition that the leveling-sharpening control reorganizes regressively (in the direction of increased leveling) when a child shifts from functioning at home (an average expectable environment) to functioning in a hospital or dental office, where stress is best experienced passively. The present study suggests further that 3 weeks after the stress environment is removed, the child maintains the tendency to level that was observed during the stress environment. Although the group differences did not reach statistical significance, the trend agrees with the major findings of the second study—that adults about to undergo surgery leveled information more than hospitalized controls who, in turn, leveled information more than nonhospitalized controls.

A question emerges from comparing the three studies of short-term changes in leveling-sharpening in response to an unusual stressful environment. The first and second studies, both involving adults, yielded statistically significant differences. In the first study parachutists changed significantly toward increased sharpening when in an environment that permitted active participation with the stress (parachute jumping). In the second study adults leveled information significantly more in the face of imminent surgery, an environment that requires passive participation in response to the stress. In the third study young boys did not show a statistically significant shift toward leveling when surgery was imminent, although like the adults, they tended to level more. Since children did not shift significantly, future research should inquire whether children are characterized less than adults by cognitive control plasticity. Because cognitive controls of children are not yet fully developed, one could reason that as a group they would show less cognitive control change in response to changing environments.

In terms of the relation between cognitive control plasticity and adaptation, the present study also offers preliminary evidence that changes in cognitive control functioning serve psychological adaptation to stress. Children who shifted the most toward leveling information when in the hospital before surgery (from the stage of functioning characteristic for them when at home) tended also to shift in expressing more literal forms of fantasied castration, more sublimated fantasies of aggression toward others, less guardedness against stress, and more cognitive differentiation. The same children were also rated by their mothers as experiencing a less troubled adjustment after surgery.

In terms of individual differences in cognitive plasticity, finally, this study suggests that children who are at an advanced stage of cognitive control functioning in their average environments tend to regress the most toward increased leveling in the face of surgery.

Fourth Study: Short-Term Changes in Leveling-Sharpening Functioning in the Environment of a Final Examination

The issue of plasticity in leveling-sharpening in short-term adaptation was also explored by Lemieux and me, using the stress of a college course final examination as the “unusual” environment to be managed.

The subjects were 44 college students, 22 men and 22 women (age range 19 to 24) attending a summer session at a university. To the experimental group of 11 men and 11 women, we administered the Leveling-Sharpening House Test in their dormitory rooms and again about 2 weeks later within 24 hours before they took a final examination. Before the second testing, the student was asked questions about the exam (how well he or she was prepared, etc.) in an attempt to create an environment associated with the examination. The controls were administered the House Test on two occasions, separated by about 2 weeks; no final examinations were scheduled near the time of either administration.

The two groups did not differ in their performance with the Leveling-Sharpening House Test during the first testing. The means and F values for the experimental and control groups were as follows:

	Means		
	Experimentals	Controls	*F*
First stop score	12.1	12.7	0.07
Number of correct changes	14.2	13.7	1.10
Ratio	12.4	12.7	0.14

Group, trial, and sex differences were examined by means of a 2x2x2 analysis of variance. (The sex differences were discussed in Chapter 6.) Both groups sharpened significantly more on the second trial because of practice effect. That is, each group detected the first change sooner, reported more changes, and observed the changes introduced with less lag. No significant difference appeared between the two groups from trial 1 to trial 2, in the degree of increased sharpening. However it is interesting to note that although failing to reach statistical significance, the final exam group shifted more toward sharpening than did the controls on each of the three measures. That is, the experimentals showed a trend toward sharpening before the stressful event. As a group they detected the first change sooner during trial 2, detected more changes, and reported them with less lag after the change was first introduced.

The results were also examined using the subjects' difference scores between times 1 and 2. The use of difference scores permitted us to take each subject's trial 1 score as a baseline and assess change from this point. Here again, no statistically significant difference was observed, but the exam group showed a more pronounced shift from their prestress baseline in the direction of sharpening.

These findings converge with those obtained by Guthrie (see the first study) in his work with parachutists. That is, like preparing to execute a parachute jump, preparing to take a final examination is associated with a reorganization of the leveling-sharpening control in the direction of increased sharpening. Perhaps we did not find statistically significant differences, as did Guthrie, because the environment represented by taking a final examination is not powerful enough as an "unusual" situation for college students to mobilize a significant change in cognitive controls. Or perhaps the particular examination itself was not sufficiently stressful. This issue could be explored further using other school situations, such as taking doctoral exams for a young adult or entering a classroom for the first time for a 5 year old.

The present study also explored the relations between personality variables and plasticity of the leveling-sharpening control. Difference scores were computed for each of the House Test measures (first stop score, number of correct changes, ratio) from the prestress and stress testings. These difference scores were correlated with measures provided by the Edwards Personal Preference Schedule (EPPS). This pencil-and-paper scale provides measures of 15 personality variables from the individual's selection of one of two statements that characterizes him or her. The EPPS scale is described in some detail in Chapter 6.

Here we consider only the variables that correlated significantly, or nearly so, with leveling-sharpening change scores. Because the correlational patterns differed for males and for females, it is more meaningful to discuss the relationships observed for each sex.

In interpreting the correlations, bear in mind that a difference score that reflects the detection under stress of a larger number of correct changes than before the exam indicates a shift toward sharpening. Similarly, a high ratio represents leveling, and a large ratio difference score indicates a greater shift toward leveling under stress.

Table 17. Correlations Between Changes in Leveling-Sharpening House Test Scores Under Stress of College Examination and Edwards Personal Preference Scores

	Shift in Number of Correct Changes,Trial 1 to Trial 2		Shift in Ratio,Trial 1 to Trial 2	
Edwards Variable	Males	Females	Males	Females
Affiliation	74**	—	—	—
Dominance	.60**	—	—	—
Deference	—	—	.49*	—
Order	—	—	.49*	—
Abasement	—	—	.49*	—
Change	—	—	—	.62**
Endurance	—	—	—	.62**
Nurturance	—	.53*	—	–.49*

*p = .10

**p = .05

Table 17 shows that with males the personality variables of affiliation, dominance, deference, order, and abasement correlated with change in leveling-sharpening under the stress condition of a final examination. The direction of the correlations indicate that males who shifted less toward sharpening when under stress (i.e., they tended to level) described themselves on the Edwards scale as (1) doing things alone rather than with friends (affiliation), (2) following the direction and leadership of others (dominance), (3) following instructions and doing what is expected by others (deference), (4) not keeping orderly schedules in daily living (order), (5) feeling timid in the presence of supervisors and guilty when doing something wrong (abasement), and (6) nurturing others.

On the other hand, males who shifted more toward sharpening under stress (larger increase in the number correct and smaller ratio) described themselves as (1) doing things with others (affiliation), (2) taking leadership in groups (dominance), (3) not accepting the suggestions of others (deference), (4) keeping orderly schedules in day-to-day living (order), (5) not feeling intimidated by the presence of supervisors (abasement), and (6) nurturing others less.

If we presume that it is more adaptive to shift toward increased sharpening in a stress situation over which one has some active control, these results suggest that the leveling-sharpening cognitive control is more plastic, or more readily fits with changing environments, if the individual is dominant and selfdirected, organized in daily details, person related, and not intimidated by authority. The male who represents the converse of these personality traits is likely not to shift or reorganize leveling-sharpening adaptively when faced with a stress situation that requires active participation. On the face of it, this pattern of personality traits produced by the male subjects fits with the cognitive tendency to actively impose more stability and differentiation (than one typically does) on the memory images of information when confronting stress that requires active participation.

It is interesting to speculate whether the adaptiveness associated with each of these personality clusters would reverse if the stress situation required passive compliance, as surgery does, and offered little opportunity for managing the information at hand. Would the dominant orderly, affiliated male shift as easily toward leveling when it is adaptive to do so? Or would the submissive, disorganized, personally isolated male shift more readily toward leveling in response to a stress that requires passivity?

The findings obtained from the female subjects cluster a different set of personality traits related to plasticity of the leveling-sharpening cognitive control. Women who shifted more toward sharpening described themselves as (1) avoiding novelty and change in daily routine (change), (2) not sticking with a task until it is finished (endurance), and

helping friends in need (nurturance). Conversely, women who shifted more toward leveling under stress of the exam described themselves as (1) seeking novelty and change in daily routine, (2) sticking with a task until it is finished, and (3) not assisting those less fortunate.

The cluster of personality variables associated in the female subjects with leveling-sharpening changes is less clear in defining personality issues related to cognitive plasticity. However we could attempt to fit the relationships. Assuming that a shift toward leveling is not adaptive in a situation that requires a person to actively engage information, we could speculate that the woman who needs change from daily routine and tends to stick with a task may be both emotionally disorganized and nondirected, and compelled to endure a task even though, borrowing from Edwards' definition of endurance, "it seems as if no progress is being made."

The findings of this exploratory study, of course, must be supplemented by additional clinical and experimental research. They do, however, add support to the value of the conceptualization of cognitive controls as reorganizing in response to changing environments, as well as to the notions that the degree of change can be viewed as an aspect of ego plasticity and that this ego-cognitive quality, in turn, serves and is served by a cluster of personality dispositions.

MISCELLANEOUS CLINICAL STUDIES

The studies in this section illustrate different applications of cognitive control assessments in areas of clinical relevance, namely, the use of cognitive control assessments to evaluate the effects of intoxication by glue sniffing on cognitive functioning, and the question of whether children with reading disabilities reveal unique lags in cognitive control functioning.

Cognitive Control Functioning and Intoxication by Glue Sniffing

Cognitive control tests have been used to evaluate the effect of glue sniffing on the cognitive functioning of children (Dodds and Santostefano, 1964). Writers (e.g., Glaser and Massengale, 1962) have expressed concern about the possible physical and psychological hazards for children who inhale plastic glue vapor (Testers polystrene plastic cement) in quantities large enough to cause intoxication.

Twelve boys were studied who had been apprehended by police while intoxicated from sniffing glue. At least 14 hours after each boy was apprehended (i.e., when he was no longer intoxicated), he was administered individually the following procedures: the Leveling-Sharpening Wagon Test, the Stromberg Dexterity Test, the Continuous Performance Test of Attention, and the Benton Visual Retention Test (Appendix B describes these procedures). Although the Leveling-Sharpening Wagon Test is the only procedure identical in form to one of the tests of our basic cognitive control battery, each of the other tests was found to relate significantly to measures of cognitive controls in the first three factor analytic studies discussed in Chapter 6. The Stromberg test related to the processes of focal attention and field articulation, the CPT to focal attention, and the Benton test to leveling-sharpening.

The 12 glue sniffers ranged in age from 12 to 15 years (mean age, 13.8 years). Ten were Hispanic and two were of Anglo-American descent. The Ammons Full-Range Picture Vocabulary Test showed the group to be of average intelligence. From reports it was determined that the boys had been sniffing glue habitually from 3 to 42 months, with the total number of glue sniffing intoxications per boy ranging from 4 to 1200. The median number of intoxications was 82.

The control group consisted of 21 Anglo-American boys randomly selected from a public school located in a large city. They ranged in age from 11.2 to 14.7 years (mean age, 12.6 years); each was judged to be average in school performance and social adjustment by teachers, and none presented a history of serious relevant physical or emotional disturbances nor of glue sniffing. It was not possible to obtain Hispanic children as controls.

The group mean scores on each of the tests were compared by means of an analysis of variance. The groups did not differ significantly in any of the measures. These findings suggest that in the group studied, glue inhalation had not resulted in deficits in the several cognitive control processes assessed. One could argue that the control group was inadequate because it did not contain any Hispanic boys. However if the sampling of control children caused a bias in the results, the bias would have been in the direction of showing glue sniffers as less efficient (or at lower developmental levels) because of the developmentally lower cognitive control functioning associated with socioeconomic status (see section on cognitive controls and SES).

It is possible that the experimental subjects had not yet sniffed sufficient amounts of glue, over some critical period of time, to result in cognitive control dysfunction. It is also possible that the effects of glue sniffing may affect areas of the central nervous system other than the cerebral-integrative areas associated with the cognitive tests used. For example, the psychological correlates of the cerebellum may be affected, but these are not assessed with the measures used. However such indices of cerebellum dysfunction as peculiarities of gait and hand tremors while drawing designs, placing blocks, or pressing a response key, were not observed by the psychologists or pediatricians who examined the children.

This study suggests future work that could be conducted to investigate the influence on cognitive control functioning of various toxic drugs (e.g., alcohol and narcotics), as well as drugs used in the pharmacological treatment of emotional disturbances. Given the current interest in chemotherapy with hyperactive children and cases of school failure, and the questions raised about the utility of this treatment approach, studies of cognitive control functioning of children before and after medication should provide valuable information to clinicians about whether one or another drug lessens distractibility, or improves attention span, memory, or conceptual thinking.

Cognitive Control Functioning and Reading Disabilities

My colleagues and I (Santostefano, Rutledge and Randall, 1965) have examined the relations between reading disability and three cognitive controls (focal attention, field articulation, and leveling-sharpening). The clinical group consisted of 24 boys identified by a remedial reading teacher as having a history of reading disability and a current problem reading at grade level. Their ages ranged from 8 to 13 years (mean, 10.9 years). Six of the boys were in the third grade, seven in the fourth, five in the fifth, and six in the sixth.

The Botel Reading Inventory (Botel, 1961) was used to establish that reading grade level was at least one year below actual grade placement. The IPAT test (1962) was also used because it provides an assessment of intellectual level relatively independent of a child's language skills. The difference between measured reading grade level and grade placement ranged from 1 to 3 years (mean, 1.5 years); IQs ranged from 65 to 116 (mean, 92.7).

From the same school a control group of 23 boys was selected whose ages (8 to 12 years, mean = 9.9 years), IQs (80 to 126, mean = 98.3), and grade placements (seven third graders,six fourth graders, four fifth graders, and six sixth graders) closely approximated those of the poor reading group. The measured reading grade level of control boys was equal to grade placement or only slightly higher. Children in both groups showed normal visual acuity (corrected or uncorrected), and none presented a history of relevant physical or emotional problems.

The Circles Test of focal attention (Appendix B), the Fruit Distraction Test (Cards II, III, and IV), and the Leveling-Sharpening House Test were administered in individual sessions to each child.

Performances by the two groups on the Circles Test did not differ in either the nonillusion or illusion conditions.

With the Fruit Distraction Test, the poor readers took longer to name the colors on Card III (peripheral distractions) versus those on Card II (baseline) than did controls, but the difference fell short of statistical significance. Poor readers also recalled a significantly greater number of peripheral, irrelevant figures after Card III was removed, than did the controls. When the groups were compared in terms of performance with Card IV (incorrect colors) versus Card II, the poor readers again showed that they were more distracted and disrupted by irrelevant information, and the difference was significant beyond the 5% level of confidence. Last, the poor readers produced slightly more errors in naming colors on both distraction cards, but the differences did not reach statistical significance.

	Poor Readers		Grade Level Readers			
Score	Mean	SD	Mean	SD	*F*	*p*
Cards III-II: time (seconds)	2.42	6.92	0.09	5.44	1.27	NS
Cards III: recalls	2.2	1.31	1.2	1.03		.05
Cards IV-II: time (seconds)	37.3	10.21	27.4	11.26	4.46	.05

No differences were found between the two groups with the Leveling-Sharpening House Test.

	Poor Readers		Grade Level Readers		
Score	Mean	SD	Mean	SD	*F*
First stop	10.29	4.86	10.43	3.83	0.01
Number correct changes	13.90	2.29	12.39	2.34	1.41
Ratio	12.77	3.90	13.43	3.32	0.37

Of the three cognitive controls examined in this study, only field articulation in managing relevant and irrelevant information distinguished the groups. These findings suggest that when viewed from the standpoint of cognitive controls, reading-disabled children are not handicapped in terms of breadth of scanning (focal attention) or differentiation and stability of memory images formed (leveling-sharpening). Their unique dysfunction appears to be associated with the cognitive control process of selectively attending to relevant stimuli and withholding attention from peripheral and contextually irrelevant stimuli. This finding converges with studies by Petty (1935) and Gibson (1963) also suggesting the management of distracting, irrelevant information is uniquely dominant in the reading process.

Several lines of cognitive controls research are suggested by this study of reading disability. Large groups of reading-disabled children at different age levels need to be evaluated to explore whether the specific cognitive control dysfunction varies with age. For example, would first graders who are nonreaders show a unique deficit in focal attention and older nonreaders a deficit in field articulation? Are there unique relations between components of the reading process (e.g., word endings, comprehension) and cognitive control? Knowledge about cognitive control deficits unique to reading disabilities should be useful in planning treatment programs. If, for example, a nonreader is uniquely deficient in field articulation functioning, tutoring in reading could be supplemented by training in field articulation to induce the child to change his idiosyncratic way of devoting attention to nonrelevant information. This issue is discussed again in Parts IV, V and VI.

CONCLUDING REMARKS

The studies presented explored various questions that derived from the developmental-adaptational model outlined in the previous chapter. The model proposed a hierarchy of cognitive controls, with each control undergoing systematic growth through a series of developmental levels in the process of adaptation to long-term, average, and expectable environments. Here controls are slow changing and stable. At each stage in development they create a “fit” between the individual and his outer and inner environments, ensuring that information is insulated, registered, and repeated at a pace that fosters adaptation and further emotional and cognitive development. The model also proposed that cognitive controls reorganize temporarily, regressively or progressively, in short-term adaptation, in response to a change from an environment that is average to one that is unusual. The regression or progression in cognitive control functioning serves to recruit or insulate information, whichever aids in mastering the unusual environment and in binding drive tensions and affects.

The long-term predictive studies indicated that kindergarten children whose age differences covered a range of only 11 months displayed many developmental levels of cognitive control functioning. When these children were followed through latency, those who were developmentally advanced in cognitive control functioning at age 5 continued to maintain their relative standing; the same was true of children who were lagging initially. Moreover, a child’s developmental level of cognitive control functioning at age 5 predicted future academic success or difficulty. Longitudinal observations, then, guided by the developmental point of view, support the concept that cognitive controls are relatively slowly changing structures that maintain their uniqueness as average-expectable environments are managed. The findings also support the value for clinical practice of the developmental diagnosis of cognitive control functioning.

Our studies of parachutists about to execute a jump, adults and children about to undergo surgery, and young adults about to take a college exam, together lend considerable weight to the proposition that cognitive controls reorganize temporarily, regressively or progressively, in response to an environment that is unusual and stressful relative to environments encountered in long-term adaptation. The studies conducted to date support our broad hypothesis concerning whether a regressive or progressive reorganization of cognitive controls is adaptive in short-term adaptation: that is, if the unusual environment requires and permits the individual to engage the conditions and stress actively and to participate in the outcome, a progressive shift in cognitive control functioning is adaptive, whereas if the unusual environment both requires the individual to experience the conditions passively and limits participation in the outcome, a regressive shift in cognitive control functioning is adaptive.

The studies conducted thus far of cognitive control functioning in long-term and shortterm adaptation raise several questions and issues that should sharpen future clinical and research observations.

1. The Origins of Normal and Deviant Cognitive Control Development. Why is it that about 25% of the children who participated in the predictive studies, and who came from advantaged homes, arrived in kindergarten lagging significantly in cognitive control development? What life experiences and innate givens, interacting throughout the first years of life, result in significant cognitive control deviations by the age of 5 that persist throughout latency and are associated with future academic difficulty? There is a need to study the factors that play a principal role in the formation of cognitive controls before the age of 5 years. But which life experiences and which innate givens (sensory thresholds, temperament, motility—see Chapter 2) should be noted if a longitudinal study were to be conducted from birth? I believe this question could be answered economically and systematically if studies of short-term adaptation were conducted first. As we learned which environmental and organismic variables are most critical in producing short-term changes in cognitive control functions, we could use these insights to guide longitudinal studies of the first 5 years of life.

2. Studies of Unusual, Short-Term Environments. Additional studies of cognitive control changes in response to unusual environments are needed to expand our understanding of short-term adaptation. These studies should detail personality-cognitive characteristics of the individual (organismic variables) and environmental factors implicated in short-term adaptation.

In terms of organismic variables, for example, we noted in one study that male subjects who shifted most toward sharpening, when faced with a final examination, described themselves as dominant and affiliated persons, whereas those who shifted less toward sharpening or shifted toward leveling described themselves as different and socially isolated. If shifting toward sharpening is adaptive before a college exam, and personality qualities of dominance and affiliation are associated with this shift, would the same qualities be associated with *regressive* cognitive mobility when regression is adaptive (as when confronted with the experience of surgery)?

Characteristics of cognitive organization, as well as traits of personality, may also be important state variables in the degree and direction of cognitive control mobility unique to an individual. The variable of whether an individual habitually functions at either extreme of a cognitive control dimension has already been addressed in the literature. Witkin (1965) and Silverman (1964) have reported that persons at either extreme of the cognitive style field dependence—independence tend to show less capacity to shift to another level. Our studies revealed that children who were sharpeners in average- expectable environments shifted most toward leveling when facing surgery. These children may not have represented the extremes of sharpening, and further work is needed to clarify this issue. It may be that cognitive control plasticity in short-term adaptation reflects a combination of the level of cognitive control typically used in long-term environments and some cluster of emotional- personality factors.

In addition to exploring organismic factors, we need to learn much about the various types of environment that differ sufficiently from average-expectable environmental conditions to mobilize short-term changes in cognitive controls. Examples of natural environments that could be explored are loss of parent or sib by death, severe illness and/or temporary absence of some family member, a move to a new neighborhood, the first day at school, or witnessing a major car crash or other similar cataclysmic event.

As soon as we mention examples of possible unusual environments, we are reminded by Hartmann's (1958) caution that what is an unusual environment for one individual may be an average and expectable environment for another, and vice versa. The child who has experienced five moves in as many years because of father's occupation would include the variable "frequent home and neighborhood changes" in his average and expectable environments. For a 7 year old who moves to a metropolitan area after living all his life in a small suburban community, a change in home and neighborhood would be unusual. But the cognitive functioning of persons for whom unusual environments are usual could also be a subject of study.

By learning more about the organismic factors implicated in short-term cognitive control changes, and by determining which environments arouse mobility, whether regressive or progressive, it should be possible to begin to gather clues to guide longitudinal studies of the origins of normal and pathological cognitive control development. For example, we observed that in addition to tending to level information while in the hospital, relative to their functioning before hospitalization, the surgical group of children also tended to level information more, 3 weeks after discharge. This suggestive finding raises the question of whether hospitalization and surgery, at certain stages of emotional development, might be sufficiently powerful, unusual environments to induce a derailed course for cognitive control development over a relatively long period of time. If a year or two after surgery the children showed that they still tended to level information, we could turn to hospitalization and surgical procedures in our longitudinal study of the first 5 years to look for factors that are critical in setting a permanent, derailed course for cognitive controls.

Another example is available from the study (Chapter 6, Table 20) indicating that children who experienced social-emotional deprivation functioned at developmentally lower levels of cognitive controls. Did the kindergarten children in our predictive studies, who arrived showing significant lags in cognitive control development, experience emotional deprivation in spite of their advantaged homes?

Both these examples relate to our hypothesis about plasticity in short-term adaptation, which could also serve to organize studies of the origin of normal and deviant cognitive controls. That is, if an environment that requires passivity sustains over some critical period of time (e.g., long-term hospitalization, prolonged emotional deprivation), cognitive control development lags in the first five years of life. Thus the child who has experienced several hospitalizations in the first years of life could reach the age of 5 lagging in cognitive control functioning. Yet if an environment that requires activity sustained over a period of time (e.g., the family changes home situations many times), the development of cognitive controls would be fixed in a course that moved through higher developmental levels. Such a child would reach the age of 5 at the advanced extreme of cognitive control functioning (e.g., excessive ignoring of irrelevant information and excessive sharpening).

3. *Evaluating Changes in All Cognitive Controls in Unusual Environments and at Different Developmental Periods.* Our studies of short-term adaptation have evaluated changes in the leveling-sharpening principle only. The exception is the assessment of field articulation and focal attention provided by the analysis of relevant-nonrelevant and peripheral-central details in Guthrie's study of parachutists. Other research should evaluate cognitive controls changes in addition to those observed in leveling-sharpening.

Moreover, investigations of short-term adaptation should systematically note whether the developmental stage of the subjects is a factor in the degree and direction of cognitive control mobility observed and in the cognitive control that changes most in response to unusual environments. Our studies involved young and older adults and latency boys. We noted that the adults showed statistically significant changes in leveling-sharpening in response to the unusual environments of parachuting and surgery. The mobility of the children did not reach statistical significance, although the individual degree of change correlated significantly with changes in the management of anxiety and aggression. Careful comparisons of plasticity in different age groups or groups indexed as representing a developmental stage, as they manage the same and different unusual environments, would permit us to explore the possibility that developmental stage and type of unusual environment are associated with differences in cognitive control plasticity.

4. *The Issue of Conscious Intentionality and Cognitive Control Functioning.* Chapter 4 dealt with the question raised in the literature regarding whether cognitive controls differ in the degree to which the individual exercises conscious cognitive control over the information being processed. We should not leave our discussions of studies of short-term adaptation without returning to this issue, because the studies bear directly on it. For example, parachutists showed systematic shifts in the central versus peripheral and relevant versus nonrelevant details they included in memory images constructed of ongoing information. And the subjects were not aware of these shifts in cognitive control preferences while processing the information. This observation offers a compelling argument that for the most part, the process unique to each cognitive control takes place outside awareness. From the psychoanalytic point of view, then, cognitive controls are primarily unconscious ego mechanisms. This viewpoint would also incorporate the supposition that an individual might become aware of his unique information processing strategies; that is, the unconscious mechanisms might be brought into consciousness. We consider this issue in the next section, which addresses the treatment of deviant cognitive controls.

5. The Relation Between Cognitive Control Functioning and the Regulation of Affects. Our studies thus far have persistently showed relations between cognitive control functioning and the regulation of affects. The factor analytic studies (Chapter 5) revealed a number of relations: that focal attention and field articulation were associated with binding and organizing affects by means of physical activity, that leveling-sharpening was associated with binding affects by means of physical and fantasy activity, and that equivalence range was associated with binding affects with fantasy and language activity. The studies of reliability (Chapter 6) revealed relations, for example, between one component of field articulation and population characteristics in a comparison of primary grade children with severe academic and adjustment difficulties and public school children designated by a test procedure as impulsive or reflective. Furthermore, the developmental trends observed (Chapter 7) led us to elaborate our formulation in relating cognitive control development to emotional- personality development during latency.

The studies of short-term adaptation described in this chapter enabled us to explore the relations between cognitive controls and the regulation of affects from an intrapsychic view. Boys who shifted most toward leveling in response to imminent surgery also shifted toward expressing in fantasy more literal castration anxiety and more indirect aggression toward others. They also shifted toward being less guarded or defended against their inner feelings and toward organizing percepts and drives in more differentiated Rorschach symbols. A shift toward leveling and the associated changes in the regulation of drives and affects were interpreted as serving successful adaptation to the trauma of surgery, an interpretation that received some support in the form of ratings by the mothers of the children.

If we relate this broad finding to the hypothesized relationship between cognitive control orientation and emotional development (Chapter 7, Figure 4), our formulation of the relation between cognitive controls and affects in adaptation can be elaborated further. The reorganizing of leveling-sharpening toward increased leveling provides insulation from information contained in outer reality. Details of ongoing information in the external environment are not differentiated in memory images, and the cognitive control becomes oriented away from the external environment and toward the inner environment (Critique, Chapter 7). This change in orientation is associated, as we noted, with being more receptive of inner feelings (lower barrier score). The presumed increase in openness to inner reality is evidenced by the observation that fantasied expressions of bodily harm and castration fears are much more vivid and literal. These fantasies are viewed as serving not only to express castration anxiety but also to bind anxiety in the organization of fantasies. Openness to the inner world is also evidenced in the observation that aggression felt toward others is expressed in fantasy more quickly, yet the content of the fantasy sublimates the form taken by the aggression. These changes in the management of anxieties and drives were in turn associated with more successful behavioral adjustment following surgery, as observed by parents.

The foregoing observations provide promising preliminary support for the proposition that shifts in cognitive control functioning from one developmental stage to another results in “a good fit” between the individual’s drives, his needs for seeking and avoiding information, and environmental demands. The fit serves successful adaptation and further development.

Future research is needed to elaborate the personality and behavioral changes measured that occur with cognitive change. Following the hypothesis proposed in Chapter 5, measures could be obtained systematically of the regulation of affects and drives in the modalities of action, fantasy, and language. These measures could then be related to differential changes in cognitive controls. For example, do changes in the regulation of affects by physical activity relate most to changes in focal attention, and do changes in the regulation of affects by fantasy activity relate most to changes in leveling-sharpening? If so, at what stages in development are these relationships strongest?

6. *The Issue of Whether an Immature Level of Cognitive Control Functioning is "Bad."* We also can return to the issue raised in earlier chapters of whether a developmentally immature level of cognitive control (e.g., leveling) is bad while a higher level (e.g., sharpening) is good. We have seen that leveling is "good" in response to surgery but "bad" in response to parachuting, whereas sharpening is "good" in response to parachuting and "bad" in response to surgery. Our studies support the proposal introduced in Chapter 4, that the value of a cognitive control must be addressed in terms of environmental, adaptational, and emotional considerations.

7. *The Issue of Treating Deviant Cognitive Controls.* At this point we have come full circle from the start of the book. Our goal was to develop concepts and technology that integrated cognition with personality and affect. To address this goal, we selected the biodevelopmental framework as a guide. We first constructed diagnostic tests of cognitive controls in keeping with a developmental scheme. We gathered support for the validity of the construct of cognitive controls and for the methods devised to assess them. The methods were also studied for reliability and criterion-related validity. We then observed the developmental courses followed by normal and deviant cognitive controls and the academic difficulty associated with immature controls. Last, we studied the role played by cognitive controls in concert with ego regulation of affects in long-term and shortterm adaptation. The major findings were (*a*) cognitive controls that lag in development at age 5 continue to lag throughout latency, (*b*) developmental lags in cognitive controls are associated with academic and adjustment difficulties, and (*c*) adequately organized cognitive controls play a key role in seeking and insulating information from both the external and inner environments.

On the basis of these findings, which gradually accumulated over the past decade, I became convinced of the necessity to devise methods for the direct treatment of deviant cognitive controls. If a child was experiencing school failure and emotional problems, and if he showed developmentally deviant cognitive controls, his psychological difficulty could be understood as related to the inefficiency of his cognitive control functioning, not primarily to neurotic conflicts as such. If the deviant cognitive control was a factor in the child's psychological suffering, it would follow that the pathological cognitive control used by the child in long-term adaptation should be reorganized and bought to stage expectations. If this were accomplished, then, according to our research findings, the child's adaptations would become successful, and cognitive control development would proceed along more usual lines.

But how should deviant cognitive controls be treated? In my own experience, play therapy conducted in keeping with traditional guidelines, and even altered to include an emphasis on cognitive tasks, did not appreciably modify the developmentally lagging cognitive control. Moreover, on several occasions I had the opportunity to evaluate children before and after they had been treated with child psychoanalysis, and I observed that the originally deviant cognitive controls were still more or less derailed: the children showed a better emotional and social adjustment but their difficulty with learning academic subjects persisted.

It occurred to me that reforming the structural organization of cognitive controls called for a treatment form and content that put primary emphasis on cognitive process and activity and included the issue of affects, drives, and emotional conflicts *within the scaffold provided by the cognitive activity.* In traditional play therapy these issues are usually inverted. Typically affects, feelings, fantasies, and emotional conflicts are emphasized in the treatment process, and cognitive activity is subordinate to the content of affects and fantasies. Accordingly I constructed a treatment method, cognitive control therapy, which grew out of the research and clinical observations already discussed. Although still under development, the method has proved sufficiently successful to warrant my urging clinicians to consider including it as one of their treatment approaches. Following the manuals of instruction for the tests of cognitive control, Parts IV, V, and VI are devoted to a presentation of cognitive control therapy.

10

METHODS FOR ASSESSING COGNITIVE CONTROL FUNCTIONING IN CHILDREN: A MANUAL OF INSTRUCTIONS

This chapter presents complete instructions for administering, scoring, and interpreting the procedures that make up the basic battery of cognitive control tests discussed in Chapter 4. As other chapters have reported, considerable evidence has been gathered to support the validity and reliability of these tests as developmental measures of the following cognitive control principles: the Scattered Scanning Test as a measure of focal attention, the Fruit Distraction Test as a measure of field articulation, the Leveling-Sharpening House Test as a measure of leveling-sharpening, and the Object Sort Test II as a measure of equivalence range. No formal studies have been conducted yet with the complete Body Schema-Tempo Regulation Test described below, although one subtest of this procedure, the Fine Motor Delay Test, has been included in several studies. Evidence gathered to date also indicates that these tests could be valuable to the practitioner interested in diagnosing cognitive disabilities and to the clinician investigating development and pathology in cognitive control functioning.

Despite the existence of appreciable data relating these measures to variables such as age, sex, socioeconomic status, and intelligence, it is acknowledged that the tests as a group are not “completely” standardized. Further studies are needed to include a greater number of children in the definition of age norms at each age level, and to clarify further clinical population differences in cognitive control functioning. However since the tests have been found to be sufficiently reliable and valid measures of cognitive controls, and since they have proved effective in clinical practice and in a number of clinical studies, they are described here to stimulate their use by clinicians and investigators.

I encourage clinicians and investigators to consider using the tests of cognitive controls

in their work, but I believe it is essential to use the tests ethically and appropriately, in keeping with present-day interest and concern about the use, and possible abuse, of psychological and educational tests.

Qualifications to Administer and Interpret the Battery of Cognitive Control Tests for Children. I request the user of these tests to follow the standards proposed by the American Psychological Association (1974). The user is obligated to evaluate what the test purports to measure, its content, requirements, and process, and results already obtained, and to decide whether the test meets the particular cognitive assessment needed. Furthermore, the user has the responsibility of deciding how the population to be diagnosed and the physical setting in which the testing is to take place relate to work reported in supporting studies. The examiner has the additional responsibility of establishing the appropriate physical setting and interpersonal relationship that enables a child to manage the test appropriately.

I am responsible for elaborating the standards about use and qualifications proposed by APA that relate to the particular cognitive control tests presented here. Clinical psychologists, school psychologists, special educators, counseling psychologists, psychiatrists, psychiatric nurses, rehabilitation counselors, and other related professionals, who have had formal training in administering and scoring psychological tests, should be qualified to make appropriate use of the tests presented here. Experience in administering intelligence scales and perceptual-motor tests to learning-disabled and emotionally disturbed children from early childhood to adolescence is essential and is a minimum requirement. Experience in interviewing child and adult patients and in administering personality tests is highly desirable. The latter issue emphasizes that a psychological examiner should have training and experience in establishing rapport and a working alliance with children and in appraising and managing the anxiety reactions of children that are inherent to the clinical testing situation.

Although these general caveats are self-evident to the experienced practitioner and clinical investigator, they deserve special consideration because in my opinion the use of cognitive tests is surrounded by misguided attitudes about requirements.

In working with trainees of several disciplines (psychology, special education, psychiatry) and with fully trained professionals, I have sometimes observed the attitude that cognitive testing is “straightforward,” “easy,” and “mechanical.” After all, what is so complicated about asking a child to tell you which of two circles is larger or whether a picture of a house has changed? This attitude usually exists side by side with the attitude that with procedures such as the Rorschach, personality assessment is much more complicated and requires more clinical finesse and interpersonal skill.

This point of view, unhappily, has frequently led workers to assign the administration of cognitive tests to clinically untrained graduate students and beginning psychology interns, without making available adequate training and supervision, and I have seen results obtained with one or another test of cognitive controls by inexperienced graduate students who did not have the benefit of appropriate supervision. For example, one student administered the Leveling-Sharpening House Test to a group of public school kindergarten children. The test scores obtained showed these children to be severe levelers when compared with a large number of children of the same age who had been tested by experienced examiners. Because the result could not be accounted for by some population variable, nor by factors such as the room used for testing, the most likely explanation of the finding seemed to be that the student’s lack of interviewing and testing experience, and his generally assertive style of relating, created an interpersonal atmosphere that influenced cognitive functioning.

As detailed in previous chapters, one thesis of this book is that cognitive control functioning and the regulation of anxiety and affects are in a delicate balance, and that cognitive controls shift regressively or progressively in response to stress. We reported several real-life environments that caused a shift in cognitive control functioning. Perhaps of more relevance is the observation that parachutists who first looked at a picture of a jumper in free fall leveled information more when next presented with the "neutral" Leveling-Sharpening House Test. This observation, and our studies of cognitive control shifts in short-term adaptation to stress, are pointed reminders that cognitive control functioning is very sensitive to the emotional atmosphere of the contemporary situation. Bearing this in mind, it appears that our graduate student examiner created an emotional atmosphere much like that of imminent surgery or dental work (Chapter 9), causing the children evaluated to show severe leveling as a group. Careful attention to rapport, to style of administering cognitive tests, and to the emotional atmosphere of the test situation is critical.

Last, it is assumed that the user takes appropriate responsibility in deciding whether a single test of cognitive control functioning, or a combination of tests, meets the need in question, and whether these tests should be used along with intelligence tests, personality tests, and history to meet the clinical or research needs at hand.

As the APA standards for psychological and educational tests and their users point out, in the last analysis the effectiveness of a test and the ethical use of test results in making judgments about some behavioral variable, depend upon the skill of the tester and the tester's knowledge of the instrument, its supporting data, and its relevance for the diagnostic need in question.

In the following discussions of test procedures, reference is made to cognitive therapy programs that have been devised to treat specific cognitive control deficits. These programs are described in Part V. Familiarity with the tests and supporting studies would aid the reader in examining these cognitive therapy programs, at which time it should be useful to refer again to the assessment method used to determine which aspect of the treatment program is indicated for a given child.

BODY SCHEMA-TEMPO REGULATION TEST (BSTR)

A Procedure for Assessing the Cognitive Control Principle of Body Ego—Motility

The cognitive control principle called body ego-motility defines a hierarchy of developmental levels that concern the schemes representing information perceived by the body and the regulation of tempos. The developmentally immature end of this continuum is defined by an individual who constructs global cognitive schemes that represent information perceived by the body and shows little differentiation of body tempos and little delay of motility. At the developmentally mature end, we have an individual who constructs articulated and differentiated schemes that represent information perceived by the body and shows differentiation of body tempos and much delay of motility. The Body Schema-Tempo Regulation Test (BSTR) is proposed as a procedure for assessing the unique and habitual ways a child constructs cognitive schemata or representations, of body positions, motility, and tempos. The BSTR is made up of seven subtests: (i) positions of the total body; (ii) positions of large parts of the body; (iii) positions of small parts of the body; (iv) touching small, ambiguous shapes; (v) moving the body at various tempos through the space of a room; (vi) moving a representation of the body (doll) at various tempos across the space of a table top; (vii) moving a pencil at various tempos across the space of a sheet of paper.

In general the child is asked to perform tasks defined by each part. The behaviors the child uses to manage the task are noted, and an inquiry is conducted to obtain the associations and representations assigned by the child to the behaviors.

Subtests I through IV are viewed as providing measures of body schemata and representations associated with the developmental progression from perceptions of the total body to fine touch perceptions. Subtests V through VII afford measures of differentiation and regulation of tempos and associated representations along two developmental progressions: *(a)* from movements of the total body to fine motor movements of the arm and hand, and (*b*) from movements experienced in the macrospace of the office to movements experienced in the microspace of a sheet of paper. The diagnostic questions elicited by a child's presenting problem may call for all subtests to be administered. For other diagnostic problems, particular subtests may be administered and others omitted. It is important to note that on each subtest the major interest is in the child's perceptions of his body sensations and associated images, and the child's regulation of body tempos, not in the child's motor coordination as such. The inquiry conducted after the child performs the task defined by each subtest is described first. This is followed by a description of the tasks administered in each subtest.

GENERAL METHOD

Each subtest includes three parts:

1. The child is presented with one of the following tasks: he is asked to assume a position with the total body, with a large part of the body, or with a small part of the body; and he is asked to touch ambiguous shapes, to walk across a prescribed pathway or move a doll across a prescribed pathway, or to move a pencil across an S-shaped maze.

2. The child is asked to focus his attention on and describe the body sensations and perceptions in awareness.

3. The child is asked to tell the examiner what the perceptions and sensations remind him of or bring to mind.

INQUIRY CONDUCTED DURING EACH SUBTEST

The following inquiry, consisting of six steps, is conducted after the child has experienced the body position or tempo prescribed by the subtest, or whenever possible while the experience is ongoing. The language used by the examiner in conducting the inquiry and in administering each subtest should fit the age and stage of the child and the child's language usage. The language used here is intended only to illustrate the focus of the inquiry.

Step 1. After the child has performed the task presented, say, "That's fine. Now try to notice what you feel (felt) when you are standing (have your arms out, open and close your eyes, walk across the room, etc.). Tell me what you notice about your body (arms, eyes, etc.).” Record the child’s descriptions, assist him in describing if necessary, and ask for clarifications as indicated. For example, if the child responds with “tight” or “dizzy,” ask, “How do you mean?” This will permit you to obtain as differentiated a picture as possible of the sensations the child has registered.

Regardless of whether the child responds at this step, or however elaborate or global the child’s response, proceed to the next level of inquiry.

Step 2. “What do those feelings remind you of? What do they make you think of?” Sometimes the response is a restatement of the child’s response in step 1, with the language changed somewhat (e.g., “Reminds me of feeling tight and stiff). In these cases proceed to steps 3, 4, 5, and 6 as indicated. If a child’s response here satisfies the expectations of all the following steps, the inquiry for that subtest is terminated. If the child’s response satisfies one or another of the following steps, administer only those not addressed.

Step 3. “Those feelings with your body (arms, eyes, walking, etc.) may remind you of something you remember, of something you have seen before or done before. What do they remind you of?”

Step 4. “Do those feelings remind you of a person you know or have seen somewhere? What person do they remind you of?”

Step 5. “Do those feelings remind you of an animal you have seen somewhere? What animal do they remind you of?”

Step 6. “Do those feelings remind you of things you have seen somewhere? What things do they remind you of?”

As a review of these steps guiding the inquiry indicates, the first three steps are open ended and become increasingly directive in requesting an association. The last three steps are most direct in requesting specific imagery. The broad goal of the total inquiry is to determine (*a*) the form and content of the child’s kinesthetic, proprioceptive and tactile perceptions, and (*b*) the form and content of the imagery a child associates and connects to the perceptions. If during steps 1 or 2 the child spontaneously associates to some person, animal, or thing, or to some event or situation involving a person, animal, or thing, one or the other of steps 4 to 6 is not administered. Step 3 is viewed as a more directed request for an association than is step 2, in that the examiner now refers to “something you remember, something you have seen before or done before. . . .” Steps 4, 5, and 6 should be administered regularly to each child as indicated, to determine whether imagery involving persons, animals, or things is available as cognitive referents of various body perceptions. Some children, even in response to the direct requests of steps 4, 5, and 6, can construct images of persons but not of animals and things, whereas others can construct imagery of things but not of animals or persons. These observations are helpful in planning and conducting cognitive therapy in body ego and body regulation (see cognitive therapy programs *Who Is Me, Where Is Me ?* and *Going Fast and Slow).* These observations are also helpful in formulating diagnostically the developmental status of a child’s perceptions of body positions and tempos and the associated network of cognitive schema.

THE TASKS OF EACH SUBTEST

Whenever possible, the seven subtests should be administered in the order presented here, because as noted earlier the cognitive processes enlisted by each subtest represent developmental progressions in terms of body perceptions (from the total body to finger tips) and in terms of psychological space (from the macrospace of the office to the microspace of a sheet of paper and small ambiguous shapes). The first four subtests focus on perceptions of the body and associated imagery; the last three emphasize perceptions of tempos and associated imagery. Although a given diagnostic question may be satisfied by one or another subtest (with the other omitted), we have found it useful in clinical practice, if time permits, to administer all subtests. This way the behaviors are generated along developmentally progressive steps.

Finally, with children who appear very constricted, inhibited, and nonverbal, it is sometimes useful to administer the groups of subtests of body ego (Subtests I through IV) and body tempo (Subtests V through VII) in the reserve order; that is, to start with Subtest IV (Touch Associations), then move toward Subtest I (Positions of the Total Body). Similarly, one would start with Subtest VII (Fine Motor Delay) and move toward Subtest V (Body Through Space). This technique permits the child to begin with experiencing a process that fits what is habitual and expectable for him—that is, very restricted, controlled, small body and tempo experiences in microspace. With each subtest that follows, the child is invited to shift regressively (in terms of ideal development) in experiencing total body and tempos in larger space.

Assessment of Body Ego and Associated Representations

RECORDING UNIQUE BODY BEHAVIORS

In each of these subtests, in addition to conducting the inquiry as just described, the examiner should observe and record the unique features of the child's body behavior that may relate to the degree of differentiation of body ego and the status of the child's cognitive control functioning concerning body ego. For example, when standing (Subtest I) a child may lean much weight on one leg, whether standing in his "regular way" or "at attention." Or when asked to spread his fingers (Subtest III), he may stiffen the palm and fingers but not spread the fingers apart. When joined with the descriptions and associations obtained during the inquiry, careful observation of various body styles revealed by the child often helps to determine the degree of body differentiation achieved and the extent to which these body posture qualities are tied to images and representations. Such data are useful in determining whether cognitive therapy is indicated at a given level of cognitive development, and if so, the focus the therapy should take.

Subtest I: Positions of the Total Body

A. Ask the child to stand in his "regular way." Conduct the inquiry. An attempt should be made to help the child register proprioceptive and kinesthetic sensations that for him define or make familiar this "regular" or "usual" posture. Children may describe sensations involving the back, abdomen, legs, neck, sole of the feet, and other body parts. Record the child's body position, capture if possible some unique feature (e.g., body weight on one leg, head lowered, body stiff).

B. Ask the child to stand "at attention." When making this request, avoid such images as "like a soldier." It is usually sufficient for the examiner to demonstrate when giving the verbal instructions (e.g., "Now stand at attention, like this"; examiner stands at attention without exaggerating the posture). Conduct the inquiry. In obtaining the child's perceptions, note whether and how they differ from those described in part A. Record the child's body position, noting especially unique features that distinguish the position assumed by the child from that in part A.

C. Ask the child to lie on his back. If the idea of lying on the floor makes the child too anxious, ask him to lie on a table. Conduct the inquiry. In obtaining the child's perceptions, note to what degree they are differentiated or global. For example, some children report that the back of the head, and shoulders, buttocks, and heels are pressing against the floor; others perceive and report that they can feel internal organs pressing down toward the floor; others perceive and report only that they feel "flat against the floor."

D. Ask the child to sit in a chair. Conduct the inquiry.

E. Ask the child to stand about 6 to 12 inches from a wall, with his back to the wall, and to lean back so that the feet remain away from the wall and the shoulders and head touch the wall. Conduct the inquiry. Note that this is the first request in which the child is asked to assume a position that places the body in a more dynamic state and out of balance. Record, in particular, behaviors indicating an increase in body confusion, awkwardness, and tension or anxiety.

Subtest II: Positions of Large Parts of the Body

A. Ask the child to stand and raise his arms parallel to the floor. Conduct the inquiry.

B. Ask the child to tilt his head to one side. Conduct the inquiry.

C. Ask the child to bend forward, from the waist, with arms down to his side. Conduct the inquiry.

D. Ask the child to stand on one leg, lifting the other at least a few inches from the floor.

Again parts C and D ask the child to experience the body in a more dynamic state and out of balance. Observations of affects and unique body movements and mannerisms are especially important here.

Subtest III: Positions of Small Parts of the Body

A. Ask the child to spread the fingers of both hands, to relax the hands, then to spread the fingers again. Conduct the inquiry.

B. Ask the child to open his mouth wide, close it, open it again, and so on. Conduct the inquiry.

C. Ask the child to open and close his eyes tightly. Conduct the inquiry.

Children whose body egos are globally defined often do not experience perceptions during this subtest but report only, for example, that they notice that their eyes "feel shut." In inquiring during this subtest, the examiner attempts to determine whether the child perceives and articulates sensations in the palms and fingers, in the facial muscles, tongue, and so on, or in the eyelids, nose, and so on, when each of the tasks is being performed.

Subtest IV: **Tactile Perception and Touch Association.** This subtest requires particular materials and a modification of the inquiry described previously.

MATERIALS. Ten ambiguous small, three-dimensional wooden or plastic objects; a piece of cloth approximately 2 x 2 feet. We have used the following items contained in the Twitchell 3-D Test: (1) a sphere, about ¾ inch in diameter; (2) a cube (1" x 1" x 1"); (3) a cone 2 inches high and 1 inch in diameter at the base; (4) a rectangle 1 x 2 x ¼ inch thick; (5) a "peak"; the base is 1 x 2 x ½ inch high, and the top surface has two steps, then a peak 1 inch high; (6) a "coil" resembling a miniature coil of rope, with an opening in the center; the total object is 3 inches in diameter; (7) a small, global, ambiguous shape approximately 1 inch at the base, 2 inches high, and 1 inch thick; (8) a large, global, ambiguous shape having a flat base, 2 x 3 ½ inches; the top surface is uneven, with the tallest point 2 inches high; (9) a "human figure"; this ambiguous shape resembling the head, shoulders, trunk, and legs of a person is 3 inches tall, 3 inches wide, and ½ inch thick; (10) a "small detail"; this is a cylindrical object with an uneven surface, 1 inch long and 1/8 inch wide.

INSTRUCTIONS. The child is seated at a table on which is placed a piece of cloth. The child is asked to place his hands under the cloth and take hold of the object the examiner places under the cloth. The examiner hands the child the sphere, and asks him to feel it with both hands. Then the examiner conducts the first two steps of the inquiry described previously, asking first, "What do you feel, with your fingers and hands?" The child might respond, "something round" or "something made out of wood or plastic" or "a ball." The third example falls in the category of an association. Regardless of whether the child produced associations to the first question, the examiner proceeds to step 2 of the standard inquiry, modified as follows: "That is fine. What does it remind you of? What could it be?" If the child has already given an association such as a ball, the examiner would say, "What else does it remind you of? What else could it be?" If the child does not produce an association, the examiner proceeds to step 3 of the inquiry and says, "What you are feeling with your fingers and hands may remind you of something you remember, something you have seen before. What is that?" Whatever the child's response, the examiner continues in the same way, administering the remaining nine objects in the order listed. That is, following the presentation of each object, the examiner asks only three basic questions: “What do you feel with your fingers and hands? What does it remind you of? What could it be?” And, if necessary, “What you are feeling may remind you of something you remember or something you have seen before. What is that?” (i.e., questions related to the first three steps of the inquiry).

After the 10 objects have been administered, the examiner may readminister any one of the items for which the child did not produce associations representing either a person, animal or thing. In readministering an object, the inquiry is further modified in that the three suggestions of person, animal, or thing associations are made together. In re-administering the fourth object, for example, the examiner may say, “When you felt this one the first time, it didn’t remind you of anything. Feel it again. Does it remind you of something you have seen before, or some animal or a person?” If the child is still unable to produce an association, the next object is readministered. With each object, whether during the first or second administration, the goal is to obtain at least two associations, if possible. After the child has constructed an association, if he does not spontaneously produce a second, the examiner asks, “What else could it be or does it remind you of?”

If the child is unable to construct another association, the next object is administered. With children who are especially productive in associating, we have used the practice of moving on to the next object after the child has constructed four associations.

Some children show considerable stress, anxiety, irritation, or suspiciousness because they are being asked to examine an object they cannot see. Other children take the object in hand and appear not to examine it, and they do not produce associations. For both groups of children the technique is modified as follows. The first object presented (sphere) is removed from under the cloth, after the child has taken it or if the child has refused to place his hands under the cloth to examine it. The child is permitted to see and touch the object. The examiner makes reassuring remarks as indicated, while asking the child to describe the object, and then to describe what it could be and “looks like.” The latter phrase is included during the visual and touch examinations. Following this, the child is asked to do the same thing again but now to examine the object under the cloth. The next object (cube) is then administered under the cloth. If the child’s anxiety, resistance, and suspiciousness continue, again the object is removed and the child is allowed to examine it visually and with touch. After conducting the inquiry, the third object is administered under the cloth. If the child is still unable to deal with the task, the test is discontinued at this point.

Assessments of Regulation of Body Tempos

RECORDING UNIQUE BODY BEHAVIORS

On all the following subtests, in addition to conducting the inquiry already described, the examiner should observe and record unique features of the child’s body postures and movements as he performs each task. For example, while walking across the room “as slowly as possible” (Subtest V), the child may stoop over, hold his arms tightly to his side, yet walk the distance as quickly as with his “regular” tempo. Another child may take many very short and quick steps when attempting to walk as slowly as possible. Or another child may move the pencil in zigzag fashion over the pathway of the maze (Subtest VII) when attempting to move the pencil as slowly as possible. These behaviors, when combined with the child’s associations, are helpful in assessing the degree of differentiation a child has achieved in regulating body tempos and the degree to which cognitive schemes are connected to these differentiated behaviors. Such information is very useful in determining whether cognitive training in the regulation of motility is indicated, and if so, the course and emphasis it should take (cognitive therapy program, *Going Fast and Slow).*

MATERIALS. Stopwatch; paper tape to define pathways on the floor and table top; rubber boy or girl doll about 7 inches tall; 8½ x 11 inch sheet of paper containing an S-shaped maze 21 inches long, each linear segment 7 inches long, with the starting point at the upper left and the end point at the lower right (Figure 1).

Figure 1. Body Schema-Tempo Regulation Subtest VII: Fine Motor Delay.

Subtest V: Regulation of Tempos When Moving the Body Through The Macrospace of the Office. Construct on the floor an S-shaped pathway 25 feet long (resembling Figure 1) by means of paper tape or other suitable material. Each linear segment of the pathway should be 7 feet long with two turns, each 2 feet long. In walking over the pathway, the child begins at the starting point (upper left), walks straight ahead 7 feet, turns right and walks 2 feet, turns right again, and walks straight ahead, turns left, walks 2 feet, turns left again and walks 7 feet to the end point.

DEMONSTRATION. Show the pathway to the child with its starting point and end point. It is helpful to call it “a sidewalk.” Explain that you are going to ask the child to walk on the sidewalk. Then demonstrate by walking over the pathway, commenting along the way as indicated. Say, “Look Jimmy (Sally), I want you to stand here and walk like this” (begin walking at a casual pace), “now turn here; then walk back this way; see how I stay on the sidewalk; turn here and walk back this way until you reach the end here.” Be sure that the child understands the task. When part A described below is administered, if the child seems confused, walks off the pathway, or walks directly from the starting point to the end point, demonstrate again, and emphasize key aspects of the task. Then readminister part A. If the child performs adequately, proceed to part B. If the child is still unable to perform the task, use the same procedure described below but with a 10 foot linear pathway.

A*. Regular Body Tempo.* Ask the child to stand at the starting point and to walk through the pathway "in your regular way until you reach the end" (point to end). The child is encouraged to stay on the sidewalk until he reaches the end. Conduct the inquiry.

Record postures and mannerisms of gait that are unique to the child's regulation of this tempo. Record the time the child takes to complete the walk.

B. *Slow Body Tempo.* Ask the child to stand at the starting point and to walk through the maze "as slow as you can." Explain to the child that he must always maintain forward motion; he should not stop, he should continue walking, but as slowly as he can. Conduct the inquiry. Record postures and mannerisms of gait that are unique to the child's regulation of the slow tempo. Record time taken to complete the walk.

C. *Fast Body Tempo.* Ask the child to stand at the starting point and to walk through the maze as fast as he can. Explain to the child that he is not to run, but he is to *walk* as fast as he can. Again record postures, mannerisms of gait, and time taken to complete the walk. Conduct the inquiry.

Subtest VI: Regulating Tempos When Moving a Doll Through The Microspace of a Tabletop. Construct on a tabletop an S-shaped pathway 96 inches long (resembling Figure 1), using paper tape or other suitable material. Each linear segment of the pathway should be 30 inches long, with two turns, each 3 inches long. In walking a doll over the pathway the child begins at the starting point (upper left), moves the doll straight ahead 30 inches, makes a right turn, moves it 3 inches, makes a right turn again, moves it straight ahead 30 inches, makes a left turn, moves it about 3 inches, turns left again, and moves it 30 inches to the end point.

DEMONSTRATION. Take a female or male doll, to match the sex of the patient. Point out the pathway to the child, noting the starting point, course, and end point. Place the doll at the starting point and say, "Look. I am going to walk Sally (Jimmy) on the sidewalk. I start here and make it walk [move the doll at a casual, smooth tempo across the table], then it turns here, walks back to here, turns here, and walks to the end here. See? Now I'd like you to walk the doll." Hand the doll to the child and administer part A, described below. If the child seems confused, moves the doll off the pathway, or moves the doll directly to the end point, demonstrate again. Emphasize key aspects of the task. Readminister part A. If the child handles the task, proceed with the next part. If the child is still unable to perform the task, use a single, 30 inch linear pathway and follow the same three steps described below.

A. *Regular Doll Tempo.* Ask the child to hold the doll at the starting point and walk the doll over the path "in his (her) regular way" until the end point is reached. Emphasize that the doll is to stay on the "sidewalk" until he (she) reaches the end point. Record time taken to complete the walk and unique behaviors the child uses to move the doll over the pathway. Conduct the inquiry.

B. *Slow Doll Tempo.* Ask the child to stand the doll at the starting point and to move it over the sidewalk, but as slowly as possible. Explain that the doll must always be walking forward, the doll cannot stop and the doll cannot be picked up. Repeat, "Make the doll walk from here to here, on the sidewalk, as slowly as he can." Record time taken to complete the walk and unique behaviors the child uses in moving the doll. Conduct the inquiry.

C. *Fast Doll Tempo.* Ask the child to stand the doll at the starting point and to move it over the sidewalk "as fast as the doll can walk." Emphasize that the doll is not to run but must walk as fast as possible. Record time taken and unique behaviors the child uses to move the doll. Conduct the inquiry.

Subtest VII: Regulating Tempos When Moving a Pencil Through the Microspace of a Sheet of Paper. Seat the child at a table. Place before the child a pencil and a sheet of paper containing the maze shown in Figure 1.

DEMONSTRATION. Take the pencil and draw a stick figure at the starting point; say, "Do you see this boy (girl)?" Point to the stick figure at the start of the pathway and say, "He wants to walk over here." Draw a stick figure at the end of the pathway. "I'll take the pencil and draw a line on the sidewalk, so he walks from here until he reaches the end. Watch." Draw a line at a casual tempo in the center of the pathway, commenting as indicated. For example, "See you walk to here, then turn; then walk back again—see how I stay in the middle of the sidewalk—then I turn again and walk to the end."

A. *Regular Pencil Tempo.* Place another maze before the child, draw a stick figure at the start and say, "Now you do it. Draw a line from here to here in your regular way, so the boy (girl) reaches the end." Start the stopwatch at the moment the child begins to draw the line, and stop it when the child reaches the end of the pathway. Record time in seconds and the unique behaviors the child uses in moving the pencil. Conduct the inquiry. If the child performs the task adequately, administer B. If not, administer a training trial.

TRAINING TRIAL. Say, "Let me help you, so you know what I mean." Ask the child to hold the pencil; then take the child's hand and move it across the pathway from start to end, saying, "See how we draw a line on the sidewalk. We stay on the sidewalk until we reach here." After training the child to draw a line on the pathway, place another test form before him and say, "Now do it again all by yourself. Draw a line from here to here on the sidewalk." If the child performs adequately, continue with the next part. If the child seems confused, draws lines at random, or draws a line from the start directly to the end, use a maze consisting of a single, linear, 7 inch pathway and follow the same procedure described here.

B. *Slow Pencil Tempo.* Remove the test blank, place another one before the child, and say, "I want you to do that again. But this time make the boy (girl) walk as slowly as he (she) can. Be sure that he keeps walking. Be sure that your pencil keeps moving. But move it as slowly as you can. Don't stop and don't pick up the pencil. Make sure the boy keeps walking to the end, but as slowly as he can. Do you understand? Go ahead." Again record time taken and unique behaviors the child uses in moving the pencil over the pathway. Conduct the inquiry.

C. *Fast Pencil Tempo.* Remove the test blank and place another before the child and say, "I want you to do it once more. Now the boy (girl) walks as fast as he (she) can on the sidewalk. He must not run; he has to walk, but as fast he can." Record time and unique behaviors the child uses in moving the pencil at this tempo. Conduct the inquiry.

Scoring System

PART I: ASSESSMENT OF BODY EGO AND ASSOCIATED REPRESENTATIONS

Two classes of data are made available by the first four subtests. One concerns observations of the unique behaviors the child uses in assuming the various body positions requested, of expressions of affect that accompany these body experiences, and of the degree to which the child describes perceptions of kinesthetic and proprioceptive sensations. The second class of data concerns the images and associations the child produces during the inquiry or spontaneously. In terms of the first set of data, we have noticed whether a child assumes the posture requested with smooth, organized behaviors or shows confused, discontinuous, disorganized behaviors. These observations are then examined together with the perceptions of kinesthetic and proprioceptive sensations the child is able to describe. For example, one child who was not retarded or brain damaged moved to the floor to assume the lying position with asynchronous movements. He lowered his left knee to the floor, while leaning his body weight to the right side; then he placed his hands on the floor behind his back; then he leaned forward and placed his hands on the floor in front of him; then he placed his right knee on the floor, lowered his trunk to the floor by bending his elbows, and rolled over. Children with well-defined and well- organized body ego seem to accomplish this task by kneeling, then sitting, then leaning back and lying down. During the inquiry, the poorly coordinated child could describe only a global perception of "feeling flat on the floor." When his attention was directed to the back of his head, small of the back, and so on, he could not differentiate and register perceptions at these parts of the body. Until extensive age norms are compiled, the clinician will need to gain experience with the method with various age groups and clinical populations to conclude whether a given patient shows evidence of body ego that is significantly more global and undifferentiated than expected for that age.

To utilize the child's associations gathered during the inquiry, we are now developing a formal scoring system that assigns numerical values along three dimensions: (1) the degree of differentiation the image reveals (e.g., when spreading fingers, one child associates to a dish, another to the spokes on the wheel of a bicycle); (2) whether the image the child constructs is proximal (here and now) or distal (there and far away), with the child as the referent [e.g., while standing, the child associates to a lamp stand in the office (proximal), another to a picture of a guard standing before a castle in London (distal)]; (3) the degree to which the image connotes a static state or dynamic state (e.g., while standing at attention, a child associates to a telephone pole, another to a swimmer diving into water; while lying, one child associates to falling asleep, another to an astronaut soaring through space in a rocket).

We are also exploring a system to examine the content of the representations psychodynamically in terms of whether they show a predominance of impulse expression associated with one or another of the psychosexual stages. In addition, the representations can be used to draw inferences about the psychodynamic content of a child's self-esteem insofar as it draws on body associations. For example, the majority of associations produced by one child incorporated some form of impairment (e.g., broken branches, a telephone pole that had been toppled by a storm, and a prisoner tied to a chair).

Special note should be taken of the degree of directness required during the inquiry to obtain an association. The child who associates during steps 1 or 2 of the inquiry, and whose associations are relatively differentiated, indicates that a fairly elaborate and available network of cognitive schema and representation are tied to body perceptions. For the child who produces few global associations and only in response to steps 4, 5, and 6 of the inquiry, stable articulate cognitive images are not tied to body perceptions.

The clinician who makes frequent use of Rorschach testing may find the Touch Association Test a helpful supplement. Some children whose Rorschach responses are banal and global produce more elaborate dynamic imagery in response to touching objects. This finding suggests that the child's cognitive schemes are tied more to sensorimotor experiences and to the action stage than to the fantasy, representational stage. Other children who have prematurely advanced to the fantasy stage, after a brief action stage, show elaborate Rorschach images. For a discussion of the constriction and inhibition of sensorimotor, action imagery and the relation between action and fantasy modes of experiencing and expressing affects and impulses, see Santostefano (1970).

PART II: ASSESSMENT OF REGULATION OF TEMPOS

On the three subtests assessing the regulation of body tempos, the time scores and associations observed during the regular, slow, and fast tempos are compared. Typically children who lag significantly in the body ego-motility cognitive control show little or no time differences between regular, slow, and fast, and produce no or few global images representing the various tempos. These children could be appropriate candidates for the cognitive therapy program *Going Fast and Slow.*

Furthermore, observations of time scores and associations should be compared in terms of the three developmental levels at which the regulation of tempos is experienced by the child. When walking over the pathway on the floor, for example, one child may show adequately elaborate associations and large time differences between the regular, slow, and fast tasks, yet he may have difficulty in regulating tempos on the microspace of a desk top or a sheet of paper, showing impoverished associations, as well. Children like this may require therapy in the regulation of tempos in microspace only. Conversely, some children show stage-appropriate regulation of tempos in microspace but reveal considerable difficulty and stress when attempting to achieve the same control in macrospace. Frequently they are making use of inhibition and constriction in maintaining an adjustment, and this defensive style is vulnerable if macrospace must be negotiated. Cognitive therapy here would focus on the regulation of tempos in macrospace.

SCATTERED SCANNING TEST (SST)[15]

A Procedure for Assessing the Cognitive Control Principle of Focal Attention

The cognitive control principle of focal attention concerns the manner in which an individual directs attention at and scans a stimulus field. The scanning activity results in registering the properties of information. As discussed earlier, the developmentally immature end of this continuum is represented by an individual who habitually directs his attention passively and at narrow segments of the informational field. At the developmentally mature end is an individual who habitually directs his attention actively and broadly at wide segments of the informational field. It should be noted that in the proposed hierarchy of cognitive controls, focal attention follows the principle of body ego-tempo regulation in the developmental progression from sensorimotor activity and the regulation of motor tempos to the dominance of cognitive activity and conceptual management of information. In focal attention functioning, therefore, motility is subordinated, regulated, and integrated into the process of directing acts of focal attention at a field information.

GENERAL METHOD

The Scattered Scanning Test (SST) is proposed as procedure for assessing the focal attention cognitive control in children. The child is asked to scan a sheet of paper (8½ x 11 inches) containing 50 geometric shapes randomly arrayed, and to mark with a pencil, as quickly as possible, the circles and crosses among the shapes. Because this test method includes a fine motor response in the process (marking shapes with a pencil) as well as focal attention, a preliminary procedure, the Motor Tempo Test (MTT), is included in the assessment. In the MTT a child marks in succession nine geometric shapes arrayed in one row and nine in another (Figure 2). In this way a measure is obtained of the motor tempo a child employs in marking shapes. This measure is used when scoring performance with the SST, to subtract the motor component from the performance.

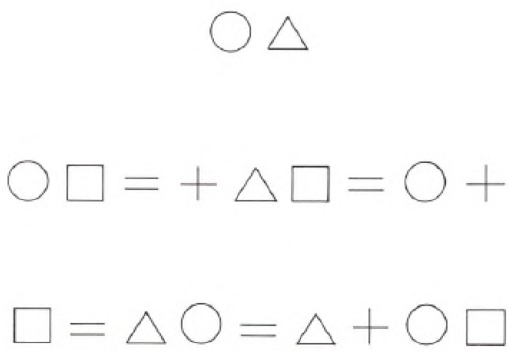


Figure 2. Motor Tempo Test.

Children from about 2.5 to 4 years of age, as well as older children who are retarded or severely impaired in focal attention, sometimes find the requirement of marking both circles and crosses too complex. In these cases, an alternate and parallel task is used in which only squares are to be marked. Children from about the age of 8 or 9 years sometimes find the requirement of marking 20 circles and crosses scattered among 30 other shapes too simple, and they mark all the circles and crosses before the time limit of 30 seconds has expired. An alternate form is administered to them, consisting of a larger sheet of paper (15½ x 21 inches) on which are arrayed randomly 200 of the same geometric shapes, including 40 circles and 40 crosses. On both the simpler squares task and the larger circles and cross form, the child is asked to mark the shapes designated, as quickly as possible, during the time limit of 30 seconds. A training trial is administered before each test task to insure that the child understands the requirements.

The general procedure of the SST is as follows: (1) the Motor Tempo Test is administered; (2) the training trial for the circles and crosses task is administered; if the child is unable to complete the task, a training trial using the simpler squares task is administered (note: the examiner may begin with training for the squares task if indicated by clinical symptoms); (3) SST Test Form 1 is administered (or Test Form 2 for older children), for either the squares task or the circles and crosses task. While the child works with the test form, the examiner records the sequence of the child's markings on an identical test form. The examiner stops the child's work after 30 seconds. If the child completes SST Test Form 1 in less than 30 seconds, the examiner should administer SST Test Form 2. Some children who handle the circles and crosses training trial adequately show confusion when dealing with the test form; for example, they mark all the shapes, scribble over the paper, or mark one shape many times. In these cases the examiner may shift to the lower level of the test, training and administering the squares task. Note that SST Test Form 1 is used for both the squares task and circles and crosses task. If a child completes the squares task with Form 1 in less than 30 seconds, the examiner does not administer Test Form 2 with the squares task. Rather, the child is trained in the circles and crosses task and Test Form 1 is administered, requesting that circles and crosses be marked.

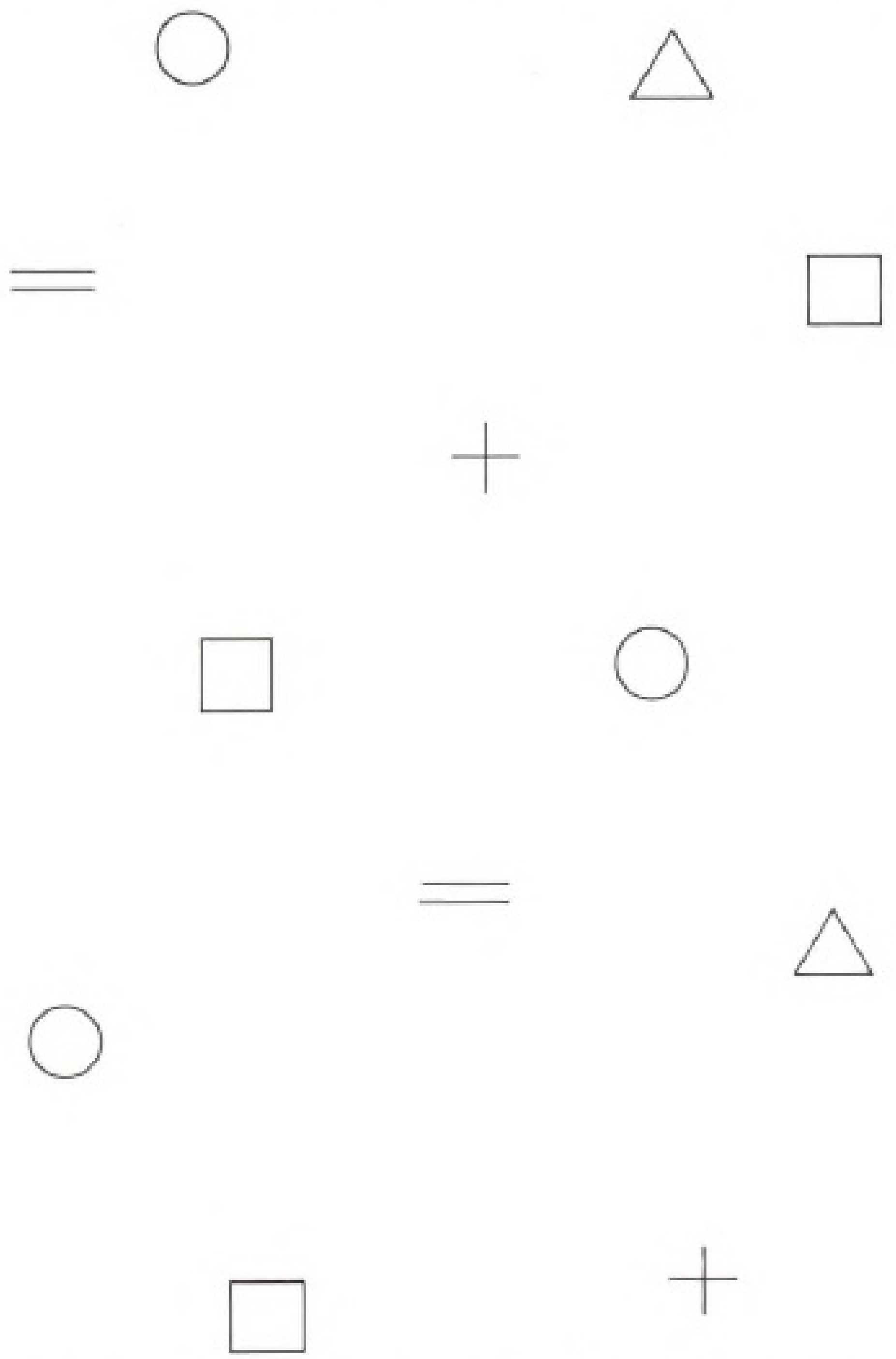


Figure 3. Scattered Scanning Test, squares task, training trial.

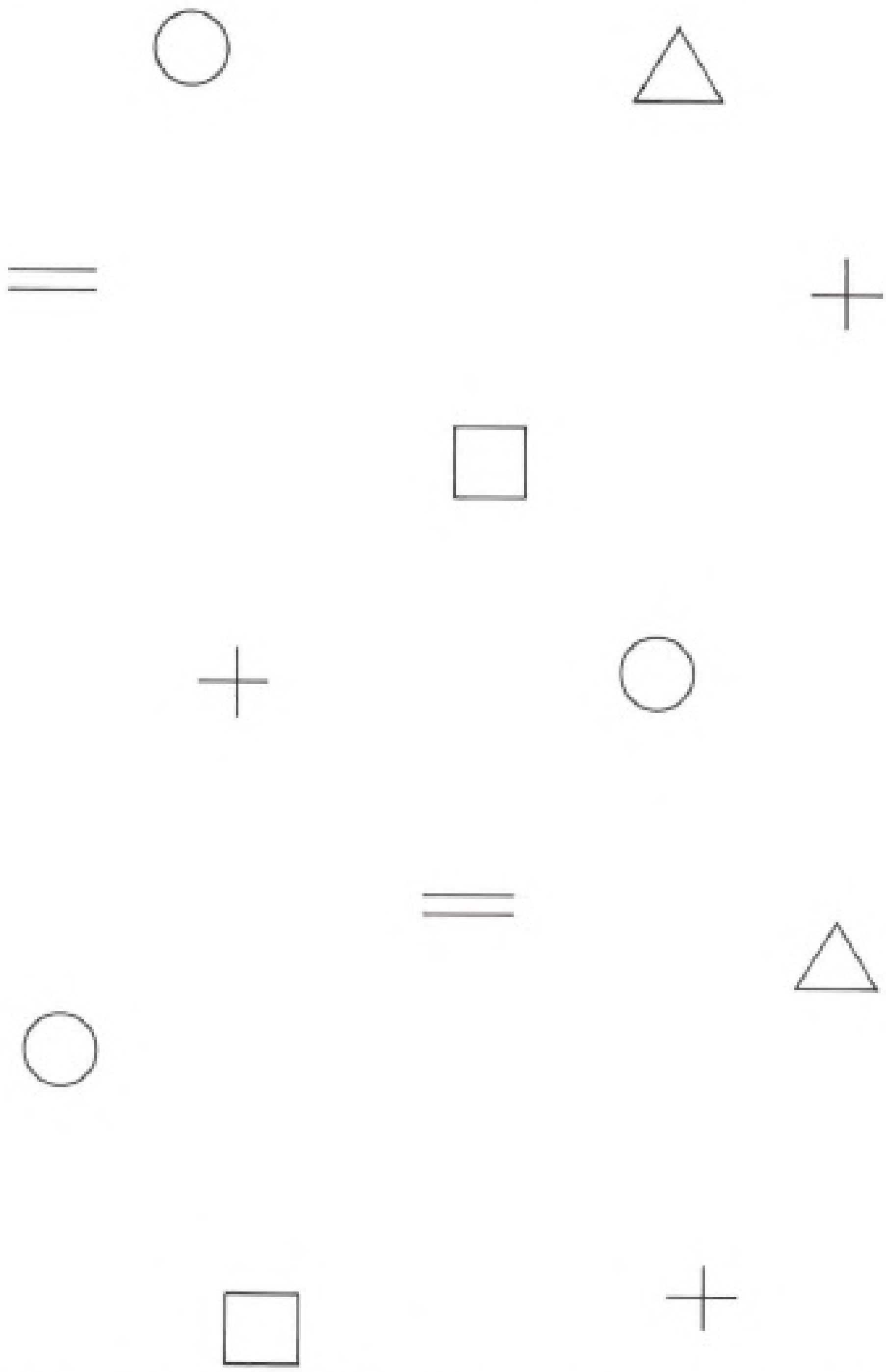


Figure 4. Scattered Scanning Test, circles and crosses task, training trial.

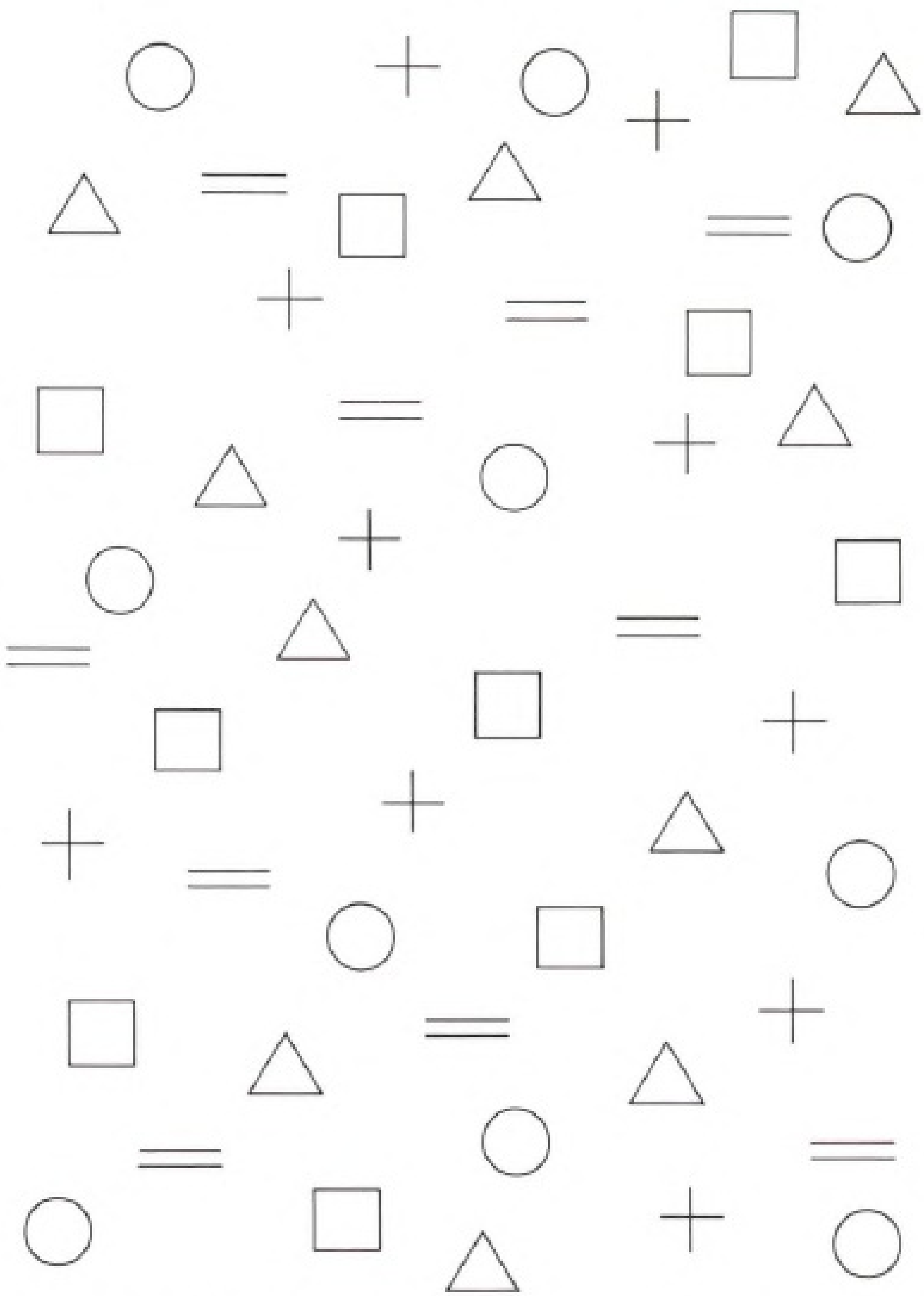


Figure 5. Scattered Scanning Test Form 1 (for squares task and circles and crosses task).

Materials. Motor Tempo Test form; circles and crosses training form; squares training form; SST Test Forms 1 and 2; stopwatch; pencil (see Figures 2 to 5, and Figure 2*A-B* of Chapter 4).

Instructions. The Motor Tempo Test is administered first, then a training trial in the squares task or the circles and crosses task, and then a test trial in either. Seat the child comfortably at a suitable table.

MOTOR TEMPO TEST. Place the Motor Tempo Test form before the child and say, pointing to the figures in the first row, “See this circle, and square, and two lines, and cross, and triangle.” For preschool and kindergarten children, it is usually helpful to label, and point to, each of the first four or five figures. For the older child, who has shown by his performance with other tests that he is further along in cognitive development, it may be sufficient to point to the figures in the first row and say only, “Do you see all these shapes?” before continuing with the instructions.

Next the examiner says, “Take your pencil and make a mark on each shape like this.” Demonstrate by making a short, vertical pencil line from top to bottom, through the circle at the top left-hand side of the form. Then ask the child to mark the sample triangle at the top right-hand side of the form. “You do the same thing. Take your pencil and mark that” (pointing).

When the child has performed the response say, “Good. Now mark all these with your pencil.” Point to the circle at the start of the first row and say, “Make a mark on this, and then on this” (point to the square), “and on this” (point to the parallel lines), “and on each shape in this row. Mark them in your regular way—not slow and not fast, but in your regular way. Then start here” (point to the square at the start of the second row) “and mark all the shapes in this row until you reach here.” (Run your finger along the bottom row to the square at the far right.)

Then, for review, point again to the circle at the start of the first row and say, “Start here and mark each shape, one after the other. Do not skip any, and go along in your regular way until you reach here.” (Point to the square at the end of the second row.)

It is important with this test that the stopwatch *not* be displayed in an obvious way. The presence of a stopwatch suggests to some children that they are expected to “race.” Keep the stopwatch in the palm of your hand out of view while giving the instructions. Remember that the Motor Tempo Test is intended to provide a measure of child’s *usual and habitual* pace with a simple perceptual-motor task.

Some children who indicate initially that they understand the task may show, after beginning, that they do not understand what the test expects. For example, some stop after marking a few shapes; some skip around, marking the various shapes at random; some will draw a continuous line through several shapes or the entire row, and others may make an "X” on each shape or may scribble on each shape.

These performances, and others like them, would not provide a measure of the process in question, namely, a child’s “normal tempo” in making short pencil strokes, one after the other, on a series of 18 shapes. When the child does not perform as expected, interrupt him in a way that does not interfere with rapport, and indicate that you would like to show him again “how the game goes.”

Then using the same form (or another if necessary), demonstrate more completely by marking each of the shapes in the first row, then in the second row, at a pace that mimics the child's as much as possible. Say, "Look, you start here; put a mark on this one; and then this one without skipping, and so on. You keep going until you reach the end."

Readminister the test. If the child again shows that he cannot perform the task, discontinue the test.

SCATTERED SCANNING TEST. Instructions for the squares task are given first, followed by those for the circles and crosses task. As noted in the introduction, the squares task is used for children from ages 2.5 to 4 years, for retarded children, children with severe attentional problems, and children with severe emotional problems. The circles and crosses task is used for children from the age of 4 years to adolescence—Form 1 is for children from 4 to about 9 years of age, and Form 2 for children from 9 years of age to adolescence. Form 2 is also is also appropriate with adults. If the more simple squares task has been used, and the child's performance indicates that the circles and crosses task would yield more information concerning focal attention functioning, the examiner should proceed with that task.

Scattered Scanning Test: Squares Task

FIRST TRAINING TRIAL. Place the practice form (Figure 3) before the child and say, "Do you see this sheet of paper? It has a lot of shapes on it." (pointing) "See, here is a square. Here is a circle. Here is a triangle. Here is a cross, and here are two lines." The examiner may modify these labels to suit the developmental status of the child, if he feels it would help the child focus on the shapes and articulate them. For example, the triangle could be labeled a "Christmas tree," the square "a box," and the parallel lines "a sidewalk." Continue by saying: "I want you to look all around this sheet of paper and put a mark on all the square boxes you can find like this." The examiner demonstrates by putting a single vertical pencil mark on the square located near the center of the page. "Do you see? Go ahead and look around the page and put a mark on other squares you can find." If the child locates and marks the other two squares, administer the test trial.

SECOND TRAINING TRIAL. If a correct response is not obtained, the examiner places the pencil in the child's hand and guides the hand so that the two remaining squares are marked. Appropriate remarks are made, such as "Do you see? We are putting a mark on the square with the pencil. This is a square and we mark it like this." Remove the practice sheet and place another before the child and say, "Here is another page. Now you mark the squares by yourself. Look for all the squares." If the child marks at least one square purposefully, say, "That's fine," and administer the test trial. If the child does not respond correctly, discontinue the test.

TEST TRIAL. The examiner places Test Form 1 (Figure 5) before the child and says, "Let's do that again. I want you to look for squares and mark them as fast as you can. Here is another page with a lot of the same designs on it. Look around for squares; put a mark on all the squares you can find as fast as you can. Do you understand?" (Clarify any questions.) "Ready! Go ahead! Keep looking until I say stop." *The examiner stops the child after 30 seconds.*

While the child marks the squares, the examiner records the sequence of the child's markings on a separate protocol, writing the number 1 on the first shape the child marks, the number 2 on the second, the number 3 on the third, and so on. It is helpful to point out before the test trial begins that the child has a page to work on and the examiner has a copy of the same page "to keep track of which squares you mark." Unless this detail is discussed in advance, some children stop during the task to ask the examiner, for example, why he is marking a page, too. As a general guideline to decide whether the circles and crosses task should be administered, we select this more complex task if the child marks 8 of the 10 squares on the form or marks more correct than incorrect shapes.

Scattered Scanning Test: Circles and Crosses Task. Place the circles and crosses practice form (Figure 4) before the child, and a pencil. Regardless of whether a child has been administered the squares task, he is administered the following demonstration and training trials. Say, "Do you see this sheet of paper? It has a lot of shapes on it." (pointing) "See, here is a square, here is a circle, here is a triangle, here is a cross, and here are two lines. Look all around this sheet of paper and put a mark on all the circles and crosses you can find like this." The examiner demonstrates by putting single vertical pencil marks on the circle and on the cross located in the center of the practice page. "Now you do the same thing; go ahead and look all round the page and put a mark on all the circles and crosses you find." If the child has worked with the squares task, say, "Now the game is different. We mark the circles and crosses, not the squares," or make similar remarks to help the child understand the change in task.

If the child stops after marking only one or two symbols, the examiner says, "Look around some more and see if you can find others." If the child correctly marks the two circles and two crosses contained in a practice form, administer the test trial. If the child marks other symbols (i.e., in addition to correct ones), if he scribbles, if he does not respond, or if he indicates that he does not understand the task sufficiently, administer the training trial.

TRAINING TRIAL. One goal in the training session is to ensure that the child recognizes and comprehends the various geometric shapes and that he comprehends the task of marking circles and crosses with a single pencil stroke. If the child marks the shapes with an X, draws a circle around the shapes, or uses any other type of marking, the examiner asks the child to stop and teaches him that he is required to make only a single pencil mark [e.g., "Jimmy, you don't have to mark the circle with an X, just put one mark on it like I did here.'' (points to demonstration item)]. Place the pencil in the child's hand and say, "Here, let me help you so you understand what you do with this game." Place another practice sheet before the child. Take the child's hand and move it through a correct response (i.e., marking the circle and the cross in the center of the page). Say, for example, "See, watch how we do it. See, we put a mark on this circle and on this cross." After guiding the child through the two correct markings (a circle and a cross) say, "Look around for other circles and crosses and put a mark on them." If a child successfully locates the remaining four correct symbols *(and* if he has *not* also marked more than two incorrect symbols), administer the test trial. If the child marks as many incorrect symbols as correct ones, or if his response indicates in some way that he cannot perform the task, discontinue the test.

TEST TRIAL. After the child has successfully completed the practice sheet and demonstrated an understanding of the task, the examiner removes the practice sheet, places the SST Test Form 1 (Figure 5) before the child, and says, "That's fine, now here's another page with a lot of the same shapes on it. Let's do the same thing again. But this time I want you to look for circles and crosses and mark them as fast as you can. Do you understand?" (Clarify questions.) "Be sure to look all over the page and go as fast as you can. See how many you can find until I say stop. Ready! Go ahead!"

The examiner starts the stopwatch when he says, "Go ahead!" and stops the child after 30 seconds, making no comments if during the test trial the child has marked symbols other than circles and crosses, or has used markings other than a single vertical line. Again, while the child marks the circles and crosses, the examiner records the sequence of the child's markings on a separate protocol, writing the number 1 on the first shape the child marks, the number 2 on the second, the number 3 on the third, and so on. Before the test trial begins, the examiner should point out to the child that they both have test forms, so the examiner can "keep track of which circles and crosses you mark."

As noted earlier, if the child completes Test Form 1 in less than 30 seconds and with only one or two incorrect markings, the second form is administered. When introducing Test Form 2, say, "That's fine, you finished before the time was up. Let's try that again to see how many you can find when there are more shapes on a bigger sheet of paper." Place Test Form 2 before the child. "See, this page is bigger and has more shapes. When I say 'Go ahead,' mark circles and crosses as fast as you can until I say 'Stop.' Ready! Go ahead!" For children who were not administered Test Form 1, of course, these comments are not necessary. Children 8 or 9 years old, or short children, may find it difficult to scan the entire page of Test Form 2 while sitting. Therefore, whenever indicated, the child should be asked to stand while completing this task.

Whether working with Test Form 1 or 2, some children, mark shapes relatively rapidly. The examiner needs to acquire practice in tracking and numbering the shapes marked. Indeed, when older children deal with Test Form 2, it is sometimes impossible for the examiner to number each shape marked in succession. In these cases, the examiner should number the first shape marked by the child and then, by drawing a continuous lines, follow the general course of the child's markings. Be sure to note the last shapes marked by the child at 30 seconds. Then ask the child to help you reconstruct the sequence of markings. Using the child's protocol, number the shapes on the examiner's protocol, using the continuous line as a general guide. In most instances the sequence of markings can be reconstructed relatively accurately. In some, where the child has marked many shapes and has hopped from one end of the page to another, only a gross approximation of the exact sequence can be achieved.

SCORING AND INTERPRETATION

Six scores are used: (1) number of correct shapes, (2) number of incorrect shapes marked, (3) total distance, in centimeters, covered by the sequence of shapes marked, (4) mean distance covered by the sequence of shapes numbered, (5) SST ratio I, which relates the motor tempo task to the number of squares or circles and crosses marked;

and (6) SST ratio II, which relates the Motor Tempo Test task to the total distance covered in marking squares or circles and crosses.

1. *Number Correct.* This score is the number of squares (with the squares task) or the number of circles and crosses (with the circles and crosses task) the child marked within 30 seconds.

2. *Number Incorrect.* This score is the number of shapes, other than squares, or circles and crosses, the child marked within 30 seconds.

3. *Total Distance Score.* Draw a line connecting the first shape marked with the second shape marked, another line connecting the second shape with the third, and another connecting the third shape with the fourth shape marked, and so on, until a line connects with the last shape marked. Measure the length of each line in centimeters and total the lengths of all lines. The score is this totaled distance in centimeters covered by the shapes marked. Note that this distance includes incorrect markings.

4. *Mean Distance Score.* This score is the total distance in centimeters divided by the total number of shapes marked (correct and incorrect).

5. *SST Ratio I* (active-passive scanning). Multiply the number of seconds the child took to mark each of the 19 shapes of the Motor Tempo Test times the number of correct shapes marked with the squares task or the circles and crosses task. The Motor Tempo time is set as a decimal. For example:

Motor Tempo Time	Number Correct	Ratio I Value
25 seconds	11	= .25 x 11 = 2.75
40 seconds	11	= .40 x 11 = 4.40
11 seconds	11	= .11 x 11 = 1.21
20 seconds	15	= .20 x 15 = 3.00
20 seconds	10	= .20 x 10 = 2.00
20 seconds	18	=.20 x 18 = 3.60

By multiplying by MTT time, the motor aspect of the response (i.e., marking a shape with a pencil) is taken into account, and the investigator is able to evaluate the focal attention aspect of the response more effectively. It can be seen from these examples that the higher the ratio value, the greater the activity of scanning. For example, compare a child who marked 11 circles and crosses and also showed a tempo of 25 seconds with the MTT, and a child who marked the same number of circles and crosses and showed a tempo of 40 seconds with the MTT. The second child marked as many shapes as the first, in spite of having a habitually slower motor tempo. Therefore, a greater degree of activity in visual scanning is reflected in the ratio of 4.40 for the latter versus 2.75 for the former. The same reasoning would apply to a children who show the same motor tempo and mark different numbers of correct shapes.

6. *SST Ratio II* (narrow-board scanning). Multiply the number of seconds the child took to mark each of the 19 shapes of the Motor Tempo Test times the total distance in centimeters covered by the sequence of shapes marked in either the squares task or circles and crosses task (item 3). The MTT time is set as a decimal. For example:

Motor Tempo Time	Total Distance (cm)	Ratio II Value
25 seconds	150	=.25 x 150 = 37.50
40 seconds	150	=.40 x 150 = 60.00
20 seconds	100	=.20 x 100 = 20.00
20 seconds	130	=.20 x 130 = 26.00

Again, by multiplying by MTT time, the motor aspect of the test response is taken into account, and the value reflects more of the child's focal attention functioning. These examples indicate that the higher the ratio value, the broader the scanning, and the lower the value, the more narrow the scanning.

INTERPRETATION

The number of correct shapes marked is interpreted as reflecting the degree of passivity or activity that characterizes the child's focal attention functioning. Using SST ratio I, a low value would reflect passive attention deployment and a high value, active attention deployment. On the other hand, the total distance covered by the sequence of shapes marked is interpreted as reflecting the degree of narrow or broad scanning characterizing child's focal attention functioning. Clearly if a child marks shapes in succession that are clustered near each other, the distance covered by this sequence would be small, as opposed to the distance produced by a child who marks one shape at the top left, the next a shape at the bottom right, the next a shape to the far left side, and so on. Using SST ratio II, a low value reflects narrow scanning, and a high value, broad scanning.

Other qualitative aspects of the child's performance during the SST are helpful in diagnosing the developmental status of a child's focal attention functioning. For example, a child may mark a series of six or seven circles and then a series of six or seven crosses. This performance is viewed as representing a developmentally lower level of the process, since the child is restricting his focal attention to one stimulus rather than scanning broadly and freely, detecting circles and crosses along the way. Also, it is our experience to date that up to about the age of 8 or 9 years, children typically scan and mark shapes in a "random sequence." After this age level, some children show orderly attention deployment in marking shapes from left to right along the top of the page, then from left to right along the next "segment" of the field, and so on until the lower section of the page has been scanned.

Thus it is diagnostically significant if a kindergartener, a first grader, or a second grader, shows this systematic quality of focal attention. When examined in terms of typical children, this behavior, seen at these younger ages suggests a premature constricting and ordering of focal attention functioning. Orderly attention deployment is observed in young children who show the beginning of an obsessional neurosis or neurotic inhibition, although it also appears in children without these personality attributes. From the viewpoint of development espoused here, such children, obsessively neurotic or not show that the focal attention control is compromised and serves to insulate them from using available information freely and extensively.

THE FRUIT DISTRACTION TEST (FDT)

A Procedure for Assessing the Cognitive Control Principle of Field Articulation[16]

The cognitive control principle of field articulation concerns the manner in which a person deals with a stimulus field containing information defined as relevant and irrelevant in terms of the requirements of the task. The hallmark of this control, therefore, is *selective* deployment of attention, and in its process it emphasizes that attention is to be withdrawn and withheld from irrelevant information and directed at and sustained on relevant information.

As discussed earlier, the developmentally immature end of this continuum is represented by an individual who significantly directs attention at and sustains attention on both relevant and irrelevant information, with the result that his performance with the central task is disrupted and less efficient. The developmentally mature end of this continuum is symbolized by an individual who withdraws and withholds attention from irrelevant stimulation and selectively directs and sustains attention on relevant information. Accordingly, his performance with the central task is efficient and not disrupted. In the proposed developmental hierarchy of cognitive control principles, the process of field articulation subordinates and integrates the developmentally earlier processes of tempo regulation and focal attention.

The Fruit Distraction Test (FDT) was devised as a procedure for assessing the cognitive control principle of field articulation with children. The FDT has been used with children from the ages of about 3 to 15 years. With older children of average or better intelligence, the task requirements may be too simple to provide meaningful samples of field articulation behavior. Since the test was designed to parallel to some extent the Stroop test (see Gardner et al., 1959), we suggest that the Stroop test, which requires reading words, be used with older, normal and clinical populations. The FDT requires that the child be able to recognize and name primary colors. If there is some question about an individual’s color perception, the Dvorine Color Plates Test, or other suitable procedure, should be administered first. A parallel form of the FDT is being developed which does not requirement color perception. Clearly the present instrument is not suitable for children who are color blind.

MATERIALS

The materials consist of four test cards, each 10 x 15 inches, and three practice cards, each 1 x 10 inches, used to train the child in the requirements of the test. The protocol used to record the child’s response appears in Figure 6 (see also Figures 4, 5, 6 and 7, Chapter 4).

Test Card I. On Card I are arrayed 50 bars, each approximately ½ x 1¼ inches. Each bar is colored one of the primary colors: red, green, yellow, or blue. There are 12 yellow or green, bars and 13 blue or red bars. The 50 bars are arrayed in 10 rows, 5 bars in each. The location of bars was determined by random assignment.

Practice Card I. Five bars are arrayed, presenting each of the four primary colors at least once.

Test Card II. On Card II are arrayed 50 line drawings of apples, bananas, grapes, and heads of lettuce, each covering an area of approximately 1 x 1¼ inches and each colored correctly with one of the primary colors, (i.e., the apples are red, the heads of lettuce green, the bananas yellow, and the grapes blue). The 50 drawings are arrayed in 10 rows, 5 fruits in each. The arrangement of colors in rows and columns matches the arrangement of Card I.

Practice Card II. Five fruits are arrayed, presenting each of the four fruits at least once and each of the primary colors.

Test Card III. Card III contains apples, bananas, grapes, and heads of lettuce colored and arranged just like those on Card II. In addition, to one side of each fruit is one of the following line (achromatic) drawings: a cake, an ice cream cone, a bottle of milk, a spoon, a glass, a loaf of bread (food-rel ted objects); and a chair, a car, an airplane, a shoe, a telephone, a clock (non-food-related objects). Each of these drawings covers an area approximately ½ x ¾ inch. In the task presented to the child, these drawings are defined as irrelevant and as distractions. Each "irrelevant object" appears four times on the card, once with each of the four colored fruits. Their arrangement is random. No practice card is used with this test card.

Test Card IV. Card IV contains the same order and arrangement of fruit as Cards II and III. However the four fruits and the four primary colors are combined incorrectly. That is, apples appear colored yellow, or green, or blue (four times each color) but not red. Bananas appear colored green, or blue, or red (four times each), but not yellow, and so on.

Practice Card IV. Five fruits, all colored incorrectly, are arrayed in a row.

Name ______________ Date ______________ Subject group ______________ Age ______________

Part I: Color bars

					Time (seconds)
Yellow	Green	Blue	Blue	Red	
Yellow	Yellow	Blue	Green	Green	______
Red	Green	Yellow	Red	Blue	
Yellow	Yellow	Red	Green	Green	______
Yellow	Red	Blue	Yellow	Green	
Red	Green	Yellow	Blue	Green	______
Blue	Red	Yellow	Green	Blue	
Red	Red	Green	Blue	Green	______
Red	Yellow	Red	Blue	Red	
Blue	Blue	Yellow	Blue	Red	______

Observations: Total time: ______________

Part II: Fruit colored correctly

					Time (seconds)
Yellow	Green	Blue	Blue	Red	________
Yellow	Yellow	Blue	Green	Green	________
Red	Green	Yellow	Red	Blue	________
Yellow	Yellow	Red	Green	Green	________
Yellow	Red	Blue	Yellow	Green	________
Red	Green	Yellow	Blue	Green	________
Blue	Red	Yellow	Green	Blue	________
Red	Red	Green	Blue	Green	________
Red	Yellow	Red	Blue	Red	________
Blue	Blue	Yellow	Blue	Red	________

Observations: Total time: ________

Part III: Fruit colored correctly and distractions

					Time (seconds)
Yellow	Green	Blue	Blue	Red	______
Yellow	Yellow	Blue	Green	Green	______
Red	Green	Yellow	Red	Blue	______
Yellow	Yellow	Red	Green	Green	______
Yellow	Red	Blue	Yellow	Green	______
Red	Green	Yellow	Blue	Green	______
Blue	Red	Yellow	Green	Blue	______
Red	Red	Green	Blue	Green	______
Red	Yellow	Red	Blue	Red	______
Blue	Blue	Yellow	Blue	Red	______

Recall of peripheral figures:

Observations: Total time: ______

Part IV: Incorrect colors (color in parentheses is color printed on card)

					Time (seconds)
Yellow (green)	Green (red)	Blue (yellow)	Blue (yellow)	Red (blue)	
Yellow (green)	Yellow (blue)	Blue (green)	Green (blue)	Green (red)	________
Red (blue)	Green (yellow)	Yellow (blue)	Red (yellow)	Blue (green)	
Yellow (red)	Yellow (green)	Red (green)	Green (yellow)	Green (blue)	________
Yellow (red)	Red (blue)	Blue (red)	Yellow (blue)	Green (red)	
Red (blue)	Green (yellow)	Yellow (red)	Blue (red)	Green (blue)	________
Blue (yellow)	Red (green)	Yellow (green)	Green (red)	Blue (green)	
Red (yellow)	Red (blue)	Green (blue)	Blue (red)	Green (yellow)	________
Red (green)	Yellow (red)	Red (green)	Blue (green)	Red (yellow)	
Blue (green)	Blue (red)	Yellow (blue)	Blue (yellow)	Red (yellow)	________

Observations: Total time: ________

Figure 6. Fruit Distraction Test.

GENERAL METHOD

The FDT asks the child to name colors presented with and without distractions and contradictions. The child is administered test cards I, II, III, and IV in that order. However, the examiner may choose to alter the order of administration to suit his own needs. In general, Cards I and II are used to provide a "baseline" measure (i.e., a measure of naming colors as rapidly as possible without the presence of distractions and contradictions). Cards III and IV are used to provide measures of naming colors in the presence of distractions and contradictions. Card III requires that the child name colors as rapidly as possible when the colors are embedded among distractions; Card IV requires that the child name colors as rapidly as possible when the information provided is contradictory.

As discussed elsewhere, factor analytic data suggest that for some children performance with Card II, when compared with that of Card I, provides a measure of color naming in the presence of distraction. Apparently naming colors that are placed on shapes representing familiar fruits is more distracting to these children than naming color bars. If the examiner wishes to obtain only one measure of the management of distractions (with either Card III or IV), either Card I or II should be administered to give a baseline measure.

The instructions presented here contain the information necessary to convey the task and set to the child. The examiner, of course, should alter the wording of the instructions to suit the child's age, vocabulary level, and general psychological status. The intent is that the child understand what the test requires of him.

INSTRUCTIONS

Card I. Place practice Card I before the child and say, "Do you see this?" Point to the first color bar, ask, "What color is it?" and wait for the child to respond. Then say "Good, and what color is this?" (pointing to the next square) "Go ahead and name the other colors for me."

The examiner ensures that the child can name all the colors. If the child does not name all the colors correctly, the examiner may coach the child as much as seems necessary to establish whether he can name colors consistently and correctly. If the child cannot do this, the test is discontinued.

After the child names correctly each of the four primary colors, say, "Now start here" (point to the first color bar on the left) "and name the colors as fast as you can until you reach here." (point to the last color bar on the right) "Do you get the idea? I want you to name colors as fast as you can. Ready! Go ahead." The examiner ensures that the child understands that he is to name the colors as rapidly as possible. We have found that young children often do not name colors any more rapidly during this phase of the training than during the first phase when they are simply identifying colors. When requested to name colors as fast as possible, children often speak the names loudly or poke vigorously at the colors, while speaking at the same rate as previously. This is accepted, of course. Other qualitative aspects of the performance should convey to the experienced examiner that the child understands that he is to read as quickly as he is able.

When the child understands the task to be performed, the examiner says, "Now I am going to give you a big card with many rows of the same colors. I want you to name the colors as fast as you can."

The examiner presents the child with Card I (color bars) and says, "See, start here" (point to the first bar on the top row)" and name the colors as fast as you can. When you finish top row" (the examiner passes his finger along the top row of color bars from left to right), "go on to this next row" (the examiner passes his finger again from left to right across the second row of bars) "until you reach here, and then go on to the next. Keep naming colors until you reach here." (point to the last figure in the bottom row) "Try not to skip any and try to go as fast as you can. Do you understand?"

The examiner ensures that the child understands the task. "Ready? Begin!" The examiner activates his stopwatch and follows the child's color naming with the test protocol (Figure 6). The examiner records reading errors by marking the appropriate box in the protocol (see section on Scoring) and reading time. The time to read each line, or pair of lines, may be recorded accumulatively, as well as the total time taken to read the entire card.

Card II. Place the second practice card before the child and say, "Do you see this fruit? What is this?" [apple] "That's right. And this?" Ask the child to name each of the fruits. If the child does not label them correctly, the examiner provides the correct names. Young children often cannot easily identify the heads of lettuce or the grapes. After the child has labeled each fruit say, "What color is this apple?" (wait for the child to respond) "That's right, it's red. And what color is this banana?" The examiner has the child name the colors on each of the fruits and reinforces each correct response. Then the examiner says, "For this part of the game the apples are colored red, the bananas are colored yellow, the grapes are colored blue, and the lettuce is colored green. Now I want you to start over here" (point to the fruit on the far left), "and name the colors one after another until you reach here." (point to the figure at the far right of the row) "Go ahead, start here and name the colors as fast as you can. Ready? Go!" The examiner ensures that the child understands that he is to name the colors as rapidly as possible, as with Card I.

If the child performs appropriately with the practice card, say, "That's fine. Now I am going to give you a big card with many rows of the same fruit and I want you to say out loud the colors of the fruit as fast as you can." The examiner presents the child with Test Card II and says, "See, start here" (point to the first fruit in the top row) "and name the colors as fast as you can. When you finish this top row" (the examiner passes his finger along the top row of fruit from left to right) "go on to this next row" (the examiner passes his finger again from left to right across the second row) "until you reach here." (point to the last figure in the bottom row) "Try not to skip any and try to go as fast as you can. Do you understand?" The examiner ensures that the child understands the task. "Ready? Begin!" As with Card I, the examiner begins a stopwatch, follows the child's color naming with the test protocol, and records reading errors in the appropriate box (see section on Scoring). The examiner records total time taken to read the card, and he may record reading time accumulatively by each line or by pairs of lines.

Card III. After the child has completed Card I or Card II (or both if the examiner has chosen to use both baseline cards), the examiner removes the card and says, "Now I am going to give you another card that has the same fruit on it and the same colors. But on this card are a lot of little pictures of other things all around the fruit. I want you to name the colors for me again, as fast as you can, starting at the top and going to the bottom just like you did with the last card. You should try not to pay attention to all the little pictures that are on the card. Look only at the colors. If you pay attention to those little pictures, they will slow you up. You will not be able to read the colors as fast you can. Do you understand?"

The examiner takes a moment to clarify any question the child may have. Usually a child who has handled Card II successfully understands the task required in Card **III.** The examiner presents the child with Card III and says, "Begin here." (pointing to the first figure) "Ready? Go!" The child should not be handed the card until he is ready to begin. If the child is given the card and he begins to ask questions, remove the card. This is necessary because the child may scan the card during the discussion, examining the peripheral distractions at this time. The child's recall of distractions, requested at the end of this test card, will be influenced by this longer exposure.

Again, the examiner inserts reading errors in the appropriate boxes of the test protocol (see section on Scoring) and records total time taken to read the card. The examiner may record reading time accumulatively by pairs of lines or by each line.

Occasionally a child fails to respond immediately and seems to be looking about the card at the peripheral figures. If a child does not begin naming colors within 10 seconds, the examiner should repeat the instructions, saying, "Begin here" (pointing to the first figure) "and name the colors for me as fast as you can. Just try to pay attention to the colors." However the stopwatch should continue to run during this time.

After the child has completed the task, the examiner removes the card and says, "I know I asked you to name the colors and to try not to pay attention to the pictures that were on the card. But kids sometimes notice the pictures around the fruit, while they name colors. While you were naming the colors, did you happened to notice any of the pictures? What pictures do you remember noticing?" After the child gives his first recall, he is encouraged only once: "Can you remember any others ?" No further encouragement is offered. The examiner records the child's recall of the peripheral figures on the protocol (see section on Scoring).

Card IV. After the child has completed Card II or Card III (or both), the examiner says, presenting the final practice card, "Now the next part of this game is a little different. Do you see?" (point to the first fruit on the practice card) "The fruits are colored wrong. The banana is colored red. What color should it be?" (wait for the child to respond) "That's right. And what color should the apple be?" In this way, the examiner establishes that the child knows the colors that should be on each fruit. "Now start here" (the examiner points to the first fruit in the row) "and name the colors that should be there as fast as you can until you reach here." (point to the last fruit in the row) "Do you get the idea? I want you to name the colors as fast as you can that should be there. Ready? Go ahead!" The examiner insures that the child understands that he is to name the colors that should be there as rapidly as possible.

"Now I am going to give you a big card with many rows of the same fruit but all the colors are wrong. I want you to name the colors that should be there, as fast as you can."

The examiner presents the child with Test Card IV and says, "See, start here" (point to the first fruit in the top row) "and name the colors that should be there as fast as you can. Keep naming colors until you reach here." (point to the last figure in the bottom row) "Try not to skip any, and try to go as fast as you can. Do you understand?"

The examiner handles any questions the child may ask and ensures that he understands the task. However the test card should not be left exposed if the discussion takes more than about 10 seconds. If the child seems unclear about anything and needs further explanation, lay the card face down until the child is ready to begin. The practice strip could be used for purposes of illustration.

"Ready? Begin!" The examiner begins the stopwatch and follows the color naming, marking reading errors in the appropriate box. The examiner records total reading time. He may record reading time cumulatively by pairs of lines or by single lines.

SCORING AND INTERPRETATION

Recording Reading Errors. Three types of reading errors are recorded on the test protocol. The first two apply to all four test cards. The third applies to Cards II, III, and IV.

1. The child names a color that is incorrect (e.g., he should say "red" and he says "yellow"). We have found it convenient to record such an error by writing the first letter of the color name as a capital letter (in this case a "Y") in the appropriate box of the test protocol. If the child spontaneously corrects himself, (e.g., "yellow, I mean red") the letter is followed by a plus sign. If an error is not corrected, only the letter is recorded.

2. The child begins to pronounce a color name that is incorrect (e.g., "bl ...indicating a clear intent to say "blue"). We have found it convenient to record this type of error by writing the first letter of the color name partly spoken (in this example, "b") with a lowercase letter. Again, the letter is followed by a plus sign if the child spontaneously corrects his error.

3. The child may say the name of a fruit rather than the color, or he may name one of the peripheral objects found in Card III. Here again, we have found it useful to use a capital letter if the entire word is spoken and a lowercase letter if part of the word is spoken and is clearly identified by the examiner. To avoid confusion with the designations for blue and green, we have used "Bn" for banana and "Gp" for grapes.

When dealing with any one of the cards, a child may make more than one error with one color. For example, if he is to say "blue" but instead says "red, I mean gr . . ., I mean blue," the symbols "R, g + " are recorded in the appropriate box of the test protocol. If the child names the colors correctly and makes no other sound, nothing is recorded in those boxes.

Other qualitative aspects of the child's performance may be recorded; several examples are given. (*a*) Pauses (both verbal and nonverbal), *(b)* The child's tempo and grouping of the color names while performing. We have noticed that some children name colors fairly evenly, pausing before each color name. Others name the colors in pairs, or in triplets, or after the five colors in one row, with brief pauses separating each set. Other children show an uneven, seemingly random rhythm when color naming. We have also noticed that a child's rhythm may be consistent from card to card or may change. For example, a child who names colors in triplets, rhythmically, with Card II, may show “random,” uneven colornaming when handling Card III, which presents the same information surrounded by distractions. A rhythm of naming colors by triplets or lines is viewed as a higher level of cognitive organization than naming colors individually or by pairs, (c) Motoric behavior the child shows while naming colors is also diagnostically significant. For example, a child may thrust his head forward, or poke each color with his finger, or jab his forefinger into the air with each color named. Again notice whether motor behavior is conspicuous with one card and not another.

Scoring. For the Fruit Distraction Test, three scores are computed and interpreted in terms of the concept of field articulation: (1) reading time distractibility score, (2) reading error distractibility score, and (3) number of recalls of peripheral figures (with Card III).

In general, to compute reading time and reading error distractibility scores, the reading time and reading errors observed with the baseline card or cards (I and/or II) are compared with reading time and reading errors observed with Cards III and IV. If Card III is used, the differences observed in reading time and reading error are viewed as related to the child’s management of information in the face of peripheral, irrelevant distractions. If Card IV is used, the differences observed are viewed as related to the child’s management of information in the face of contradiction.

1. Reading Time Distractibility Scores (seconds)

a. Reading time with Card II minus reading time with Card I (time: II-I).

b. Reading time with Card III minus reading time with Card II (time: III-II).

c. Reading time with Card IV minus reading time with Card II (time: IV-II).

2. *Reading Error Distractibility Scores*

a. Reading errors with Card II minus reading errors with Card I (errors: II-I).

b Reading errors with Card III minus reading errors with Card II (errors: III-II).

c. Reading errors with Card IV minus reading errors with Card II (errors: IV-II). It may be helpful, when examining reading errors, to distinguish between types of reading errors (e.g., whether the total name of a color was spoken incorrectly or only the first sound of the name; the number of verbal and nonverbal pauses, etc.).

3. *Number of Recalls of Peripheral Figures.* The peripheral objects recalled after Card III has been removed are analyzed in terms of (*a*) the number of correct food related objects, (*b*) the number of correct non-food-related objects, and (c) the number of fabulated objects. The following is a list of food and nonfood recalls accepted as correct:

Food	Nonfood
Bread	Clock

Ice cream cone	Plane, jet
Cake, cheese	Car, auto, or make of car
Glass, cup	Chair
Spoon	Telephone
Bottle, milk, milk bottle	Shoe, slipper

The fabulated recall score represents the number of items the child reports remembering which are not present on Card III (e.g., a train, a bed, a book, a boat) or represent possible distortions or elaborations of objects present on Card III (e.g., a sandwich, a fork, milk shake). The description of an object that is not articulated (e.g., "something round") is not considered a fabulation.

4*. Reading Variability Score.* We have found it helpful to compute a measure of variability, if reading time is recorded for each line or for each pair of lines, namely, the arithmetic mean of the reading times observed for each line or pair of lines. Then the deviation of each value (of each time for each line or pair of lines) from the mean is squared, and squared values are summed. (Those familiar with the formula for the statistic "variance" will recognize that this is the procedure being employed.) It may be helpful to compare variability observed in reading time with baseline cards (I or II) and variability observed with distraction cards (III and IV).

Interpretation. The child who takes longer to name colors, makes more reading errors when naming colors with Cards III and IV versus Cards I and II, and recalls more peripheral objects after Card III, tends not to selectively withhold attention from irrelevant and peripheral information when managing information surrounded by distraction and irrelevancies. This child would tend to deploy attention more or less indiscriminately to all information. Accordingly, this child is likely to be easily distracted from the central task by irrelevant information. In terms of the theoretical framework discussed here, such an individual would be viewed as functioning at a developmentally low level of the cognitive principle of field articulation. On the other hand, the child who reads Cards III and IV nearly as quickly as Cards I and II and recalls few peripheral objects located on Card III tends to deploy attention selectively, that is, to withhold attention from information defined as irrelevant and to direct attention at information defined as relevant to the task at hand. Therefore this child is not likely to be disrupted by peripheral, distracting information. In terms of the theoretical framework discussed here, such a child would be viewed as functioning at a developmentally mature level of the cognitive principle of field articulation. Time and error differences associated with various age levels were presented in Chapter 7.

Qualitative aspects of the child's performance are examined along with time and error differences. For example, a child may take 10 seconds longer to name the colors of Card III than the colors of Card II. Yet while naming the colors of Card III, the child may shout the names and punctuate each color named with a forward thrust of his head—behavior that was not observed when he dealt with Card II. Taken together, these behaviors would indicate that the distractions of Card III were competing for attention, that the distractions were creating cognitive-affective stress, and that the child was relying on motoric, rhythmic behavior to sustain attention on the relevant information. From the developmental point of view, involving motoric behavior to this extent in a primarily cognitive task represents an ego regression and suggests a deficiency and vulnerability in field articulation functioning.

Restlessness, angry outbursts, silliness, losing one's place, refusal to continue, and other affective expressions of distress are commonly observed during Cards III and IV with children who are diagnosed as significantly lagging in field articulation functioning and development. For example, behaviors such as these were typical of the kindergarten children who were judged to be at risk academically and who showed learning disabilities in elementary grades (Chapter 6). The reader should make use of the factor analytic data presented in Chapter 5 in interpreting the results of a given protocol. For example, brain-damaged children showed especially inefficient field articulation functioning when the background (e.g., the incorrect color of Card IV) contained the irrelevant information. With orphaned children, for whom peripheral irrelevant information aroused affects related to need states and these affects were inefficiently isolated or otherwise defended against, the field articulation principle was particularly inefficient in managing peripheral, distracting information.

THE LEVELING-SHARPENING HOUSE TEST (LSHT)

A Procedure for Assessing the Cognitive Control Principle of Leveling—Sharpening[17]

The cognitive control principle of leveling-sharpening concerns the manner in which an individual manages information that remains stable and changes over time. As discussed earlier, the developmentally immature end of this continuum is defined by an individual who constructs relatively global, unstable images of information, thereby fusing present information with past information so that information loses its discreteness. At the developmentally mature end of this continuum is the individual who constructs articulate, stable images of information, thus differentiating present information from past information and maintaining the discreteness and uniqueness of information. In the developmental hierarchy of cognitive controls proposed, the process of leveling-sharpening subordinates and integrates the developmentally earlier processes of tempo regulation, scanning, and selective deployment of attention and concerns uniquely the construction of memory images of changing and stable bits of information that have been attended. As the factor analytic studies discussed earlier indicate, the process of leveling-sharpening involves two basic components: the degree of differentiation a memory image achieves and the stability or fluidity of that image over time.

The Leveling-Sharpening House Test (LSHT) was devised for assessing the cognitive control principle of leveling-sharpening. The procedure been used with children from the ages of 3 years through adolescence, and with adults.

GENERAL METHOD

The LSHT requires that the child be able to sit for about 15 minutes and direct his attention continuously at a series of 60 pictures of a house, displayed in succession (each picture exposed for 5 seconds), and to report when he notices something in the picture change or look different.

MATERIALS

The test materials consist of 60 test cards, 8½ x 11 inches and 6 practice cards, used to train children and adults in the requirements of the test.

Test Cards. The test cards contain a scene of a house, simply drawn in two dimensions and in black and white. (Figure 8, Chapter 4) The main elements of the scene are a house with a front door, two rectangular windows and one round window; chimney and weathervane on the roof, with smoke rising from the chimney; ground lines; sidewalk; fence; tree; cloud; and sun.

The first three cards contain all the elements. Beginning with Card 4, the doorknob is omitted and remains absent from all the remaining pictures. Cards 7, 8, and 9 contain all the elements except two: the doorknob and the lower horizonal board of the fence. Cards 10, 11, and 12 contain all elements except three: the doorknob, the fenceboard, and the rays of the sun. In this manner, 19 elements are omitted accumulatively from the scene. After the first three cards, each new configuration or scene represents some combination of omitted details, and each new scene is presented three times. Less conspicuous elements are eliminated early in the series of pictures, and the more conspicuous elements are omitted later in the series. Figure 7 lists the details that are omitted from the house scene, and the number of the card on which the deletion first takes place.

Display Numbers	Numbers and Description of Detail Omitted	Numbers of Cards to Last Card After Change First Appears
1	Complete scene	
2		
3		
4	1. Doorknob	56
5		
6		
7	2. Fence board	53
8		
9		
10	3. Rays of sun	50
11		
12		
13	4. Ground line to right of fence	47

5. Top of weathervane pole	44
6. Ground line to left of evergreen	41
7. Directions	38
8. Horizontal pane of side window	35
9. Horizontal pane of front window	32
10. Three pickets of fence	29
11. Panes of oval window	26
12. Smoke from chimney	23
13. Oval window	20
14. Roof line	17
15. Remainder of weathervane	14
16. Vertical window panes of front and side windows	11

50		
51		
52	17. Flagstones in walk	8
53		
54		
55	18. Evergreen tree	5
56		
57		
58	19. Walk	2
59		
60		

Figure 7. Leveling-Sharpening House Test: list of details omitted and scoring key for correct changes perceived.

Practice Cards. These cards present the scene of a Christmas tree, simply drawn in two dimensions and in black and white. The main elements are: a Christmas tree, a star at the top of the tree, decorations on the tree, and gifts under the tree. The first two cards contain the complete scene. The star is omitted from the third and fourth cards, and on Cards 5 and 6, the decorations are omitted.

INSTRUCTIONS

The instructions presented contain the information necessary to convey the appropriate goal and set to a child. The examiner, of course, should alter the wording of the instructions to suit the child's age, vocabulary level, and general psychological status. The intent is that the child understand what the test requires. These instructions are modified as needed when the test is administered to adults.

Before each administration the examiner should ensure that the practice cards are stacked in order. If placed on a desk top, the pictures are stacked face down, with Card 1 at the top and Card 6 at the bottom. Similarly, the test cards should be checked to ensure that they are in order, with Card 1 at the top and Card 60 at the bottom. The examiner should also have a stopwatch.

The test is administered most easily if the examiner sits opposite the child. In both the training and test phases the examiner holds the entire deck of cards upright so that the pictures face the child and the backs face the examiner. The stopwatch is placed on the desk top just in front of the examiner and behind the deck of cards so that it is easily seen by the examiner but is out of the child's view.

Training Phase. Hold the deck of practice cards before the child as just described so that Card 1 faces the child and say, “Do you see this picture of a Christmas tree? I want you to look it over for a little while so that you can remember as much as you can about it. Then I will take it away and show you another picture of the same tree. When I take this picture away, I want you to look at the next picture of the tree and tell me if the picture looks the same or whether anything has changed. Do you understand?”

While displaying the first card, the examiner should observe whether the child is looking at the card. Hyperactive children and subjects from other clinical groups may be observed to take only fleeting glances at the picture while looking around the room. If the child is not directing attention at the picture, say, “Look at the picture. Try to look at it as hard (carefully) as you can, for as long as I hold it in front of you. After I take the picture away, I want you to remember what is in the picture.”

Although the examiner is to give some emphasis to the requirement that the child focus his attention on the card displayed, it should be recognized that some children habitually direct their attention inconsistently and are easily distracted. These children are viewed as having a developmentally immature field articulation functioning to use with this task. After being encouraged to focus his attention on the picture being displayed, the child may continue to take only brief glances at it. This performance is accepted as part of the child’s cognitive control functioning and is assumed to influence the stability and articulateness of the memory images constructed.

Following these initial remarks, continue to display Card 1 to the child for 5 seconds. Then turn Card 1 face down so that Card 2 is displayed and say, “Now look over this picture of the tree. Is this picture the same as the one you just saw? Has it changed?”

After these remarks, display Card 2 for an additional 5 seconds. Then turn it face down so that Card 3 is displayed.

If the child responds that Card 2 looks different, ask him to describe and point out what has changed in the picture. Since the picture remains the same, the change described by the child, of course, will be one that does not occur (e.g., “The tree looks bigger,” “These presents weren’t there before,” or “There were more balls on the other tree”). After the child describes the change he perceived, pick up Card 1 and place it over Card 2 so that the child again can examine the first display. Say, “Look at this first picture again. Try to remember all of the picture.” Display Card 1 for about 5 seconds, then place it face down and display Card 2, saying, “Now look at this picture again. Is this picture the same as the first or has it changed?” If the child now indicates that the picture looks the same, “That’s right. This time the picture stays the same.” Then place Card 2 face down so that Card 3 is displayed.

If the child continues to report that he perceived a change, pick up Card 1 and hold it next to Card 2, permitting the child to examine both pictures simultaneously. Say, “Look at the first one again and then look at the second one again. Do they look the same?” The child is coached until he establishes that the pictures are the same. Then turn both cards face down and display Card 3.

Say, “Now look over this picture of the Christmas tree. Is this picture the same as the others or is it different?” Display the card for 5 seconds. If the child correctly perceives and reports that the star is absent, turn the card face down and display Card 4. If the child reports that Card 3 looks the same, or reports a change that does not occur, follow the foregoing procedure as needed. That is, first display Card 2 again for 5 seconds, followed by Card 3. If the child is still incorrect, the perception the child reports is accepted and Card 4 is presented.

The same procedure is followed in displaying Cards 4, 5, and 6. When the child has handled the sixth display, make the summary statement as needed, such as, “Do you understand? With this game I show you one picture at a time for a little while, and I want you to look at each picture as hard (carefully) as you can, so you can remember what is in the picture and so you can tell me if you see something change in the picture.”

We have found it useful to readminister the six practice cards to children who show considerable difficulty in understanding the task required. This gives them an opportunity to get the idea that it is not necessary to say anything if the picture looks the same, and they are to say “Stop” and report a change whenever one is perceived.

During the training period, point out the stopwatch to the child, saying, for example, “I have a stopwatch here to help me know how long to show you each picture.” We have found it helpful to leave the stopwatch running for the training and test phases. The examiner can pick up 5-second intervals with a glance.

Testing Phase. After the training phase the examiner sets aside the deck of practice cards and positions the deck of test cards, saying “Now we will play the same game using this picture.” Raise the test deck so that Card 1 is displayed to the child for about 3 to 4 seconds. Then place the deck down and say, “I am going to show you a lot of these pictures” (point to the deck) “I’ll show you these pictures one at a time, for just a little while. You look at the card as hard (carefully) as you can, as long as it is up in front of you. After you see the first picture, if any other pictures look different or something looks like it changed, you say ‘Stop.’ Then tell me and show me what has changed. If the picture looks the same, you don’t have to say anything. Just look it over. Remember, sometimes the picture will Took’ the same, and sometimes they will Took’ different. OK? Ready?”

The examiner raises the deck so that Card 1 is displayed again. After 5 *seconds*, Card 1 is turned face down and Card 2 is displayed. After 5 seconds, Card 2 is placed face down, and so on. During the test phase each card is displayed for only 5 seconds. The examiner makes only the following remarks, other than those necessary to establish a change the child has perceived:

1. If the child does not say “Stop” at any time during the first 15 cards, say, while displaying Card 16, “Look at each picture carefully and say ‘Stop’ if the picture looks different.” No other comment is made as long as the child is making an effort to examine each picture. If the child is “ignoring” the pictures, the test may have to be discontinued.

2. Sometimes a child who has reported a given change reports the same change again in the very next display.

For example, when Card 10 is displayed, the child may say. “The lines around the sun aren’t there.” Then when Card 11 is displayed, the child says, “The lines around the sun are still not there.” If this occurs, the examiner says, “That’s right. Those lines” (or whatever detail the child has noted) “are not there. You already told me about that. You need to tell me only once about any change you see. Tell me when you notice something else change or look different.” If the child again reports the same detail on the very next card or if he reports another change twice, the examiner makes the foregoing remark a second time. Thereafter, no comments are made and the child’s multiple reports of a change are recorded. These responses, considered here as “perseverations,” are treated by the scoring system.

The examiner continues the presentation until all 60 pictures have been displayed.

NOTES ON ADMINISTRATION

1. We have devised a form that has been useful in recording our subjects’ responses; all responses, whether correct, incorrect, or “extra test,” are recorded on the line opposite the card number being displayed, as in Figure 11. Occasionally a child begins to report a change just as the card is turned face down, or immediately afterward. In these cases, we have asked the child to identify the perceived change on the card now being displayed. If a child asks to see a card already turned face down, he is told that in this game, a card is examined only once and that he is to search for whatever change he may have perceived on the present card.

2. When the child reports and describes a change, the response is recorded as quickly as possible (i.e., within a few seconds) on the record form. The examiner should use various abbreviations, as necessary to work rapidly enough. The cards should be placed face down while a response is being recorded, to ensure that each picture is examined for only 5 seconds.

3. When giving the instructions during the training or test phase, the examiner should avoid saying that parts of the picture “drop out.” The child should be told only that the picture may “change” or may “look different.”

4. Often children do not say “stop” but report a change immediately while examining the display (sometimes they exclaim over the discovery of a change). For example, when Card 22 is displayed a child may say, “Look! The letters are gone up here.” Occasionally a child begins to verbalize a change in a way that indicates he will need more than a few seconds to report the change. In these cases, the examiner should place the deck of cards face down, preventing the child from examining a picture for more than 5 seconds while reporting the change. Say, “We can’t look at the picture any more, but go ahead, tell me what looks different about it.” In all cases, after the child has identified a change, the examiner should lay the deck of cards face down while recording the change on the record form.

5. During the training phase the child was coached to detect a correct change (or to realize that no change occurred) whenever he reported perceiving a change that did not occur (e.g., that the Christmas tree looked bigger). However during the test phase reports of incorrect changes are accepted without comment and recorded. Incorrect

changes are treated by the scoring system.

6. The examiner should be alert to verbalizations by the child that seem to convey a change correctly even though the exact nature of the change is not made explicit. For example, if the child reports that the sun “now looks like a moon,” this is understood to convey the child’s realization that the sun-ray lines have dropped out. Similarly, when the letters are omitted from the weathervane, some children say, “Now this looks like a TV antenna.” In these cases, the examiner should inquire in ways that might help the child articulate the detail that he has registered as having changed. For example, if the child reports that the sun now looks like the moon, the examiner could say, “Yes, and what is different from the other pictures? What makes this moon different from the other pictures?” The child may respond with, “There are no lines around here” (pointing). Children are not always able to verbalize what detail has changed. They can say only that “this looks like a moon” and convey that somehow the detail seems to differ from other pictures. Changes that are not detailed by the child are handled by the scoring system. These “vaguely perceived changes” are seen as related to the degree to which the memory image is articulated and differentiated.

Along the same line, occasionally a child asks the examiner to stop the display, whereupon he reports that the picture looks different but he is not able to articulate the change. For example, with Card 25: “Stop.” “What’s changed?” “I don’t know. It just doesn’t look the same. Something looks different with the house but I don’t know what.” This response would be recorded.

7. We have found it helpful to ask the child, “Show me,” when he seems to have perceived a change correctly but lacks the verbal skill to describe the modification. If the child points correctly to a particular part of a card and accompanies his gesture with appropriate remarks, the response is accepted as correct. For example, the examiner says “Show me,” and the child responds “These things” (runs finger around the sun) “aren’t there.”

8. A child may spontaneously report he has “just now” noticed a change but he feels the change “happened a long time ago.” We have found “extra test” remarks such as this to be valuable, and they should be recorded whenever possible.

9. Some workers have wondered why the test is administered manually and have pointed out that greater precision in display time, and so on, can be obtained if the pictures are projected on a screen with a timing device. Our experience in administering leveling-sharpening procedures with projectors and screen and with memory drums has left the impression that two quite different test situation are created when the examiner and the child interact over a set of cards administered by the examiner, and when they interact over displays projected on a screen by a machine. Our impression is that the manual administration is more meaningful clinically and seems to be more intimate and comfortable for the child. However we have not studied systematically the effects of different techniques of administration. Certainly a worker may find that his needs are satisfied better by the use of a projector and timing devices.

10. The method used for the Leveling-Sharpening House Test omits details of a scene to create “change” in information over time. We have also used a procedure in which details are added to a scene to create “change” in information, and another in which the size of a circle is gradually increased. The latter method is very much like the method used by George Klein and his associates to assess the leveling-sharpening cognitive principle with adults (see, e.g., Gardner et al., 1959, for a discussion of the “Schematizing Squares Test,” which presents a series of squares gradually increasing in size). The methods of adding details and of increasing the size of a circle have correlated highly with a method of omitting details (see Chapters 5 and 6).

A comment is also indicated about the technique employed here of presenting each change three times before the next change is introduced into the scene. Some workers have asked whether individuals realize at some point during the testing that changes occur after every three displays. To date we have administered the Leveling-Sharpening House Test to more than 1000 children and adults in various situations and we have not yet observed an individual to notice the regularity with which changes are introduced. From the methodological standpoint, it is desirable to display all “changed sets of information” the same number of times.

SCORING AND INTERPRETATION

As noted above, all responses by the child are recorded, whether or not they convey that a correct change has been perceived. Figure 13 is a blank sample of the record form we have found convenient for recording responses; an asterisk before a number indicates that a change occurs on the card so designated.

For the purpose of scoring, the responses recorded are viewed in terms of three scoring categories: (1) correct changes perceived, (2) incorrect changes reported, and (3) perceptions conveying qualitative aspects of the way a child forms a memory of information, retains the memory, and relates the memory to present information being examined.

Figure 7 contains the scoring key for correct changes perceived. The numbers from 1 to 60 designate the 60 cards displayed to the child. To the right of this column of numbers are listed the 19 changes (details omitted) that are introduced beginning with Card 4. To the right of the list of changes introduced is a column of numbers indicating the number of times (i.e., cards) a change is presented to the child, from the introduction of the change until all cards have been displayed. Remember that when a detail is omitted, it is not restored to the scene during the remainder of the test. Therefore the number to the right of the details listed in Figure 7 represents the number of opportunities a child has to detect that change. Card 4, for example, omits the doorknob, and this detail remains absent from the scene throughout the remainder of the test. The number 56 to the right of the change, “doorknob” indicates that beginning with Card 5, the child has 56 opportunities to detect that the doorknob has been omitted. This number is used in computing the leveling-sharpening ratio (per below).

Figure 8 gives the scoring key used to evaluate incorrect changes, code letters A and B designate two broad groups of incorrect changes perceived. Group A changes are those perceived by the child in information—that is contained in the house scene displayed. Group B changes are incorrect changes perceived by the child—that is, they involve information that is not provided by the house scene displayed.

Score	Description
Group A changes perceived in the information that is provided by the house scene	
Aa (addition)	A detail is perceived as having been added when that detail has been present in the previous cards displayed. *Examples:* "There is smoke coming out of the chimney now and there wasn't any before." "This round window wasn't there before."
Ac (color)	The total scene, or a detail of the scene, is perceived as darker or lighter. *Examples:* "That whole picture looks darker." "The lines of the tree got darker."
Am (movement)	The total scene or a detail of the scene is perceived as shifting in location, direction, or perspective, or is perceived as in movement. *Examples:* "The tree is on this side now; before it was over here." "The whole house looks like it shifted over so you see the side more." "A strange thing, when I looked at that this time, the smoke looked like it was moving."
Ao (omission)	A detail of the scene is reported as missing when it is present in the display being viewed and it has been present from the start of the test. *Example:* "The letters on that antenna aren't there any more." (The letters are present on the card being examined.)
As (size)	The total scene or a detail of the scene is perceived as changing in size. *Examples:* "The tree is shorter." "The house looks longer."
Group B: changes perceived concerning information that is not provided by the house scene	
Ba (addition)	A detail is perceived as having been added when that detail has not been and is not a part of the scene displayed. *Example:* "There is a rooster on the weathervane."
Bo (omission)	A detail is perceived as missing when that detail has not been and is not a part of the scene displayed. *Example:* "The birds flying over the house are gone."

Figure 8. Leveling—Sharpening House Test: scoring key for incorrect changes perceived.

Figure 9 lists two miscellaneous scoring categories for changes that are neither correct nor incorrect.

Score	Description
P	The child reports a perceived change that he has already perceived and reported. *Note:* a "p" is scored only after the examiner has clarified for the child that he need not report changes he has already reported (see Administration).
?	The child perceives the total scene or a part of the scene as looking different but is unable to specify or articulate the change. *Examples:* "The whole picture looks different. I don't know: it just looks different." "Something about the fence looks different but I can't really tell you what."

Figure 9. Leveling—Sharpening House Test: miscellaneous scoring key.

Figure 10 lists examples of "extra test" remarks made by the child that have been useful to us, qualitatively, in understanding how a child forms memory images and how they are related to present information, and in assessing the stability of those memory images. We have not yet devised a quantitative scoring system for these responses but have used them clinically.

1. "Three sticks on the fence are gone." versus "The fence is shorter, used to be more sticks, but I don't know how many."
2. In response to Card 55: "The smoke is gone: I have the feeling it dropped out a long time ago, but it just dawned on me."
3. "Sometimes, when I'm watching the picture, for a second I forget what the picture was about."
4. "It's hard for me to pay attention that long; after a while the picture just fades away."

Figure 10. Leveling-Sharpening House Test: examples of extra-test responses of qualitative significance.

To score a child's performance with the Leveling-Sharpening House Test we transfer the responses from the record form of Figure 13 to the scoring form illustrated in Figure 14.

Scoring a Sample Test Record. To facilitate discussing the scoring procedure, let us score a hypothetical record (Figures 11 and 12). The first step is to transfer the child's reports of changes perceived from the record form to the scoring form. This is done by taking each of the reported changes, in the order in which they are given by the child, and recording them in the first four rows of the scoring form; the symbol + is used for correct changes and the card numbers listed in Figure 7; for incorrect changes, we used the code letters listed in Figures 8 and 9.

In row I of the scoring form we record the number of the card on which the child perceived a change, whether the change is correct, incorrect, or miscellaneous. In row II we put the abbreviation of the category in which the perceived change falls (e.g., if the change is a correct one, a plus sign). Rows III and IV concern only correct changes perceived. We insert in row III the number of the card on which the change perceived is first introduced, and we record in row IV the difference between the number in row III and the number in row I. The difference represents the degree to which the child "lagged" in detecting the change. For example, if the omission of the sun's rays, which first occurs on Card 10, is detected by the child on Card 15, the number recorded in row IV would be 5. This value signifies that after the change was introduced, the child examined five displays before reporting detection of the change.

Leveling-Sharpening House Test Record Form

Name: John Jones	Date of exam:__________	Group:____________
1. __________________	21. letters are gone	41. __________________
2. __________________	*22. __________________	42. __________________
3. __________________	23. __________________	*43. __________________
*4. __________________	24. __________________	44. __________________
5. Tree looks shorter	*25. Windows look different but I don't know how.	45. __________________
6. __________________	26. __________________	*46. Weathervane gone.
*7. Cloud moved over.	27. __________________	47. __________________
8. __________________	*28. __________________	48. __________________

9. Birds in sky now.	29. Windowpane gone in both windows.	*49. ________________
*10. Rays of sun gone.	30. ________________	50. Vertical windowpanes gone
11. Rays of sun gone.	*31.Fence is shorter	51. ________________
12. ________________	32. ________________	*52. ________________
*13. ________________	33. ________________	53. Fence board gone.
14. ________________	*34. ________________	54. ________________
15. Rays of sun gone.	35. ________________	*55. Tree gone.
*16. ________________	36. ________________	56. ________________
17 Now there's a weathervane.	*37 Smoke is gone and the sidewalk looks different.	57. ________________
18. ________________	38. ________________	*58. Walk gone.
*19. ________________	39. Lines in round window gone.	59. ________________
20. Line gone (left).	*40. ________________	60. ________________

Figure 11

Leveling-Sharpening House Test: Scoring Form

Name: ______________________ Date: ______________ Group: ______________

I. Card number of stops:	5	7	9	10	15	17	20	21	25	29	29	31	37	37	39	46	50	53	55	58
II. Change reported:	As	Am	Ba	+	p	Aa	+	Ao	?	+	+	+	+	?	+	+	+	+	+	+
III. Card number when change reported first appears:				10			19			25	28	31	37		34	46	49	7	55	58
IV. Cards from stop to first appearance of change:				0			1			4	1	0	0		5	0	1	46	0	0

Correct Changes		Miscellaneous Changes		Incorrect Changes			
First Stop score	10	p	1	Aa	1	Ba	1
Number of changes	12	?	2	Ac	0	Bo	0
LS ratio	15.1	Total misc.	3	Am	1		
				Ao	1		
				As	1		
				Total A	4	Total B	1

Noteworthy qualitative responses:

Figure 12

Leveling-Sharpening House Test Record Form

Name:________________	Date of exam:_________	Group:___________
1. ________________	21. ________________	41. ________________
2. ________________	*22. ________________	42. ________________
3. ________________	23. ________________	*43. ________________
*4. ________________	24. ________________	44. ________________
5. ________________	*25. ________________	45. ________________
6. ________________	26. ________________	*46. ________________
*7. ________________	27. ________________	47. ________________
8. ________________	*28. ________________	48. ________________
9. ________________	29. ________________	*49. ________________
*10. ________________	30. ________________	50. ________________
11. ________________	*31. ________________	51. ________________
12. ________________	32. ________________	*52. ________________
*13. ________________	33. ________________	53. ________________
14. ________________	*34. ________________	54. ________________
15. ________________	35. ________________	*55. ________________
*16. ________________	36. ________________	56. ________________
17________________	*37________________	57. ________________
18. ________________	38. ________________	*58. ________________
*19. ________________	39. ________________	59. ________________
20. ________________	*40. ________________	60. ________________

Figure 13

Leveling-Sharpening House Test: Scoring Form

Name: ______________________ Date: ______________ Group: __________

I. Card number of stops:

II. Change reported:

III. Card number when change reported first appears:

IV. Cards from stop to first appearance of change:

Correct Changes		Miscellaneous Changes		Incorrect Changes			
First stop score	____	p	____	Aa	____	Ba	____
Number of changes	____	?	____	Ac	____	Bo	____
LS ratio	____	Total misc.	____	Am	____		
				Ao	____		
				As	____		
				Total A	____	Total B	____

Noteworthy qualitative responses:

Figure 14

Now let us turn to the completed sample record form (Figure 11). We can see that the child examined the first four cards without reporting a change. With Card 5 he perceived the tree as "shorter." Accordingly, in row I of the scoring form (Figure 12). the number 5 is recorded on the first line provided, indicating that the child stopped the display and reported a change with Card 5. In row II, below the number 5, we write the code letters "As," indicating that the perceived change falls in the category of incorrect changes perceived and represents a perception of change in the size of some detail.

The record form reveals that the child's next response was to Card 7, and he perceived that the cloud had "moved over." Accordingly, on the second line in row I of the scoring form the number 7 is recorded, and the code letters "Am" (indicating an incorrect perception of movement) are recorded below in row II. The same procedure is followed with the incorrect change perceived on Card 9 ("birds in the sky"). The child perceived the first correct change on Card 10, and the number 10 is recorded on the scoring form, in row I, as well as a plus sign in row II, indicating that the change perceived is a correct one. Because the fourth response *is* a correct one, rows III and IV must be completed. In row III the number 10 is recorded, to show that in the test the change perceived is indeed introduced on Card 10. A zero is placed in row IV (the difference between the number in row I and the number in row III), indicating that there was no lag in the child's detecting the change. That is, the child detected the change on the card that introduced it. An examination of the remaining changes reported on the record form and their transfer to the scoring form shows that the same procedure is followed throughout.

Discussion of two other responses may be helpful. First, the record form indicates that on Card 53 the child reported that the “fence board” is missing. Accordingly, on the scoring form the number 53 is written in row I (the 18th change reported by the child.) In row II below, a plus indicates that the change perceived is a correct one. The number 7 in row III indicates that the change in question was introduced with Card 7. The difference between the card number on which the change was perceived (53) and the card on which the change is first introduced (7) is 46, and this is recorded in row IV.

The record form shows that when presented with Card 29 the child reported perceiving two changes: (1) the horizontal pane of the side window is omitted (this change is introduced on Card 25), and (2) the horizontal pane of the front window is gone (change introduced on Card 28). When two (or more) changes are perceived on one card, the changes are listed separately on the scoring form, and rows II, III, and IV are completed accordingly for each detail reported.

It would follow then that at any given “stop,” if a child’s report contains the perception of multiple changes, various combinations of the scoring categories discussed are possible. When viewing Card 22, for example, the child may report a correct change (e.g., “the directions are missing”) an incorrect change (e.g., “the tree looks bigger”), and a miscellaneous change (e.g., “the fence looks different but I don’t know why”). All three changes would be recorded on the scoring form and treated as separate responses as follows: the number 22 (the card on which the changes are perceived) would be recorded three times in succession in row I. In row II, would be written the code symbols of each of the three changes, respectively: a “ + ” under the first 22, “As” under the second, and “?” under the third. Rows III and IV would deal only with the correct change perceived. The number 22 would be recorded in row III, since this is the card number on which the change involving the directions is introduced; and zero would go in row IV, since there was no lag in the child’s detecting the change. Other combinations of multiple changes would be treated by the same system.

Special instructions are necessary to compute the lag score (row IV) for two particular changes introduced in the test: changes involving the weathervane, and changes involving the side and front windows. These details require special attention because changes in them are introduced at more than one point in the test. When computing the lag score, therefore, a question may arise about which card number is to be taken as the reference point if the child detects a change, either in the weathervane or in the windows. If the child reports that the weathervane is missing when Card 46 is displayed, or with any card thereafter, the lag score is computed with Card 46 as the reference point unless the child specifies or articulates other details. For example, if when viewing Card 48 the child says, “The whole weathervane is gone now and the letters on it,” this report indicates that the child has perceived and remembered two separate details (the direction letters and the weathervane), and these two details are treated as separate responses. The lag score for the total weathervane is computed by referring back to both Card 46 (entire weathervane removed) and Card 22 (letters removed). If, however, the child's response at Card 48 is, "the whole weathervane on top of the roof is gone," then one refers back only to Card 46 to compute the lag score, since the child's report does not articulate other details of the weathervane that were changed.

The same situation holds for changes involving the front and side windows. Beginning with Card 49, the vertical windowpanes are removed from both windows simultaneously. If at Card 49, or with any display thereafter, the child detects that the vertical windowpanes have been removed and makes no mention of the horizontal windowpanes presented (assuming that these were not detected after Card 25), the lag score is computed with Card 49 as the reference point. If, however, the child articulates both the vertical and horizontal windowpanes in his response, three separate changes would be recorded and scored. For example, the child may say on Card 51, "The lines going down like this are gone on both windows, and lines were going across on both windows—they're gone too." In terms of the construction of the test, this response articulates two changes involving the horizontal panes and one change involving the vertical panes. In terms of the horizontal panes, one lag score would subtract Card 25 (where the horizontal pane for the large window is first omitted) from Card 51 (where the change was perceived), and result in a score of 26, which would be recorded in row IV. A second lag score would subtract Card 28 (where the horizontal pane for the small window is first omitted) from Card 51 (where the change was perceived), and result in a score of 23, which would be recorded in row IV. In terms of the vertical panes, since the change was perceived on Card 51 and both vertical panes are removed on Card 49, a score of 2 would be recorded in row IV.

Occasionally after Card 49 a child perceives and reports on only one vertical windowpane. For example, "The line going up and down is gone from this big (side) window." Since only one of the two vertical window panes has been articulated, this change is scored by adding "½" to row II (half a correct change was perceived). In terms of the leveling-sharpening ratio (see below), the number 5 is added to the numerator—a procedure that takes half the distance from the introduction of the vertical panes to the end of the test (i.e. II.).

After the changes reported have been transferred to rows I, II, III, and IV, three scores are computed from the correct changes reported. The incorrect and miscellaneous changes within each of the categories are summed and recorded on the appropriate lines.

Scores for Correct Changes

1. *First Stop Score.* The first stop score is the number of the card on which the first correct change is perceived. In the example being considered, the child first perceived a correct change with Card 10 (i.e., "the rays of the sun are missing"). Accordingly, the first stop score is 10, as noted in Figure 12.

2..*Number of Correct Changes.* This score is the total number of correct changes perceived. In the sample case, the child reported 12 correct changes, giving a number of correct change score of 12, as indicated in Figure 12.

3. *Leveling-Sharpening Ratio.* The leveling-sharpening ratio takes into account which correct changes were not perceived, which were perceived, and how soon they were perceived. Find the numerator as follows:

a. For each change "missed," note the number of opportunities the child had to detect the change not perceived. For each change, this number is obtained from the scoring key (Figure 7); recall that this value is the number of times a given change is presented to the end of the test, following its first appearance.

b. For each change detected, note the number of opportunities the child had to detect the change before he perceived it. These values are obtained from row IV of the scoring form.

The sum of all the opportunities the child had to detect changes he did not perceive (part *a)* is added to the sum of the opportunities the child had to detect changes before he did in fact perceive them (part *b).* This sum is divided by 19, the number of changes introduced in the test.

Thus the formula for the leveling-sharpening ratio is

$$\text{LS ratio} = \frac{\begin{array}{l}\text{for each change not detected, number of opportunities to}\\ \text{perceive each change (i.e., number of cards displayed to end}\\ \text{of test following introduction of a change)}\end{array} + \begin{array}{l}\text{for each change detected, number of}\\ \text{opportunities child had to detect change before}\\ \text{change 4 was detected (i.e., values in row IV)}\end{array}}{19}$$

In the example being considered, the child did not perceive the following changes: numbers 1 (doorknob), 4 (ground line to the right), 5 (top of weathervane pole), 7 (directions), 13 (oval window), 14 (roofline), and 17 (flagstone). In the order listed, these changes are presented the following number of times: 56, 47, 44, 38, 20, 17, 8. The total (230) of these values is left-hand term in the numerator.

The child did perceive all the other details. However if we total the values in row IV of the scoring form, we find that the child had a total of 58 opportunities before the changes detected were eventually perceived and reported. Some changes were perceived on the card that introduce them (e.g., sun rays), whereas others were not perceived until 46 displays had been presented (e.g., the fence detail, which is introduced on Card 7).

These two totals (230 and 58) are summed and divided by 19, yielding a ratio of *15.1.*

INTERPRETATION

Before considering the interpretations given the various scores attained, it may be helpful to review briefly the concept of leveling- sharpening in terms of which performance with the Leveling-Sharpening House Test is being examined. Recall that the leveling-sharpening cognitive principle defines a series of cognitive organizations, hierarchically ordered, involving the manner in which an individual remembers and relates past and present information. At one end of the continuum are individuals characterized by "leveling" behavior. They tend to construct vague memories of past information and to blend past and present information. Therefore these individuals tend not to notice whether information has changed or remained the same. At the other end of the continuum are individuals (referred to as “sharpeners”) who construct differentiated memory images of past information, maintain images clearly in memory, and articulate these images from present information. Therefore they tend to notice when information has changed (even in subtle ways) and when it has remained the same.

It may be helpful to repeat that the difference between a leveler and a sharpener is considered to be one of degree, not of kind; someone at the leveling end of the continuum is operating in terms of one cognitive organization involving the construction and maintenance of memory images, whereas someone at the sharpening end is operating in terms of another cognitive organization.

The earlier a child detects a correct change (i.e., the smaller the value of the first stop score), and the greater the number of changes detected (i.e., the higher the number of correct changes), the more the individual’s cognition is characterized by the “sharpening” end of the continuum. The later the child first detects a change, and the fewer correct changes are detected, the more the individual is characterized by the opposite or leveling end of the continuum.

Similarly, in terms of the LS ratio, the more the detections, and the less the lag in detecting changes, the smaller the ratio—therefore, the more the individual tends to maintain articulate memories of past information which are not fused with present information (sharpening). The fewer the detections, and the greater the lag in detecting changes, the larger the ratio; thus the more the individual forms vague memories of information, and the more he tends to fuse past information with present.

As discussed in Chapter 4 leveling and sharpening are not viewed as “bad” or “good.” Our work has shown that the cognitive organization labeled as “leveling” is associated with the developmentally immature cognitive system, and “sharpening” with developmental maturity; yet we have reported observations in particular circumstances indicating that leveling (or the more immature, “regressed” organization) is more adaptive than sharpening, and in other situations, the reverse is true (Chapter 9).

We have had some opportunity to conduct formal studies of incorrect changes perceived. It is our observation that these perceptions characterize young “normal” children (ages 4 to 7 years) more than older children. We have also observed that perceiving many incorrect changes also characterizes the test experience of children who represent various clinical diagnoses (e.g., atypical child, borderline child, ego-deviational; minimally brain damaged) and the test experience of adult psychotics (Chapters 6, 7, and 9). This relationship seems to hold especially for type B incorrect perceptions, but it also seems to be the case for type A (especially Am), although to a lesser extent.

I do not wish to leave the impression that the perception of incorrect changes signifies serious psychopathology. Neurotic children and learning-disabled children, with no major emotional disorder, also tend to report incorrect perceptions with the Leveling-Sharpening House Test. Until sufficient formal data are compiled concerning the unique significance of incorrect perceptions, we can use these test responses as evidence of the instability and fluidity of a child's intake of information and of the memory images he constructs.

THE OBJECT SORT TEST II[18]

A Procedure for Assessing the Cognitive Control Principle of Equivalence Range[19]

The cognitive control principle of equivalence range concerns the manner in which an individual relates, categorizes, and conceptualizes information. The developmentally immature end of this continuum is defined by an individual whose uses narrow categories to relate information. The concepts assigned to these categories are concrete and bound to the physical properties of the stimulus, or are unrealistic and illogical (atypical). At the developmentally mature end, we have an individual who uses broad categories to relate information. The concepts assigned to these categories are abstract and realistic in terms of the main physical properties and functions of the stimuli. In the proposed developmental hierarchy of cognitive controls, the process of equivalence range subordinates and integrates the earlier processes of constructing stable memory images of information, deploying attention selectively at relevant stimuli, scanning broadly and actively, and regulating tempos.

The Object Sort Test II (O-S II) was devised to assess the cognitive principle of equivalence range. This instrument has been used with children from the ages of about 4 years to adolescence and with adults. The Object Sort Test I (see note 4) was developed for children from the ages of 2 to 4 years and for older children for whom O-S II is not appropriate.

The O-S II is adopted from Rapaport's (1945) clinical application, with adults, of Goldstein and Scheerer's (1941) experimental use of the method, and from that of Klein and his associates (Gardner et al., 1959), who employed the method in their studies of cognitive controls. The test materials used are most like those originally discussed by Rapaport. I developed the scoring system on the basis of observations made of children dealing with the task.

MATERIALS

Forty-six objects of varying familiarity are used, representing many materials, sizes, colors, shapes, and contents. The materials should be presented to the child in a predetermined array (see Figure 15), to optimize comparing the performance of one child with that of another. The objects are (1) red plastic plate, (2) two corks, (3) candy cigar, (4) toy spoon, fork, knife, (5) white filing card, (6) one red and one yellow poker chip, (7) two nails, (8) two keys (that fit the lock, item 24), (9) one red and one green cardboard circle, 2 inches in diameter, (10) toy ceramic dog (11) real pliers and screwdriver, (12) wooden block with a nail driven in halfway, (13) plastic red apple, (14) toy wooden clapper (noisemaker), (15) real smoking pipe, (16) bicycle bell, (17) real spoon, knife, and fork, (18) two sugar cubes, (19) red rubber ball, (20) real cigarette, (21) toy screwdriver, hammer (red handle), saw (yellow rubber), and pliers (red rubber), (22) box of stick matches, (23) two saltine crackers, (24) padlock, (25) eraser, (26) large white candle and small red candle, (27) real cigar, (28) plastic red cup, and (29) candy cigarette.

	Examiner										
	1	2	3	4	5	6	7	8	9	10	11
A	Red plate	Cork	Candy cigar	Toy spoon	Index card	Yellow poker chip	Nail	Key	Red cardboard circle	Toy dog (brown and white)	Real pliers
B	Real screwdriver	Wood block with nail	Apple (red plastic)	Toy clapper	Toy knife	Real pipe	Bicycle bell (silver)	Real knife	Cube of sugar	Key	Red ball
C	Real cigarette	Matches	Cork	Toy screwdriver	Nail	Soda cracker	Padlock	Eraser	Toy saw (yellow)	Red candle (small)	Toy cigarette (white candy)
D	Toy hammer (red handle)	Real fork	Cube of sugar	White candle (large)	Real cigar	Toy pliers	Toy fork	Bathtub stopper (white)	Real spoon	Red poker chip	Green cardboard circle
	Red cup					Child					Soda cracker

Figure 15. Object Sort Test II: display of materials as presented to the child.

GENERAL METHOD

The child is asked to place the objects into groups, locating together objects the child sees as belonging together for some reason. The child may form any number of groups, and any number of objects may be placed in a group. The child may designate a single object as forming a group, or as belonging alone for some reason. The child is asked to try to locate all the objects displayed in some group, but he is also told that objects may be omitted from the groupings constructed. There is no time limit. The examiner records the child's groupings and conducts an inquiry after the child has completed forming the groups. The child's equivalence range functioning is inferred from two aspects of his performance: the objects he has physically grouped, and the verbal label he assigns to the group in response to being asked to explain how the objects belong together.

Instructions. The examiner places the 46 objects before the child as in Figure 15. The objects should be arranged before the child enters the room, or this should be done while he is occupied with another task.

The examiner says, "Do you see all these different things" (pointing to the objects) "spread over the table? Put together the ones you think belong together. Take some things you think belong together and put them here." (points to the table available for the groupings) "Then take other things you think belong together and put them here" (pointing) “and then some other things. You can have as many groups (piles) as you like, and you can have a few or a lot of things in a group (pile). If you think some thing belongs by itself for some reason, you can put that over here too. Try to find a place for all the things. But if you don’t use some things, because they don’t belong in a group, that’s OK, too.”

The examiner answers any questions the child asks and clarifies or repeats aspects of the instructions as indicated. If the child pauses for several minutes and does not respond, it is sometimes helpful to repeat, “Take some of those things that you think belong together and put them over here.” (pointing)

Several details concerning administration are important. The examiner should ensure that ample space is available for the child to locate groups. Placing two child-size tables at right angles is desirable. If the objects are arranged on the left-hand table, the child can easily place objects forming a group on the right-hand table, simply by taking a step or turning his body.

The examiner should avoid naming the objects, referring to them only as “things.” Occasionally a child will ask the examiner, “What is this?” or “Is this real?” or “Is this a cigar?” The examiner replies by reflecting the question, asking the child to describe what he thinks the object is or could be, and the name or designation the child assigns the object is accepted. Although the examiner should avoid naming the objects or their functions, this could be done if necessary to maintain rapport.

As the child constructs groups, record the names of objects placed in a group, and when possible the physical arrangements of the groupings. Data in the latter category are especially meaningful clinically in evaluating conceptual thinking (see Scoring and Interpretation). For example, a child may locate the real cigar, smoking pipe, and cigarette together, then group the two candles, placing them several inches away, and then place the box of matches between them, noting later that the matches light the cigar and the candles but the child is not sure into which group the matches should be placed. Also, some children remove an object from one group and locate it in another, “spoiling” the conceptual tie of the former or the latter by the relocation. Whenever possible, the changes in location of objects should be noted. Clearly recording the physical location of the groups, the sequence of groups constructed, the sequence in which objects are gathered to form a group, and the relocation of objects provides, valuable data about the process of the child’s conceptual thinking. Of course spontaneous comments the child makes, and ways in which he manipulates objects, should also be noted. For example, one child may puzzle over the bicycle bell, handle it, explore it, push the lever and discover the ring, decide that it makes noise, and place the bell with the toy clapper. Another child may puzzle over the bell, not handle it, decide “it’s kind of round,” place it with the ball.

Inquiry. When the child indicates that he has completed the groupings, conduct the following inquiry. If the child pauses, and the examiner has the impression that the child has completed the task, nevertheless the child should be asked if he has finished forming the groups before the inquiry is conducted.

When the child has confirmed that he has completed the task, say, “That’s fine. Now let’s take this group.” (pointing to the first group the child constructed) “Tell me, how do these things belong together? Why did you put them together?” With similar questions, the examiner attempts to obtain from the child a label defining some relationship among the objects. The makeup of the group constructed, plus the child’s verbal label, are given a developmental score according to the system described below. Whenever possible, begin the inquiry with the first group the child has constructed; then inquire about the other groups in the order in which the child formed them.

Sometimes during the inquiry a child will take an object and locate it in another group. The examiner should attempt to obtain the child’s explanation for the original group constructed before the object is removed. Some children do not offer a verbal concept, saying only, “I don’t know,” or “Because they belong together.” Others give labels that strike the examiner as peculiar or incorrect. These verbal concepts are accepted matter of factly. If a child responds, “They are the same,” always ask at least once, “How are they the same? Why do they belong together?” Sometimes a child then produces evidence of a higher level conceptualization.

Detailed knowledge of the scoring system is necessary for effective inquiry. For example, a child may group the silverware, cup, and dish, saying in response to the inquiry, “They all do things.” This response would qualify for the atypical score, syncretic (see Scoring and Interpretation). However questions such as “Do what? How do you mean do things?” may elicit a response such as “Do things for when you eat—they’re things that you do with to eat.” This additional conceptual thinking by the child would place the performance within a typical scoring category, yielding a score of 6, since the grouping and the concept verbalized define a main function of the objects. Of course, on further inquiry the child may say, “They are things that do things,” in which case the syncretistic score remains.

SCORING AND INTERPRETATION

In general, each group a child constructs, plus the concept verbalized to account for the objects grouped, is assigned a *main score* from one of three scoring categories: *typical groupings, miscellaneous groupings and atypical groupings.* Typical groupings receive a numerical score. Miscellaneous and atypical groupings are assigned only code letters. Four of the atypical scores used (syncretistic, fabulated, chain, and symbolic) are adopted from Rapaport’s system (1945). I constructed the system of typical, miscellaneous, and other atypical scores on the basis of responses produced by children.

An *additional score,* as well as a main score may be assigned to some groupings. Suppose that a child constructs and conceptualizes a group having a major portion that qualifies for a typical score and a minor portion that qualifies for an additional miscellaneous, or additional atypical score. In such a case the grouping is given a typical numerical score plus an additional miscellaneous or atypical score. *Only typical groupings qualify for an additional score, and only miscellaneous and atypical scores are used as additionals.* If a grouping is judged to be atypical or miscellaneous, it *cannot* receive an additional typical score.

The most common additional score with the test performance of children involves the atypical category "perceptual distortions" (PD). These are distinguished in terms of major and minor perceptual distortions (PD1 and PD2, respectively). For example, a child groups the cigarette, cigar, pipe, matches, and eraser and says, "They are all for smoking," and when asked about the eraser replies, "That too." Articulating the eraser as a smoking object is considered to be a major perceptual distortion. This test performance receives a main typical score of 6 and an additional atypical score of PD 1. Minor perceptual distortions (PD2) are represented, for example, by a child labeling the real and toy silverware as "Things you eat with"; this response receives a main typical score of 6 and an additional, PD2, since failure to distinguish between real and make-believe silverware is considered to be a minor perceptual distortion. The same scheme is applied in assigning other miscellaneous or atypical scores as additionals. In general, an additional score is assigned whenever the *minority* of objects in a group do not fit the typical concept offered that in fact fits the majority of objects in that group.

It is important to note that the score assigned takes into account *both* the grouping of objects constructed *and* the reason or concept a child verbalizes in response to the question "How do these belong together? Why did you place them together?" The concept the child verbalizes is critical in determining the child's developmental level of conceptual thinking. On occasion a child is unable or unwilling to verbalize a concept accounting for the group constructed. This test performance is handled by two of the miscellaneous scores. The child's language style should *not* influence the score. For example, if a child says in response to grouping the hammer, screwdriver and pliers, "These things make things fixed," he is expressing a functional concept appropriate to the group of objects, and this response is given the typical score of 6. However, language deficits are scored. The scoring categories are summarized first, followed by examples illustrating each.

I. Typical Groupings

Score	Description
7	The group of objects and the concept verbalized define an abstract class or realm to which the objects belong.
6	The group of objects and the concept verbalized define a main function common to the objects.
5	The group of objects and the concept verbalized define a physical property or attribute common to the objects.
4	The group of objects and the concept verbalized define a concrete functional relationship between objects located in the group (i.e., one object performs a function on another in that group)
3	The group of objects and the concept verbalized define the objects as identities.
2	The group of objects and the concept verbalized, define a concrete relationship between objects in the group and another object (or objects) not present.
1	The group of objects are not bound together with a concept; rather, the objects are named or in some way identified as isolated units.

II. Miscellaneous Groupings

Code Letters	Description
SO	*Single Object.* A single object is specifically set apart as representing a group. The verbalization indicates that the object is segregated as defining a realm and as standing alone.
OD-A	*Object Difference—A*. A single (or multiple) object is specifically set aside as different from other objects of the test material not in that group; the nature, or content, of the difference is not articulated.
OD-B	*Object Difference—B.* Objects are grouped to emphasize differences between the objects in that group; the nature or content of the difference is articulated and does not define opposites.
OD-C	*Object Difference—C.* Two or more objects are specifically set aside to emphasize some difference; the nature or content of the difference is articulated in terms of opposites or extremes. One item in the group is viewed as the opposite of another in that group. In the case of a group of one item, the object is viewed as opposite that of other objects in the test or outside the test.
R-NR-D	*Related Objects—No Verbal Response—Demonstration.* A group of objects is constructed that appear to the examiner to be related conceptually. The child does not verbalize a concept relating the objects but demonstrates a relationship among the objects by physically engaging one or more objects in some way with other objects in the group.
R-NR	*Related Objects—No Verbal Response*. A group of objects is constructed that appear to the examiner to be related conceptually. The child does not verbalize a concept and does not manipulate the objects to relate them.
U-NR	*Unrelated Objects—No Verbal Response*. A group of objects is constructed that appear to the examiner to be unrelated conceptually. The child does not verbalize a concept and does not manipulate the objects.
PO	*Partial Objects*. A group of objects is constructed, and a concept verbalized, that relates a physical or functional part of one object (or objects) with all, or part, of another object or objects in that group.
GP	*Grouping of Part Groups.* A group of objects is constructed, and a concept verbalized, that consists of two or more part groups. That is, the total group is made up of two or more subgroups.

III. Atypical Groupings

Code Letters	*Description*
SYN	*Syncretistic.* The group of objects constructed and the concept verbalized articulate a function, concrete attribute, origin, or location common to the objects grouped that is vague, overgeneralized, and overextended, conveying that many other objects not present belong to the realm. The characteristic of syncretistic groupings formed by adults is that the conceptual basis of the objects grouped becomes excessively extended so that everything may belong with everything else. The same overextended quality of conceptual thinking is observed in the test behavior of children. Although children contain or confine the concept within the group of objects, they nonetheless show that a vague and overly extended concept is guiding the grouping. For example, the toy screwdriver and nail are seen as belonging together because "they are too little."
FAB	*Fabulated.* A group of *three or more* objects is constructed, and a concept verbalized, that selects an attribute of one object and makes it the starting point of a story that then unwinds, so that in its course reference is made to other objects in the group. Thus the conceptual thinking verbalized does not articulate a single construct that unites the objects but rather, articulates attributes that figure as different parts of one story. For example, a child may start out with the screwdriver as belonging to a workman and add the rest of the tools, describing the different kinds of work he does with them; then the sugar and eating utensils are added with the explanation that the workman went to lunch; the lock is added because he locked up his tool kit while eating lunch; and finally all the smoking utensils in the group are included because he likes to smoke a cigarette when he does heavy work, a cigar when he does easy work, and his pipe after lunch. Fabulated groupings usually make use of functional concepts but can be distinguished from the typical category, level 6, because a single dominant function common to all the objects is not articulated to unite the objects. Rather, a narrative including several functions unites the objects. It may be helpful to view fabulated sorts as a process in which the central object, plus the concept it generates, shifts continually as the grouping is explained or evolved. This category should also be distinguished from the miscellaneous category GP, in which the subgroups that make up the total groups are not connected by a narrative.
FAB-0	*Partial Fabulated.* A group of objects is constructed and a concept verbalized indicating that a need state or drive dominates the category. Although there may be a logical connection between the objects and the verbal label, several steps have been skipped over from the properties of the objects to the explanatory label in accounting for the grouping; this category is also reserved for groupings that combine aspects of fabulated, chain, and symbolic groupings but do not qualify totally as one of these categories.
CH	*Chain.* A group of objects is constructed, and a concept verbalized, relating the physical property of one object to the physical property of a second. Then another physical property of the second object is conceptualized and related to a physical property of a third object, and so on. In this way a shifting series of concepts, articulating physical properties, is

	used to account for the objects. For example, the red of a poker chip is related to the red of the ball, then the roundness of the ball is related to the roundness of the bell, and so on. Chain groupings are distinguished from fabulated groupings even though in both cases the concepts employed to relate the objects are fluid, with one concept giving way to another. In the former, however, a shifting series of physical properties is articulated; in the latter, a series of functions or physical properties is woven into an organized or disorganized narrative.
SYMB	*Symbolic.* A group is constructed, and a concept verbalized, radically reinterpreting the meaning of the objects and presenting an arbitrary, symbolic meaning as the basis of group. For example, a round piece of paper is interpreted as "an ashtray" and the large and small silverware as "mothers and their babies."
F1	*Forced.* A group of objects is constructed and a concept verbalized serving to force a connection between the objects that is nonsensical, unrealistic, and highly idiosyncratic. For example, the child groups a padlock and eraser by leaning the padlock on the eraser saying, "You can do this with them." The child groups the toy dog and the matches and says, "They belong together because the dog can carry that to a man." This category has been useful in identifying groupings and verbalizations (observed in children) that do not qualify as one of the four categories of illogical thinking described by Rapaport (syncretistic, fabulation, chain, symbolic). Forced groupings may be developmentally earlier forms of the illogical groups observed in adults. The forced category may at times be confused with level 4 of the typical categories. The functional connection articulated in level 4 groupings appears to be appropriate and intrinsic to the objects in the group. The functional connection in forced groupings appears to be forced and unrealistic. Compare the "dog and match" example just given with a level 4 grouping in which a candle is placed on the dish "because you can hold the candle with this." The latter grouping does bring two objects together realistically and in terms of intrinsic properties of each.
F2	The forced category is divided into two groups, F1 and F2, representing major and minor distortions, respectively, in conceptual thinking.
PD1	*Perceptual Distortion 1.* A group of objects is constructed and a concept verbalized, suggesting a gross perceptual distortion in registering the properties of the objects. For example, the cigar and eraser go together because "They are both cigars."
PD2	*Perceptual Distortion 2.* A group of objects is constructed and a concept verbalized, suggesting a minor perceptual distortion in registering the properties of the objects. For example, the toy silverware and real silverware are grouped together because, "They are all used to cut and eat meat." As discussed earlier, PD1 and PD2 are often used as *additional* scores. Care should be taken to distinguish between forced groups and PD groups. With the latter, the child is linking objects whose physical properties are ignored or perceived incorrectly. With forced groups, the child attempts to relate the objects by physically juxtaposing them, or by forcing an unrealistic concept on the group to bind the objects together.

IV. Additional Scores

Two scoring categories are used only as additional scores. One is used to note that an affect or drive expression appreciably influences the concept guiding the grouping. The other is a means of recording a deficit in language or labeling, which is revealed in the concept verbalized and goes beyond language style. Either score can be added to main scores of the typical, miscellaneous, and atypical categories.

Code Letters	*Description*
DR	The concept verbalized to relate the groups reveals in its content a major expression of affect or impulse (i.e., drive).
V Def	*Vocabulary Deficit.* A group of objects is constructed that appear to the examiner to be related in terms of one of the typical score categories; the child verbalizes a concept relating the objects, but the label used in articulating the concepts is deficient. Care should be taken not to assign a test response to this category on the basis of the child's idiosyncratic language style, if this has a cultural or age-appropriate basis.

EXAMPLES ILLUSTRATING SCORING CATEGORIES

Examples of typical groupings are listed first, followed by miscellaneous and atypical groupings in that order. When indicated, special considerations are discussed for using a category. At the close of this section, examples are given to illustrate three issues: *(a)* groupings and verbalized concepts that reveal drive-dominated conceptual thinking, (b) groupings and verbalized concepts that require multiple additional scores, and (c) groupings and verbalized concepts that require further inquiry to clarify the type and level of conceptual thinking reflected by the test behavior.

I. Typical Groupings

In general, the seven-point scale assigned to typical groupings defines developmental levels from no relating or categorizing of objects (conceptual immaturity, level 1) to relating objects in terms of abstract realms or concepts (conceptual maturity, level 7). The groups of objects articulate the following entities: level 7, an abstract realm; level 6, a dominant function inherent in the objects; level 5, a dominant physical property inherent in the objects; level 4, a functional-physical connection between the objects in the group; level 3, the identity of objects; level 2, the use or origin of the objects in terms of their application with objects outside the test material; and at level 1 the objects are not related but are treated as independent items. The examples are presented from the most mature level to the least, representing usual and borderline responses.

SCORE = 7
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED DEFINE AN ABSTRACT CLASS

Grouping	Concept verbalized
1. The real spoon, fork, knife	1. “They are all silverware.”
2. The red and blue disks; the red and yellow poker chips	2. “They’re all a circle.”
3. The toy silverware	3. “They’re all small silverware.” “They’re all silverware to play with.”
4. Ceramic dog and rubber ball	4. “They’re toys.”
5. Two saltine crackers	5. “They’re food.”
6. The real pliers, screwdriver	6. “They’re tools.”

Special Considerations

1. The cardboard disks and poker chips conceptualized as “circles” are scored here because “circle” is an abstract realm. If these objects are conceptualized as “round,” the realm of a physical property is articulated, placing the response in level 5; conceptualized as “the same,” these objects articulate the more global realm of identities, and the response belongs in level 3.

2. Two crackers conceptualized as “square” articulates the realm of physical property and locates the response in level 5; using the concept of “both crackers” articulates the objects as identities and places the response in level 3.

SCORE = 7
ADDITIONAL SCORE = PD1

The majority of the objects in the group and the concept verbalized define an abstract concept. The minority of objects reveals a major perceptual distortion

Grouping	Concept verbalized
1. Rubber ball; plastic apple	1. "They're fruits."
2. Real and toy silverware; lock	2. "They're silverware."
3. Real and toy tools; lock; two keys; toy cigarette; pipe	3. "They're all tools."
4. Clapper; nail	4. "They're musical things."

Special Consideration. When both the group constructed and the concept verbalized by a child reveal a perceptual distortion, the examiner should inquire further, without conveying criticism of the group, to obtain further information about the child's thought process and awareness of the perceptual distortion. Usually this can be done by restating the child's concept in the form of a question. For example, with group 1 above, "How (or why) are these all fruit?" The child may reply, "That's an apple and that's a plum." Occasionally the child removes the object or objects that do not fit when further inquiry is conducted. If a child makes clear that an object is removed because it does not belong, the PD1 score is dropped, but the original performance is noted for diagnostic purposes. An additional PD1 is assigned only after inquiry has established that the child is unaware of the perceptual distortion or accepts it.

SCORE = 7
ADDITIONAL SCORE = PD2

The majority of the objects in the group, and the concept verbalized, define an abstract concept. The minority of objects reveals a minor perceptual distortion.

Grouping	Concept verbalized
1. Real and toy silverware	1. "They're all silverware."
2. Two crackers; plastic apple	2. "They're all food."
3. Real tools; two nails	3. "They're all tools."
4. Red and yellow chips; red and blue disks, stopper; bell; lock; rubber ball	4. "They're all circles."
5. Real and toy tools	5. "They're all tools."

Special Considerations. If with inquiry the child acknowledges that the apple (group 2) is not real, the PD2 additional score is not assigned. No additional inquiry is conducted with respect to groupings containing minor perceptual distortions. The most common response that qualifies for a PD2 additional score occurs when real and toy objects are grouped and inquiry does not elicit an acknowledgment of their real and make-believe properties.

SCORE = 6
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED DEFINE A MAJOR FUNCTION COMMON TO THE OBJECTS

Grouping	Concept verbalized
1. Two corks; stopper	1. "They keep water from going out."
2. Two sugar cubes	2. "You eat them."
3. Pipe; real and toy cigars; real and toy cigarettes; red and white candles;	3. "They all light up fire, real and make

matches	believe.”
4. Red and yellow poker chips	4. “They’re play things.”
5. Real tools	5. “They’re for working.”
6. Real silverware	6. “You eat with them.”
7. Pipe; real cigar and cigarette	7. “You smoke these.”
8. Cup placed on dish	8. “For drinking.”

Special Considerations. The third group does not receive an additional PD Score because the child acknowledges the “make-believe” attribute of some objects.

SCORE = 6
ADDITIONAL SCORE = PD2

The majority of objects in the group, and the concept verbalized, define a major function common to the objects. A minority of the objects represent a minor perceptual distortion.

Grouping	Concept verbalized
1. Pipe; real cigar; toy cigarette	1. “They’re for smoking.”
2. Pipe; candy cigar; real cigar; matches	2. “You smoke these.”
3. Real silverware; toy silverware; cup	3. “All for the kitchen.”
4. Saucer; cup; plastic apple; two crackers	4. “They’re eating things.”
5. Real and toy silverware	5. “They’re all for eating.”
6. Real and toy tools	6. “They’re all for fixing.”

Special Considerations. The most common response at this level, which qualifies for an additional PD2, is also the grouping of real and toy objects with no acknowledgment of the attributes “real” and “make-believe.” With group 2, a PD2 is added to distinguish this response from one that does not include the matches. No further inquiry is conducted with respect to groupings that contain minor perceptual distortions. With scores of 6 or less, major perceptual distortions are rare. However the examiner may assign a PD1 as an additional score where indicated; for example, the cigar, real cigarette, pipe and eraser are grouped “because they’re smoking things.” Usually major perceptual distortions occur with abstract concepts that fall into level 7.

SCORE = 5
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED DEFINE A PHYSICAL ATTRIBUTE COMMON TO THE OBJECTS

Grouping	*Concept verbalized*
1. Bell; rubber ball	1. “Both round.”
2. Matches; eraser	2. “Both square.”
3. Lock; bell; two nails; two keys	3. “These are all metal.”
4. Red and blue disks	4. “They’re paper things.”

5. Toy tools	5. “All plastic.”
6. Real knife; two nails	6. “Sharp.”
7. Two crackers; two sugar cubes; eraser	7. “All square.”

SCORE = 5
ADDITIONAL SCORE = PD2

The majority of the objects in the group and the concept verbalized define a physical at tribute common to the objects. The minority of the objects reveal a minor perceptual distortion.

Grouping	*Concept verbalized*
1. Toy clapper; wood with nail; two corks	1. “They’re all wood.”
2. Dish; lock; rubber ball; plastic apple; stopper; red and yellow chips; red and blue disks	2. “They’re all round.”

SCORE = 4
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED DEFINE A FUNCTIONAL RELATIONSHIP BETWEEN THE OBJECTS IN THE GROUP

Grouping	*Concept verbalized*
1. Lock; two keys	1. “Keys lock it.”
2. Matches; real cigarette	2. “Matches light it” (cigarette).
3. Eraser; index card	3. “Eraser rubs off the paper.”
4. Toy hammer; wood with nail	4. “The hammer bangs the nail.”
5. Red candle; matches	5. “Light it to burn.”

SCORE = 4
ADDITIONAL SCORE = PD2

The majority of objects in the group and the concept verbalized define a functional relationship between the objects. The minority of objects reveal a minor perceptual distortion.

Grouping	*Concept verbalized*
1. Real and candy cigarettes; pipe; real and candy cigars; matches	1. “Matches light them.”
2. Real and toy cigarettes; red and white candles; matches	2. “Light with.”

SCORE = 3
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED DEFINE THE OBJECTS AS IDENTITIES

Grouping	*Concept verbalized*
1. Two nails	1. “Both nails.”
2. Two keys	2. “Keys.”
3. Red and yellow poker chips	3. “Both circles.”
4. Red and white candles	4. “Both candles.”
5. Two corks	5. “Both corks.”

6. Two sugar cubes	6. "Both sugar."

Special Consideration. With group 3, although the physical attribute "circles" is specified, the objects are identical and the verbalization "circles" is taken to mean "both poker chips."

SCORE = 3
ADDITIONAL SCORE = PD2

The group and the concept verbalized define the objects as identities but also reveal a minor perceptual distortion.

Grouping	*Concept verbalized*
1. Real and toy pliers	1. "Both same; they're both pliers."
2. Real and toy knife	2. "Both knives."
3. Red and white candles; plastic apple	3. "All candles."
4. Red and blue disks	4. "Both the same."

Special Consideration. The most common response in this category is the grouping of identical objects, one real and one toy.

SCORE = 2
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED DEFINE A CONCRETE RELATIONSHIP BETWEEN THE OBJECTS AND ANOTHER OBJECT (OR OBJECTS) NOT PRESENT

Grouping	Concept verbalized
1. Two corks	1. "Go on top of bottles." "Come from bottles."
2. Cup; saucer	2. "For coffee."
3. Two sugar cubes	3. "They go on a collage."
4. Red and yellow poker chips	4. "Go with cards."
5. Red and white candles	5. "Candles for a party."

SCORE = 2
ADDITIONAL SCORE = PD2

The group of objects and the concept verbalized define a concrete relationship between the objects and another object not present. The group reveals a minor perceptual distortion.

Grouping	Concept verbalized
1. One cork; stopper	1. "They go on bottles."
2. Real and toy silverware	2. "They go in the kitchen drawer."

SCORE = 1
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED DO NOT RELATE OR BIND THE OBJECTS TOGETHER

Grouping	Concept verbalized
1. Cup; plastic apple	1. “Cup and apple for drinking and eating.”
2. Cup; dish	2. “It’s a cup and a plate.”
3. Toy silverware	3. “It’s a spoon, fork, knife.”
4. Two sugar cubes	4. “This is sugar and this is too.”

SCORE = 1
ADDITIONAL SCORE = PD2

The group of objects and the verbalization are not bound together with a concept, and a minor perceptual distortion is revealed.

Grouping	Concept verbalized
1. Toy screwdriver; real and toy pliers	1. “This one turns (pliers); this one screws.”
2. Eraser; toy cigarette	2. “This is a pen and eraser.”
3. Cup; saucer; apple	3. “Stuff for eating and an apple.”

II. Miscellaneous Groupings

SCORE = SO
A SINGLE OBJECT IS SET APART

Grouping	Concept verbalized
1. Plastic apple	1. “It goes by itself.”
2. Dog	2. “It goes alone.”
3. Bicycle bell	3. “Because it’s a bell and you ring it to tell somebody you want to go by.”

SCORE = OD-A
THE OBJECTS GROUPED AND THE CONCEPT VERBALIZED DEFINE THE ATTRIBUTE “DIFFERENCE”: THE DIFFERENCE IS NOT ARTICULATED

Groupings	Concept verbalized
1. Bicycle bell	1. “Because it’s different from all of these.”
2. Dog; two keys; matches	2. “They’re different from everything else.”
3. Two corks; lock	3. “They’re different things.”

SCORE = OD-B
THE OBJECTS GROUPED AND THE CONCEPT VERBALIZED DEFINE THE ATTRIBUTE “DIFFERENCE”: THE CONTENT OF THE DIFFERENCE IS ARTICULATED

Grouping	*Concept verbalized*
1. Lock and poker chips	1. “This is shiny, and that one isn’t.”
2. Two keys; cardboard disks	2. “These are hard and these aren’t.”
3. Cup; disk	3. “One you put food on and this you don't, you drink.”

4. Real and candy cigar	4. "One is gum and this isn't."

SCORE = OD-C

THE OBJECTS GROUPED AND THE CONCEPT VERBALIZED DEFINE THE ATTRIBUTE "OPPOSITES"

Grouping	*Concept verbalized*
1. Real and toy spoons	1. "This is tall and that is short."
2. Ball and poker chip	2. "This is fat and that is skinny."
3. Wood with nail; rubber ball	3. "This is hard and this is soft."
4. Ball; real pliers	4. "This is for work and this is for play (ball)."

SCORE = R-NR-D

RELATED OBJECTS ARE GROUPED; THERE IS NO VERBALIZATION; THE CHILD DEMONSTRATES THE RELATIONSHIP

Grouping	Behavior—Demonstration
1. Lock and two keys	1. The child unlocks the lock with the key or inserts the key in the lock.
2. Cup and dish	2. The child places the cup on the dish.
3. Two poker chips; two cardboard disks	3. The child stacks the objects in a tower.
4. Wooden block with nail; toy hammer	4. The child taps the nail with the hammer.
5. Cup on dish; sugar cube	5. The child places the sugar cube in the cup.
6. Real and toy cigarettes	6. The child places each in his mouth and puffs.

SCORE = R-NR

RELATED OBJECTS ARE GROUPED; THE CHILD DOES NOT VERBALIZE OR DEMONSTRATE THE RELATIONSHIP

Grouping	No concept verbalized
1. Lock; bell	1. "Just because."
2. Real and toy cigars; real and toy cigarettes; pipe	2. "Just do, that's all." "I want them to."
3. Rubber ball (red); plastic apple (red); saucer (red); red candle; red chip; red disk	3. "Because." "they're supposed to."
4. Pliers and screwdrivers	4. "They just do."

SCORE = U-NR

UNRELATED OBJECTS ARE GROUPED; THE CHILD DOES NOT VERBALIZE A CONCEPT

Grouping	No concept verbalized
1. Pipe; bell	1. "I didn't do that; I don't know."
2. Real fork; real and toy spoons; real knife; toy saw; toy hammer	2. "Don't know."
3. Eraser; red and white candles; bell	3. "Don't know."
4. Lock; white candle; eraser; toy hammer	4. "Don't know."
5. Dog; index card; toy hammer; toy saw	5. "Don't know."

Special Considerations. Because the child does not or cannot verbalize the thought process that guided the grouping of objects, these responses do not receive an atypical score.

SCORE = PO
A PART OF ONE OBJECT IS RELATED TO ALL OR A PART OF ANOTHER OBJECT

Grouping	Concept verbalized
1. Wood with nail, two nails	1. “Two nails here and one here” (in wood).
2. Eraser, white candle	2. “There’s white on this,” (lettering on eraser) “and the candle is white.”
3. Lock; toy hammer	3. “Silver on this” (head of hammer) “and on this lock.”
4. Two sugar cubes; toy clapper	4. “Squares on here” (toy clapper) “same as sugars.”
5. Bell; dish	5. “There’s red on the plate and red on the bell” (red lettering on bell).
6. White candle; toy screwdriver	6. “Candle is round and screwdriver round here” (the handle).
7. Real and toy spoons	7. “Both are round at the end.”

Special Considerations. The child should designate and appropriately relate a part of one object with a part or all of another object. Care should be taken that the part attributes articulated are realistic. If the parts related are unrealistic, these responses could qualify as *forced* (e.g., the saw and bell “both have handles”). See forced groupings, below.

SCORE = GP
THE GROUP OF OBJECTS CONSISTS OF SUBGROUPS OF OBJECTS

Grouping	Concept verbalized
1. Real and toy silverware; saucer; toy cigar; two crackers; two sugar cubes; plastic apple	1. “You eat with these” (silverware) “food goes on a plate; you eat bubble gum and crackers and apple.”
2. Two corks; two keys; lock; bathtub stopper	2. “These” (stopper) “lock bottle; these” (keys and lock) “lock other things; these corks go on bottle.”
3. Two crackers; two sugar cubes	3. “Two crackers are same; and two sugars are same.”

III. Atypical Groupings

SCORE = SYN
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED DEFINE A REALM THAT IS OVER-INCLUSIVE AND OVER-EXTENDED

Grouping	Concept verbalized
1. Toy knife, fork, and spoon; noisemaker; bell	1. “They all make a musical sound.”
2. Eraser; wood with nail	2. “It’s what you play with.”
3. Plastic apple; rubber ball	3. “It’s what you use.”
4. Toy knife; blue disk; eraser; red candle	4. “They are all nice things.”
5. Dog; eraser	5. “Make them in a factory.”
6. Dog; noisemaker; stopper; eraser; bell; lock	6. “They all make sounds: bark; clap; draining; rubbing; ringing.”
7. Cup; plastic apple; dog	7. “Can use them for decorations.”

8. Toy spoon; cup; saucer; red and blue disks; red and yellow chips	8. “All for mothers.”
9. Two corks; two keys; eraser	9. “Just regular, things so you can do things.”
10. Red and blue disks; red and yellow chips; rubber ball; plastic apple; dog	10. “All for people.”

SCORE = FAB
THE GROUP OF OBJECTS IS RELATED BY A NARRATIVE THAT BEGINS WITH OR EMPHASIZES ONE FUNCTION OF AN OBJECT

Grouping	Concept verbalized
1. Bell; toy hammer; wood with nail	1. “You hammer with wood, bell can be broken by hammer.”
2. Lock; two keys; stopper	2. “Keys go in lock and you lock the plug” (places lock in ring of stopper) “plug locks the water in.”
3. Eraser; real and toy tools; lock; keys; bell	3. “When a man builds a house he needs ’em—lock it up to keep ’em safe—use bell on the door.”

Special Considerations. The fabulated responses produced by children are not the elaborate narratives produced by some adults. However as the foregoing examples reflect, a child may construct a narrative around the group rather than relating the objects with a concept. Also, care should be taken to distinguish fabulated groupings from groups within a group (GP).

SCORE = FAB-0
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED INDICATE THAT THE CONCEPTUAL REALM IS DOMINATED BY A NEED

Grouping	Concept verbalized
1. Saucer; cup; real and toy forks	1. “Thirsty.”
2. Cup; saucer	2. “Starving to death.”
3. Real and toy knives	3. “Dangerous; might cut my finger off.”

SCORE = CH
THE GROUP OF OBJECTS AND THE CONCEPTS VERBALIZED DEFINE A SERIES OF SHIFTING PHYSICAL ATTRIBUTES THAT RELATE THE OBJECTS IN SERIES

Grouping	Concept verbalized
1. Red and yellow poker chips; red and blue cardboard disks; index card	1. “They’re all round” (chips and disks) “and this” (disks) “is cardboard like this one is cardboard” (index card).
2. Red and yellow poker chips; toy saw	2. “This one is the same as this” (two chips) “and this” (yellow chip) “is yellow like this” (toy saw).
3. Cracker on index card; dog	3. “The paper doesn’t get the cracker dirty, and the dog is watching the cracker.”

SCORE = SYMB
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED REPRESENT A RADICAL REINTERPRETATION OF THE MEANING OF THE OBJECTS

Grouping	Concept verbalized
1. Real and toy pliers; real and toy screwdrivers; toy hammer; toy saw	1. “They’re poison, you shouldn’t touch them.”

2. Noisemaker; eraser	2. "They're nice to each other."
3. Red and yellow poker chips	3. "This means good money and this is bad money."
4. Two sugar cubes	4. "Cheese for mouse."
5. Red and blue disks; red and white candles	5. "Two cakes, big and little candles for them."
6. Saucer; two corks; cup; plastic apple	6. "Have a party with them."

SCORE = F1
THE GROUP CONSTRUCTED AND THE CONCEPT VERBALIZED DEFINE A RELATIONSHIP AMONG THE OBJECTS THAT IS FORCED AND UNREASONABLE TO A MAJOR DEGREE, GIVEN THE OBJECTS USED AND RELATIONSHIPS DEFINED

Grouping	Concept verbalized
1. Bell; clapper; eraser; wood with nail	1. "Musical instruments, they also make noise."
2. Stopper; nail	2. "You can hammer nail into it."
3. Dog; bicycle bell	3. "Glass on the dog; glass on bell."
4. Dog; bell	4. "Both breakable."
5. Cup; stopper	5. "You can drink out of both."
6. Pipe; stopper	6. "It" (stopper) "covers the pipe."
7. Red and blue disks; index card	7. "You can write on all of them."
8. Lock; bell; two keys	8. "They go on garage door."
9. Bell; stopper	9. "Noisy, one is noisy and one is quiet."
10. Toy knife; candle	10. "Knife cuts the candle."

Note. Group 9 does not receive an O-D miscellaneous score, although a difference is articulated, because the attributes articulated are not reasonable.

SCORE = F2
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED, DEFINE A RELATIONSHIP AMONG THE OBJECTS THAT IS FORCED AND UNREASONABLE TO A MINOR DEGREE, GIVEN THE OBJECTS USED AND THE RELATIONSHIPS DEFINED

Grouping	Concept verbalized
1. Dog; index card	1. "Dog goes to bathroom on the paper."
2. Cup; plastic apple	2. "Juice in apple, juice in the cup."
3. Dog; two sugar cubes	3. "Dog eats sugar."
4. Two nails; box of stick matches	4. "Nails go in box."
5. Dog; cork	5. "A bone for dog to chew."
6. Dog; bell	6. "You call the dog with the bell."
7. Pipe; real cigar	7. "Both long."
8. Hammer; red candle	8. "Long and straight."

SCORE = PD1
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED SUGGEST A GROSS PERCEPTUAL DISTORTION

Grouping	Concept verbalized
1. Two sugar cubes	1. “Rocks.”
2. Plastic apple; rubber ball	2. “It’s a big apple and a big cherry.”
3. Cork; two sugar cubes	3. “Made out of wood.”
4. Toy cigar; red and white candles	4. “Candles.”
5. Cup; saucer; bell	5. “Things you use to cook.”
6. Cracker and eraser	6. “Both to eat.”
7. Yellow and red poker chips	7. “Buttons.”
8 Toy saw; real and toy pliers; toy screwdriver	8. “They’re the same all chop wood.”
9. Dog; real spoon	9. “Both silver.”
10. Rubber ball; plastic apple	10. “Apples.”
11. Red and blue disks; red and yellow chips	11. “They’re all paper; they can bend.”
12. “They’re all to eat.”	12. Pipe; toy and real cigars; real and toy cigarettes; two crackers
13. Lock; bell	13. “Both glass.”
14. Toy saw; red cup	14. “They look yellowish.”

SCORE = PD2
THE GROUP OF OBJECTS AND THE MINOR PERCEPTUAL DISTORTION

Grouping	Concept verbalized
1. Noisemaker; two corks	1. “They’re made of wood.”
2. Real cigarette; real cigar	2. “Cigars.”
3. Two sugar cubes	3. “They’re both Styrofoam.”

Special Consideration. The distinction between perceptual distortions and forced groups is sometimes difficult to make. In the former, the examiner needs to judge whether the major issue seems to be the misperception or apperception of some object much as a child may apperceive the violin in TAT Card 1 as a machine gun. In the latter case the examiner needs to judge that there is no major apperception involved in the process and that the process involves primarily forcing a relationship between the objects.

IV. Additional Scores

SCORE = DR
THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED REVEAL A NOTEWORTHY DEGREE OF DRIVE OR AFFECT EXPRESSION IN THE CONTENT DESCRIBED

Grouping	Concept verbalized	Score
1. Real knife; rubber ball	“It (knife) cuts the ball.”	4 + DR
2. Noisemaker; toy saw	“The saw can grind it.”	4 + DR + PD1
3. Dog; toy hammer	“Hammer smashes dog.”	4 + DR

4. Real cigarette; real cigar; pipe	"For smoking; my daddy uses to smoke a pipe but he died—they're monsters on the pipe."	6 + DR
5. Bell; toy hammer; wood with nail	"Hammer nail into wood; bell can be broken by hammer."	4 + DR
6. Dog; bell	"Both breakable."	Syn + DR
7. Dog; matches	"Put the dog in the box 'cause it's fragile."	F1 + DR

SCORE = V DEF

THE GROUP OF OBJECTS AND THE CONCEPT VERBALIZED REVEAL A DEFICIT IN LABELS AND VOCABULARY

Grouping	Concept verbalized	Score
1. Bell; lock	1. "The color that make them is same."	5 + V Def
2. Saucer; cup	2. "They're both dishes."	4 + V Def
3. Bell; noisemaker	3. "Both do stuff when you use them."	6 + V Def
4. Real and toy pliers	4. "Both wrenches" or "both squeezers."	3 + V Def

Special Considerations. To qualify for this score, the child must verbalize an abstract realm, physical attribute, or functional property that is appropriately related to the objects. The child's verbalization shows a deficit in finding or forming a label that ties the objects together conceptually. The vocabulary deficit is not apparently due to language style of the child's culture or family.

FURTHER INQUIRY INDICATED

The examiner should always take special care in conducting an inquiry of a group that appears, on initial presentation, to qualify for a miscellaneous or atypical score. Upon appropriate inquiry, what appeared to be an atypical group may emerge as a typical group, or what appeared to represent one type of miscellaneous group may be seen in relation to another.

For example, a child groups two crackers and two cubes, saying, "crackers and sugar," which suggests a possible typical score of 1. However following the remark "Tell me more about it," the child replies, "These two crackers are the same, and these two are both sugars," now indicating a miscellaneous score of GP (two groups forming a larger group).

Or a child groups the real and candy cigars saying, "one is gum and this one isn't," which suggests the score OD-B. Following the request to "Tell me more about it," the child say, "This one is soft and this one is hard," now indicating a score of OD-C (opposites). Or of course the child may repeat, "Just one is gum and one isn't," in which case the score is OD-B (a difference unarticulated).

Take as another example a child who groups the real knife and ball, saying, "Slice," which suggests a possible score of Fab-0 because the concept is dominated by a drive. Upon inquiry, the child might add, "The knife cuts the ball in half," now indicating a score of 4 + DR. Here the affect or drive is subordinated to the functional relation assigned the two objects. On the other hand, following inquiry, the child may say, "Slice! Chop! Stab!" clarifying that the process is dominated by aggressive affects, and the score of Fab-0 applies.

Once the child has responded to the question "How do these belong together?" the inquiry, if necessary, should begin with a nondirective statement, for example, "Tell me more about it." Further inquiry, if indicated, would (*a*) ask about some attribute the child has specified (e.g., "How do you mean, 'they are all silly things'?"), (*b*) emphasize that some commonality is to be found among the objects (e.g., "Yes, this is a cup and that's a fork; in what way do they belong together?"), or (c) point to one or more objects to determine how the child views them within the concept already verbalized [e.g., "OK, these all are hard things; tell me about this." (pointing to the rubber ball)].

Inquiry is necessary to explore whether an additional score is indicated as well as to clarify the main score. The examiner needs to determine, of course, whether a child's articulation of the conceptual process represents his maximum capability, and he must be aware if the inquiry may be creating undue anxiety or causing the child to feel criticized. Our experience in training students and professionals to administer the Object Sort Test to children, especially clinical populations, indicates that most examiners need to learn to be tolerant of unrealistic thinking and to learn when to accept a child's conceptual view of information. The child may reply, "They just do," to the examiner's asking how the grouped objects belong together. And if the examiner says, "Tell me more about that; in what way do they belong together?" the child may repeat, "They just do." The same response to one additional inquiry is usually sufficient to indicate that the child cannot go further in processing the information conceptually.

The following examples illustrate responses that require inquiry beyond "How do these belong together?"

Grouping	Concept verbalized	Sample of additional inquiry
1. Two nails; wood with nail; noise maker; lock	1. "They make noise."	"How do you mean, 'all these make noise'?"
2. Index card; eraser; crackers	2. "They're all shapes."	"How do you mean, 'all shapes'?"
3. Dog; bell	3. "Both breakable."	"How do you mean, 'breakable'?"
4. Two corks; stopper	4. "All corks."	"Tell me about this," (stopper).
5. Eraser; red candle	5. "Both light."	"How do you mean, 'light' ?"
6. Real and toy pliers	6. "They're both heavy."	"How do you mean, 'heavy'?"
7. Real and toy forks	7. "They both have something on the end."	"Tell me about that."
8. Toy clapper; dog	8. "A thing and a doggie, . . . same thing, same thing."	"How are they the same?"

EXAMPLES OF GROUPINGS THAT RECEIVE MULTIPLE ADDITIONAL SCORES

A group could receive more than one additional score. Again, only atypical or miscellaneous scores and the standard additional scores of DR and V Def can be assigned to groups as additional scores. And only typical groups receive additional scores. The following are examples of multiple additional scores.

Grouping	Concept verbalized	Score

1. Real and toy tools; two nails (the child strikes a nail with the hammer)	1. “All tools.”	7 PD2 + RNR-D
2. Real and toy forks	2. "Both forks; one is big; one is small; they stab.”	3 + OD-B+DR
3. Real and toy tools; wood with two nails	3. “All tools and things you use with tools.”	7 PD2 + GP

MEAN BREADTH SCORE

As discussed in Chapters 2 and 4, workers have usually taken the number of groups a person forms with the objects of a free sort test as an index of the width or breadth of categories the person typically imposes on information. Forming many groups with a given number of objects has been taken to indicate a preference for “narrow” categories, while forming few groups with the same objects has been taken to indicate a preference for “broad” categories.

Yet, category width, as reflected by the Object Sort Test, seems to be revealed by test behaviors in addition to the number of groups constructed. For example, if two persons each form five groups with the objects, and one person includes 10 objects in each group, while the other 5 objects, a difference in category width is being revealed. Similarly, if one of these persons assigns concepts to each of the five groups which result in a mean score of 7.0 (abstract), while the other obtains a mean score of 4.0, a difference in category width is again reflected.

Accordingly the Mean Breadth Score was designed to take into account three aspects of a person’s performance with the Object Sort Test: (1) the total number of groups constructed which qualify as Typical Groups; therefore each group receives a score from 1 to 7 (see above) in keeping with the level of abstraction revealed by the group; (2) the mean of the scores assigned; (3) the mean number of objects used to form each of the groups constructed.

These three values are set in a ratio as follows:

$$\frac{\text{Mean number of objects used in Typical groups} \quad \text{x} \quad \text{Mean of the scores assigned to Typical groups}}{\text{Total number of Typical groups}}$$

The larger the value of this ratio the more broad the category width or breadth preferred in a free sort test. The smaller the value the more narrow the preferred category width.

SUMMARY OF SCORES OBTAINED FROM OBJECT SORT TEST II

The following is a list of the scores obtained from performance with the Object Sort Test and which can be employed both clinically and in research:

(1) Total number of groups (all groups combined)

(2) Total number of Typical groups

(3) Total number of Atypical groups

(4) Total number of Miscellaneous groups

(5) Mean Typical Score

(6) Mean Breadth Score

(7) % Atypical groups

(8) % Miscellaneous groups

(9) % Atypical additional scores

(10) % Miscellaneous additional scores

Notes

[15] Materials of the Scattered Scanning Test are available from the author.

[16] Materials of the Fruit Distraction Test are available from the author.

[17] Materials of the Leveling-Sharpening House Test are available from the author.

[18] The Roman numeral II designates the higher form of this test, to distinguish it from Object Sort I, which represents a less complex sorting task to assess equivalence range. Readers interested in a copy of the manual for Object Sort I may contact the author.

[19] The materials used in the Object Sort Test II are available from the Psychological Corporation.

Part 4

COGNITIVE CONTROL THERAPY: THEORY, RATIONALE, TECHNIQUE

11

COGNITIVE CONTROL THERAPY: INTRODUCTION AND RATIONALE

Professionals in the fields of education and mental health are being asked more and more to give attention and assistance to the needs of children with learning problems and cognitive disabilities. It is now recognized that these children represent a relatively large population, and they are typically referred to by one or another of the several diagnostic labels, which seem to alternate in popularity: (e.g., minimally brain damaged, learning disordered, dyslexic, perceptually handicapped, cerebrally dysfunctioned, educable-retarded, pseudo- or minimally mentally retarded, neurologically handicapped, ego deviational, and hyperkinetic). Although the clinical features distinguishing these groups sometimes are not clear, the problems, as presented by parents and teachers, often include complaints such as very short attention span, highly distractible; perceptually confused, perceptually lazy, lost in daydreams, and unable to retain what is learned from one day to another. In short, these children show significant difficulties with registering, organizing, and assimilating information and stimulation presented by the typical school program.

The children sometimes reveal major neurotic conflicts along with their cognitive disability. However, psychotherapists who attempt to assist them by means of traditional play therapy techniques find that the cognitive disability, and consequent learning problem, is modified only slightly, even though the child's general emotional adjustment benefits and some emotional conflicts are worked through. Play therapy has also been employed as a treatment for children who show, along with their learning problem, ego deviations and such character trait disturbances as hyperactivity, angry impulsiveness, and inhibition of feelings and actions. Yet psychotherapists have observed that after months of treatment the child's play remains predominantly disorganized, or consists of numerous, discontinuous brief themes, limiting sharply the extent to which issues interfering with the child's psychological functioning can be delineated, brought to awareness, and worked through. Not only is play activity itself limited in terms of therapeutic effect, but the words spoken by the therapist frequently are not grasped by the child and used to modify behavior. As a result, there is little change in the child's cognitive disability or the impulsivity or inhibition.

When clinical child psychologists search for new techniques that might bring assistance to these children with major cognitive disabilities, they find available a multitude of special education and behavior modification procedures, many of them devised with the implicit rationale that the child's cognitive functioning is a passive switchboard into which one is to construct new connections between stimulus and response. To the dynamically oriented practitioner, who ascribes to the propositions of the biodevelopmental point of view discussed in Chapter 2, these perceptual training procedures, as presented, do not sufficiently consider the total child—his environment, thoughts, feelings, fantasies, and actions (the holistic view); the coping and defensive strategies with which the child attempts to influence and accommodate to the environment's opportunities and limitations (the adaptive view); the forces impelling the child's behavior, be they instinctual urges or ego anxiety, interests, and curiosities (the dynamic view); the organization a child gives to his emotional and cognitive experiences (structural view); or the stages defining the psychological changes through which the child moves (the developmental view).

Some years ago it occurred to me that an approach to the psychological treatment of cognitive disabilities that incorporates these points of view could be provided by integrating principles of dynamically oriented psychotherapy with principles of cognitive control functioning in children discussed in previous chapters. My thinking about the appropriateness of psychotherapy, and more recently of psychoanalysis, with children who showed major cognitive disabilities was gradually influenced by observations of the development of cognitive controls, of changes in the organization of cognitive controls in response to changing environments, of the relation between cognitive controls and future school performance, and of deficiencies in cognitive controls associated with traumatic life experiences and central nervous system dysfunction. Rather than relying on the rationale and technique of psychotherapy and ignoring the insights of cognitive development and perceptual training methods, or relying on perceptual training methods and ignoring the insights of the psychotherapy, an integration of the two approaches, constructed within the guidelines of biodevelopmental principles, appeared to me to offer a new approach to the treatment of cognitive disabilities. To distinguish the method from psychoanalytic psychotherapy, while recognizing the close relationship of the two, and to emphasize that the method is primarily concerned with the reorganizing of cognitive control functioning, I have called the approach "cognitive control therapy."

This method has been evolving over the past 15 years, mainly in the treatment rooms of my colleagues and me, and also with the benefit of a few formal studies. Since it was first described (Santostefano 1967, 1968, 1969a and 1969b), cognitive control therapy, like most therapeutic innovations, has been undergoing continuous change, shaped by therapeutic necessity and new experiences and insights, as well as by theory. The number of cases treated by the method, though appreciable, is relatively small, and the number of therapists who have used the method is even smaller. Therefore generalizations must be cautious. Moreover, no claims to superiority of the method over other therapeutic techniques are made. It appears nevertheless that the basic rationale and technique have reached a stage in development and have resulted in sufficient positive clinical experiences, to permit the suggestion that the method may be of use to clinical child psychologists and other professionals interested in a psychodynamically oriented treatment method for cognitive disabilities.

In most general terms, cognitive therapy is a variation of psychotherapy devised specifically for use in the treatment and rehabilitation of learning disorders, cognitive deficits, and perceptual handicaps in children who also show aspects of one or more of the following behavior disorders: hyperactivity, impulsiveness, aggression, withdrawal-inhibition. These children may or may not show neurological evidence of brain damage or brain dysfunction. The method can be applied to retarded children as well as to children of average or better intelligence. With cognitive therapy the therapist initiates and provides the child with a systematic sequence of kinesthetic and perceptual (tactile, visual, and auditory) experiences through the use of materials and activities aimed at retracing the stages of cognitive control development that have been diagnosed as lagging or derailed. Following the developmental model of cognitive controls discussed in Chapter 8, these therapeutic experiences are designed to rehabilitate the psychological functions concerned with (*a*) constructing body ego and body schemata, (*b*) regulating motility and delaying action and impulse, (*c*) scanning information actively and broadly, (*d*) deploying attention selectively in terms of relevance, (*e*) constructing stable, articulate memory images of information and (*f*) manipulating information conceptually.

For the most part, children for whom cognitive therapy is the treatment of choice lack the cognitive equipment that is a prerequisite for psychotherapy. That is, they lack the necessary capacity to subordinate physical activity, to delineate psychological conflicts through fantasy play, and to bring their attention, memories, and conceptual thinking to bear on these conflicts in order to resolve them and effect a change in social-personal functioning. The aim of cognitive therapy is to build or rehabilitate these deficient cognitive structures and functions.

To introduce the rationale and technique of cognitive therapy, this chapter is organized into two sections. The first presents an overview of the method. The second considers theoretical issues of particular relevance to the technique. Chapter 12 discusses techniques that apply to cognitive therapy in general, and Chapters 13 to 17 present instructions for each of seven cognitive therapy programs designed and prescribed to parallel the developmental hierarchy of cognitive controls. Chapter 18 summarizes formal research conducted with the method.

To make use of the discussions of general technical considerations and of theory and rationale, the reader needs some knowledge of the content and rationale of the seven cognitive therapy programs that have been devised to date, whereas some familiarity with the technique and theory is necessary to appreciate the content of the therapy programs. Therefore the reader is encouraged to review one discussion, then others, and to return to each, circling the total presentation several times, to ascertain how each part contributes to the overall rationale and technique of the method. The clinician will then be in a position to decide whether and how the method of cognitive therapy could serve clinical practice.

COGNITIVE CONTROL THERAPY: AN OVERVIEW

In integrating observations of cognitive control functioning, aspects of biodevelopmental theory, and principles of psychodynamic psychotherapy, cognitive control therapy emphasizes in the treatment process: innate cognitive givens, stages of cognitive control development, negotiation in adaptation, conflict between ego-cognitive organization and environmental information, and the interface between cognitive control activity and affects. Essentially cognitive therapy attempts to enable the child to give up certain acquired patterns of controlling and managing information and to relinquish certain feelings and behaviors that accompany the management of information, in favor of developmentally higher cognitive control—affective patterns that are viewed as more adaptive and growth fostering. To this end, cognitive therapy attempts to restructure and analyze cognitive control functioning and accompanying affects. In the process of treatment, the child evolves new cognitive organizations that control and manage information, and learns to some extent to observe the unique strategies he uses to approach, avoid, and process information, and the affects and behaviors that accompany these efforts.

Cognitive control therapy is based on several interlocking propositions (Figure 1) that rely on research observations discussed earlier.

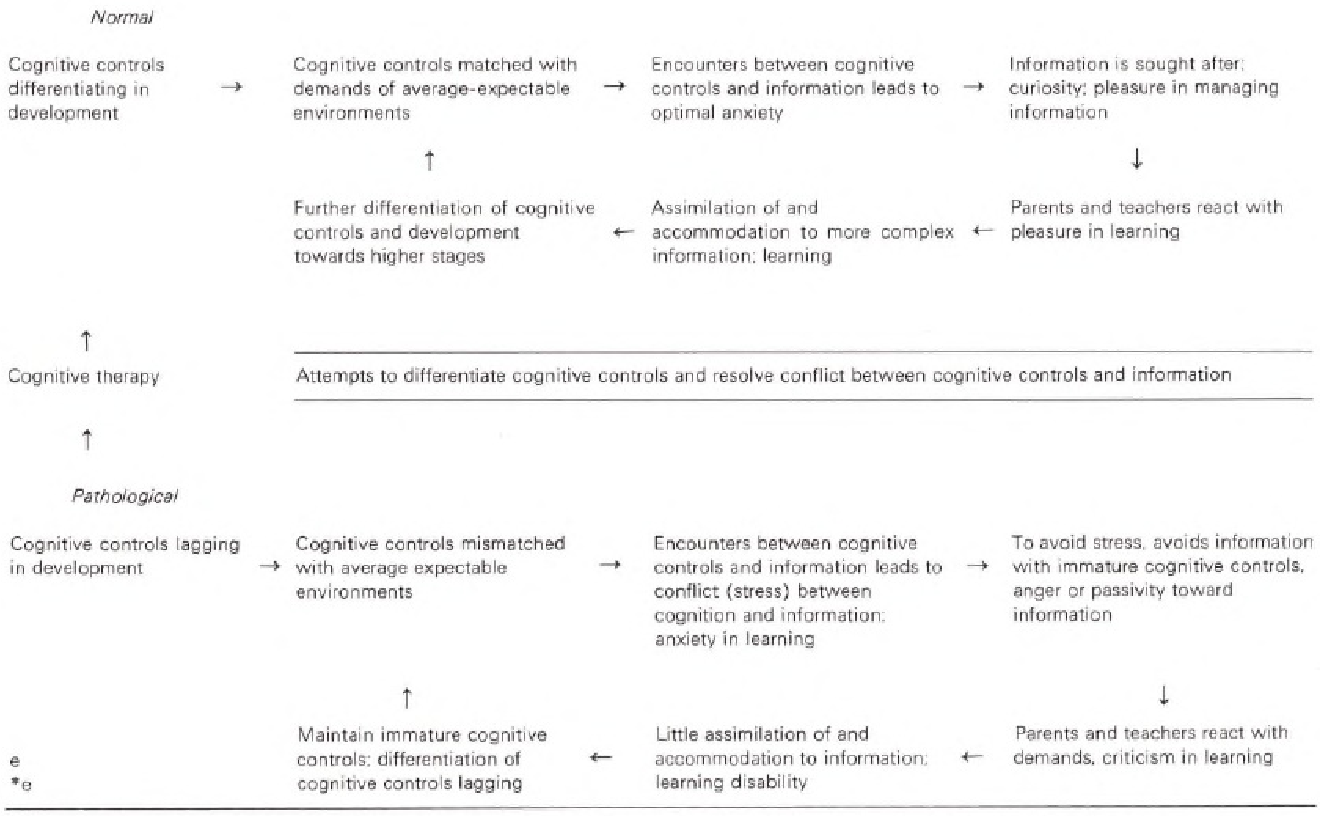


Figure 1. Paradigm of cognitive therapy and normal and pathological cognitive control functioning.

1. Cognitive controls form the substrata or underlying structures on which the operation of various intellectual functions and skills relies.

2. Cognitive controls that are organized at stage-appropriate levels are preadapted to manage the complexity and tempo of informational demands presented by average and expectable environments. This match between stage-appropriate cognitive controls and average and expectable environments represents a synchronous, mutual give and

take in which cognitive controls accommodate to, assimilate, and influence environmental information on the one hand and, on the other, demands accommodate to and influence cognitive controls. During this process ego anxiety is at optimal levels.

3. In encounters and experiences with information, stage-appropriate controls are associated with ego affects and optimal anxiety (e.g., pleasure in learning and curiosity) and with cognitive behaviors that seek, approach, and master information. During these encounters with information, cognitive controls that are organized at stage-appropriate levels accommodate to and assimilate experiences with information, and thereby undergo increasing differentiation toward developmental maturity, becoming restructured and preadapted to meet new, more complex informational demands.

4. Cognitive controls that are derailed and developmentally immature in terms of stage expectations fail to manage the complexity and tempo of informational demands presented by average and expectable environments. This failure represents a conflict between ego-cognitive functioning and environmental information and results in high, pathological levels of ego anxiety and stress.

5. To avoid painful stress and anxiety, or to prevent higher levels of stress, people employ a variety of cognitive and overt behaviors and affects that serve to avoid encounters with information. For example, the child may tenaciously maintain the habit of limited narrow scanning, keep his body in constant motion (hyperactivity), or relate to reality in a passive, withdrawn way or in an aggressive-impulsive way. In combination, these cognitive, overt, and affective behaviors are viewed as serving to avoid information.

6. During encounters with informational demands, these avoidance behaviors result in little or no assimilating of cognitive experiences. A learning disability becomes clinically manifest. Moreover, the immature organization of cognitive controls is sustained, failing to differentiate toward higher developmental stages. Accordingly, the mismatch between cognitive control organization and information persists and intensifies, especially if informational demands become more complex in organization and tempo.

Several assumptions follow from these propositions. If children who operate with immature cognitive controls are treated with the open-ended process of psychotherapy, which does not emphasize encounters between ego and specific, graded organizations of information, children seek to avoid or reduce painful anxiety and stress by persisting in the use of cognitive control strategies and affective-overt behaviors that avoid processing information. In the process of psychotherapy, therefore, cognitive structures do not assimilate and accommodate to more complex informational demands, and accordingly they lag in becoming more differentiated and developmentally mature. If these children are treated with perceptual training methods that do not match the complexity of information with the child’s cognitive status, or with methods that do not teach the child that the stress and anxiety that accompany learning are due to a mismatch between cognitive organization and the demands of information, the treatment experience results in negative affects (anger, passivity), and basic structures that avoid information persist. Moreover, the child has less opportunity to generalize the perceptual training experience to all forms of learning (e.g., mathematics, reading, science, language skills).

To treat children who are handicapped by immature cognitive control organizations and by related affects and behaviors that serve to avoid new, more complex information, the method of cognitive control therapy begins by setting before the child a developmentally graded series of cognitive tasks. These tasks require, for the most part, one or another cognitive control process for their solution. To determine which series of tasks is indicated for a given child, preliminary diagnostic data must be obtained concerning the developmental status of the child’s cognitive controls. Whether the child’s presenting problem includes failure to read at grade level, short attention span, daydreaming, distractibility, impulsiveness-aggressiveness, or shy, constricted behavior, the basic battery of cognitive control tests is administered (see Chapters 4 and 10). Based on the results, it should be possible to identify the cognitive controls in the developmental hierarchy that are developmentally immature or deficient in their operation.

Ideally, then, cognitive control assessments, as well as presenting problem, history, and other test data, are used to prescribe the starting point (cognitive tasks) and course of cognitive therapy. If the evaluation reveals that the field articulation cognitive control is significantly deficient, for example, the child would be presented tasks that emphasize the process of field articulation in their solution. Moreover, the content and the form of the tasks are selected with the goal of starting the child with experiences requiring the relatively immature levels of field articulation functioning that characterize his current stage of development. In this way the child is asked to experience cognitive encounters with information that arouse low levels of stress and anxiety and little conflict between cognitive controls and information. Gradually tasks are presented that require more mature, differentiated levels of field articulation. It appears that as the child manages and processes tasks, over and over again, and assimilates and accommodates to the increasing complexity of informational demands, the field articulation control undergoes restructuring (increased differentiation) toward developmental maturity.

While presenting a developmentally graded sequence of cognitive experiences, the therapist attempts at the same time, to train the child to observe and become familiar with his unique cognitive control functioning, its efficiencies, and its moments of disorganization, and to relate these behaviors observed in the office to behaviors that occur in the classroom and in other learning situations. The therapist also attempts to train the child to observe and become familiar with his unique anxieties, aggressive tensions, and other affects, which accompany cognitive encounters with information. He also helps the child to understand the ways these affects interfere with successful adaptation and to teach him how such affects can be recruited to facilitate cognitive functioning.

In broad terms then, cognitive control therapy attempts to provide for the child a corrective experience that restructures a particular cognitive control. The treatment also offers the child an opportunity to resolve the psychological conflict that exists between cognitive controls and informational demands (i.e., between the ego and environment) by helping him become more aware of the ingredients of this conflict (e.g., between the habit of narrow scanning and the informational demands of second grade), and the anxiety and avoidance behaviors that result.

Table 1. Cognitive Therapy Programs Prescribed for Each Level of the Hierarchy of Cognitive Controls

Developmental Levels of Cognitive Control Functioning	Cognitive Therapy Programs
5. Equivalence range	*5. Where Does It Belong?* Categorizing visually present information that is near and present and far and absent into conceptual groups: from narrow physical and functional realms to broad conceptual realms.
4. Leveling-sharpening	*4. Remember Me.* Constructing images of information in memory: from simple, global information to complex, differentiated information.
3. Field articulation	*3. Find the Shapes.* Deploying attention selectively: from narrow fields of information containing little irrelevant information to broad fields with many distractions and much irrelevant information.
2. Focal attention	2b. *Which Is Big, Which Is Small?* Tracking information actively: from narrow to broad scanning in macrospace and microspace.
	2a. *Follow Me.* Tracking information passively: from narrow to broad scanning in macrospace and microspace.
1. Body ego-tempo motility	1b. *Moving Fast and Slow I Make my Engine Stop and Go.* Regulating motor tempos from those involving the body through space to those involving objects across a table to those involving a pencil across paper,
	1a. *Who Is Me, Where Is Me ?* Building cognitive schemata: from those involving the total body to those involving small parts of the body.

Thus far seven therapy programs have been developed and employed clinically with children who show cognitive control deficits. These programs, listed in Table 1, are described in detail in subsequent chapters. Using the developmental hierarchy of cognitive controls as a guide (Chapter 8), the programs were designed to represent a developmentally graded series of cognitive experiences from those of Programs la and lb, which concern developing body schemata and differentiated motor tempos (the first developmental stage in the proposed hierarchy), to Program 5, in which abstract, broad categories for the management of information, both present and hypothetical, are developed in conceptual terms. Moreover, each program associated with a cognitive control represents a developmentally graded series of cognitive experiences, from the early, immature levels of that cognitive control to developmentally differentiated, mature levels.

In summary, when taken together the programs represent a developmental progression from dominant sensorimotor activity to dominant cognitive activity, with sensorimotor activity subordinated. With each program the therapist (1) presents cognitive tasks to the child for work and solutions ; (2) helps the child gain awareness of the stress and anxiety he experiences in *reaction to* the complexity of the task and the information to be managed; (3) helps the child become aware of his habitual ways of utilizing cognitive control functioning, and related negative affects and behaviors, to avoid the demands of the task and information to prevent painful stress and anxiety; and (4) helps the child generalize these contemporary behaviors of the treatment situation to situations in school that require the management of information and learning. In meeting these goals, it is assumed that cognitive controls undergo reorganization (differentiation) and that pleasure in managing information and in learning replaces painful anxiety and flight. The child is enabled to assimilate cognitive experiences that further differentiate cognitive controls and is preadapted to meet more complex cognitive demands and to follow a less impaired line of cognitive development.

CONCEPTS AND ASSUMPTIONS OF COGNITIVE CONTROL THERAPY

Conceptualized and conducted as a variation of psychoanalytically oriented psychotherapy, cognitive control therapy applies psychoanalytic theory in the treatment of cognitive disabilities. Accordingly, cognitive therapy shares a number of assumptions belonging to psychotherapy while proposing a number of modifications in procedure devised to suit the unique therapeutic needs of children with major cognitive dysfunctions. After a few words about the assumptions common to both cognitive therapy and psychoanalytically oriented psychotherapy, this section considers modifications and variations of basic concepts and technique proposed by the method of cognitive therapy.

Cognitive Control Therapy and Psychoanalytic Psychotherapy

Freud's first writings on psychotherapy (1904, 1905, 1912, 1913, 1914) still provide the clearest statement of the basic assumptions of psychotherapy to which the method of cognitive therapy ascribes. It is assumed that each individual acquires his own specific methods for conducting his emotional and cognitive life. These methods are developed especially in the first years of life, but also throughout childhood, by the interacting and combining of the individual's innate dispositions (e.g., temperament, drive levels, motility, thresholds of sensation, ego apparatus of perception, thinking, and memory) with experience. The methods an individual develops to conduct his emotional and cognitive life are related and tied, in particular, to experiences with major caretakers (e.g., mother, father, grandparents, preschool teacher) and emotional and informational environments they presented. Moreover, although employed by the individual in interacting with these early significant caretakers, these methods persist and later are employed in many situations and with many other persons. The methods may prove to be adaptive and growth fostering, or maladaptive and growth restricting. In the later case, the results are painful anxiety, emotional turmoil, personally experienced dissatisfaction, and conflict between the individual and his environment and between agencies within the individual (e.g., between a wish and the prohibition felt by the individual against it).

Suppose that an individual enters a psychological treatment situation and the therapist exhibits serious interest in the well-being of the patient, carefully clearing away the inhibitions and resistances that in the beginning of a relationships could obscure the patient's uniqueness. In the treatment situation and in transactions with the therapist, then, the patient will gradually repeat, bit by bit, the methods he has developed to conduct his emotional and cognitive life; both the adaptively successful and unsuccessful approaches will be exhibited. That is, the individual, in interaction with the therapist, will repeat and relive methods of conducting his life that grew from past experiences with significant caretakers. Freud referred to this process as *transference.*

The psychoanalytic view of therapy also proposes that the individual cannot escape repeating his unique methods of behaving in the treatment situation. As Freud pointed out, a patient in the beginning of treatment does not talk about remembering being defiant and critical toward his parents as a child, but instead behaves in this way with the therapist. Ora patient does not talk about remembering, as a child, having been intensely ashamed of certain activities and afraid of being found out by his parents. Rather, he behaves with the therapist in ways that make clear that he is ashamed of the therapy he has now undertaken and is very occupied with keeping it a secret from friends. The assumption is made that because the patient does not remember, or is not aware of these issues and methods of behaving that have developed, the behaviors are acted out or repeated in the relationship with the therapist. The patient's repeating of behaviors is his way of knowing or remembering.

This phenomenon of the compulsion to repeat in action instead of knowing and remembering is viewed as closely related to the concepts and phenomena of transference and resistance. Since in repeating behaviors, the patient transfers onto the therapist and the treatment situation modes of thinking and feeling that belong to transactions with the earliest significant caretakers, it is assumed that he also transfers these modes onto all other persons and situations in his current life situation. The therapist, therefore, must be alert in constructing connections between attitudes, feelings, and modes of thinking displayed by the patient in treatment with those displayed in other settings and with various other persons in the patient's current life. In helping the patient become aware of the issues and behaviors he repeats adaptively and maladaptively, one major task of the therapist is to establish connections between "here" and "out there," between "me" and "them," and between "present" and "past."

Alongside repetition in the transference is the phenomenon of resistance, representing the other side of the same coin. As we have noted, having developed methods for conducting his emotional and cognitive life with early significant persons, the individual repeatedly employs these methods with other persons and in other situations. If the assimilation of these subsequent experiences results in a process of continuous change in the methods of behaving (differentiation and flexibility), optimal psychological functioning and growth are presumed, since with each assimilated change and differentiation of modes of behaving, the individual becomes preadapted to negotiating the next situation and new important persons in his life field. If the methods of behaving remain more or less unchanged (as in the case of Freud's patient who behaved in a defiant and critical way with all authority figures, as he did with his parents), and if they are repeated in many situations and with many persons when such attitudes and modes of behavior are not appropriate or necessary, the behaviors in questions are viewed as not differentiating or as resisting change, and this is a hallmark of neurotic conditions and character traits.

During his first efforts to evolve the technique of psychotherapy, Freud observed that resistance to change is often graphically displayed by the patient in his transference experiences with the therapist. That is, the patient is compelled to repeat these maladaptive modes of functioning in the transference rather than to suspend acting and to subject the behavior to examination and understanding, much as in real life he has resisted suspending his habitual ways of functioning as a first step in assimilating new situations and persons as they actually exist. Thus much of the patient's behavior in the transference is viewed as serving the individual's resistance to change; and from this point of view, transference becomes synonymous with the process of resistance.

Freud raised a question that must also occur to us, Why is the transference so ideally suited as a means of expressing resistance? He answered from his interest in the role of repressed impulses in the formation of neurotic symptoms. If it is assumed that a patient is transferring feelings and perceptions onto the therapist, as if the therapist were mother or father, it must be recognized that it is difficult for that patient to admit a wishful impulse, since in so doing the impulse would have to be revealed before the very person to whom it relates. As we shall see later, it is useful to view cognitively disabled children as repeating maladaptive ways of managing information and as resisting becoming aware of these cognitive strategies for the following reason: it is difficult for such children to change their maladaptations because the behaviors serve to manage the therapist and treatment situation as a transference representation of parent or teacher, or simply of information and learning.

It is in this repeating, reliving, and working through of resistance to change in the treatment situation that the re-forming or rehabilitating of the patient's unsuccessful methods for conducting his life is presumed to take place. An early statement by Freud emphasizes the importance of this process in psychotherapy and also serves to clarify cognitive therapy as a psychotherapeutic process to be distinguished from methods of "perceptual training" or "behavior modification" now prevalent in the field of psychology:

> ... we must (eventually) treat his illness, not as an event of the past, but as a present day force. This state of illness is brought, piece by piece, within the field and range of operation of the treatment, *and while the patient experiences it as something real and contemporary we have to do our therapeutic work on it. . .* (italics mine) (Freud, 1914, *Collected Works*, standard ed., Vol. 12, p. 151).

The method of cognitive control therapy ascribes to these basic propositions of psychoanalytically oriented psychotherapy: the phenomena of repetition, transference, and resistance, and the primacy of the task of capturing for the patient in the treatment situation contemporary experiences that serve as the nexus for change in mode of functioning and as the basis for educating the patient about the methods he uses to conduct his present-day life. However cognitive therapy takes as its primary focus the cognitive activity, and the related anxiety and affects, employed by the cognitively disabled patient in managing information and learning. This is in contrast to the emotional, "instinctual" activity that is the focus of psychotherapy. To maintain this focus, the therapist must elaborate this view of transference, repetition, and resistance, and accordingly his technical interventions and the content of treatment.

Rationale for the Process of Cognitive Control Therapy:
Setting a Task Before the Child and the Concept of Ego Autonomy

The method of psychotherapy and its propositions, as evolved by Freud, shaped the use of psychotherapy with children. The traditional view of psychoanalytic child psychotherapy holds that the child should be given the freedom to do in the playroom whatever he wishes (save for a few restrictions). With the benefit of this freedom, the child gradually repeats in play behaviors, conflicted, unconscious attitudes, wishes, and feelings, which he transfers onto the person of the therapist. However the child resists reflecting on and understanding his behaviors in favor of repeating them. Then, with the help of the therapist, the child gradually overcomes these resistances and learns about his conflicted wishes, fantasies, and feelings, which heretofore have been outside awareness and have governed his maladaptive behavior. As a result of this insight or education, the child becomes free to modify (re-form) the methods he has been using to conduct his emotional life.

In contrast to this view, cognitive control therapy sets a cognitive task before the patient with which he is asked to work. For example, with the program *Moving Fast and Slow* (see chapters that follow), the child is asked to walk along a pathway at various tempos. With another program, *Find the Shapes,* the child is asked to scan a matrix of 30 geometric shapes, to selectively deploy attention at the large triangles, and in managing them, to withdraw and withhold attention from other geometric shapes. In so doing, the therapy departs from one basic proposition of psychoanalytic therapy, as stated by Freud "It is wrong to set a patient tasks." As we have considered earlier, this proposition is based on others indicating that if the patient is permitted the freedom to bring into the treatment situation whatever thoughts, feelings, and behaviors he chooses, in repeating these behaviors, he will gradually give organization to the conflicted issues that are causing him difficulty. From this point of view, it is necessary to reduce contact with reality and minimize direction from the therapist, if the patient is to transfer and recreate his reality within the relationship with the therapist, and if the patient's unique conflicts are to gain expression and rise to awareness.

However Freud's view of unconscious mental conflict, reflected in his advocacy of a non-directive treatment situation, has been reexamined and elaborated over the past three decades with the advent of psychoanalytic ego psychology. In 1939 Heinz Hartmann ushered in a new emphasis in psychoanalytic theory with his publication, *Ego Psychology and the Problem of Adaptation.* Hartmann urged that when conceptualizing the functioning of persons, workers must go beyond the early psychoanalytic emphasis on drives and conflicts—that is, the notion that an individual develops control and defenses against such drives and conflicts, and he must arrange socially appropriate opportunities for discharging them in the environment. This early view, Hartmann proposed, should be supplemented by the basic proposition that an individual is part of a social matrix and many of his efforts are directed toward dealing with and adapting to a social reality as well as the representational or symbolic reality that concerned Freud.

THE THEORY OF EGO AUTONOMY

From among the observations and concepts gathered within psychoanalytic ego psychology since 1940, Rapaport's theory of ego autonomy (Gill 1967) in particular provides a framework within which to consider the issue of maintaining a nondirective treatment situation versus setting a task before the patient. In broadest conceptual terms, Rapaport's theory of ego autonomy contrasts the extremes of a Berkeleyan view of man with the Cartesian view. In the Berkeleyan view, outside reality is created by man's imagination. Thus man is totally independent of the environment and dependent on the forces and images residing within him. In the Cartesian view, an infant is a clean slate on which experience is recorded. No forces or images exist in man except for those arising from his encounters with the outside world. Thus man is totally dependent on outside reality and is independent of internal forces. Rapaport said that neither of these views is supported by psychoanalytic observations that have been directed both to the role of inner forces and, with the advent of ego psychology, to the role of external reality. To organize these observations, Rapaport formulated the interrelated concepts of "ego autonomy from the id" and "ego autonomy from external reality." Here all behaviors and functions subsumed under the construct "ego" (i.e., sensation, perception, motility, thinking, remembering, executing actions) are guaranteed autonomy from the influence of drives and wishes by virtue of the fact that from birth, these functions are inherently related to, tied to, and "fitted with" the environment and its stimulation. The many studies in the past 10 years (Kessen, Haith, and Salapatek, 1970) illustrating that infants in the first days of life track moving information and direct their visual gaze at increasingly complex information, could be viewed as experimental observations of "primary ego apparatus" that is inherently fitted to external information from birth. On the other hand, the ego's autonomy from the environment is viewed by Rapaport as guaranteed by man's constitutionally given drives and the tendency to translate and represent these drives in the metaphors of wishes, fantasies, and symbols. Man's inner representational world, then, is viewed as preventing him from becoming stimulus bound and a slave of environmental stimuli. The embellishments children add to drawings, when asked to copy a cup, could be accepted as experimental observations of "inner realism and drives" that protect a person from being bound to stimuli (e.g., Freeman and Janikoun, 1972).

Rapaport further proposed that the ego's autonomy from the influence of drives on the one hand and from environmental stimuli on the other is relative, and he discussed the conditions that interfere with each form of autonomy. For example, the ego's autonomy from the id is disrupted during puberty when the intensification of drives dominates the adolescent's perception of authority, resulting in inappropriate, rebellious behavior. The disruption of ego-id autonomy is further illustrated by experiments in sensory deprivation. Reality stimuli (tactile, visual, auditory), which guarantee the ego's autonomy from the id, are removed, and the individual's confused thinking and psychotic fantasies are said to result from the loss of this autonomy and from the ego's domination by the id.

The ego's autonomy from the environment is disrupted, for example, by excessive repetition of information or stimulation—for example, as is used in "brainwashing" procedure. The aim of these procedures is to bring about an intense commitment or tie to a particular set of "facts," "beliefs," or external symbols (e.g., swastika), preventing the individual's inner world from playing a role in defining and interpreting reality, and reducing the individual to "stimulus-bound or reflexive thinking." Rapaport noted further that concentration camp studies and other observations suggest that when an individual is robbed of his privacy by the incessant intrusion of environmental surveillance and information, or when he is experiencing extreme need (hunger, cold, danger), he becomes bound to the external reality and stimuli, as in a conditioning experiment, and there is a collapse of the autonomy provided by the inner world of representations, opinions, images, and wishes.

In summary, then, the ego's autonomy from the id is impaired when environmental stimulation is excessively decreased; then drives and wishes dominate thinking and perceptions of reality. Likewise, the ego's autonomy from the environment is impaired when environmental stimulation is excessively increased, along with dependence on it, for thinking and perception become stimulus bound and operate without the benefit of inner-subjective meanings stemming from wishes, fantasies, and drives.

Rapaport related the concept of ego autonomy to the psychoanalytic treatment situation. The use of a couch in psychoanalysis, the injunction against "acting out wishes," and the therapist's neutral stance in both psychotherapy and psychoanalysis, are all viewed as forms of stimulus deprivation. Freud came upon the nondirectional treatment technique, and later the use of a couch, explicitly recognizing that a reduction in contact with reality is necessary to permit drives, wishes, and fantasies to dominate perceptions and thought and to rise to consciousness. Rapaport noted that from the standpoint of theory of ego autonomy, reduction in contact with reality information and stimulation, if effectively applied in the psychoanalytic treatment situation, alters the ego-autonomy balance, increasing the ego's autonomy from the environment and decreasing the ego's autonomy from the id. Rapaport added, however, that for some patients the stimulus deprivation of the analytic treatment situation fails to stimulate an increase in autonomy from the id, rendering this therapy inappropriate for them.

Even before the emphasis brought by ego psychology appeared, psychoanalytic workers raised questions about the suitability of the psychodynamic treatment situation for some patients, especially those who revealed, from the perspective of the more recent concept of ego autonomy, excessive autonomy between the ego and the id. One early major writer was Sandor Ferenczi (1952a, b), who in 1919 proposed a treatment variation he termed "active therapy" (Feather and Rhoades, 1972b). He observed that some patients in analysis clung to describing daily details, others rarely daydreamed, and others repeated psychologically important tics, mannerisms, and postures that did not reach awareness. To deal with these situations, Ferenczi made use of techniques such as giving orders and prohibitions intended to interrupt the habitual, growth-restricting ways the patient used to discharge impulses, such as tics and mannerisms. In other situations, when the patient rarely produced fantasy material, the therapist set a task before the patient. He asked the patient to construct a particular fantasy or to perform some behavior. For example, one patient was asked to fantasy doing something aggressive toward the analyst. A constricted, phobic patient was asked to sing a song during the hour, thereby bringing into overt behavior her wish to be exhibitionistic. Initially Ferenczi proposed that techniques such as these could be used in the analytic treatment situation, under special circumstances, when the patient's modes of behavior presented barriers to the treatment process. Later, however, he included in his treatment variation physical interaction with patients. At this point he was subjected to much intense criticism from other psychoanalytic workers. He withdrew many of his ideas and ceased to practice the method he had innovated. Glover (1958) reviewed Ferenczi's innovations and cautioned against the risks involved, especially those incurred when a therapist plays the part of superego by issuing criticism, orders, and prohibitions. In emphasizing that active therapy differed in basic ways from traditional psychoanalysis, Glover reconceptualized Ferenczi's method as "analytically guided interference."

It is interesting to note that Rapaport, from his discussion of ego autonomy and the recent observations of ego psychology, addressed the same issues, but from the other side of the coin. Rapaport pointed out that recent understanding of the ego's delicate balance between environmental stimulation and drive influence has resulted in modification of psychoanalytic technique. For example, the observation that ego-impaired (borderline) patients become too disorganized and id dominated when deprived of reality stimulation has led to an interest in learning more about when the couch should be replaced by a face- to-face situation between patient and therapist, and when the nondirective, relatively silent therapist should become more participating, supportive, and directing. Therapists are now more alert to noting, for a given patient, when and to what extent the stimulus deprivation of the traditional analytic situation will induce, more regression than is therapeutically necessary or beneficial.

These comments by Rapaport serve to remind us that some patients are at risk of an imminent collapse in the autonomy between the ego and the id. Therefore these individuals need directed, prescribed external stimulation in the treatment situation that keeps the influence of the id at some appropriate distance, making it possible to master psychological problems. Aspects of Ferenczi's earlier writings serve to remind us that certain patients are too greatly bound to reality stimulation. Accordingly, they need directed, prescribed internal stimulation to permit mastery of psychological problems. (See Feather and Rhoades, 1972a and 1972b for a creative example of such a treatment method.)

If we hold the controversy surrounding Ferenczi's active therapy to one side, the issue of the degree of activity introduced into a therapy situation can be articulated heuristically with the benefit of new advances in ego psychology. First, as Rapaport stated in his discussion of ego autonomy, the fundamental task of all therapies is to help the patient achieve therapeutically effective change in the methods he uses to conduct his emotional and cognitive life, neither permitting an inappropriate, pathological reduction in the ego's autonomy from the id, nor impairing the ego's relation to and use of reality stimulation, information, and relationships. Some patients can make growth-fostering use of the nondirective treatment situation that has been a tradition of the psychoanalytic framework. These individuals come to treatment with a more or less appropriate, flexible balance between the two sets of autonomies, ego from id, and ego from reality. Most individuals who are primarily neurotic, and who have developed *mature stages of cognitive control functioning*, fall into this category.

An adult patient can leave the reality of the office for a moment and experience and feel a fantasy that includes the person of the therapist as a critical parent, or as a source of affection and esteem. The patient then returns to the reality of the office, and to therapist as therapist, and examines the fantasy and feelings just experienced, understanding them as determined by his inner world and as influencing his current mode of living. Or a child patient may imagine a chair in the playroom as a “green giant” who tries to order him and some puppets to destroy toys. He plays out this fantasy, experiencing the feelings and expressing the behaviors. Minutes later he returns to the reality of the playroom, looks at this fantasy and behavior with the help of the therapist, and understands that the “green giant” is a wish within the child to be angry and destructive. In terms of cognitive activity required to construct therapeutically beneficial fantasy play, for example, the child must freely scan the objects and information in the playroom, then selectively attend to some object (chair), categorize this object according to some symbol (green giant), with the help of memory images of other objects; then he must relinquish the symbol and perceive the chair as belonging to some other category (e.g., furniture and something to sit on). The chair may be perceived as a “bad” airplane, and something to fly, in the next fantasy play, repeating the same issue of an evil force about to do damage.

The typical nondirective treatment situation requires advanced stages of cognitive control functioning if the child is to benefit from organizing play themes, repeating them until they become articulated and “visible,” then standing back and “examining” the play “to conceptualize” its meaning in his current life.

But some patients do not come to treatment with the benefit of this appropriate, flexible balance between ego and id, and ego and environment. Children with major learning problems and cognitive disabilities, in particular, lack the cognitive equipment to articulate, focus on, and organize the perceptions, thoughts, and feelings stemming from encounters with external and internal information. These children require a treatment variation that meets their unique cognitive and emotional makeup. Thus we are led to ask whether it is possible to construct a variation of treatment that benefits from the recent insights of psychoanalytic ego psychology and the long experience of psychoanalytically oriented therapists with the treatment of psychological conflict. Cognitive control therapy is offered as one possible method. It is not considered to be psychoanalysis, or a variant thereof, but in Glover’s terms it could be taken to be form of activity therapy that makes use of “analytically and developmentally guided interference.”

We can now use the framework provided by the theory of ego autonomy to understand the observations made of cognitively disabled children in treatment situations. The typical play therapy situation, with its relative lack of direction and a therapist who relates more or less as a “blank screen,” reduces environmental stimulation and thereby collapses the ego’s autonomy from the id, permitting drives, wishes, and fantasies to dominate behavior. Under the dominance of these id forces, *the impaired cognition is ill-equipped to give organization* to these feelings and drives in play activity and words. The regression promoted is not under the control of the ego. Accordingly, the child’s behavior is hyperactive and impulsive or automatized and stereotyped, lacking the organized, flexible repetition that is necessary for the child eventually to “recognize” a pattern of behavior and to understand its meaning, the role this issue plays in his difficulties, and the need to find alternative behaviors. In short, the child lacks the cognitive equipment to gain mastery over and benefit from the degree of id-dominated regression that is permitted.

In treatments that present automatic, conditioned perceptual stimulation, (e.g., some perceptual training programs), the ego's autonomy from the environment is disrupted in that the child is encouraged to become stimulus bound, and autonomy from the id is increased. This prevents fantasies and feelings to play a role in mastering and managing information and limits the extent to which *feelings become organized by cognition.* By the same token, tutoring the child in reading or manipulating his attention span by techniques of behavior modification, will not treat the anxiety that results in maladaptive behaviors and is caused by the basic conflict between immature cognitive structures and informational demands.

THE CONCEPT OF EGO AUTONOMY IN COGNITIVE CONTROL THERAPY

The method of cognitive control therapy gives to the therapist the task of initiating and repeating cognitive tasks and activities, organized in developmentally graded steps, to foster cognitive development. Gradually the initiative in prescribing and repeating these activities is transferred to the child. In initiating and repeating cognitive tasks, the therapy is guided by the long-range goal of helping the child achieve an optimal balance between the ego's autonomy from the environment on the one hand, and from the id, on the other. With each program the child is presented initially with very structured cognitive tasks, cues, and information that minimize the participation of feelings and fantasies. Thus the method acknowledges explicitly the child's ego-cognitive impairments and vulnerability to id impulses, and at the beginning the child is kept close to external reality and far from the feelings, fantasies, and drives of his inner world. As cognitive controls differentiate and organize to manage increasingly complex information, the method prescribes that the therapist encourage the ego to reduce its autonomy from the id, in facilitating the expressions of feelings, wishes, memories, and drives *as they pertain to the cognitive task and information at hand.* Moreover, as cognitive controls become differentiated, organized, and mobile in the face of simple and complex information, and as flexible autonomy of the ego from environment and id is guaranteed, as in ideal development during infancy, the therapist needs less and less to set tasks before the patient. With the differentiation of cognitive controls, the patient has the cognitive apparatus sufficient to organize and repeat behavioral expressions of id forces that emerge, and to approach, assimilate, repeat encounters with, and selectively avoid reality information.

These several theoretical considerations also relate to the material intentionally selected for the tasks presented by the cognitive therapy programs (e.g., geometric shapes, wooden rods, primary colors, configurations of contours and lines). The rationale for this choice includes the proposition that the cognitive controls of the child who is disabled in this regard engage information not as neutral but as threatening the individual's integrity and equilibrium. Therefore to rehabilitate and differentiate immature cognitive controls, the information and tasks presented initially to the child should be as neutral, and "outside of psychological conflict concerning the representational world" as is the information (shapes and patterns) the infant engages in the earliest phases of cognitive control structuring. In this way the child's cognition is "brought back" to the beginning stages of development, where information is engaged and cognitive controls function in the "conflict-free" sphere of experience. The geometric shapes and wooden rods the programs use, therefore, and the shape discriminations and visual pursuit activity they require, are not ends in themselves but means to an end—namely, fostering the cognitive control of information as a psychological nourishing, pleasurable activity, rather than as a stressful activity that disrupts integrity.

If we examine the programs of cognitive control therapy listed in Table 1 in terms of the foregoing discussion, two broad progressions are suggested. From the first step within a cognitive therapy program to the last, or from one program to the next developmentally higher one, the therapeutic experiences provided for a child follow two intertwining developmental lines in terms of the ego's encounters with information in reality and in the representational world: (1) from requiring much sensorimotor activity and little cognitive activity in response to primarily neutral information, to requiring much cognitive activity with little sensorimotor activity, and (2) from requiring little expression of id derivatives (drives, wishes, affects) as reality information is processed, to requiring more expression of id derivatives.

A major hypothesis emerges concerning cognitive therapy in terms of the concept of ego autonomy. As cognitive functions are differentiated and structured through experiences with regulating body motility, representing body experiences in cognitive schemata, directing attention at information, selecting relevant from irrelevant information, building memory images of information, and conceptualizing information, it appears that affects, wishes, and drives become framed within this cognitive scaffold. In this way cognition and affect are now stamped as two sides of the same coin and are molded together as one. The child can now maintain a better balance between ego and id and between ego and environmental information. He can process and assimilate information as information, existing outside his emotional life, and he can inject his fantasies, wishes, and affects into reality information to foster his cognitive growth and adaptive efforts. Free of his cognitive disability, the child can direct his attention at a plant, for example, assimilate details concerning contours of leaves, photosynthesis, and pollination (information as information); he can also collapse the distance between cognition and the id and "see" that same plant as "slumped over and sad with the end of summer," in writing a theme for English class.

In concluding these remarks on the concepts of ego autonomy and the degree of directness contained in the treatment situation, it is interesting to note that psychoanalytic technique underwent three stages (Freud, 1914). First, the method of catharsis, encouraged the patient (in the hypnotic state) to remember and abreact the feelings associated with the moment at which the symptom was formed. This method was abandoned when, in the next technical variation, the patient was given the task of focusing on the situations that had given rise to the symptom and free associating. The therapist used the free associations to help the patient become aware of what he failed to remember. In a sense this technique was much like Ferenczi's active therapy technique, which asked patients to focus on a particular fantasy or behavior. In the last phase, which set the stage for psychoanalytic psychotherapy as practiced currently, the therapist did not attempt to bring a particular moment or problem into the patient's focus but observed whatever was present, "on the surface of the patient's mind." The therapist then employed interpretation to bring resistances to the patient's attention as behaviors and feelings that are repeated in the transference to block change.

Cognitive control therapy presents the child a focus or task, as was the case during the second phase in the evolution of the psychoanalytic technique. As we have seen, this approach relates to the unique need of cognitively disabled children to begin with specific tasks and concrete information in the external reality, as well as their inability, because of cognitive defects, to make therapeutic use of the freedom to think, feel, and do whatever may come to mind in the playroom.

Rationale for the Content of Cognitive Control Therapy: Setting Organizations of Information Before the Child, and the Concept of Stimulus Nutriment

As we have seen, cognitive therapy programs present step by step, configurations of information for the child to manage that gradual increase in complexity. For example, with the program *Find the Shapes* (see Chapters 13 to 17) the child may be shown six geometric shapes and asked to remove the squares. With subsequent therapeutic tasks the child is given 12 geometric shapes to process and manage, and later 24. It is assumed that with repeated encounters with, accommodations to, and assimilations of a configuration of information (6 shapes, 12 shapes, etc.), the cognitive control function in question (in this case, field articulation) is organized, increasingly differentiated, and structured hierarchically. The notions that cognitive controls become structured as a result of accommodations to information, that cognitive controls become stable structures in the face of various informational situations, and that cognitive controls continue to differentiate, rely on the concept of "stimulus nutriment."

THE CONCEPT OF STIMULUS NUTRIMENT AND THE STRUCTURING OF COGNITION

The concept of stimulus nutriment as proposed by Rapaport (Gill, 1967) is a generalization of Piaget's concept of alimentation (Flavell, 1963; Wolff, 1960). In most simple terms, these two related concepts propose that the individual must "nourish" his cognitive schemata or structures by repeatedly incorporating environmental "nutriments" (information) that sustain them. Recall that Piaget conceptualized the structuring of cognition as follows: circular reflex behavior and schemata relating to them are initially adapted to a range of stimuli. With the presentation of a new stimulus, the schema assimilates the stimulus and ensures that a motor accommodation is made to it. Initially neither the assimilation nor the accommodation can be fully successful, and complete adaptation does not result. That is, there is some imbalance between the configuration of information assimilated and the motor accommodation made to it. Because of this imbalance the process of assimilation-accommodation is repeated until the schema is totally adapted, that is, accommodated to the object or organization of information. When this occurs, the schema is a new cognitive structure. However when new objects or organizations of information appear, to which the schema is not adapted, the equilibrium between the existing schema and new information is disrupted and the process of assimilation-accommodation is activated until the schema differentiates once again into new schemata.

For both Piaget and Rapaport, this process of differentiating and structuring cognition is contingent on the availability of initiating informational stimulation, which Piaget refers to as “aliment” and Rapaport refers to as “stimulus nutriment.” Moreover, both Piaget’s concept of cognitive structuring and Rapaport’s psychoanalytic elaboration propose a hierarchic layering of progressively differentiating structures. A number of infant studies have been conducted with these concepts as guides. One by Brennan, Ames, and Moore (1966) can be viewed as related and is of particular use for our purpose because the information presented to infants was varied along clearly quantifiable dimensions. The workers observed the visual preference of infants aged 3, 8, and 14 weeks for black and white checkerboards varying in number of squares. They found that the youngest infants looked longest at 2 x 2 checkerboards and least at 24 x 24 checkerboards, the 8 week-old infants looked longest at 8 x 8 checkerboards and least at the 2 x 2, and the 14 week-old infants preferred the 24 x 24, 8 x 8, and 2 x 2 checkerboards, in that order. From the viewpoint of stimulus nutriment, one could infer that the schemata of the youngest infants were differentiated and adapted to the simplest organization of information (2 x 2 checkerboards), which accordingly was sought after and preferred. It could also be inferred that with an increase in age from 8 to 14 weeks, cognitive schemata were more differentiated, thus adapted to and sought nourishment in increasingly complex organizations of information (from 8 x 8 to 24 x 24 checkerboards).

In normal development then, cognitive structures seek out a level of complexity of information that is only slightly greater than the complexity of existing schemata, as the assimilation-accommodation process is repeated and as the structure undergoes further differentiation.

In elaborating this process within the psychoanalytic framework, with the concept of stimulus nutriment, Rapaport suggested models of cognitive structuring in abnormal or derailed development, as well as in normal development. In general, the psychoanalytic view holds that cognitive structures may remain fixed in their organization or may lag in assimilating and differentiating, when they become part of an organized defense or coping strategy. In these cases the stimulus nutriment comes from the drives and from the avoidance of stress, rather than from information in external reality. This concept helps explain a variety of clinical and anecdotal observations, as Rapaport noted, such as the case of a Japanese man who maintained his identity (structure) as a soldier in World War II, although for more than 25 years he had had no stimulus nutriment for this structure (e.g., the presence of colleagues, ongoing battles, and propaganda) as he lived isolated in the jungle. This concept also relates to our observations of emotionally disturbed children whose immature cognitive controls were oriented away from reality information (see Chapter 7).

Let us apply the psychoanalytic concept of stimulus nutriment to the microlevel of cognitive control structures. The principle of focal attention serves as an example in elaborating both abnormal and normal structuring of cognition. As discussed in Chapter 4, focal attention involves active and extensive perceptual-cognitive exploration (scanning) of the environment. Psychoanalytic ego psychology (Freud, 1900; Schachtel, 1954; Gill, 1967) proposes that for some bit of information, some object, person, or event, or some mental image, memory, or thought to become noticed—that is, to become part of one's subjective consciousness (awareness)— it must be attended to and invested with cognitive energy (cathected). By investing attention and energy in information, the individual literally constructs his reality. He grasps, maintains, and subsequently uses what he has noticed. This is done by a process that involves the "binding up" of attention-energy to form "cognitive structures" or "schemata" of information.

Of direct relevance is the work of Wolff (1965; 1966; Wolff and White, 1965), pertaining to the development of visual attention in infants. With careful observation, Wolff has been able to identify and describe a state of attentiveness in infants in the first days of life. Wolff calls this state "alert inactivity."

> . . . with alert inactivity . .. as the name implies, the infant is fully awake but quiet, rather than excited ... his eyes are wide open, shiny, and capable of conjugate eye movements and he makes visual. . . pursuit movements to appropriate objects (Wolff, 1965, p. 816).

Wolff has demonstrated convincingly that these states of attentiveness, during which an infant is likely to visually pursue an object, occur when the infant is not hungry, not stooling, and not moving his limbs, fussing, or crying. That is, when he is experiencing sensations of hunger or motoric restlessness, the infant is not attentive; he does not pursue objects visually. To explain these findings, Wolff uses the ego psychological theory of attention, which states that simultaneous or continuous stimuli compete for attention-energy, and the more intense or more important stimulus will win out in the competition.

Thus during the first days of life, when hunger sensations, for example, command the infant's attention, attention-energy is not available for objects in the environment and these objects are not pursued with attentional acts. But when hunger or other compelling psychological stimuli are absent, objects in the infant's visual field command his attention-energy and the infant's visual pursuit of these objects can be observed.

Wolff also reports that during the first month of life these states of attentiveness are increasingly prolonged. He also notes that after the first week "attentive behavior no longer requires a condition of almost complete absence of hunger" (p. 825). Thus the attentive state shows very early a growing independence from the competing visceral stimulation.

Wolff's work, then, indicates that during the first weeks of life the infant's functioning is characterized by an attentive state that although primitive, contains the beginning of the crucial components of the process of focal attention; namely, that attention can be sustained on external information or on internal stimulation.

What purpose for general development is served by these attentive states? From the point of view of ego psychology, the goal of visual pursuit is to prolong visual contact with information in the environment, enabling the infant to construct mental schemes of these objects and to bring the object to awareness. For our purposes it is helpful to describe next the development of several other aspects of the process of focal attention as observed by Wolff.

Up to this point (i.e., the first weeks of life), the process of focal attention has not been completely formed because the infant remains fixed on one aspect of the environment during his prolonged visual pursuits (narrow-passive scanning). We need to recall that the process of focal attention also involves several or many approaches to an object, each approach articulating and registering some property of the object (broad-active scanning). When does this critical component of focal attention appear? Wolff's research indicates that in about the fourth or fifth week of life "all babies abandon simple fixations [of objects] for systematic inspection [of objects]" (p. 820). This change in attentive behavior was found by Wolff in all his subjects and in repeated observations of them. Wolff reports that the infants gradually made as many as six visual oscillations either up and down or back and forth, while perceiving various objects such as a tower of blocks, a bedpost, or a telephone connected to a telephone line. In terms of focal attention, the infant is now scanning more actively and extensively.

Several other key steps in the development of focal attention can be noted. Although from the fourth day on the infant may coordinate head rotations with eye movements to increase the range of his visual pursuits, this coordinating becomes relatively proficient in about 10 weeks, and at that age an object no longer necessarily disappears if it moves out of the infant's field of vision.

Also at approximately 10 weeks another decisive step can be identified in this developmental course. Now the infant shows that he maintains attentive states for markedly longer periods of time, and this development coincides with the infant's discovery of his hands as objects of contemplation.

At 3½ months, when the infant is able to turn over by himself, thereby making available for visual inspection a host of new objects, another sharp increase in the duration of attention is observed.

At 9 to 12 months, if an obstacle is placed before an object the infant is viewing, he will attempt to remove the obstacle. From the standpoint of the development of cognitive controls, this behavior represents a decisive step. By removing the obstacle between himself and an object, the infant indicates that the object has not ceased to exist for him when hidden from view. In other words, he has developed a mental image or a schema of that object, an image constructed by directing many focal acts at the object and by investing attention-energy in that object and its properties over many days and weeks of visual activity and the motor behavior it directed.

Throughout the first year of life the entire enterprise of focal attention is gradually contributing the earliest bits of information about properties of objects, culminating in the first, primitive mental images or schemata. Moreover, these bits of information are taking on properties of relevance, they are being held in memory, and they are being related to categories; that is, they are summoning the cognitive control of field articulation, leveling-sharpening, and equivalence range, respectively.

Thus by 22 months, if a child is being guided by the adaptive intent of placing a large doll in a small box, he is likely to direct several focal acts at the opening of the box, constructing an image of its size, then he may direct several focal acts at the doll, constructing an image of its size (focal attention process), while ignoring the design on the box, the clothing on the doll, and so on (field articulation process). Then by relating the size of each image (leveling-sharpening process) the child at this age is able to reach the "understanding" that the doll will not fit into the box (equivalence range process). This child would not try to stuff the doll into the box or would quickly abandon this activity after only a brief attempt. Perhaps by utilizing other schemata he might even go to the closet for a larger box that he remembers being there and views as "belonging" to the size represented by the doll.

If we consider this very active attentional life of the young child from the viewpoints of adaptation and cognitive control theory, another critical issue is suggested. Not only is the child constructing and organizing the basis of his world and its information during his first three years, he is also establishing a unique, enduring style of deploying his attention. The child moves on from the third year not only with a foundation of mental images but with a particular "style" of attention deployment.

We can now raise two questions. How does a child develop deficiently operating focal attention, and how does the concept of stimulus nutriment help in understanding the deviant development of cognitive controls and their treatment?

From the empirical results and theoretical framework detailed in previous chapters and here, it could be argued that beginning with the first week of life a number of environmental and personal conditions may disrupt the developing process of focal attention in critical ways. Let us consider several hypothetical examples that may be illustrative.

Physical handling and temperature changes that are excessive and too abrupt in relation to a particular infant's physical equipment and innate temperament can result in hypermotility, crying, and sensations of physical distress. During the first weeks such physical changes would represent powerful stimuli commanding the infant's attention-energy, thereby diminishing sharply his opportunities to gain experience with visual pursuit of external information and focal acts that normally take place at this time. As a result, the development of his focal attention would be retarded, since this process relies on encounters with increasingly complex information and the stimulus nutriment provided.

When the same child at 3 or 4 months, then begins to turn himself over and gains exposure to a host of new objects, his focal attention process is not preadapted (as might be the case with normal conditions and development) to make growth-fostering use of the objects available for inspection. We can see that an already deviant process of focal attention is rendered more disabled because the new world of objects overwhelms the child. He attempts to maintain his psychological integrity by avoiding attentional encounters with the new objects, through narrow, passive scanning.

The beginnings of disabled focal attention can be similarly inferred from various other conditions, especially if they occur at decisive stages in the development of focal attention. For example, if physical illness prevents the child from turning himself over, the child does not benefit from the increase in number and variety of objects which, at this time, usually phases in with the sharply emerging attentional process now available.

Or, a child may continuously experience a “quiet” state of hunger because his mother is depressed, is not perceptive, and does not recognize his unique feeding style and time preferences. This child, from the first weeks, would have available much less attention-energy to pursue objects visually and would have much less than the normal amount of experience in exercising focal attentional acts. As a result he would not be able to lay the groundwork, by the age of 2, for an efficiently operating focal attention process and for age- appropriate organizations of schemata.

Another infant with average thresholds for visual stimulation might be born into an environment that is very intense with respect to object stimulation and is characterized by abrupt, frequent changes and a high level of “commotion” and “glare.” As early as the first weeks and months of life, this infant is very likely to begin protecting his psychological equilibrium by avoiding information with narrow, passive scanning.

The minimally brain-damaged child of average or better intellectual endowment can also be viewed as illustrating deviations in the development of focal attention as a result of particular organic conditions and related experiences. It is possible, for example, that the reflexive coordination of head and eye movements that normally takes place in the first weeks of life was impaired from the start, restricting the extent to which the infant could benefit from early experiences with the visual pursuit of objects. From the start, then, the minimally braindamaged infant has constructed faulty images of objects. Yet in spite of this initially inadequate construction of images, he continues to inspect objects. This continual flow of new information is related in poorly organized ways to already faulty or confused images. Such a state of affairs would be cause enough to keep the child’s psychological equilibrium and integrity in constant jeopardy.

To maintain some measure of equilibrium under these circumstances, the minimally brain-damaged infant may develop a unique cognitive control with respect to focal attention. He does not scan broadly and actively over an extended period of time. Rather, such a child seems to develop the unique cognitive control of exercising many focal acts, but each of very short duration. By darting from one stimulus to another, he apparently keeps to a minimum the number of attributes that are registered, thus requiring entrance into the existing mental schemata. This formulation could be one way of accounting for the “mind in flight” quality commonly observed in the minimally braindamaged child.

When considering the illustrations just presented, we begin to wonder about the maintenance or persistence of a deviant cognitive control—in this case, focal attention—once it has been established. As discussed in Chapter 8, a cognitive control becomes derailed or immaturely organized in the first three years of life by various environmental conditions interacting with the child’s innate cognitive equipment. Gradually, with use, this pathological cognitive control achieves autonomy; it becomes an enduring, stable part of the individual's cognitive-adaptive equipment. It becomes a way of cognitive life, as it were, persisting in its first form, even though the conditions that necessitated it and shaped its unique style are no longer present.

The psychoanalytic concept of stimulus nutriment goes beyond Piaget's concept of aliment in approaching the question of why the deviant cognitive control of focal attention persists as an autonomous structure and lags in differentiating. In each of the examples just discussed, the structure of focal attention that involves passive and narrow scanning is organized *primarily* as a defensive-coping maneuver, to handle a *pathological* degree of mismatching between the child's attentional system and the tempo and complexity of external information. In being organized as a defensive-coping maneuver, the structure of passive-narrow scanning primarily serves the goal of avoiding encounters with information to ensure that ego stress and anxiety are kept at a low level and to maintain equilibrium. Therefore, unlike the instances of normal cognitive development (considered by Piaget) in which cognitive structure receives its nutriment *from the content and organization of external, neutral information,* the structure of narrow-passive focal attention, in the foregoing examples, receives its nutriment *from the internal information represented by freedom from stress and anxiety.* It is important to note that in this instance of pathology, narrow and passive scanning persists, accompanied by lags in differentiating, because the structure avoids accommodating and assimilating external stimulation, yet it accommodates to and assimilates nutriment from the internal request that information be avoided.

Cognitive control therapy employs these several considerations in its general approach. The child is presented a matrix of geometric shapes and a cognitive task intended to re-stage (albeit artificially) the earliest conditions of cognitive control structuring that exist during infancy. In asking the child to accommodate to and assimilate developmentally graded patterns of geometric shapes, the two fold goal is to desensitize the anxiety and stress aroused by encountering information, and to shift the source of nutriment from the internal information of relief from stress to external information as information. When this is achieved, the child can assimilate the complexity and organization of information contained in reality, and the cognitive control can begin differentiating.

Rationale for Transference and Resistance Unique to Cognitively Disabled Children: The Concept of Negotiation

With the foregoing discussions, of the role of stimulus nutriment in the structuring of cognitive functions, and the role of ego autonomy in the management of external reality and internal impulses and wishes, we have returned to our starting point: that is, the consideration of the psychoanalytic concepts of repetition, transference, and resistance in the process of psychological treatment. If we reexamine these concepts, holding in mind our interest in therapy with cognitively disabled children, along with our considerations of ego autonomy and stimulus nutriment, we can immediately recognize the need to expand the view of transference and resistance in a therapeutic process that emphasizes the *cognitive* experiences of the patient and cognitive control of information, including affects and impulses.

As we discussed at the start, psychoanalytic theory proposes transference and resistance as intertwined in a continuous interpersonal process involving patient and therapist. Within this process the patient experiences the therapist and the treatment situation as if they were carbon copies of earlier caretakers and situations. In dealing with these transference experiences, the patient repeats patterns of behavior that may have been successively adaptive, then defensive, with the original caretaker and situation. But in the patient’s subsequent life experiences these patterns failed to assimilate from and accommodate to new stimuli; they failed to differentiate and grow. They became fixed developmentally, therefore ill-suited to meet the demands presented by later stages of the patient’s life. Thus these patterns of behaving, which served to defend against and cope with persons and situations of old, now are instrumental in preventing further psychological growth.

The interrelated concepts of repetition, transference, and resistance have been applied, by and large, to the content and form of behaviors that characterize the functioning of adults, as adults, and also of children after the age of 4 or 5 years. Moreover, these concepts have been applied, by and large, to observations of intrapsychic conflict between one impulse and another, or between a wish or impulse and internal standards and defenses, with the ensuing anxiety and guilt. For example, Freud’s patient mentioned earlier, who wanted to keep psychotherapy a secret from family and friends, was revealing by his repetition of these surreptitious behaviors a conflict between childhood sexual wishes and impulses and parental prohibitions and standards against them that had since been internalized by the patient.

But in our view of cognitively disabled children, conflict exists between cognitive structures and information, between the level of organization of the child’s cognitive controls and the level of complexity of information. Such a child habitually uses immature cognitive control behavior (e.g., narrow scanning, brief acts of focal attention directed at relevant and nonrelevant information, constructing vague memory images of information). These immature cognitive controls may have served effectively as defenses and coping devices in managing caretakers and fields of information that existed long ago, but in the absence of proper development, they are insufficient to manage and assimilate the information of later stages of life, information that becomes increasingly complex. This mismatch between the organization of cognitive controls and the organization of information results in stress and in flight or fight behaviors, and it is a barrier against the child’s internalizing from other significant adults ego affects of pleasure, curiosity, and competence in learning and in managing information.

Moreover, in our formulations of the formation of patterns of cognitive functioning we have given central importance to the first three years of life. It is during this period that cognitive controls are proposed, as initially compromised and set on a derailed course (see Chapter 8, discussions of Types I and II cognitive control pathology and earlier sections in this chapter).

To make use, then, of transference and resistance as working hypotheses in cognitive control therapy, we need conceptual elaborations that derive from interactions unique to children in the first three years of life with caretakers, transactions between a young child and other persons and information in the external environment, must be emphasized, and special attention must be given to the earliest structuring of the ego as it processes information, transacts with persons, and develops affects.

The model and observations of Sander (1962, 1964, 1976) allow us to expand the concept of transference and resistance for cognitive therapy, in keeping with the foregoing considerations. Based on longitudinal observations of infant-mother interactions, Sander has proposed that infant and mother are involved in a continuous and active process of give and take, in which each one attempts to influence and accommodate to the other in mutual adaptations. Sander also proposes that the continuous interactions between infant and mother are organized in the first three years of life around particular "issues," which mother and infant "negotiate." These negotiations contribute to the structuring and organizing of the infant's ego functions (e.g., perception, motility), the infant's organization and expression of earliest emotions, and the infant's style of seeking, engaging, and avoiding information.

These issues emerge with a particular timetable, and the manner in which mother and infant negotiate one issue influences ego development and the success of future negotiations with later issues. Thus Sander's model includes considerations of interaction, adaptation, development, cognition, and affect, which are precisely those prescribed by the biodevelopmental framework that has guided the work reported here (see Chapter 2). Let us first review Sander's developmental model of mother-infant interaction, borrowing freely from his writings. Then we use Sander's model to elaborate the concepts of repetition, transference, and resistance for cognitive therapy.

SANDER'S MODEL OF MOTHER INFANT INTERACTION

Sander proposes that mother and infant negotiate nine issues that define developmental stages during the first three years of life.

Issue 1: 0 to 3 Months, Period of Initial Adaptation. During the first stage mother and infant must fit together and mesh mothering activities with the cues the baby gives of his state, indicating what is necessary for him to live and thrive. The infant presents behaviors—for example, states of alert inactivity (see earlier discussion of Wolff's observations), various cries, smiling, and affects of fussiness and contentedness. Likewise, the mother presents behaviors—for example, accuracy of her reading of the baby's cues, the type and timing of the stimulation she provides (rapid, delayed, consistent, discontinuous), her affects in interacting. The infant's behaviors influence and also assimilate and accommodate to mother's behaviors, and vice versa. The successful negotiation of the first issue should take place by the third month and is reflected in the extent to which the child has developed a predictable, organized rhythm of feeding, eliminating, sleeping, and wakefulness. The infant also begins to respond to mother in a discriminating way. He usually becomes more responsive to her and quiets for her more readily than for others. The mother also begins to show a more differentiated, in-depth cognitive and emotional awareness of her baby's behavior. She feels she "knows" her baby and feels at ease in caring for him.

The degree to which a fitting-together can be negotiated during this phase depends in part on the balance the mother can maintain between her empathy with what she feels are the child's cues and needs and her objectivity in viewing him as an individual apart from her projections of her own needs. Without some objectivity, the mother cannot pick up and respond to the unique cues and qualities the infant presents. The question Sander raises of the first three months of life is, "To what degree in the adaptation established between mother and child will the mother's behavior be specifically appropriate to the baby's stage and to the cues he gives of it?"

Issue 2: 3 to 6 Months, Period of Establishing Reciprocal Exchange. The second stage establishes the extent to which interactions between mother and infant will include reciprocal sequences of exchanges—back and forth, active-passive alternations of stimulus and response. Sander has given special importance to the reciprocal exchanges that take place around the infant's smiling response, which is now rapidly developing. For example, the mother smiles and then pauses, allowing the baby to respond; then the mother moves her smiling face closer to the baby and pauses again, waiting for the infant to react; then another presentation of mother's face, now with a new stimulus added—a touch, a vocalization. Throughout this back and forth process, the infant gradually elaborates his response, from the localized smile, to include arms, legs, trunk, and voice in "an exuberant, wiggling, infectious, joyful play." For Sander the quality of crescendo and the organization occurring in this reciprocal activity are crucial. Similar exchanges occur during feeding, changing, and other child-care activities. A related issue in reciprocity is the extent to which mother can allow the child to play or to pursue some activity by himself (such as the visual pursuit behavior described by Wolff), and the extent to which the mother and child begin to initiate attributes of each other's behavior.

Issue 3: 6 to 9 Months, Period of Early Directed Behavior. The social interchange between mother and child to this point is observed by Sander to be largely in relation to mother's initiative in eliciting and sustaining it. During the third period, however, as the baby's smiling response reaches its height, he begins to use the response to initiate establishing social contact and reciprocal exchanges with mother. The child attempts to reach out to the mother and stimulate her to respond to him. The manner in which the mother responds to the baby's initiative forms the basis for the negotiation of the third issue.

With the infant taking on more initiative and becoming more active in directing his own behavior and that of others, several behavioral dimensions assume importance. If the baby initiates social interchanges with mother, the baby is now experiencing qualities of *intention* and *anticipation.* The baby intends to engage a person and some form of stimulation, and he anticipates in turn some response and organization of stimulation. Furthermore, in initiating and directing, the baby is beginning to show *preferences* for stimulation, attempting to actively control stimulation approaching him, as well as stimulation avoiding him or disappearing. In the realm of social activity, the baby's intentions, anticipations, and preferences in directing activity and stimulation are especially apparent in the well-known response of stranger anxiety, which emerges during this stage. In crying and fussing when a stranger appears, the baby is attempting to control and direct stimulation.

While directing and selecting behaviors are taking place in the realm of social contact, they are also occurring in the realm of contact with inanimate objects. The infant is now more active in reaching out to, manipulating, and avoiding physical objects and information around him and approaching him, as well as information disappearing from him. It is during this period that a baby reaches for a spoon that has been covered or has dropped from view. This behavior suggests that a mental image of the object substitutes for and sustains the existence of the object over time and guides the intentions to recover it.

During the third stage of negotiation the major accommodation required of mother is that she make more use of a passive response in her adaptations, modifying the active response that was called for during the first two periods. Now the mother should begin to honor the infant's preferences and initiative in social interchange. For example, she should perceive the various qualities of stranger anxiety in her baby, and her responses and the timing of them should reflect these perceptions. Similarly, mother contributes in the negotiation of directed activity, in her choice of the objects and information she removes or brings within the child's reach in response to his direction and preferences.

Issue 4: 9 to 15 Months, Period of Focalization. During the fourth period the infant's directed activity (or selectiveness for stimulation) becomes increasingly more differentiated, with the result that much more explicit cues are sent to mother for responses. In this process the baby focalizes on mother as a person who can fulfill his needs and protect him from stressful, dangerous information, and the baby focalizes mother on his person and the various, specific preferences for type and pace of stimulation and gratification. Sander sees this process as concerned with the infant's negotiating the absolute, unconditional availability of mother. And the success with which the child succeeds in focalizing mother on his many unique needs, Sander believes, is one of the important roots of autonomy in the first two years of life.

During this period, as noted, the infant continues attempting to direct activity, but now the organization and the type of stimulation being sought or avoided are increasingly detailed. Fear of strangers, intense at this time, is more discriminating and is expressed more selectively in the child's various social contacts. In the realm of exploring his physical world, the infant approaches and shows preference for encounters with things and information that might be dangerous as well as nourishing. In responding, the mother now must assure the infant of her full availability. In ideal circumstances she provides protection from and sets limits on dangerous stimulation, as well as giving stimulation and gratification on command by the child. Protection from danger is now a more dominant need as the child becomes physically more mobile and extends his explorations into larger space. These responses may require sensorimotor contact or only cues of mother's attention and awareness. Above all, mother shows that she maintains her own integrity as she permits and enjoys her infant's possessing her during this phase. If she can ensure this degree of focalization, while still maintaining the reciprocity negotiated earlier, she provides at the same time a stable base from which the child can move away from her and explore increasingly larger geographies, aided by his growing competence in walking and his curiosity for new stimulation. Sander proposes that the infant needs to establish focalization, needs to be guaranteed the total availability of mother, as a base of operation, before he can begin asserting himself against her and the larger environment, a process that characterizes the next period.

Issue 5: 12 to 20 Months, Period of Self-Assertion. The onset of the negotiation of the child's self-assertion overlaps the last negotiations of focalization. As the child negotiates the guaranteed availability of mother and experiences his newly formed autonomy, he pushes to extend the areas of interaction with persons and things that are coming under the control of his initiative. The extent to which he may assert himself in opposition to mother now becomes the focus of their negotiations and transactions. As the child elaborates his motoric manipulation and curiosity of things, as he feels secure when separate from mother, he begins to show more negativism and possessiveness (e.g., in the use of "no" and "mine" and in holding onto his belongings), as well as more temper outbursts and more exhibitionism (e.g., dashing into the living room before company, clad only in pajamas or completely naked). The mother phases in limits and permission by physical means and with emotional reactions, in responding to the child's assertiveness and in attempting to get the child to accept her requests and directions. Toilet training, introduced by mother at this time, becomes one arena in which these negotiations take place. Other arenas include getting dressed in the morning, asking the child to wear particular clothing for some family event or to eat a certain food, or asking the child who insists some toy is his, to return the toy to a neighbor's child. Mother's responses in these negotiations vary in terms of consistency, flexibility, and freedom from ambivalence and guilt. Mother's response can also vary in terms of the imagination she uses in suggesting alternatives. For example, when the child refuses to eat a particular solid food, the mother might present two other suitable foods and ask the child to eat one of them. Or if the child insists on manipulating and exploring a kitchen utensil that is dangerous, the mother might offer another utensil that is relatively safe.

Sander believes that to successfully negotiate the issue of self-assertion and to make further gains in autonomy in active exploration and control of the environment and its information, the child must sense that his victory in being self-assertive in some areas can be accepted by mother. If mother's behaviors are severely limiting, the child may surrender the push for self-assertiveness. In turn, active explorations and transactions with information and persons are compromised. If mother and child find a mutually satisfactory outcome to the child's bids for self-assertion, they are prepared to enter the next two phases, in which they will shape the role played by aggressive tensions in the child's management of relationships, information, and the environment.

Issue 6: 18 to 24 Months, Period of Initial Testing of Destructive Aggression. The assertive behaviors of the child during the last few months of the fifth period gradually give rise to behaviors that are explicitly aggressive and destructive toward persons and things. The child's aggressive intentions vary (e.g., to destroy some object, to scatter materials, to make a mess, to injure another child or an adult). Often during this phase the child aggresses on some household item that is especially valued by mother. She is frustrated and puzzled, for example, when the child smashes a crystal figure that "he knew was my favorite." The child shows a sense of triumph not only in acts of aggression and destructiveness but also in achievement ("I did it!"). And there is elaboration of the child's exhibitionism and sense of competence. Having tested some destructive behavior, the child may initiate "making up" with mother by means of various accommodating behaviors, by initiating an activity that pleases mother, or by trying to undo the aggressive act (e.g., sticking bits of tape on the pieces of broken crystal).

Several dimensions of mother's behaviors are especially important as she joins the child in negotiating the issue of destructive aggression. The mother recognizes and distinguishes among the various destructive intentions displayed by the child. Moreover, her responses (severe limits, physical punishment, threats of loss of love) are coordinated in terms of the intentions mother implies.

One particularly important issue concerns whether mother distinguishes between the child's more literal expressions of destructive impulses from those made representationally in play and fantasy. For example, does the mother distinguish between biting behavior by the child that conveys destructive intention and biting behavior that is playful and perhaps contained in some game? A related consideration involves the extent to which mother begins to phase in alternative aggressive behaviors the child could employ. If he is banging his toy hammer against the refrigerator, does mother set an old pan beside him and invite him to hammer it instead? Finally, the mother may initiate a making-up process or respond to the child's initiative to make up. After punishment or limit setting, she might engage the child, for example, in repairing or witnessing the repair of some damaged object. Responses such as this from mother begin the task of negotiating the modification of aggression, which occurs during the next period. If aggression is effectively modified, the child has not surrendered ambition, a push to achieve, assertiveness, and pleasure in accomplishment—affects that relate to general development but in particular to active and appropriate exploration and assimilating of information.

Issue 7: 24 to 36 Months, Period of Modification of Aggressive Intent. In this stage the aggressive behavior displayed during the second year of life undergoes gradual modification as the child accommodates to and internalizes the stand mother takes in terms of his aggression, that is, her permissiveness toward and prohibitions against aggressive behaviors of different forms. The child's modification of aggressive behavior can be seen in his changing the means and aims used to express aggression. For example, the child shifts from pounding a souvenir ashtray valued by mother to pounding wooden pegs into a form board given to the child by mother. During this period the child begins to show socially acceptable aggressive play and to substitute flexible, constructive play for stereotyped play. This period of negotiations emphasizes the extent to which the child will challenge mother's convictions and the extent to which mother will provide a flexible range of opportunities for aggression.

In addition to negotiating a modification of aggression to fit household standards, the child modifies his sense of omnipotence in keeping with reality testing, internalizes standards for activity, and strengthens his identification based on parental modeling. The child also begins to test these standards for aggression with other persons and in other environments.

Issue 8: 12 to 36 Months, Extension of Secondary Process Functions in Interaction. Sander proposes that throughout the second and third years of life negotiations concerning the earlier issues of mutual adaptation and reciprocity, along with negotiations of initiative and the testing and modification of aggression, are continually repeated also in the service of the child elaborating secondary process functions of speech, symbolic representation, and play. The issue emphasized here is communication, playful and verbal, between child and mother, and the solidification of their relationship in this respect. What is the mother's ability to understand the child's symbolic and verbal behaviors, how does she stimulate and respond to them? And to what extent does the child internalize symbolic communication invented in the process of mutual interactions? In solidifying their relationships through communication and symbols, both mother and child advance in understanding the intentions of the other and the alternatives available for the mutual exchange, a growth that takes place at the same time the issue of aggression is being negotiated.

Issue 9:0 to 36 Months, Consolidation of Body Image. Throughout the 3 year period the child is viewed as negotiating, constructing, and solidifying body image and sexual identification. The child expresses curiosity in his own body and the bodies of parents and sibs in exhibitionistic, seductive, and auto-stimulating behaviors. Parents respond with interest, stimulation, and prohibitions. Parents and child communicate about the body and body parts. Throughout these many transactions the child develops perceptions and sensations of body tensions, cognitive schemes of body parts, and a sense of self.

SANDER'S MODEL OF MOTHER-INFANT NEGOTIATIONS AND TRANSFERENCE AND RESISTANCE IN COGNITIVE CONTROL THERAPY

Our observations of children in cognitive control therapy suggest that the model proposed by Sander can serve as a useful conceptual guide in understanding transference and resistance behaviors and in selecting technical interventions, within the context of this form of treatment.

We proposed at the start of this chapter that the cognitively disabled child is in conflict (mismatched) with caretakers and other significant persons (parents, teachers), that cognitive controls are in conflict with information the environment is asking the child to manage, and that the formation and fixation of immature cognitive controls relates to the child's experiences with caretakers and information during the first three years of life. When related to issues of the treatment process (transference resistance), this proposal leads to the following assumptions. The cognitively disabled child who is engaged in a therapeutic process resists changing his cognitive control organizations and modes of interacting by transferring to the therapist behaviors that relate to one or another of the developmental issues proposed by Sander, issues that were not adequately negotiated with caretakers during the first three years of life.

Let us elaborate this proposition, relying on previous discussions. In cognitive control therapy the child participates in a relationship that presents him with cognitive tasks, organized to engage the cognitive controls that are uniquely deficient. For example, the child habitually approaches information in the environment with narrow, passive visual scanning, to be able to control and adapt to information without the disruption of excessive stress. The therapist presents a task that requires more broad and active scanning than the child habitually uses. As a result of this mismatch between information presented by the therapist and the child's deficient cognitive controls, the child becomes stressed. The stress reaction in turn leads to the child's resisting the information and its task. In resisting, the child moves to one or another of the early developmental issues around which to engage the therapist. The issue or issues the child introduces and transfers to the therapist, and onto the demands the therapist is making, are those which the child has not negotiated successfully in the first three years of life with early caretakers (e.g., reciprocal exchange, focalization, self-assertion). The child has remained fixated, as it were, to "incompletely or pathologically negotiated issues," and the child repeats these issues whenever he is at odds with the environment, which is requesting change and further development.

CASE ILLUSTRATION

To pursue this view further let us compare an illustration of resistance and transference behaviors revealed in psychotherapy by a primarily neurotic child with behaviors revealed in cognitive therapy by a child whose primary cognitive control deficits were viewed as having been organized in the first three years of life (Type I pathology, incomplete ladder; see Chapter 9). At one point in treatment an 8-year-old girl suffering from neurotic symptoms sat under the therapist's desk and placed several cardboard boxes around it. She told the therapist she did not want to come to any more sessions and hated "this stupid place." The therapist commented that it seemed the child needed to hide from him and to protect herself with a wall, and maybe she could find a way of telling him what the hiding was all about.

After two sessions of sitting silently under the desk, she began writing "notes" to the therapist, which she cautiously passed to him from her enclosure. The notes were one or two words conveying no obvious meaning. After the child repeated this configuration of activity over several sessions, during which the therapist made a number of clarifications designed to prepare the child for an interpretation, the therapist pointed out to the child that it seemed she had secrets she wanted to tell him, yet also to keep hidden. The therapist noted that maybe the child imagined she would be punished if she revealed her secrets to him, but he was her doctor and wanted to help her with her worries.

This interpretation was followed by a marked shift in the child's activity. She initiated doll play, with parent dolls angrily scolding and spanking a child doll for being "naughty" and "dirty" and because sometimes the child doll "touched things she shouldn't."

This sequence of behavior is very familiar to clinicians practicing child psychotherapy. The child's resistance was revealed in her refusing to engage the therapist and her wish to avoid future sessions. It was assumed that the child showed resistance because she had transferred onto the therapist fears and anxieties belonging to caretakers whose standards had been internalized. Therefore in hiding from the therapist, the child was hiding from punishing parents and from punishing inner standards. The resistance was resolved as the therapist made several statements, which brought to the child's conscious awareness her fear of punishment. The statements selected by the therapist were guided by the model of intrapsychic conflict: that sitting barricaded under a desk reveals the need to hide past and contemporary forbidden behaviors and wishes because of internal standards that prohibit and punish these behaviors and words; that to keep these behaviors and wishes hidden keeps guilt and anxiety at a tolerable level. The resistance was resolved by helping the child accept the therapist as a helping figure, not as a transference figure of punishment and prohibition. Resolving the resistance, for the moment, enabled the child to elaborate her internal conflict further in doll play and to continue participating in the treatment process until other conflicted issues, memories, past experiences, and wishes again recruited resistance.

Let us set next to this example an illustration of transference as resistance in cognitive therapy. An 8-year-old boy presented various symptoms (academic failure, poor relationship with teacher and peers, aggressive and hyperactive explosions) that were viewed as related in part to Type I cognitive control pathology. Significant deficits were observed in body ego-tempo regulation, in focal attention, and in all the developmentally higher controls. In spite of these cognitive deficits, the boy showed bright-normal intelligence when tested. History and projective data suggested a character disturbance rather than neurotic conflict.

Over a number of months the therapist had been providing therapeutic experiences in body ego-tempo regulation (Chapter 13) and in the first stages of focal attention functioning (passive tracking of moving targets; Chapter 14). At this point in treatment the therapist presented a new task and asked the child to visually examine two rods, differing in height by 6 inches and set 1 foot apart, and to point to the taller one. The child responded correctly. With this task the child was being introduced to the developmentally higher phase of therapy concerned with active pursuit of information. In an effort to determine which configuration of information to be actively sampled was too complex and stressful, given the status of the child's cognitive controls. The therapist next set two rods 3 feet apart on the table, these rods differed in height by only 2 inches. When asked to point to the taller one, the child responded by pushing the rods onto the floor, proclaiming he didn't want to play "that stupid game" any more and he was going to color. Then he took crayons and paper and sat under a table. He quietly busied himself, drawing lines on paper over and over again with different colored crayons, until the session ended. On several occasions during this time the therapist set the rods on the table and asked the child to look them over. Before the therapist had finished his remark the child shouted "Go (expletive deleted) yourself!" With that blast, he was clearly keeping the therapist and his demands at some distance. Yet on two occasions during the same period of time, the child held up his paper, directing the therapist's attention to the colored lines he had drawn. The therapist showed pleasure in the colors and commented about the “nice design” the lines formed.

During the next session the child again located himself under the table, with crayons and paper, and started drawing “designs,” primarily long lines. Again the child blasted the therapist whenever he attempted to make contact, yet again the child brought the therapist’s attention to particular designs. The therapist expressed interest and then waited, sometimes drawing lines himself with colored crayons.

Soon the child began to include a new dimension in his behavior. On several occasions he mumbled that he could not find a crayon of a particular color. The therapist then went to the shelf, obtained the crayon mentioned, and placed it next to the child. The first time this happened the child picked up the crayon and tossed it across the room, emphasizing with an expletive his rejection of the crayon. On the next occasion, however, the child picked up the crayon and used it, without acknowledging that it had been brought to him. At another point in the session the child broke a crayon as he pressed on it in drawing lines. The therapist obtained tape and without comment joined and bound the two halves of the crayon, which the child subsequently used.

The following session went along about the same way. The therapist busied himself drawing lines with crayons when the child was similarly occupied. At the same time the therapist and child interacted more often around the child’s drawing activity.

In the next session, after obtaining a crayon the child needed, the therapist asked the boy to challenge him by drawing two lines, and the therapist would try to figure out which was longer. The child accommodated, and the therapist asked the child to draw other lines and “to make the job for me very hard.” The child was delighted, taking great pains to draw lines differing in height by only centimeters. With each set of lines the therapist examined, puzzled, and verbalized his search for the longer line. Following this the therapist asked the child “to take a turn.” The child accepted, working with a set of fines the therapist presented.

In the next session this activity continued for a while, child and therapist taking turns examining lines the other had drawn. The therapist was active in noting how difficult it was to tell which line was longer when there were differences in color, width, presence of curves, and so on. The therapist then asked the child to continue the game, now using the rods that had been pushed off the table several sessions ago. He noted that with the rods they could be more sure about the length of each, the distance between them, and so on. The child accommodated, and the therapeutic activity continued following the program defined in Chapter 14 *(Which Is Big, Which Is Small?).*

This example was selected to illustrate several critical differences in conceptualizing and managing transference as resistance in cognitive therapy as compared with psychotherapy. Let us first consider this anecdote through the lens of Sander’s model, and then discuss the concepts of transference and resistance as modified in cognitive therapy.

The child reached a point in therapy where he refused to continue with the treatment regime he and therapist had agreed to follow. That is, he refused to examine the rods, pushed them to the floor, and occupied himself under a table with stereotyped, controlled activity (drawing fines with crayons). The therapist did not conceptualize this behavior as related to an intrapsychic conflict between one wish and another or between a wish and a prohibition. Rather, the behavior was seen as related to the conflict between the child's cognitive status (habitual narrow scanning) and the sharp increase in the complexity of information the child was asked to manage. The first set of rods being compared had been 1 foot apart and with a 6 inch difference in height. But the child had pushed from the table the second set of rods, located 3 feet apart and differing only by an inch. The second cognitive task presented by the therapist exceeded the child's cognitive status, represented a strong push for change and differentiation, and accordingly created stress. In managing the stress, the child gained control over the therapist, the information, the task, and the situation by transferring onto the therapist a particular form of one interpersonal issue, reciprocal exchange. From the viewpoint of Sander's model, the child ruptured the transactional process of back and forth, give and take, and settled the issue by keeping distance from the therapist, the relationship, and its demands. He sat under a table, remained occupied with stereotyped repetitive activity, and shouted vindictively if the therapist tried to engage in reciprocity.

This pattern of behavior had become quite familiar to the therapist from observations during the previous months of therapy and from descriptions by parents and teacher. The child was resorting to an old pattern of controlled withdrawal and refusal to reciprocate.

However his refusal was not 100%. He did hold up his paper for the therapist to see. Here the child was attempting to focalize the therapist. Taking his lead from the child, the therapist introduced a number of behaviors, guided by Sander's model, which were intended to engage the child in negotiating reciprocity, focalizing, and self-assertion, in an effort to resolve the resistance and reestablish an interaction that would permit the treatment to proceed. First, in responding to the drawing when the child presented it while at the same time making no comment about the child's having canceled the relationship, the therapist accommodated to the child's probe, which seemed to focalize the therapist to ensure that he was still available and interested. In drawing designs with crayons, the therapist imitated the child's behavior, an ingredient of reciprocal exchange. Moreover, in noticing the child's cues for particular crayons, obtaining them, and fulfilling the child's need to have a crayon repaired, the therapist continued to focalize himself *behaviorally on the aspects of the child's needs that bore some connection to the basic agenda of their therapeutic relation, namely, the child's school failure and cognitive disability.* The therapist showed the child that he noticed his needs and met them.

Throughout all these interventions the therapist did not respond to the child's angry vindictiveness, but stepped past it, displaying interest and showing that his integrity was intact. Then by inviting the child to challenge him in a game of judging lines, the therapist extended an invitation for reciprocal exchange; however his behavior allowed the child to maintain the initiative and to experience self-assertiveness. The child accepted the invitation, it is assumed, because of the therapist's sustained interest and focalized behavior. By suggesting that they take turns in drawing and judging lines, the therapist provided the child an entrance to negotiating reciprocal exchange and self-assertion further, but now on the terms of both parties. The activity of drawing designs had been initiated by the child. The modification of that activity, so that it assumed features of the cognitive task the child had abandoned, was initiated by the therapist. In taking turns with the active and passive positions in the relationship (presenting lines to be judged, and judging lines that were drawn), the child was helped to reenter a reciprocal relationship, using his own self-assertiveness. By renegotiating these several issues therapeutically, the therapist resolved the resistance and enabled the child to continue with the course of treatment until the next more complex cognitive demand led to new resistance and the need for another phase of renegotiations.

It is important to note that the therapist refrained from making interpretations. In cognitive therapy the therapist includes verbal interpretations when resolving resistance only at later points in treatment, after the child has constructed a fairly high degree of awareness of his behaviors and affects when dealing with the hierarchy of cognitive tasks. In our illustration the therapist might have said at a later time, "When rods are very close in height and placed 3 feet apart, figuring out which is taller is very hard for you, and you get nervous and mad." When the child had gained cognitive control over that connection (between the complexity of information and the stress reaction), the therapist would work further to point out to the child that he had managed the stress by "quitting" the relationship and the task and keeping the therapist away with "swear words" and "easy drawings."

Symbolic verbal communication in the form of interpretations is reserved for the middle phase of therapy (Chapter 12) to help the child become conscious of his cognitive control deficits and the unique affects and relations with persons that are aroused when these deficits engage complex information; the child also must come to realize how these behaviors are defeating and do not permit mastery and growth. But following Sander's model, symbolic verbal communication is introduced only as the child evidences growth in sustaining a reciprocal relationship, in modifying aggressive tensions, and in flexibly asserting himself and accommodating to the therapist.

Issues in Conceptualizing Transference as Resistance in Cognitive Control Therapy

With this illustration before us, we can articulate several broad issues to guide us in conceptualizing transference and resistance in cognitive therapy. First a few general propositions are necessary. In observing and conceptualizing the child's behavior during treatment, the therapist should be oriented to the interpersonal issues being negotiated: initial adaptation, reciprocal exchange, directed activity, focalization, self-assertion, and testing and modifying aggressive behavior. Unless a child suffers from major neurotic conflicts as well as cognitive disabilities, the therapist should subordinate an orientation toward internal conflicts among inferred wishes, impulses, and standard. In cognitive therapy the more common forms of resistance include aggressive-destructive behaviors, excessive self-assertiveness or its opposite (excessive passivity, fatigue, lack of interest in the task), and stereotyped play. All these behaviors serve to keep control over the therapist and the cognitive tasks that create stress for the child. The more common affects accompanying resistance are fear of and anxiety about an external threat (e.g., the therapist, the task). Guilt and anxiety related to internal threats (wish, impulse) are less common. The child's resistance does not give way to verbal interpretations as much as to behaviors by the therapist that engage the child in negotiating one or another issue to which the child has retreated to block the progression of treatment.

These broad propositions suggest several guidelines, following Sander's model, for conceptualizing and managing transference as resistance.

1. *Initial Adaptation.* The therapist accommodates to the child's body rhythm, postures, temperament, and preference for pace and timing of stimulation. The therapist should be aware of his own anxiety in attempting to "know" the child and to negotiate a fittedness with the child.

2. *Reciprocal Exchange.* The therapist searches for opportunities to engage the child in back-and-forth, active-passive exchanges, especially in terms of displaying a crescendo in affects.

3. *Early Directed Activity.* The therapist is alert to the occasional appropriateness of being more passive in response to the child's directions, especially as the child attempts to seek and avoid information. It is in this negotiation that the therapist obtains clues from the child about the level of complexity of information that brings cognitive nourishment or cognitive strain.

4. *Focalization.* In response to focalizing behaviors from the child, the therapist ensures his or her availability, sensitivity, and awareness of the child's uniqueness. These responses initially are behavioral, only later becoming verbal.

5. *Self-Assertion, Testing Destructive Intentions, and Modifying Aggressive Behavior.* The therapist views assertive and aggressive behaviors and their regulation and modification as a critical part of the process necessary for the child to establish autonomy, to acquire pleasure in achievement, and to actively pursue information and cognitive tasks. The therapist reverses roles when appropriate, allowing the child to set the task and direct the activity. The therapist carefully discriminates among the aggressive-destructive behaviors the child displays, providing alternatives that not only render the form of aggression more socially appropriate but, more important, bind the expression of aggression with the pursuit and assimilation of information.

6. *Extension of Secondary Process Functions in Interaction.* The therapist introduces, in stepwise fashion, verbal concepts and symbols that represent the child's cognitive deficits and subsequent flight or fight behaviors, and gradually brings these into the child's awareness and under his cognitive control.

Although the conceptual guidelines discussed here could apply to all therapeutic relationships and processes, especially psychodynamic psychotherapy, they are especially critical in conducting cognitive therapy. I contend that when a model of negotiation is employed in conceptualizing transference and resistance, the therapist's behaviors are dominated by techniques and interventions that are proposed as being more effective with cognitively disabled children. The next chapter, concerned with technique, considers further techniques the therapist employs when managing transference in terms of a model of interpersonal negotiation.

THE RELATION BETWEEN COGNITIVE CONTROL THERAPY AND BEHAVIOR THERAPY: THE ROLE OF TRANSFERENCE-RESISTANCE AND INTERPRETATION REVISITED

On the face of it, cognitive control therapy and behavior therapy are similar in some respects and dissimilar in others. This state of affairs presents a problem to the author who wants to interest therapists of all persuasions in considering the possible merits of cognitive therapy as a treatment method for cognitively disabled children. The problem stems from an unfortunate polarization that exists between behavior therapy and other psychotherapies, especially psychoanalytically oriented ones. Sometimes this polarization is highly emotional (see, e.g., Eysenck, 1960; Szasz, 1967). Because of this schism, some readers who conduct psychotherapy within either a psychodynamic or a more specially psychoanalytic framework may interpret cognitive therapy as a form of behavior therapy and therefore dismiss it. Or they may interpret cognitive therapy as a modification of psychodynamic psychotherapy and ignore the ingredients of cognitive therapy that are similar to those of behavior therapy and are essential, I believe, in the treatment of cognitive dysfunctions in children. Some readers who conduct behavior therapy may interpret cognitive therapy only in terms of its psychoanalytic orientation, and reject it. Or they may interpret cognitive therapy as a form of behavior therapy, accept it, and ignore the ingredients of cognitive therapy that derive from psychoanalytic principles and again appear to me to be essential in the treatment of cognitive dysfunctions in children.

Because of these possibilities for misunderstanding and "selective perception," and because I want to encourage therapists of all persuasions to consider the blending of concepts and techniques that make up cognitive therapy and the suitability of this treatment method for cognitively disabled children, comments about the relation of cognitive therapy to behavior therapy are in order.

Comprehensive discussions of the theoretical and technical similarities and differences between behavior therapy and psychodynamic psychotherapy have been reported (e.g., French, 1933; Shoben, 1949; Alexander, 1963; Breger and McGaugh, 1965; Weitzman, 1967; Marmor, 1971; Feather and Rhoades, 1972a and 1972b. Because these critiques are available, and because an exhaustive comparison of cognitive control therapy and behavior therapy would be outside the focus of this book, we limit this discussion to a review of the major similarities and differences between cognitive and behavior therapies, relying on the formulations presented earlier in this chapter. The reader may find it useful to return to this discussion after becoming familiar with the presentation of general technique in the next chapter and with the content of cognitive therapy programs given in the chapters that follow.

The rapidly growing field of behavior therapy encompasses a wide variety of goals, concepts, and techniques that form a heterogeneous collection (Davison and Stuart, 1975). Moreover, though the development of these concepts and techniques has relied on learning theory, emphasis has been given to one of the schools proposed by Dollard and Miller, by Wolpe and Eysenck, and by Skinner (Breger and McGaugh, 1965). Furthermore, some behavior therapeutic efforts are designed to change the ways in which and individual responds to forces in his environment. Other approaches are designed to modify the environment in ways that suit the individual.

Because of this diversification of goals, applications of learning theory, and techniques, our interest in a discussion of the relation between cognitive therapy and behavior therapy would be aided by a formulation that defines the broad characteristics of behavior therapy. One such formulation, presented by Davison and Stuart (1975), seems to be especially suited to our needs. The subsequent discussion uses the characteristics of behavior therapy articulated by Davison and Stuart, noting similarities with cognitive therapy and the consequences of the differences.

Similarities Between Behavior Therapy and Cognitive Therapy

1. Davison and Stuart propose that the model of human behavior that has emerged in behavior therapy stresses "the dynamic interplay of biological factors and experiences in past and present environments" (1975; p. 757). The units of behavior selected as important are observable events, including psychophysiological responses and overt actions, as well as verbal reports of feelings, goals, interests, and desires. They note that the "mechanistic language" of behavior therapy (e.g., stimulus, response, reward schedules) conveys a detached orientation to human beings that obscures this model.

In relating to this proposal, the reader must refer to the discussion in Chapter 1 for a critique of the mechanistic (learning theory) and organismic views of human behavior and the different propositions that emerge from each if the theoretical positions are held to consistently. Furthermore, if behavior therapy ascribes to the model proposed by Davison and Stuart, given its origin in learning theory, the opinion of Breger and McGaugh (1965) becomes pertinent: namely, that there is little relation between the *theory* of learning, as a model of human behavior, and the *practice* of behavior therapy.

For our purposes, though, this controversy is not critical and belongs to the realm of model building and to the role of theory in guiding questions, definitions, observations, and technique. Briefly, if the practice of behavior therapy does indeed follow the model proposed by Davison and Stuart, I would conclude that model has much in common with the biodevelopmental model followed in the practice of cognitive control therapy.

This conclusion receives support from the consideration Davison and Stuart give to the concept of "countercontrol," which has been proposed and studied by learning theorists: "Further it is recognized that although the individual is the focal point of persistent patterns of social influence, he can also respond with countercontrol, so that emergent behavior is a consequence of the interplay between the behaviors of the individual and those with whom he/she interacts" (p. 757). Considering this proposal in terms of our previous discussion of transference and the origins of cognitive control functioning, we at once see a similarity between the concept of countercontrol and the phenomenon we have called "negotiation" as observed in the treatment process of cognitive therapy.

2. From this model of human behavior, Davison and Stuart propose several more concrete characteristics of behavior therapy. The techniques derive from experimental findings, and the goal of behavior therapy is to alleviate human suffering and enhance human functioning. When practiced responsibly, behavior therapy also involves a contractual agreement between patient and therapist, a specification of the goals and methods of intervention, reeducational efforts designed to increase interpersonal skill and personal satisfaction, and a systematic evaluation of treatment outcome. One particular characteristic that underlies almost all, if not all, behavior therapy techniques should be underscored; namely, desensitizing the patient to stimulation that arouses crippling anxiety, guilt, or stress. In desensitization one begins with the least intrusive procedure, intervention, or therapeutic stimulation and systematically progresses to the most intrusive or disruptive. The stimulus or procedures used are selected so to permit experiences with them in the treatment situation to be generalized to experiences in the broader environment.

Each of these characteristics is quite similar if not identical to those typifying cognitive control therapy with its base in psychoanalytic psychotherapy. In both cognitive control therapy and psychoanalytic psychotherapy the techniques derive from experimental findings, if we accept systematic observations in the treatment room, beginning with those of Freud, as experimental findings. Certainly the concepts and method of cognitive control therapy emerged from observations and formulations made in a number of formal research studies presented in the first half of this book. It goes without saying that a treatment contract is negotiated with parents and child when conducting cognitive therapy and that the therapist is expected to evaluate treatment outcome in formal studies of groups (see Chapter 18) as well as in the follow-up of individual cases, including school and home reports, test data, and the like.

Perhaps the most important characteristic cognitive control therapy shares with behavior therapy is the technique of desensitization—that is, the selection of a procedure or stimulation that relates to the patient's problem, followed by the introduction of the least intrusive version of this stimulation, and then systematically removing from the stimulus the components that are stressful and incapacitating to the patient. As we have noted, cognitive control therapy presents the cognitively disabled child with cognitive tasks whose makeup is uniquely tied to the child's cognitive dysfunction. The first tasks are as neutral as possible in complexity. Then in a stepwise developmentally graded sequence, the child is presented with increasingly complex tasks. In this process the child is viewed as becoming desensitized to the stress created by information, developing the cognitive competence at each step to manage the next more complex configuration of information, without flight or fight behaviors that are maladaptive.

In including the technique of a gradient of desensitizing cognitive tasks, we departed from traditional psychoanalytic guidelines. But as discussed at the start of this chapter, beginning with Freud's first formulations at the turn of the century, the fundamental problem of psychodynamic psychotherapy has been to determine how best to enable a patient to give up modes of thought, feeling, and behavior that were suited for past environments and persons but are now growth restricting and maladaptive. It is also necessary to determine how best to enable the patient to develop modes that are more adaptive given his stage in life and current environment. With the treatment of neurotics, the psychoanalytic framework takes the position that over time, within the patient-therapist interactions, the patient repeats and reveals the modes of behaving that are maladaptive and is helped to change them.

It is this principle that seemed to me to require modification for the treatment of cognitively disabled children. We proposed that conducted in terms of traditional psychoanalytic principles, psychotherapy does not provide the most effective interpersonal context within which the child can repeat and reveal the specific and unique cognitive deficits that are among the causes, if not the major cause, of his suffering. To facilitate capturing maladaptive cognitive behavior in the treatment room, the therapist conducting cognitive control therapy presents the child with cognitive tasks in a stepwise fashion in accordance with behavior therapy guidelines of desensitizing and generalization. The tasks change progressively from simple to more complex, from less stressful to more, from bearing little resemblance to the cognitive activity the child engages in school to being very similar.

Differences Between Cognitive Control Therapy and Behavior Therapy

To this point we have reviewed several characteristics shared by cognitive therapy and behavior therapy. The one most likely to generate confusion and misinterpretation among therapists of both camps is the technique of desensitization. However it is exactly at this point that cognitive therapy shows fibers in its fabric that are different from those that make up behavior therapy. These fibers distinguishing cognitive therapy derive from the psychoanalytic framework. One concerns the phenomena of transference and resistance, another the process of becoming aware of what is unconscious (insight), and another the technique of turning over to the patient, whenever possible, total initiative in prescribing the pace, sequence, and content of the treatment activity. Let us consider each of these in turn.

TRANSFERENCE AND RESISTANCE

We have indicated that perhaps the characteristic serving most to distinguish cognitive therapy from behavior therapy is the central role given the phenomena of transference and resistance in cognitive therapy. In conducting cognitive therapy we subscribe to the psychoanalytic proposition that regardless of whether the child is free to do and say whatever comes to mind (or for the adult patient to say whatever comes to mind), or whether the child or adult is presented with a series of stimuli or tasks, the patient will tend to cling to his behavior patterns and resist change—that is; will refuse to adhere to the therapeutic regime and contract agreed upon. In the service of resisting, the patient transfers to the therapist and tasks attitudes that belong to persons, past or present, in the patient’s life, persons who are implicated in the patient’s very motives for constructing and maintaining the mode of behavior that is now facing change.

Leading figures in behavior therapy have published opinions that resistance does not exist in behavior therapy and that the concept of resistance is an “alibi” used when treatment does not succeed (Wolpe and Lazarus, 1966, p. 21). The exclusion of resistance as an issue in behavior therapy is also reflected in the characterization of this method by Davison and Stuart, considered earlier. They point out that at times differences arise between the goals of the patient and those of the therapist. When this happens, treatment efforts are held in abeyance, suggesting that the therapist interrupts treatment until the patient resolves the difference or terminates the sessions.

In contrast, others who practice behavior therapy have addressed the issues of resistance and transference. For example, Weinberg and Zaslove (1963) reported that phobic patients they were treating with desensitization exhibited what they believed should be viewed as resistance. One patient failed to practice relaxation at home. Another wasted time by talking about issues quite removed from the problem that was the focus of therapy. And another dreamed of not having to come to appointments because he was cured. Crisp (1966) has stated that transference behaviors that occurred in behavior therapy seemed to precede change in symptoms.

Feather and Rhoades (e.g., 1972a, 1972/?; Rhoades and Feather, 1972 and 1974), in their creative integration of behavior therapy and psychodynamic techniques in the treatment of neurotic adults, have been perhaps among the practitioners of behavior therapy who have systematically attended to resistance and transference. They describe patients who showed negative feelings toward the method of treatment or the therapist and for whom the symptom served a current need. With one case they illustrate the psychoanalytic proposition that through experiencing resistance and transference behaviors with the therapist, the patient changes old modes of behaving with the therapist and in the environment. The patient, who presented as one problem his difficulty in asserting himself, appeared late for his treatment sessions and, after a course of desensitization, became directly assertive with the therapist: the investigators believed that this behavior was related to the patient’s increased assertiveness in his nonclinical environment.

Thus in addition to presenting the child a series of desensitization tasks, the method of cognitive therapy includes, as a major aspect of treatment, the process of articulating and working through transference and resistance behaviors. As these old modes of behaving are experienced and changed in transactions with the therapist, they become changed in transactions with persons outside the treatment milieu. Cognitive therapy ascribes to the psychoanalytic proposition that by resolving and abandoning transference-resistance behaviors experienced in transactions with the therapist, and by experimenting with different modes of behaving with the therapist, the patient is set on a developmental track that leads to structural changes in behavior and to new, more adaptive modes of functioning.

INSIGHT

The proposal that the resolution of transference and resistance in cognitive therapy becomes the vehicle for the development of new modes of cognitive behavior relates to the role of insight (making conscious what is unconscious). In psychoanalytic therapy the patient resolves a transference reaction by gaining the insight that the maladaptive modes belong to persons and places that no longer exist and that they are being applied inappropriately to the persons and places with which the patient is now engaged.

This insight is constructed gradually and involves bringing repressed thoughts, feelings, and memories into consciousness. As the patient repeats behaviors in the treatment situation, the patient's accompanying free associations and discussions, reveal to the therapist bit by bit, the persons, events, and issues—especially from the past, but also from the present—that induced the maladaptive behavior. When psychoanalytic therapy is conducted appropriately, the therapist shares this understanding with the patient, usually in the form of interpretations of behavior. The interpretations are presented in carefully selected bits, paced and phased in at effective points in treatment, and integrated and organized with previous interpretations made. It is believed that an especially effective point in treatment for interpretations and insight occurs when the patient is submerged in a transference reaction with the therapist, reliving issues and feelings that belong to others. The more differentiated and elaborate the insight achieved by the patient, the more connections are established between the present and past, and between experiences in the treatment room and those outside. The more connections constructed, the more the patient gains cognitive control over issues and forces that interfere with current functioning, and the more the patient is free to evolve new ways of conducting his life.

But the children of interest to us are handicapped, at least initially, in constructing insights or cognitive constructs that firmly grip (articulate, explain, conceptualize, and control) a set of issues, persons, events, and information with which the children are in conflict. As a result, although the goal of achieving insight is accepted by cognitive control therapy, it must be modified. With the method of cognitive therapy a two-step process is followed in helping children resolve resistance and achieve insight into their difficulties.

The resistance and transference behaviors revealed by the child are incorporated as often as possible within the hierarchy of cognitive tasks being presented. In the earlier illustration the therapist transformed an 8-year-old boy's resistant behavior of drawing designs into an activity of drawing lines and judging their relative lengths, and eventually to the systematic sequence of tasks involving rods.

To conduct cognitive therapy appropriately, the therapist must return to the prescribed sequence of tasks because the tasks are seen as the stimulation that gradually differentiates and develops immature cognitive controls. At the same time, the therapist negotiates with the child transactional issues that appear to be blocking him from continuing with the treatment regime. In the psychoanalytic framework this total process is conceptualized as a "corrective experience." The child engages with the therapist in an interpersonal experience that has therapeutic benefits and leads to structural change. However the child is not aware of (lacks insight into) the issues that are causing him conflict and producing the maladaptive behaviors he repeats.

In the next step the therapist employs clarification and interpretation to bring to the child's awareness each of the following, preferably in the sequence noted: (1) unique emotions and behaviors the child shows when resisting cognitive tasks in the office, (2) connections between the resistance and the unique makeup of the cognitive task at hand (e.g., the task is now more complex than the last in respect to some feature; the rods are now farther apart), (3) unique characteristics of the child's cognitive control functioning (e.g., the habit of narrow scanning and the experience of stress when a task requires broad scanning), (4) connections between experiences in the office and analogous experiences at school and home, (5) alternative modes of cognitive functioning that are emerging (e.g., the child is made aware that whereas he formerly became stressed when surveying a matrix of 8 geometric shapes, he now surveys a matrix of 20 with no stress), and (6) alternative modes the child could use to manage affects and tensions when dealing with a complex cognitive task (e.g., tapping each printed letter with a finger, rubbing an earlobe).

It is recognized that not all these stages of interpretation and insight building involve uncovering repressed, conflicted memories, wishes, and feelings—materials that have been the target of psychoanalytic interpretation from the start. However I have found that a modification of the concept of insight building is a useful working concept in cognitive therapy. A child may be actively keeping from awareness attributes of cognitive tasks with which he has unique difficulty (conflict); and he may be keeping from awareness the unique way in which he approaches, avoids, and manipulates his behavior in interaction with a significant adult. Another child simply may not have registered these issues, consciously or unconsciously. In either case the goal is to bring to the child's awareness information about his unique cognitive functioning and mode of adaptation that could help him re-form old habits into new modes that are more successful in meeting academic and interpersonal demands.

With children who have organized neurotic conflicts as well as cognitive control deficits, the techniques of cognitive therapy can be integrated with those of psychotherapy, including the goal of resolving (clarifying and interpreting) the neurotic conflict that either is the source of the cognitive control compromise or is related to it in terms of some defensive or adaptive need. (See Chapter 9, discussion of Type II cognitive control pathology, and Chapter 12.)

SHIFTING TO THE CHILD THE FREEDOM TO PRESCRIBE THE TREATMENT ACTIVITY

In cognitive control therapy the therapist formally works toward shifting from himself to the child the function of prescribing the content and form of the therapeutic activity, much as the child in psychotherapy is permitted relative freedom to choose play themes and topics of discussion.

With some children this goal is achieved in a very limited way. For example, the child is asked to select a game or activity to be engaged during a period of delay required by the cognitive task at hand. Or after a course of treatment during which the therapist has completely determined the hierarchy of tasks to be managed, a child may show a growing capacity to repeat and elaborate cognitive behaviors and activities that permit the working through of cognitive deficits. This child would be asked to elaborate or modify the hierarchy of cognitive tasks to be engaged and to invent others that relate to the therapeutic goals. In this connection, the reader may wish to refer to the discussion of the role of play in cognitive therapy (Chapter 12).

THE RATIONALE OF COGNITIVE CONTROL THERAPY: SUMMARY STATEMENT AND CONCLUDING REMARKS

I developed the method of cognitive control therapy as research observations of normal and pathological cognitive control functioning converged with observations made in conducting psychotherapy with children and, later, child psychoanalysis. Cognitive control therapy evolved to help children who suffer primarily from learning disabilities and cognitive dysfunctions and whose cognitive symptoms do not appear to respond to classical psychodynamic psychotherapy. At its simplest, the method consists of reorganizing immature cognitive controls and associated maladaptive coping behaviors that presumably underlie the academic and behavioral symptoms.

The assumption is made that pathological cognitive controls, if diagnosed, are among the key structures underlying the child’s symptoms. The child has failed a grade, or lags two years in reading, in part because of the persistence of deviant cognitive controls (e.g., scanning and sampling information with narrow, passive visual acts of attention; forming global, fluid memory images of information). These immature cognitive controls were formed during the first three years of life and served in managing the mismatch that existed between the child’s cognitive organization and the tempo, complexity, and content of information presented by significant caretakers and the household environment. These deviant cognitive controls were also tied to one or another issue negotiated by mother and child during the first three years of life, with outcomes that required a compromising of interactional skills. The issues that were inadequately negotiated concern providing mutual stimulation, exchanging affects, developing autonomy and initiative, as well as the earliest bonding with adult figures.

Although deviant cognitive controls, embedded within a pathological style of interacting, served the child in managing his earliest environments, these pathological structures persisted in long-term adaptation into childhood. For the cognitively disabled child beyond the age of 4 or 5 years, a conflict exists between the individual’s immaturely organized cognitive controls and the information and cognitive tasks of school and home. This conflict results in personal stress, which the child manages by negotiations with persons (e.g., teachers) and environments that in some way assist the deficient cognitive controls; for example, the child may constantly test aggression, thereby keeping the environment at a distance; or he may periodically refuse abruptly to reciprocate in a relationship, leaving the teacher or tutor, and their cognitive tasks, impotent.

Immature or deviant cognitive controls are in a vulnerable and delicate state of balance with information contained in outer environments and with information from the inner world of feelings, wishes, fantasies, and impulses. Particular information in the outer environment is clung to, repeated, and used in stereotyped ways that serve to control and ward off demands, while other information is ignored or assimilated in most global terms. At the same time, deviant cognitive controls attempt to maintain maximum autonomy from information contained in the inner world of feelings and fantasies. This autonomy is tenuous, however, and when it collapses, feelings, wishes, and fantasies are poorly organized and are distorted by the poorly developed, deviant cognitive controls.

This delicate balance between the autonomy of cognition from outer and inner environments leaves cognitive controls in a state of developmental fixation, especially when cognitive controls are viewed as structures serving long-term and short-term adaptation. Since they rigidly repeat the same ways of managing external information and environments, deviant cognitive controls do not derive stimulus nutriment from increasingly complex information. They fail to assimilate and accommodate to new configurations of information and accordingly are delayed in differentiating and in developing a sense of pleasure in learning. Rigidly maintaining maximum autonomy from information contained in the inner environment, cognitive controls fail to benefit from the participation of feelings, fantasies, and affects in managing, interpreting, assimilating, and using information. The nutriment that sustains deviations in cognitive control functioning, then, derives from the relief from stress provided by deviant cognitive controls in their defensive stance with outer and inner information.

Cognitive control therapy shares with psychoanalytic psychotherapy the proposition that when interacting with a therapist, regardless of whether a patient is prescribing the activity or presented with a task by the therapist, he will repeat both adaptive and pathological behaviors, the latter serving as resistance to therapy and change. Cognitive therapy maintains, however, that the deviant cognition of the cognitively disabled child, given its shaky autonomy from both inner and outer environments, limits the extent to which the child can repeat and change, within the treatment process, the deviant, underlying cognitive structures and modes of negotiating. If treatment is conducted in the open-ended manner traditional for psychodynamic psychotherapy, the child maintains the same autonomy from inner feelings and fantasies, and the same defensive stance with external information and cognitive tasks, by resorting to stereotyped, cognitively simple play (e.g., form-board games) that keeps the therapist and the treatment process under control and that does not elaborate, work through, and change the pathological structures in question.

Because of this, the method of cognitive therapy proposes that it is effective if the behavior therapy technique of desensitization is integrated within techniques of psychodynamic psychotherapy. The patient is presented stimulation that relates to the stressful conflict. He or she is presented first the most neutral version of the stimulation and then carefully graded hierarchies of this stimulation. In cognitive therapy the content of this hierarchy is organized in terms of a series of developmentally ordered cognitive tasks. Each series of tasks requires one or another cognitive control in its management, and each series shifts from simple configurations of information that bear little resemblance to information in schools to more complex configurations of information that bear much resemblance to information and tasks found in schools.

In the process of engaging each task, the child reaches a level of task complexity for which the deviant cognitive controls are inefficient. The child resists change by repeating various flight and fight behaviors. Upon resolving this resistance, with active participation and intervention by the therapist, the child returns to the task; his or her cognitive controls now engage information free of conflict, and differentiate. The process continues until the next significant more complex task is encountered, when again the child experiences resistance to the treatment regime. The resistance is again resolved, with the child gaining increasing awareness of his unique cognitive control deficits, the attributes of information that represents stress, the effects and coping behaviors employed that are maladaptive, and the alternative cognitive and coping strategies available. With each resolution of resistance, and each time the child returns to the cognitive task, a developmental course is set for cognitive control development that is presumed to be more adaptive and to result in changes in the structures underlying the child's cognitive and emotional symptoms.

The resolution of the patient's resistance to the cognitive task is accomplished by integrating the behavior used as resistance into the hierarchy of cognitive tasks and by verbally describing, clarifying, and interpreting for the child the unique cognitive control habits he employs, showing how they are mismatched with the requirements of the cognitive task, how this mismatch leads to stress (which in turn leads to aggressive or avoidance behaviors), and how the same difficulty observed in the office is also experienced at school with teachers and in other environments.

The method of cognitive control therapy consists of specific developmentally graded guidelines and cognitive tasks for each cognitive control being treated. The techniques of each program are organized in a stepwise fashion, but the sequence from one treatment program to the next is also seen as a developmental progression, from treatment experiences emphasizing body activity with cognitive activity subordinate to treatment experiences emphasizing conceptual and cognitive activity with body activity subordinate. Chapters 13 to 17 present the specific programs.

Chapter 12 proceeds from the rationale and concepts discussed here and describes general techniques that apply when conducting any one of the cognitive therapy programs. It is acknowledged that at present the cognitive therapy programs are designed to treat immaturely organized cognitive controls and to promote their development to more mature stages of increased differentiation. There is a need to design programs to treat cognitive controls that are pathological in that they are organized at the extreme *mature* end of the developmental continuum of each cognitive control. As we know from previous discussions, some learning-disabled children are observed, for example, to sharpen information excessively (i.e., to construct very highly differentiated images of information) or to be so field articulate that they ignore all information except for a very few relevant details. However our observations indicate that the majority of children with learning disabilities present immature cognitive controls, organizations that characterize developmentally early stages of development as discussed in Chapter 7. Therefore it seemed reasonable to begin by designing programs that treat immature cognitive controls and promote their development. I am reserving for future writings programs for the treatment of developmentally mature cognitive controls that in their extreme represent cognitive pathology.

12

GENERAL TECHNIQUE IN COGNITIVE CONTROL THERAPY

The techniques discussed in this chapter apply to all the cognitive therapy programs. Specific instructions for each program are detailed in Chapters 13 to 17. This chapter, the descriptions of each program, and the concepts considered previously, together define the practice of cognitive control therapy.

As we have seen, the broad goal of cognitive control therapy is to resolve the mismatch and conflict between immature or deficient cognitive controls, on the one hand, and information presented by average and expectable environments, on the other. This mismatch between cognitive control structures and information is presumed to underlie the child's cognitive symptoms, whether general (broad learning problem) or specific (poor reader), and to underlie the related behavioral symptoms (impulsive-aggressive, constricted-withdrawn). The therapist deals with this broad goal first, by helping the child experience and work through, in the treatment situation, the unique conflict that is engaged when he is dealing with information and learning. This is done by presenting to the child a developmental hierarchy of cognitive tasks and helping the child become aware of the unique cognitive controls he employs, the stress he experiences when processing information, and the avoidance behaviors he uses to cope with the conflict between cognition and information. It is assumed that by helping the child to manage carefully graded cognitive tasks and to become aware of and work through negative affects associated with processing information, one is enabling that child's cognitive controls to undergo differentiation to more stage-appropriate levels, with the result that the child becomes preadapted to handle and assimilate more complex learning tasks. The effectiveness of cognitive therapy then is presumed to lie in the restructuring (i.e., further differentiation) of cognitive controls and in promoting plasticity in cognitive control functioning, permitting the management of and accommodation to more complex information and tasks, as well as less complex ones, with an accompanying emotional sense of curiosity and pleasure. The effectiveness of cognitive therapy is also presumed to lie in lessening the stress that ensues from encounters between cognition and information.

INDICATIONS FOR COGNITIVE CONTROL THERAPY AND INITIAL PLANNING

Any child who presents a *major* cognitive symptom (e.g., poor reading, short attention span, school performance below grade level) and behavioral problems that appear to be personality trait disturbances rather than neurotic conflicts (e.g., hyperactive-aggressive, passive-withdrawn) can be studied diagnostically to determine whether cognitive therapy is the treatment of choice. Our diagnostic studies have relied on a carefully recorded history, a play interview, and/or projective testing, intelligence testing, and cognitive control testing as discussed in Part III.

The history we obtain differs somewhat from the usual psychosocial-psychiatric history in that special attention is paid to the games and activities the child has favored and avoided, especially those which could give clues about the child's cognitive control functioning in earlier life. For example, a parent may report that at age 5 the child became restless and irritable after only a few minutes with the game Candy Land and seemed to lose his place often. Yet he seemed to enjoy himself more, and showed an adequate sense of direction, when running about playing tag, suggesting that actively scanning a pathway and sustaining attention in microspace was compromised at least by kindergarten age. Or the history may show that a child prematurely limited attention to one type of material in microspace, avoiding the free encounters with information typical of that stage. For example, one mother reported that during the third and fourth year of life her child would sit for hours fitting together pieces of animal puzzles, yet he avoided actively looking at animals during a trip to the zoo and did not track passing vehicles, like the other children in the preschool class. Another mother recalled, when her attention was drawn to the issue, that frequently as an infant her child had closed his eyes and turned away when she wore vividly printed clothing.

By noting behaviors that concern deploying attention in various situations during infancy and early childhood, one could infer whether the child showed unusual sensitivities to particular organizations or tempos of information, and whether a mismatch existed between the child's cognitive controls and the information represented by his unique environment. A history emphasizing cognitive activity could also provide clues about affects and coping behaviors revealed by the child when dealing with stress between cognitive competence and informational demands. For example, another mother recalled that her child would become hyperactive and aggressive when she engaged him in matching dominos, a game her other children enjoyed and had assimilated in learning number concepts.

The play interview and projective and intelligence testing are used along with the history to clarify whether the child's emotional responses and defenses suggest a major neurotic conflict as a possible underlying cause of the school failure. This determination is facilitated in our experience by having available the results of cognitive control testing. Children with school failure who show primary neuroses as inferred from history, interview, and projective and intelligence testing, tend on the average, to show adequate cognitive control functioning as assessed by the battery of cognitive control tests. The school failures or learning symptoms of such children are understood as related to emotional problems, not to cognitive control deficits per se. Exceptions to this involve children whose primary neuroses are more or less severe and include the compromising of a specific cognitive control (see discussion in Chapter 9 of cognitive profiles conceptualized as "broken rungs"). We have employed cognitive therapy with these children, selecting the program that is designed specifically to permit therapeutic work with the particular control that is compromised. In our experience to date with these cases, cognitive therapy has been conducted during some phases of the treatment and traditional psychotherapy during other phases, with the cognitive therapy techniques serving to bring the child's unique learning problem into sharp focus within the treatment relationship.

In our experience with children who show various severe learning symptoms, the history, interview, and psychological testing usually do not suggest a primary, well-organized neurosis, but a mixture of neurotic and personality trait disturbances. Moreover, results of cognitive control testing tend to show a profile suggesting developmental failure of cognitive control functioning, and we believe that this failure is at the bottom of the learning symptoms and a number of the maladaptive behaviors such as impulsivity, passivity, and hyperactivity (see Chapter 9; Type I cognitive control pathology). Cognitive therapy is especially indicated for these children, since they lack the cognitive and emotional equipment that is a prerequisite for a good experience in psychotherapy. The discussion in this section of technical considerations centers around these children.

To plan the content of cognitive therapy for children who show developmental failure in cognitive control functioning and a mixture of neurotic and personality trait disturbances, the profile of cognitive control assessment is used as a guide. Typically, cognitive therapy is begun with a program, or with a stage within a program, that presents the child with cognitive tasks that require cognitive control functioning *developmentally below* the function that has been assessed as lagging or deficient. That is, therapy begins with cognitive activity and tasks that readily match the child's cognitive control competence. In this way the least intrusive stimulation is presented first, to aid in the process of desensitization (Chapter 11).

To facilitate a discussion of planning cognitive therapy, let us consider three hypothetical children referred with the same presenting problem by their first grade teachers. In the classroom these children show major difficulty in learning to read, short attention span, distractibility, and occasional impulsive-aggressive behavior. The history, psychological testing, and interviewing rule out primary neurotic conflicts as underlying symptoms. Cognitive control testing, however, reveals developmental failure of cognitive control functioning, and an examination of the cognitive control profiles shows that developmental failure occurred for these children at different stages in the cognitive control hierarchy.

*Table 1. Planning the Starting Point and Course of Cognitive Therapy for Three Children of the Same Chronological Age and Presenting Problem**

Cognitive Control Assessment	Child		
	Jim	Tom	Harry
Equivalence range	narrow, concrete concepts	narrow, concrete concepts	narrow, concrete concepts
Leveling-sharpening	global, unstable memory images	global, unstable memory images	global, unstable memory images
Field articulation	indiscriminant deployment of attention at relevant and irrelevant information	indiscriminant deployment of attention at relevant and irrelevant information	adequate
Focal attention	narrow-passive scanning	adequate	adequate
Body ego-motility	global body schema; poor regulation of tempos and motility	adequate	adequate

* Three first grade boys are referred because of major difficulty in learning to read, short attention span and distractibility.

As shown in Table 1, Jim's performance on the cognitive control tests revealed developmental failure at all stages of cognitive control functioning from the developmentally early stage of body ego-tempo regulation to the advanced stage of equivalence range. Accordingly, Jim's course of cognitive therapy would begin with the program *Who Is Me, Where Is Me?* (Table 1, Chapter 11). After weeks or months of treatment, when he shows some development in attending to body-motor sensations and in articulating schemata representing these sensations, the next program in the hierarchy is introduced. In *Moving Fast and Slow,* the treatment focuses on the regulation of body tempo. As noted in Chapter 13, which describes these therapy programs in detail, the therapist may include aspects of both programs during the same sessions in treating the earliest of the cognitive controls. Again, when appropriate differentiation has been achieved in articulating body sensations and related schemes, and in regulating body tempos, and when the child has worked through the negative affects and avoidance behaviors associated with body ego—motility functioning, the next program, *Follow Me,* is begun. Now the therapy emphasizes the development of focal attention. The course of therapy would proceed in this stepwise fashion, with each developmentally higher program phased in when Jim gives behavioral evidence that the cognitive controls and ego functions addressed by the program administered have developed to stage-adequate level.

Tom's profile, the second case in Table 1, indicates adequate cognitive control development from the early stage of body ego to the next stage, focal attention. However at this point cognitive control development lags and is derailed, as a major deficit is observed in field articulation functioning and in the higher controls. Tom's therapy program would begin at the advanced levels of the treatment program in focal attention, *Which Is Big, Which Is Small?* In this way his cognitive experiences in the treatment situation begin at the level that matches his cognitive control competence. When a working relationship is established, the course of therapy would move to therapy in field articulation, with the program *Find the Shapes,* then with therapy in leveling sharpening with the program *Remember Me ?* and so on.

The third child, Harry, shows adequate cognitive control development from the stages of body ego to field articulation, with derailment and deficits beginning with the leveling-sharpening cognitive control principle. Accordingly, therapy would begin with the advanced steps of the program *Find the Shapes,* enlisting his competence in field articulation, and proceeding to the program *Remember Me* when a therapeutic alliance has been achieved.

The starting point of a course of cognitive therapy is determined by the therapist first on the basis of test data, then including clinical observation over the first four or five treatment sessions. Based on observations of the child's cognitive functioning, the therapist shifts to a developmentally higher or lower level of the program until a match is achieved between the child's level of cognitive control competence and the level of cognitive complexity represented by the program. For example, Tom's program would begin with the advanced levels of focal attention training. He may show ego regression, symptomatized by his becoming hyperactive and very impulsive during the first weeks of therapy. This regression would suggest vulnerability in regulating body tempos. Accordingly, the therapist would include aspects of the earlier program *Moving Fast and Slow,* along with therapy in focal attention, during the first weeks or months. Discussions below concerning resistance and behavioral observations of stress in response to cognitive activity are relevant here.

The foregoing hypothetical examples illustrate the general procedure followed in planning a course of cognitive control therapy. They also demonstrate that children with the same presented learning symptoms often show different developmental failures in cognitive control functioning. We have observed repeatedly that different cognitive control deficits underlie similar clinical symptoms and the same deficits underlie different symptoms.

A teacher may describe a child as highly distractible and having a short attention span. With cognitive control testing, that child may perform quite adequately on the Scattered Scanning Test and the Fruit Distraction Test, for example, and he may show severe deficits in work with the Leveling-Sharpening House Test. In this case the *clinical symptoms* of distractibility and short attention span would be understood as related to the underlying *structural deficit* that involves the ability to construct differentiated and stable memory images. Because in our experience the assessed cognitive control deficits are not always isomorphic with the specific symptoms highlighted by a teacher or a parent, we believe that cognitive control assessments are indispensable in planning the starting point and course of therapy.

GENERAL ARRANGEMENTS

Any typical playroom or clinical office is appropriate. The only pieces of furniture required are a table about 4 feet long and suitable chairs. Therapy conducted with tempo regulation calls for a large room, as discussed in connection with the program *Moving Fast and Slow.*

There should be a minimum of toys and play materials present, in addition to the materials used in cognitive therapy, especially during the first phase of treatment. The materials used in cognitive therapy, as noted in the descriptions of the programs, are relatively simple (wooden rods, geometric shapes, a few puppets, etc.). One major reason for suggesting that other traditional play materials not clutter the office during cognitive therapy is that the geometric shapes, for example, soon take on important significance in the transference, as well as the person of the therapist. Because the geometric shapes are *the information* the child is asked to process, and because the child has experienced lifelong stress and conflict between cognitive structures and informational demands, the shapes are often the target of angry resistances. For example, children hurl them across the room, or tell the therapist, "I don't want to play with those stupid shapes any more!" Clearly these behavioral-emotional resistances reveal a great deal about the conflict the child experiences in coping with information, and they give the therapist opportunities to teach the child about the ingredients of this conflict and how it underlies the school failure that is causing him much suffering.

In terms of frequency of sessions, we have had experience conducting cognitive therapy at varying frequencies from one 50 minute session per week to five 30 or 15 minute sessions weekly.

It is our impression to date that for severely cognitively disabled children, fewer than two sessions per week is ineffective, and a frequency of three or four times per week is highly desirable, even with abbreviated 30 minute sessions. We have employed this frequency, especially with inpatient populations. If the cognitive deficit is less severe, or if cognitive therapy techniques are blended within a course of psychotherapy, a frequency of once or twice a week can be effective.

The course of therapy is prescribed and developmentally graded for most children as described earlier, but the therapist may combine aspects of several programs in the same phase of treatment as indicated. General arrangements unique to conducting cognitive therapy with groups of children are discussed separately below.

THE INITIAL PHASE OF THERAPY

During the first session of therapy, after appropriate introductions, the therapist should present the cognitive task selected as the starting point and ask the child to work with it. It is best not to begin with long comments explaining to a cognitively disabled child why he is coming for treatment. In our experience verbal discourses are not the most effective way to orient the child and to structure the therapy, primarily because the child’s cognitive deficits limit his ability to assimilate the therapist’s verbalizations. Accordingly, we have kept verbalizations to a minimum and introduce them as much as possible *in relation to the cognitive task, the child’s cognitive activity, and the child’s emotional-behavioral reactions to the task.*

In the first session, then, the therapist may introduce himself and ask usual questions to become acquainted with the child (age, name of sibs, teacher, school, etc.). If the therapist conducted the evaluation, of course he is already acquainted with the child. After the first moments, the therapist tells the child that they will be meeting every week—for example, twice a week—“to work on a lot of different things.” The therapist then says he would like to show the child one of these and places the task on the table, or describes it if no special materials are needed. The child is then asked to perform the task. If the child succeeds, the therapist may administer the next task defined by the program.

During these first administrations the therapist looks for *behaviors* the child reveals while dealing with the task that would serve as points from which to begin clarifying for the child the content and reasons for the therapy. For example, let us imagine a child is asked to walk across the room “in his regular way,” and then as slowly as possible, as defined in the program *Going Fast and Slow.* The therapist would ask the child if he noticed anything while walking slow. Let us assume that the child hunched his shoulders and used a “chicken-step” gait during the slow task, but does not acknowledge awareness of this. The therapist might ask the child if he noticed the way he moved his legs going regular and the way he moved them going slow. If the child registers the difference in gait, the therapist agrees, and adds that when walking as slow as possible, the child took no less time to cross the room than when he walked in his regular way. The therapist might next ask if the child has ever done that before. The child may respond that his teacher thinks he runs around the classroom too much. This association would suggest that the child already relates the task to a difficulty experienced in school and relates the therapist (as a transference object) to the teacher. This seems likely because the therapist's comment about the time taken to complete the walk is experienced by the child as a criticism, suggested by his associating to the teacher's criticism of his hyperactivity.

At this point the therapist might include any of the remarks that follow, as indicated: that walking across the office regular and slow is like walking around the school room, that the child's teacher feels he moves too fast; that it is hard to learn and move fast at the same time. The therapist adds that the things they will do each week will help him learn how to walk around in a lot of different ways—some ways belong to the classroom, some ways to the playground.

By way of another example, a child in the first meeting may be asked to look over a matrix of 16 geometric shapes, as defined in the program *Find the Shapes*, and to remove all the diamonds. The child may remove two diamonds, look around the room and ask about an animal statue on the bookshelf, look again at the shapes, remove another diamond, then vigorously scratch his head and move about restlessly in his chair. The therapist would ask if the child noticed anything about what he did while looking for diamonds. Let us assume that the child is totally unaware of his behaviors or is unwilling to say. The therapist could point out to the child that after removing the first two diamonds he did something, then ask, "Do you remember what?" Let us again assume that the child does not recall or will not say. Selecting one of the behaviors in question, the therapist would say that the child had looked over at the bookcase and had asked about the animal statue. At this point the child might grunt an agreement. Given this reticence, the therapist could only suggest that in school the child has to study things and pick things out, and maybe he looks away from his school work just as he looked away from the shapes on the table. With a reticent child, the therapist need not add that the meetings will help him with this problem. In the first sessions it may be sufficient simply to note some behavior that reflects the child's cognitive problem. This serves to tell the child that you understand what causes him to suffer, *in terms of the school setting, learning, and processing information.* Moreover, since the behavior is articulated by the therapist, it sets the stage for the understanding that help will be provided for behaviors and difficulties with concentrating and learning.

One should not expect to structure "completely" the nature and reason for the treatment in the first session or during the first several sessions. This is accomplished over time as the therapist patiently and gradually works on the primary task of the initial phase of cognitive therapy, which is to teach the child to become observant of his behaviors and affects as he copes with the tasks administered.

The examples above illustrate what should take place many times during the first months of treatment. Interpretations should be avoided. For example, one would not say to the first child, "Everybody thinks you're in a hurry," or "You always feel in a hurry," or "You feel nervous." From the view of cognitive therapy, the words "hurry" and "nervous" do not yet have clear behavioral and representational referents (see section on the middle phase). Similarly, one should not interpret to the second child, "You are easily distracted," or "Maybe there are thoughts and imaginations inside that take your mind away from school work." The comments by the therapist should be, as much as possible, *descriptions* of some behaviors of the child, preferably a finite, easily circumscribed behaviors that relate to the child's conflict between deficient cognitive controls and the task and information presented. Interpretations are avoided because before behavioral referents have been carefully constructed the extent to which the interpretation can be assimilated with meaning and understanding is limited by the child's cognitive disability.

It is our experience that the cognitively disabled child needs considerable experience and assistance first in learning to observe and register in awareness his cognitive functioning and related behaviors. One should not assume that the cognitively disabled child is like the primarily neurotic child being able to see what seems obvious, or in being aware of an affective experience or behavior. What may be a "nervous feeling" or "worry" for the neurotic child may be a disorganized feeling for the child who is cognitively disabled and a feeling that is initially beyond awareness and verbal description.

Thus the primary goal of the initial phase of cognitive therapy is twofold: (1) teach the child to observe his unique cognitive functioning in general, and the uniqueness of the cognitive control being treated in particular; (2) teach the child to observe the unique stress he feels when engaged in some particular cognitive control functioning (e.g., tempo regulation, scanning, managing irrelevant information) and the affective and overt behaviors that accompany this cognitive activity.

The behaviors that the child is asked to articulate and observe should at first be global. For example, referring to several of the therapy programs described in the next chapters, the therapist may choose to bring the child's attention to the gait he used in an attempt to move slowly, the many times he reached for and touched a triangle while looking for diamonds among a display of geometric shapes, the many times he looked around the room or out the window while supposedly examining two rods to decide which was bigger, the great amount of body twitching and restlessness he revealed while sitting and looking at a pattern of shapes to decide whether a change in the pattern had been introduced, or his consistent failure to notice changes that had been introduced in the periphery of a pattern.

Gradually the behaviors the child is asked to articulate and observe should be more subtle and discrete—for example, twitching fingers, tugging on an earlobe, mouth movements, fleeting glances away from the information of the task.

In the view of psychodynamic psychotherapy, this goal of the initial phase of therapy is to help the child develop an observing ego. In cognitive therapy the observing ego is directed at cognitive, affective, and overt behaviors that are *involved in processing information* in terms of one or another cognitive control. The goal of the initial phase is also related to the view in psychodynamic psychotherapy of defense analysis. As can be seen, however, rather than teaching the child that he assigns his feeling of anger to someone else (projection), in cognitive therapy the stage is set to teach a child how he operates his cognitive controls uniquely. That is, the child gradually learns that he has the habit of scanning narrow segments of the environment, or that when he is directed to move slowly his habitual tempo is the same as when he thinks he is moving fast.

During the initial phase of treatment the therapist should use the “game names” (Table 1, Chapter 11) as seems appropriate in discussions with the child. The name of the program is a convenient, brief label to communicate to the child the task set before him. Referring to the name of the program, however, is also an effective way of acquainting the child with the issues both therapist and child are focusing on. For example, the therapist might say at the start of each session, “Today we are going to work more on *I Make my Engine Stop arid Go* and *Follow Me."* As the child uses and relates to the name of a therapy program, he gradually increases his understanding of his need for a particular program and the goals of treatment. After 4 months of therapeutic work with the program *I Make my Engine Stop and Go,* one child turned to the therapist and said with pride, “Look Dr. Smith, I really *can* make my engine stop and go,” reflecting the child’s insight into his problem with motoric regulation and his sense of pride in newly developed cognitive mastery achieved over motoric regulation.

No time frame can be given, of course, to the initial phase. One child may require only 10 or 15 sessions to show sufficient gains with the goals of the initial phase; another may need 40 or 50 sessions. Indeed, treatment of children with several cognitive deficits and severe character disorders and/or mental retardation may consist only of issues that belong mostly to the first phase.

It may be helpful to recapitulate the broad goals of the initial phase before moving to a discussion of the middle phase. During the initial phase the child engages a graded series of *cognitive tasks that for the most part are relatively neutral in complexity and only minimally stressful,* given the child’s cognitive control status. While engaging and performing this series of desensitizing tasks, the child is helped to begin to observe his cognitive control habits, the attributes of information with which he has difficulty, and the affects he experiences and behaviors he expresses when processing information and solving cognitive tasks.

THE MIDDLE PHASE OF THERAPY

To this point the child has gained some understanding of his need for a particular program of tasks and the broad goals of treatment by noticing his unique cognitive control habits and associated affects while dealing with a series of tasks presented by the therapist. But the tasks thus far have been relatively neutral and only minimally stressful.

For example, suppose that the child’s major deficit is diagnosed as involving field articulation functioning (i.e., managing information that is embedded in distractions and contradictions). The treatment of this deficit requires the hierarchically arranged program *Find the Shapes* (Chapter 15), designed to present increasingly complex tasks, all emphasizing the management of distractions while sustaining attention on relevant information.

In keeping with the guidelines discussed earlier, however, the therapist presents tasks during the initial phase that implicated the developmentally lower cognitive control of focal attention. If the child does not have a major deficit in this control, tasks emphasizing focal attention functioning should be minimally stressful. By visually tracking moving targets and comparing and judging the relative sizes of pairs of rods and the volumes of breakers of water (see treatment program in focal attention, Chapter 14), the child is oriented to treatment and gains some experience in observing his unique cognitive and affective behaviors.

The therapist now judges that the child has made sufficient progress with the goals of the initial phase. Of equal importance, the therapist judges that therapist and child have formed an appropriate working alliance and have established adequate rapport. At this point the therapist introduces tasks from the developmentally lower end of the hierarchy of tasks that are specifically tied to the child's major cognitive control deficit. In the case of our example, the therapist now introduces the most neutral tasks of the field articulation treatment program *Find the Shapes.*

Presenting the program that addresses the child's major cognitive deficit ushers in the middle phase of treatment. Two issues distinguish this phase of treatment. The therapist presents increasingly complex and stressful cognitive tasks that require and emphasize the cognitive control function that is deficient. The child resists the tasks and the therapist (with increasing frequency), and the therapist actively participates in resolving the resistance.

Given our discussion in the previous chapter, it would follow that as the therapist increases the complexity of the tasks, as the tasks become more similar to those in other learning situations (school), and as the tasks exert a greater strain on the deficient cognitive control and press for change in cognitive functioning, the child will experience stress and engages in resistance. The management and resolution of these episodes of resistance are major aspects of the therapeutic work of the middle phase of treatment. We have already conceptualized the process involved in working through and resolving resistance, namely, incorporating the resistant behavior into the hierarchy of tasks and negotiating interactional issues to which the child has retreated (see Chapter 11). Clinical techniques for managing and resolving resistance are discussed in a separate section, for convenience.

The resistance exhibited by a child while dealing with increasingly stressful cognitive tasks may range in form from complete refusal to engage the therapist and tasks to a moment of flight or fight behavior. Chapter 11 described a child who sat under a table drawing lines for several sessions and shouted vindictives at the therapist. This episode is an example of refusal to continue with the treatment process.

A lower degree of resistance was reflected by a child who walked away from a cognitive task to look out the window and observe children playing outside. This patient commented that it was difficult to handle the task "with all that noise outside." She described and showed interest in the various activities of the children. Then with mild irritation and anger she said, "The game we are playing is boring. Why can't we do something that is more fun!" She followed this with efforts to engage the therapist in debating (negotiating?) why the cognitive tasks were boring, worthless, and of no help, and how so many other activities could be more interesting and helpful.

Recalling that the child introduced her resistance by giving attention to the shouts and activity of children outside, it is interesting to note that she was working with tasks from the program *Find the Shapes* that require the management of distractions. Moreover, the therapist had just presented a task that was appreciably more complex than those with which the child had been working. The matrix of geometric shapes arrayed was made up of pairs of shapes stacked in towers. The child was to scan the array and pick up particular shapes from those on top of the stacks. The bottom shapes were intended as distractions. We return to this anecdote and the therapist's interventions in the discussion below on techniques for handling resistance.

Symbolic of an even smaller degree of resistance was the behavior of a child who abruptly walked away from the task of visually tracking a target the therapist was moving across the room. The child paused for a moment, seemed agitated, darted glances about the room, and said "I feel all itchy!" He rubbed his stomach and arms nervously for a moment, then focused on the activity of scratching his ankle. He then returned to the place he had been standing while tracking the target. At the time the child introduced this stalling behavior he was dealing for the first time with the task of standing in one place while tracking a moving target moving only his head. Before this he had followed targets by walking alongside them, as well as keeping his eyes on them (see programs in Chapter 14). Again, the therapist's intervention is described below.

These examples illustrate the range of behaviors that are interpreted as resistance: from the child who directly and violently refuses for several sessions to engage the tasks and therapist, to the child who refuses but continues to engage the therapist, to the child who shows some avoidance and stress but returns to the tasks. The examples also illustrate timing of resistance behavior. Resistance may emerge at any moment in treatment, but we have observed that some form of resistance typically occurs when the therapist presents a task involving a significant increase in complexity, given the child's known cognitive control deficits and unique modes of negotiating persons and affects.

The therapist of course must determine at the moment whether and in what ways he will address the resistance. Probably most therapists would formally attend to the resistance expressed in the first two examples (i.e., the child sitting under the table, and the child debating the merits of the cognitive tasks and other games). With the child who momentarily interrupted work with the tasks to scratch himself, some would address the behavior formally and some would ignore it. In this case the behavior would be evaluated in terms of other signs of resistance that may have preceded it and in terms of the child's unique ways of showing stress and resistance, to determine whether intervention is indicated. The broad guideline to follow in deciding whether to engage the resistance formally and purposefully can be stated in the form of two interrelated questions: (1) Is the behavior, viewed as resistance, blocking further work with the hierarchy of cognitive tasks and the goals of treatment? (2) Does the behavior suggest that a major rupture in rapport and in the working alliance between child and therapist might occur or is occurring? If the answer is yes to one or both questions, the resistance should be managed formally by the therapist.

If the answer is no to one or both questions, the therapist would wait and observe carefully, to determine whether resistance is escalating. Or the therapist may choose to respond to the resistance to prevent escalation and to create a better balance between pleasure and stress the child experiences when processing information.

With this comment we are reminded of another important goal of the middle phase of treatment, namely, fostering the experiencing of pleasurable affects while processing information and managing cognitive tasks. We have said at length that when the complexity of a cognitive task exceeds the developmental organization of a cognitive control, one outcome is for the child to experience stress, which becomes translated into various affects that serve to ward off the stressful stimulation (e.g., anger directed at the therapist or the task, sleepiness, fatigue, silliness, erotic tensions, general irritation, anxiety). Some of these could be viewed as consciously “negative,” painful affects (e.g., anger, frustration), and some as “positive” or consciously pleasurable (silliness, coyness). However they all serve to avoid the stress experienced when dealing with cognitive tasks. In working with these affects, the goal is to help the child become aware of the stress and pain associated with cognitive functioning that are being masked. Another goal would be to help the child achieve a balance between experiencing stress and pleasure when engaging cognitive activity. As still another goal, one would try to join balanced affects to cognitive activity, so that affects and cognitive functioning become both the rider and horse, one for the other.

The child described in the third example, who briefly interrupted work to scratch himself, represents an instance in which the therapist could answer “no” to each question. The behavior did not block further work and did not rupture the working alliance. Yet the behavior did suggest that for a few moments the child was enveloped by a surge of diffuse irritability and tension *in the context of performing some cognitive activity.* The therapist could elect to use this moment, when the child is experiencing *in vivo* some element of his cognitive disability, to introduce an intervention that contributes to the process of redirecting this diffuse irritability (scratching) to affects that might balance stress and pleasure *and serve effective cognitive functioning.* The technique the therapist used, described below, is one example of this process.

An additional technique belonging to the middle phase of treatment requires consideration. We noted that in this phase the therapist is actively presenting the child with hierarchies of tasks that address the major cognitive control deficit. When this treatment program is completed, the therapist proceeds, addressing each of the more advanced cognitive controls, as indicated by the child’s developmental stage, clinical problems, and needs. In administering these hierarchies of tasks, we have found it useful whenever possible to introduce a new task at a higher level of complexity during the same session or sessions when the child is managing the last stages of the old task. An examination of the programs indicates that the therapist can follow this guideline by introducing, for example, treatment in the first stages of field articulation while the child is still working on the last stages of focal attention. Or the therapist may introduce a new level within a given program while the child is still working on the previous level. For example, the therapist might include several trials of asking the child to track a target while standing still and moving only head and eyes during the same sessions in which the child is working with the last phases of tracking objects both visually and by walking.

In summary, the middle phase of treatment consists of a continuous spiraling process: the therapist asks the child to deal with a series of tasks, gradually increasing in complexity, that require the deficient cognitive control to function; the child works along, then resists and refuses the tasks; therapist and child negotiate a resolution of the resistance; the therapist continues presenting the hierarchy of tasks, and the child works, then resists, then negotiates the resistance, and so on. When dealing with a series of cognitive tasks, each one more complex than the last, and when negotiating resistance with the therapist, the child's cognitive controls differentiate and develop. Furthermore, the child gradually increases his awareness, started in the initial phase of treatment, of his unique cognitive control habits, of the attributes of information that are particularly stressful, of the flight and fight behaviors and affects experienced when engaging in cognitive activity, and of the alternative, more adaptive modes the child could employ to sustain a balance of pleasure and stress in learning and negotiating with others, especially teachers. Throughout the entire process, then, the child becomes increasingly aware (insight) of the unique ingredients of his learning and cognitive disability and of possible pathways for change.

The mention of the child's negotiations with teachers brings us to one remaining technique initiated during the later stages of the middle phase and emphasized in the final phase of treatment. The child is helped to begin generalizing from the contemporary experiences occurring in the office to experiences occurring in the broader environment, especially school.

The duration of the middle phase varies. In our experience some children have worked through the process just described over a 3 year period, two sessions per week; others for a 1 year period, four sessions a week; and still others for a 2 year period, two sessions per week. We have found that major cognitive dysfunctions are rarely treated appropriately with less than two years of treatment, whereas minor dysfunctions may respond to one year of work. It is our contention that the frequency and duration of treatment should ideally permit therapist and child to work through episodes of resistance until the child shows behavioral evidence in the office that he or she can engage cognitive tasks at a stage-appropriate level of complexity without stress and flight or fight behaviors that appreciably interfere with cognitive efficiency, and making use of adaptive negotiations that preserve the therapist and the relationship as a matrix for growth.

THE FINAL PHASE OF THERAPY

In the final phase of treatment the therapist helps the child generalize from experiences in the office to experiences in other environments (school), and from present to past experiences. By this time the child has worked through and resolved major interpersonal and cognitive issues around which his cognitive disabilities are organized. Now the child is not crippled with maladaptive behaviors and affects when dealing with a cognitive task, and he is more free to reflect on and examine his experiences in the office (current and past) and to connect them with experiences, to which he associates, that occurred in school, while doing homework at home, and the like. The stage of a child's development as well as the nature and degree of cognitive and emotional pathology influence, of course, the extent to which the child can pursue this line of work. With assistance, children who have major learning problems, are low-average or higher in intelligence, and show only moderate personality trait and/or neurotic disturbances, can accomplish a great deal in constructing fairly detailed connections between their experiences in managing cognitive tasks during treatment and analogous experiences at school, past and present. They also can make us of these connections not only to expand their insight but to discuss alternative behaviors that might be more adaptive.

As noted in each of the cognitive therapy programs described in the next chapters, as early as possible the therapist actively encourages the child to associate, using as a stimulus an experience in treatment. However during the middle phase these associations and connections are described and registered, for the most part. It is in the final phase that they are pursued, elaborated, and related to other issues that together form the basis of the patient's cognitive disability and adaptive failures.

One 9-year-old patient was asked to look over a pattern of four geometric cutouts and remember it, and after the pattern was covered, then uncovered, she was supposed to determine whether the pattern had changed in any way (see Chapter 16). This was a new, more complex task for the patient. Almost immediately she began yawning. She commented she felt like "curling up and going to sleep." The therapist had registered this reaction with the patient many times during the middle phase of therapy. During some of these episodes the girl actually curled up on the floor or put her head on the table, and with irritation kept the therapist at some distance. However now she was more work oriented and less defensive, and she sustained engaging the therapist and tasks. The therapist acknowledged with a smile "that sleepy mood we know so well" and wondered "what it makes you think of this time." The patient associated to a recent experience in her classroom when she had become very sleepy. She then recalled that there was a lot of "commotion and noise" while a substitute teacher was trying to explain something. This led to memories when her family moved to town two years ago, how sleepy and "mopey" she had been every morning while preparing for school, how difficult it was for her to go the new school, and how sleepy she became in school. (The therapist was familiar with this aspect of her presenting symptoms, which initially had been explored in terms of possible physical causes.) This discussion was elaborated in future sessions, as the child was able to do some work on her characterological use of passivity, on the environmental presses that exaggerated the tendency, and on how this tendency affected her coping with school demands.

The process of connecting memories of several experiences, then abstracting issues from the configuration requires, of course, fairly high level cognitive activity (the critical principles in cognitive control theory are leveling-sharpening and equivalence range). Yet we feel that some effort should be made by the therapist to foster this work with all children whenever indicated. Of course the therapist must also be sensitive to children who are limited or unable to engage in this work by virtue of either their developmental stage or their cognitive and emotional disability.

During the final phase the therapist should make formal attempts to gradually transfer to the child the task of prescribing and initiating the content of a series of tasks. We have discussed at length the conceptual issues involved in this technique. Although many cognitively disabled children can assume only partial initiative in prescribing tasks, some can assume almost total initiative; thus during the final phase of treatment the process is much like that of psychodynamic psychotherapy in which the child determines the activity and topics of discussion. From the viewpoint of cognitive therapy, when transferring the task of designing and repeating treatment activities for the child who has a major cognitive disability, he or she should design and repeat tasks that address the cognitive deficit in some way. Otherwise the activity would be interpreted as resistance (see below). If the child has major neurotic conflicts, and if he or she has adequately worked through cognitive deficits, the last phase of treatment takes on major elements of traditional psychodynamic psychotherapy in which the child is permitted to use free play to repeat and work through emotional issues.

TECHNIQUES AND ISSUES IN MANAGING TRANSFERENCE AND RESISTANCE

We have before us an outline of phases of cognitive therapy defined by the technical issues that are emphasized from the start to the end of treatment. With this outline, we can consider technique more specifically in terms of the management of resistance and transference.

Chapter 11 discussed at some length the behavioral processes called transference and resistance, which are seen as critical in conducting cognitive therapy. Briefly, when interacting with a therapist over a period of time, the child transfers to the relationship attitudes, feelings, and modes of behaving that were constructed to manage interactions with other persons and environments. Applied to the situation of cognitive therapy, the child transfers attitudes and feelings and modes of behaving that concern, in particular, processing information, performing cognitive tasks, learning, and engaging the therapist as representing school, teachers, or parents. If the child transfers positive elements of these behaviors, pleasure in learning and approaching new information, flexibly reciprocating with teachers and parents by passively assimilating their information, then actively directing and controlling it, the treatment process sails on this growth-fostering current. If the child transfers negative elements of these behaviors (stress in learning, avoiding and fighting new information and cognitive activity, inflexible interactions with teachers and parents), the treatment process is arrested or derailed and further development is inhibited. It is the appearance in treatment of the latter behaviors, the negative elements of transference, that requires formal intervention by the therapist if the child is to sail again on the current of development.

The management of transference behavior, then, requires techniques that foster positive elements of transference and techniques that resolve negative elements (resistance to change). The latter, in turn, bring our attention to techniques that address negative affects and play as resistance, the need to organize and integrate affects and fantasies with cognitive activity, and the need to integrate stimulation across modalities, to foster a love of learning.

Techniques in Fostering Positive Elements of the Transference

The techniques used in cognitive therapy to foster positive elements of the transference derive from our understanding of transference in terms of Sander's model of mother-infant negotiations (Chapter 11). Cognitive controls, as ego-adaptive and defensive structures, are thought to be shaped in the first three years of life by the ways in which mother and infant negotiate the exchange of information and affects. It may be recalled that from his observations of mother-infant interactions, Sander assigns a critical role to the smiling behaviors of mother and infant, to the growth in intensity of the affects they share and exchange, and to the ways in which they "make up," as they negotiate mother's needs to care for the child while maintaining her unique personality and household standards, and the child's needs to ensure mother's availability while initiating and asserting himself against her preferences and controlling the pace and intensity of stimulation. Throughout this process as mother and child accommodate to each other, the child first imitates the mother, then internalizes her modeling behavior and standards, which subsequently organize and guide the child's behavior in the mother's absence.

It is in these first experiences with negotiating, we believe, that the child forms his unique strategies for approaching, assimilating, rejecting, and pacing information. Of equal importance, given the interest of this book in the relations between cognitive functioning and affects, we also believe that the child organizes unique ways of reacting emotionally when processing information and stimulation in these first experiences with negotiating. The reader may find it useful to review or become acquainted with the discussion of this conceptualization in the previous chapter and in Part III before continuing here.

This view of cognitive-affective regulating structures shaped in the first three years of life converges with Ekstein and Motto's view (1969) of the learning process in a way that serves our need to consider techniques that foster positive elements of the transference in cognitive therapy. Ekstein proposes that in the first phase of development in the process of learning, the child works to get love from the teacher. The child learns and masters the information presented by the teacher through repeating cognitive tasks and engaging information over and over again. During this repetition, the child's identification with the teacher slowly grows. Accordingly, learning gradually becomes tied to the child's identification with and valuing of the teacher's way of working and processing information, and to the teacher's curiosity, interests, and pleasure in learning. As the child's identification with the teacher differentiates and solidifies, approval or rejection from the relationship becomes a less important factor in the child's motivation to work and learn. This motivation now comes from pleasure derived from the work itself, from the selective pursuit of information, from discovery, from mastery, and from new skills or knowledge, all of which have become sources of pleasure and reward in themselves. Borrowing the title of Ekstein's discussion, the child progresses in the development of the learning process "from learning for love to love of learning."

We would add that the substrate of this process is the child's negotiations with mother in the first three years of life. From the child's point of view, during the negotiation of initial adaptation, reciprocal exchanges, early directed activity, and focalization, the child repeatedly engages mother and her information with a major need for her love and for her gratification of needs. From these negotiations the child lays down the first foundations of autonomy, trust, identification, and commitment to others, and steps forward to negotiate self-assertion, testing destructive intentions, and modifying aggressive behavior. If these negotiations have resulted in reasonable settlements (i.e., the formation of ego structures to handle the regulation of information, affects, and interactions with others) between mother (teacher) and child (pupil), the child emerges during the fourth year of life with a love of learning, as well as with ego functions that flexibly engage and avoid information and teachers while also maintaining an interpersonal bond.

If we apply these considerations to the issue of fostering elements of the positive transference, several techniques are suggested. In general the therapist should be alert for opportunities to respond to invitations from the child to engage in negotiations and for opportunities to initiate negotiations with the child, especially those which permit phasing in genuine expressions of curiosity and pleasure in learning and in engaging information and cognitive tasks. These responses by the therapist range from action to verbal behaviors. We have found it useful to design these techniques in terms of the issues Sander formulated.

We have also found it useful to coordinate the techniques and the issues negotiated with the three phases of treatment conceptualized earlier. From the first to the last phases of treatment, the therapist emphasizes the issues negotiated following the sequence proposed by Sander. During the initial phase, with its focus on orienting the child to his needs for particular cognitive tasks and the goals of treatment, and with its emphasis on establishing a working alliance and rapport with the child, negotiating the issues of initial adaptation, reciprocal exchange, early directed activity, and focalization seem to be most important. During the middle phase, which centers on the presentation of complex tasks and the resolution of the resistance that ensues, negotiating self-assertion and testing and modifying aggressive behavior now seem to be most relevant to the treatment. During the final phase, in which experiences in the treatment room are generalized to experiences in school, negotiating the extension of secondary process functions (verbal concepts, symbols) seems to be most important to the goals of this phase of treatment. Although the emphasis given the issues negotiated may follow this hierarchical progression, the need to negotiate any one issue may also cycle into treatment at any time, especially in the context of resistance. We return to this consideration at a later point.

INITIAL ADAPTATION

Considerations and techniques that involve negotiating initial adaptation with the child apply especially to the initial phase of treatment. During the first weeks of treatment the therapist should be alert to opportunities to familiarize himself with the child’s unique temperament, body postures, rhythm of activity, and thresholds for stimulation. One child may regularly enter the treatment room and dawdle for several minutes before showing signs that he is interested and ready for work. Another child may enter the treatment room piercing the space like an arrow, and after vigorously engaging several cognitive tasks, slump in his chair and withdraw.

Cognitively disabled children give many clues in the first weeks of treatment that are usefully conceptualized as related to the negotiation of initial adaptation. The child may comment that the lights are too bright or too dim, that the room temperature is too warm or too cold, and that wall decorations are “nice” or “crazy with too much color.” One child regularly maintains physical distance from the therapist, while another regularly positions himself very near the therapist, frequently making body contact.

Comments about the therapist are also relevant to initial adaptation. When the therapist moved to pick up material for a task, one child startled and said “You scared me.” Another child laughingly said to the therapist, “You move in slow motion.” Still another child told the therapist that he spoke too softly and could not be heard, while on occasion one child covered his ears when the therapist raised his voice (to what he thought was a moderate level). It is also helpful to view items the child might wear in the first weeks of treatment as communication to the therapist and as related to the negotiation of initial adaptation. A child may arrive wearing a button that says “Wow!” or “Peace.” A child may leave his coat on, remove his shoes, or be very concerned with “getting my clothes dirty.”

Our discussion in the previous chapter indicates that the therapist should be observant of the unique quality, frequency, and rhythm of a child’s states of alert inactivity. Although Wolff has described these states in infants, the concept is helpful guiding our observations of cognitively disabled children. During these states, which can be observed during the first weeks of treatment and last from several seconds to a number of minutes, the child is maximally alert and is receptive to information and cognitive tasks. The behavioral qualities of cognitively disabled children that signal these states vary considerably. One child characteristically slumps, sometimes almost resting her head on the table. A boy begins drumming his fingers on the table; and another hums various tunes, but always in the rhythm of a march.

The job of the therapist does not end with “knowing” the patient, his unique postures, temperament, and rhythms of activity. To successfully negotiate initial adaptation, thereby setting the stage for the development of positive transference elements, the therapist must purposefully analyze the degree to which there is a match or mismatch between his own rhythms of activity, temperament, and preference for stimulation and those of the child. If the therapist feels anxious or tense when interacting with the child, or insecure about whether he can “reach” the child, it may be helpful to take a closer look at whether there is a major degree of asynchony between therapist and child in terms of the issues discussed. When such is the case, the therapist must set about to actively negotiate initial adaptation. Taking clues from the child, the therapist can dim or brighten the lighting, wait several minutes before introducing the first task of the session, or be ready from the very start of the session to leap into activity and equally ready to slow down or stop minutes later. As the therapist phases in responses such as these, designed to create a “fit” with the child’s rhythm and temperament, the child should show behavioral evidence of accommodating to qualities of the therapist.

We advise (especially psychodynamically oriented psychotherapists) that interpretations not be used in negotiating initial adaptation with cognitively disabled children. If the child yawns and rests his head on the table as a task is set before him, the therapist does not remark “You seem to have feelings about what we’re doing,” or even “Do you think that sleep-feeling has something to do with what we’re doing?” Rather, the therapist would leave the task alone, stretch, and slow down the pace of interacting. Analogous comments would be made in psychotherapy if a neurotic child abruptly said “I have to get a drink.” In cognitive therapy the therapist would take this behavior, during the initial phases, as signaling a mismatch in rhythm and initial adaptation. With cognitive therapy, the therapist would take a drink with the child and analyze the factors that might give him insight into the mismatch and an approach to appropriate interventions. As discussed in the outline of phases in cognitive therapy, bringing the child’s attention to affective reactions and connecting them to cognitive activity is postponed until initial adaptation has been negotiated and an alliance established.

RECIPROCAL EXCHANGE

This issue emphasizes the active-passive exchanges between patient and therapist, especially those resulting in a rising swell of pleasure exchanged while engaging a cognitive task. A number of opportunities to engage the child in reciprocal exchanges come from unique behaviors showed by the child when negotiating initial adaptation. For example, the child who wore the “Wow!” button during the first weeks of treatment appeared at one session some weeks later wearing the same button. The therapist suggested they place the button on the table while working on the cognitive tasks “to keep us company.” The child was working with the task of gathering a series of geometric shapes from a large array, in the order named by the therapist. When the child successfully returned the cutouts, the therapist spontaneously exclaimed “Wow!” throwing up his arms in pleasure and excitement. The child followed suit. In this and subsequent sessions, therapist and child would exclaim “Wow!” and laugh together, after each successful completion of a task. The vigor of this affective change apparently fit the child’s temperament.

Other exchanges of affects may be much more subdued, in keeping with the child’s temperament, and may involve affects other than pleasurable ones. If a child frowns while puzzling over which of two beakers contains the most water, then glances at the therapist, the therapist, submerged in a state of empathy, should engage in some exchange of affects reciprocating the child’s. And if the child then grins, ever so slightly, having pointed to the correct beaker of water, the therapist should respond with a grin and a twinkle of pleasure in his eyes. Several issues are embedded here. The therapist should reciprocate with a range of affects at an intensity that matches the child’s. The therapist’s sense of pleasure and excitement when engaged in work and with the cognitive tasks should be genuine and spontaneous. And the therapist’s feelings should join the child’s in his moments of frustration and discouragement when managing a task, at the same time urging the child to push on.

In addition to the exchange of affects, the negotiation of reciprocal exchange also involves allowing the child to pursue his own behavior for some moments. *During the initial phase,* if a child interrupts a cognitive task to pursue his own behavior, or if he starts to drift into some other activity, he is permitted to do so. If appropriate, the therapist should join the child. During the initial phase such behavior is viewed as a part of the negotiation of reciprocal exchange. Usually the child will accommodate and return to the cognitive tasks, especially if the tasks are only minimally stressful and do not yet engage the cognitive control deficit. If a child pursues his own activity during the middle phase of treatment, such behavior is viewed as resistance and should be handled according to guidelines discussed below. If the child pursues his own activity and resists returning to the hierarchy of cognitive tasks during the initial phase, the therapist should examine the tasks chosen as the starting point and determine whether an even more neutral program, or level within a program, should be used initially.

EARLY DIRECTED ACTIVITY

Still during the initial phase, the therapist looks for opportunities to be relatively more passive in response to the child’s directions. By initiating directions, the child is beginning to show preferences for pace and complexity of stimulation. In these negotiations the therapist obtains from the child the first clues about the complexity and pace of information providing cognitive nutriment or cognitive strain.

Usually when dealing with the first hierarchy of cognitive tasks presented, cognitively disabled children show many activities and affects that can be used as clues by the therapist to engage in negotiating early directed activity. The following examples refer to the content of the treatment programs described in the next chapters. A child spontaneously moved two rods within 2 feet of each other, after the therapist had placed them 5 feet apart in preparation for a task requiring the child to judge the taller one. With the program *Find the Shapes,* a child wanted to locate the geometric cutouts on the table in an array that was determined by him. The therapist had been placing the cutouts to form a random array. When the child initiated “his turn,” he located them in rows and columns, a stimulus array that is less complex. Of course a child might locate the cutouts in a more random array, revealing a preference for an increase in complexity. By way of another example, a child directed that the cutouts presented by the therapist be located on one half of the table, while the cutouts the child arrayed be located on the other half of the table. This behavior showed no obvious connection with the child’s preference for a particular pace or complexity of stimulation. However it serves as an example of behavior a child could introduce simply to negotiate early directed activity and to anticipate a more passive response from the therapist in accommodating to the child’s request.

During the initial phase of therapy, the therapist can facilitate this process by providing the child with opportunities to direct aspects of the activity. For example, with the program *Remember Me,* which requires the child to examine and remember a pattern of cutouts, to be able to determine whether a change has been introduced, one child began to close his eyes and blink while surveying the pattern. The therapist invited the child to initiate something he could do in setting up the game they were playing. The child said that after the cutouts were located on the table, he wanted to place the cloth over the display; then the therapist could introduce the change. The blinking, one way of pacing information, was brought directly into the negotiating of initiative. With the same program, another child decided that he would remove the cutouts displayed and the therapist would set up the next pattern.

Successful negotiations of the child's directing activity phases into negotiations of the next issue, focalization, which strengthens rapport and the working alliance and thereby addresses directly one major goal of the initial phase of therapy.

FOCALIZATION

We noted in the conceptual discussion in Chapter 11 that as the child continues participating in the treatment relationship, his directions for activity (preferences for stimulation) become more differentiated and also take a form designed to focus the therapist more directly on the person of the child. We should understand that this development occurs during the later stages of the initial phase of therapy at a time when the cognitive tasks the therapist is presenting are more complex, are less neutral, and approach the child's major cognitive control deficit. The child uses focalizing behaviors to acquaint the therapist with the unique stress he experiences when dealing with cognitive tasks and the modes he employs to manage the stress and the stress- arousing cognitive activity. Of equal importance, the child uses focalizing behaviors to determine whether the therapist can protect him both from information that is too stressful and from modes of handling stress that are potentially dangerous. With focalizing behaviors, the child is attempting to ensure the unconditional availability of the therapist and to establish an unswerving alliance.

In conducting cognitive therapy we have observed focalizing behaviors, that vary from subtle cues by the child to very dramatic situations that require all the "cool" and ingenuity a therapist can muster. After several months of treatment, one child began to bring the therapist's attention during each session to an assortment of very minor cuts and bruises (some with and some without visible evidence). The therapist always showed interest and concern, asked how each cut had been obtained, and when indicated applied a Band-Aid. With another child, the therapist sharpened a pencil when the child broke the point; and when another child made it clear with body twitches and grumbling that she found a chair uncomfortable, the therapist provided her a different chair without comment.

More dramatic episodes of behavior, which we interpret in terms of focalization, are illustrated by the following anecdotes. As the tasks became more complex during the initial phase, one 8-year-old child began to climb pipes along the ceiling and climbed into the top of a large cabinet. Each time this happened the therapist lifted the child to the floor, expressing concern for his safety and noting the dangers involved. Another child would abruptly run to the window, open it, and hang half his trunk over the sill, sometimes raising his feet off the floor. The therapist, obviously anxious, would quickly haul the child back into the room and point out that the behavior was dangerous.

For the most part, when negotiating focalization during the initial phase of treatment, the therapist responds to the need the child is expressing with appropriate nonverbal and verbal behaviors. The therapist does not interpret the behavior to the child. For example, he would *not* say to the child who displayed bruises, “You are worried about getting hurt,” or “You worry about whether all your hurts can be taken care of.” Or in response to the child who leaned precariously out the window, a therapist would not say “You want to hurt yourself,” or “You want to put yourself in danger.”

Rather, with cognitively disabled children, the therapist responds to the child’s expressed need with behaviors that convey the therapist’s unconditional availability and unswerving alliance.

In addition, as noted in the discussion of the initial phase of treatment, the comments by the therapist, rather than being interpretive, are designed to establish connections between the child’s behavior and the stress aroused by the particular cognitive task being managed. After lifting the child from the top of the cabinet, for example, the therapist might have said, “See what happens when you have to look over and concentrate on 12 shapes—you run off and climb on top of the cabinet.” An appropriate response to one of the other situations would be: “When you have to look at rods that are far apart, you notice a bruise on your arm.”

These examples remind us of another major goal of the initial phase, namely, to help the child to begin to develop an observing ego; that is, to help the child develop the ability to perceive some state of stress and the behavior used to manage it and to connect both these to the cognitive task and its requirements. In this process the therapist should be careful not to interpret the behavior prematurely. Initially the therapist describes connections over and over again (e.g., “When you look at 12 shapes you climb onto the cabinet,” “When you look at 12 shapes you crawl under the table.”). Once the child shows the ability to perceive and acknowledge his behaviors and stress as occurring in the face of a cognitive task (usually by the middle phase), the therapist introduces interpretations. For example, the therapist could point out that the child is avoiding or hiding from cognitive activity and the task demands. The child must perceive and recognize his stress and the related behaviors before it is possible for him to derive meaning from the concept “hiding from.”

To recapitulate, by expressing and negotiating the issue of focalization, the child transfers onto the therapist the need to ensure his availability as a helping figure, an adult who understands the child’s unique stress reactions to tasks and the complexity of information, who protects the child by removing dangerous stimulation, and who conveys that the situation is under control. As the child’s observing ego develops, as he begins to feel secure in the alliance and in the therapist’s unconditional availability, the child phases into the transference negotiations of his autonomy, assertiveness, and aggression— developments of additional aspects of the positive transference that relate primarily to the middle phase of treatment.

SELF-ASSERTION, TESTING DESTRUCTIVE INTENTIONS, AND MODIFYING AGGRESSIVE BEHAVIOR

Once trust and alliance are established, once the child shows some awareness and understanding of the goals of treatment and the reasons for engaging the cognitive tasks, the therapist can introduce hierarchies of cognitive tasks that require, in particular, the cognitive control (or controls) in which the child's functioning is especially deficient. Thus a child whose major deficits are in field articulation would have spent the initial phase working with the more neutral tasks of the focal attention; yet now he is coping with tasks that emphasize the functioning of field articulation. We have observed repeatedly that when dealing with tasks that implicate in their solution the pathologically deficient cognitive control, cognitively disabled children transfer into the relationship self-assertive and aggressive behaviors, or behaviors that are understood as masking aggression. The negotiation of these behaviors is critical to the process of cognitive therapy. Successful negotiations of the child's self-assertion and testing and modifying aggressive behaviors contribute to the individual's development of the tendency to actively and vigorously pursue and engage information and cognitive tasks, and to his acquisition of a sense of pleasure in cognitive activity and achievement. In broad terms, the therapist's interventions in managing these transference reactions are designed to recruit the child's aggressive tensions and behaviors, which are split off from and antagonistic to cognitive activity. The interventions are designed to bind aggressive tensions to and integrate them with cognitive activity. This process, which relies on the trust, alliance, and identification already established, contributes to a child's developing a love of learning and a feeling of triumph in cognitive mastery and achievement.

A variety of behaviors, observed within a positive transference, reveal the child's bids to negotiate self-assertion and testing and modifying aggressive intentions. The child's verbalizations and behaviors might indicate that he is bored, irritated, or restlessly agitated. While working with several tasks in the hierarchy of the program *Find the Shapes,* one child assertively proclaimed, "This is boring. Let's do something else!" Another child working with this program began to scratch the paint on the geometric cutouts with her fingernails, while another child picked up a cutout and tapped it on the table, sometimes with considerable force. A boy who had been working along with a series of tasks from the same program showed restless agitation, then abruptly got up from the table, picked up a rubber-tipped dart gun that was in the playroom, and proceeded to shoot the dart at the walls, then at puppet figures. On occasion he playfully aimed the gun at the therapist. He then returned to the tasks, dart gun in hand.

Other behaviors we have observed reveal more intense and direct expressions of self-assertion and aggression. One child insisted on holding in her hands a particular geometric cutout which the therapist was using in a special way as part of the pattern forming the task. The child angrily insisted, "You just have to use something else!" The same child later asserted that the therapist could use only green, yellow, and blue cutouts, not red ones, in the tasks presented. Another child announced during the middle phase of treatment, "From now on we work with *Find the Shapes* for half the meeting and we do my game for the other half!"

Even within a positive transference, the testing of aggression may involve aggressing directly on the materials used and on the person of the therapist. With the program *Remember Me* one child began to toss across the room the geometric cutouts representing changes in the pattern to be remembered. Another child took one of the wooden rods used with the program *Which Is Big, Which Is Small?* leaned it on the edge of a shelf, and vigorously pounded his foot against it, snapping the rod in two. On another occasion a girl was gathering various objects as part of the program *Where Does It Belong ?* with the goal of clustering the objects into groups and categories. She picked up a pair of scissors. Then without warning, while standing next to the therapist, she cut the end of his necktie.

Let us revisit these anecdotes to illustrate possible interventions by the therapist. The goal of interventions, as we noted, is to bind and integrate the aggression and self assertiveness with the cognitive activity. Therefore one guideline is to find ways in which the child's aggressive and self-assertive behavior can be incorporated *into the hierarchy of cognitive tasks.* This may require also finding ways to gradually modify the aggressive behavior, to render its form less destructive and more socially acceptable.

In response to the child in our first example who proclaimed that the task was "boring," the therapist asked what the child wanted to do instead. The child picked up two puppets. After some minutes of interacting with the therapist and the puppets, the child engaged the puppets in a vigorous "karate fight" loudly shouting "Yah!" as the puppets threw "karate chops" at each other. When the child had played this theme for several minutes, the therapist said he had an idea how the karate fighters could help the boy work with the present cognitive task. The therapist had been asking the child to remove a series of geometric cutouts in a specified sequence from an array (in the program *Find the Shapes).* The therapist suggested that the child hold in his hand one of the karate fighters (puppet), and when the therapist named the different cutouts to be removed, the karate fighter would "chop" each one. The boy engaged the task with enthusiasm, shouting "Yah!" and pounding the puppet against each cutout named. The therapist went a step further in subsequent sessions and suggested a competition between the two puppet karate fighters to see who "could get the most right." Over a number of sessions, the child used the two puppets in this way. As the number of cutouts named was increased and the order in which they were to be "chopped" became more complex, careful records were kept to determine which fighter "won."

This anecdote illustrates one way of embedding the aggression within the cognitive task and activity and of modifying the aggression (from karate chops against the cutouts to karate fighters in competition to determine which one remembers the longest series of shapes). Parenthetically, as the child became more engrossed in the task as a competitive match between two puppets, the vigor of the karate chops moderated, and eventually a very vigorous "Yah!" was accompanied by a relatively moderate tap against the cutout. This vignette also illustrates that the therapist should first help the child explore whether the negotiation of aggressive intentions is emerging. Here the child was asked what he would prefer to do, following his remark, "This is boring!"

The same general procedure was followed to handle several of the other expressions of aggression described earlier. The child who scratched at the shapes was given a piece of sandpaper and invited to "scrape" the cutouts in response to the particular cognitive task, and later "to rub" the cutouts with a piece of cloth. The child who obtained the dart gun was invited to shoot the rubber-tipped darts at the cutouts designated by the task as the ones to be removed; later the child was asked to hold the dart in his hand and strike the rubber tip against the cutout, and still later to jab the cutout with his finger. The child who threw the cutouts across the room was invited to try to "win points" by tossing the cutouts into a box the therapist located in one corner. With the child who broke the stimulus rod in two, the therapist set a thin stick of wood alongside each rod and asked the child to break the stick next to the taller rod. Later the child was asked to twist coat hangers, and still later to straighten coat hangers that had been bent. The child who cut the therapist's tie with scissors was invited to cut the therapist's handkerchief "into something that would fit into" one of the categories of objects being constructed. Later the therapist handed the girl sheets of paper and joined her in the "exciting challenge" of "seeing how many things we can cut out to fit one of the groups we are making (see the program *Where Do I Belong?* for therapy in equivalence range functioning)."

The foregoing examples illustrate techniques the therapist uses to bind and integrate the aggressive tensions into the cognitive activity and to foster a sense of pleasure and achievement in accomplishing cognitive tasks. The examples also give an idea of the ingenuity the therapist must exercise in suggesting alternatives for the aggressive behavior and for the ways in which aggressive and destructive intentions can be transformed into feelings of competition, challenge, and mastery. But we know from our previous discussion of the middle phase of therapy and of interpretation in cognitive therapy that these interventions represent only one half of the therapist's task. Unless the child becomes consciously aware of the connection between the destructive and aggressive impulses and the stress of the cognitive task that is the source of these tensions, the child has learned nothing new about himself or herself. Nor has the child been helped to gain cognitive control over the tensions or to use the control in other and new situations. Following our discussion of the middle phase of therapy, then, the therapist is active pointing out connections between a specific element of the cognitive task being managed and the associated aggressive behavior.

We have observed that usually a child introduces noteworthy aggressive behaviors to be negotiated when an increase in cognitive complexity appears in the current task in the hierarchy. This is the case in the several examples considered. The child who proclaimed the task to be boring and introduced the karate fighters had been working out a level of field articulation therapy that required the removal of one or another type of cutout from a large array (e.g., all the small blue diamonds and medium green squares). The child introduced the aggressive behavior to be negotiated when the therapist shifted to the next level of the hierarchy. Here the child was to remove a series of cutouts in the order designated (e.g., one medium green triangle, one large yellow diamond, one small blue circle). And the child who stepped on and broke a wooden rod did so when the therapist began to locate the rods 10 feet apart, after a series of tasks in which the rods were only 6 feet apart.

Typically the therapist makes connections between the aggressive behavior and some attribute of the cognitive task *after* the child has gained some behavioral control over the aggression by incorporating the aggressive behavior into the cognitive activity. To illustrate, when the child had played the karate game over several sessions and was showing a decrease in the vigor with which the cutouts were "chopped," the therapist began to point out, bit by bit, that "finding a whole bunch of one kind of cutout was easier than remembering and finding certain cutouts in a certain order," that the latter task was more complex, that this had created stress because of the child's deficit in managing relevant and nonrelevant information, that the child handled the stress by becoming bored and then angry, that therapist and child were familiar with this set of issues, and that using the karate fighters to deal with the task showed that there were various ways to use the anger one feels when a cognitive task becomes too difficult and thinking and learning become "boring."

Of course the child may also introduce aggressive intentions into the treatment in the absence of an obvious increase in task complexity. Such behavior is understood as stemming from the accumulation of stresses that takes place as the child copes, one after the other, with tasks that implicate the deficient cognitive control.

The negotiations characterized here are repeated many times throughout the middle phase of treatment. That is, increase in task complexity is followed by aggression injected into the transference, the incorporation of aggressive behaviors and feelings within the cognitive activity, and the mastery of the aggression, first by means of activity and then by connections (insight) between cognitive tasks and aggressive reactions and the alternatives available for aggressive tensions.

Negotiating Aggression and the Principle of Reciprocal Inhibition. For those familiar with behavior therapy, a similarity may suggest itself between this process and that characterized in behavior therapy as the counterconditioning hypothesis and the principle of reciprocal inhibition. In the treatment of phobias this principle states that stimuli that tend to elicit anxiety will lose their potential to do so if some behavior antagonistic to the anxiety can be engaged in the presence of the stimulus that arouses anxiety. In behavior therapy patients have been asked to engage in a variety of behaviors (muscle relaxation, most typically) in the presence of the anxiety-producing stimulus. When these concepts are applied to cognitive therapy and the process summarized earlier, it is seen that the complexity of the cognitive task arouses aggressive tensions that are antagonistic to sticking with the cognitive task and learning. By including the aggressive behavior within the cognitive task, the child is engaging in cognitive behavior (organized cognitive activity, processing information) that is antagonistic to action-aggressive behaviors. The aggressive behaviors become modified both by the superimposition of the cognitive task on them as well as by other ego structures that reroute and sublimate aggression. In turn, the cognitive activity becomes modified by the injection into it of aggression (ambition, achievement, vigor).

Given this similarity, however, there are two important differences the reader should note if possible benefits of the method unique to cognitive therapy are to be considered. First the child is given the freedom to spontaneously introduce the form his aggressive behavior is to take. Thus the child who proclaimed the hierarchy of tasks to be boring was invited to choose, as it were, an aggressive behavior that was antagonistic to cognitive activity. The child is not directed to engage in some other assertive behavior or "fun" behavior; and of course the child's aggressive behavior is not punished in any way, save for restrictions at the moment that are necessitated by behavior that is potentially dangerous to the child, the therapist, or property. In all cases the therapist begins the task of joining the aggression to the cognitive activity by taking the behavior the child presents as the starting point.

The second difference relates to the possibility that a child will not accept the therapist's interventions designed, to join cognition and aggressive behavior, and will not accept interpretations and use the insight to understand and modify his maladaptive cognitive and coping behaviors. If this happens when the therapist believes his interventions have been appropriate, the child is resisting treatment and is in negative transference. From the viewpoint of cognitive therapy, this resistance must be worked with and resolved directly. We return to the management of resistance in the next section.

Further Considerations in Negotiating Aggression: Therapist's Reactions and Child Behaviors that Mask Aggression. Before leaving this discussion of the negotiation of the child's self-assertion and aggressive intentions, a number of other issues require our attention. In several of the vignettes related earlier, the child's behavior appeared to involve self-assertion more than aggression; for example, the child who insisted on holding onto one geometric cutout and the child who insisted that half the session be devoted to the hierarchy of tasks and half to "doing his own thing." Assuming that a positive transference dominates, the therapist accommodates to the child's request and does not view or manage the behavior as resistance. Moreover, the therapist should respond (genuinely) with affect, indicating that the child's sense of victory is accepted and admired. When the child insisted on having the session divided into two sets of activities, the therapist (very likely relying on his sense of the child's uniqueness) spontaneously drew himself to attention, clicked his heels, and saluted the child with a "Yes, sir!" All with a grin and gleam in his eyes. Then therapist and child burst into laughter. As the child assimilated this response, giving "orders" with respect to what game would be played "in my half," the feeling tone between therapist and child was positive and allied. What had started as a confronting self-assertion for the child transformed into a positive experience, with autonomy and pleasure in being the victor. Over several sessions the child accommodated and gradually integrated the activity from his half of the session (a form-board game of Superman) into the hierarchy of cognitive tasks.

This example reminds us that therapists need to be in touch with their own vulnerabilities in relinquishing their authority in response to a child's self-assertions. Our examples also emphasize the need for therapists to be in touch with their own unique ways of experiencing and expressing aggressive tensions. Although these needs are addressed by all therapists, those practicing the method of cognitive therapy with cognitively disabled children should give the matter focused attention. My own experiences and the observations of a number of students and colleagues conducting cognitive therapy convince me that the most common pitfall for practitioners of cognitive therapy lies in the self-assertive and aggressive behaviors of children. This chapter has emphasized that self-assertion and aggression (sometimes very intense aggression) are very common in the transference experiences of cognitively disabled children. The therapist, therefore, must give special attention to his own makeup and capacity to remain objective and imaginative in the face of continuous aggressive behavior.

Self-assertion and aggressive and destructive behavior are indeed the most common reactions of cognitively disabled children to cognitive stress, but other reactions are observed. A child may become sleepy. (One child actually fell asleep on occasion during the first months of treatment.) A child may become silly, tease, or show other erotic forms of excitement. We have approached such behaviors with the hypothesis that they are on the surface covering underlying aggressive and destructive intentions that are prohibited by the child's character style and/or defenses. If the therapist follows this working hypothesis, he must be patient, draw on clinical ingenuity, and deal with the behavior at hand following the same principle of incorporating the behavior into the cognitive task. We have found that when this is done, aspects of the underlying aggression usually emerge.

With the child who moved into states of sleepiness, the therapist jokingly commented that the wooden rods (being used as displays of information) "were sleepy" and they would like "a nice bed to sleep in." The child agreed and readily accepted the therapist's invitation that they make beds (squares of cotton). The child became very concerned that the cotton be thick enough, the right size, and so on, "so the beds would be comfortable." With each presentation of a task in the hierarchy (see the program *Which Is Big, Which Is Small?)* each rod was placed on its bed. Over several sessions the child gradually introduced activity that elaborated the issue of sleepiness and the underlying aggression that related to cognitive stress. When the therapist set a task and asked the patient, "Which is the big one now?" the child spoke for the rods and replied, "Hey, who woke me up!" This was repeated in an almost stereotyped, controlled way over several sessions. Then the child began to topple the rods saying, "Hey, who knocked me out of bed!" As might be expected, toppling the rods gradually shifted to more directed aggression against the material, and eventually the child angrily refused to engage the tasks. The therapist now faced the challenge of resolving resistance. This progression from sleeping to refusing therapy is viewed as an opportunity for the child to begin changing an old habit (getting sleepy in the face of learning) and becoming more aware of some of the reasons for his school difficulties.

In summary, throughout the middle phase of treatment, as the child repeatedly negotiates self-assertion and aggression, integrates and blends aggressive tensions with cognitive activity and work, and elaborates his awareness of connections between his unique cognitive deficits, cognitive complexity, stress, and aggression, his cognitive control functioning matures and cognitive activity brings a sense of assertiveness, achievement, and pleasure. From this base the child is prepared to broaden connections with experiences in the office and those in school.

EXTENSION OF SECONDARY PROCESS FUNCTIONS IN INTERACTIONS

Generalizing and interpreting from experiences in the office to experiences in other environments receives emphasis in the final phase of therapy. If the negotiations of self-assertion and aggression within a positive transference have been accomplished with reasonable success, therapist and child have a broad, articulate set of shared experiences to generalize to situations, especially school, that implicate the child's cognitive disability.

In the process of generalizing and interpreting, the therapist becomes active in selecting a specific transference episode as a stimulus and asking the child to associate from it to experiences in school. The therapist should select as a stimulus some attribute of the task and related maladaptive behaviors that have already been articulated reasonably clearly—behaviors the child has experienced a number of times and of which he is now quite aware in interactions with the therapist.

For example, the patient who threw cutouts across the room experienced and examined this behavior a number of times throughout the hierarchy of tasks constituting the program *Remember Me.* Then treatment was phased in with the program *Where Does It Belong ?* (equivalence range therapy). At one point as the child was looking about the room to locate objects that shared some attribute and concept with the stimulus object, he tossed a few objects across the room. Relying on the many discussions of this behavior, the therapist pointed out, "There you go again; when the job is new or harder, you become Mr. Throw." The therapist had coined the name a few weeks earlier as a symbol of the configuration of issues the two had discussed many times. The therapist added that probably the patient sometimes became "Mr. Throw" at school, and the child associated to a recent experience in school, gradually elaborating details analogous to those which had been identified in the office many times. The teacher had passed out mathematics work sheets that introduced the method of long division to the class. The patient crumpled his sheet into a ball and tossed it at one of his friends who, he explained to the irate teacher, had been bugging him. This explanation, of course, was not enough to prevent a visit to the principal's office, a not infrequent result of the patient's disruptive classroom behavior before treatment and during the early months of therapy. In discussing this episode the child was able to recognize the same ingredients (i.e., the new, more complex cognitive task, the tension and aggression, the old habit of throwing, and the need for coping behaviors to prevent having to go to the principal and receiving a "blast" from parents). The therapist was rewarded for his therapeutic efforts several sessions later. Upon arriving the child exclaimed, "Guess what? Mr. Throw didn't throw. He waited until recess and chased the hell out of kids in the playground."

This example is intended to illustrate and emphasize that the technique of the therapist in this phase includes inventing symbols, stimulating the child to generalize from *specific* cognitive and affective behaviors in the office to ones in school, and initiating discussions of the issues involved. The aim is to help the child acquire verbal concepts and symbols that represent his unique cognitive deficits and flight and fight behaviors. Although clearly the age and stage of child and the nature of a child's cognitive deficits shape and limit the level of work that can be conducted, we have observed that most children, including those suffering mild mental retardation, can gain some awareness of the unique ways in which information stresses them. The symbols, concepts, and connections provide the child with cognitive control over stimulation and flight and fight behaviors. The symbols and concepts serve as a tool he can use in new situations.

Techniques in Managing and Resolving Resistance

As we discussed earlier at some length, the child may refuse at some point to continue participating in the treatment process (e.g., dealing with hierarchies of cognitive tasks). During these episodes the child experiences the therapist as having attitudes and feelings and as presenting stimulation that in fact belong to caretakers and environments of the past. These caretakers and environments are in turn the very reasons the child has constructed his pathological modes of coping with information and interactions. During episodes of resistance, then, the child is locked into reliving the past and is tenaciously clinging to his old modes of behaving as the only means of survival. In terms of the interests of cognitive therapy, the child clings, for example, to his habit of very narrow scanning. Any cognitive task that requires broad scanning creates stress and is resisted, as well as the person who is making the demand. In resisting the person, the child falls back to pathological ways of negotiating that served in the past. For example, the child obstinately refuses to reciprocate with a person who is perceived by the child to be unwilling to be passive during an exchange. The child also fears that such a person will match his feelings of pleasure with hostility and will fail to recognize his bids for focalization. It would follow that the more severe the child's cognitive control deficits and the more pathological the child's modes of interacting and negotiating, the more intense the resistance to the treatment process.

CRITERIA FOR RESISTANCE

In managing resistance, the clinician is obliged to determine whether he is in fact dealing with resistance or with an exaggeration of some behavior, as discussed in the previous section, that occurs within a mostly positive transference. There are no hard and fast definitions of resistance. The decision relies on the therapist's familiarity with the child's history of coping at home, at school, and in the office. Nonetheless, with cognitive therapy as our focus, we can present several guidelines that help determine whether a child is resisting the treatment process, clinging to maladaptive ways, and refusing to change. Resistance is inferred when the following clinically derived guidelines hold:

1. The form and content of the child's behavior block further work with the hierarchy of cognitive tasks over about three treatment sessions or more.

2. The activity in which the child engages while refusing the cognitive tasks does not respond to appropriate interventions by the therapist designed to integrate the activity with the cognitive tasks.

3. During this time, the alliance and rapport appear to have ruptured. The child relates to the therapist primarily as a person to defend against and avoid.

All the techniques described in the preceding section apply in managing and resolving resistance, especially the techniques of focalizing the child's needs and repeatedly attempting to integrate resistance behavior with the cognitive task. However when the working alliance is ruptured and the resistance behaviors exhibited are even more pathological, several additional techniques and considerations are indicated.

TIME, PATIENCE, AND INGENUITY

The first consideration, although perhaps an obvious one, is that the therapist should exercise patience and ingenuity and give ample time to resolving resistance. Children with severe cognitive control deficits usually are also handicapped by severe character trait disorders. We have had experiences with such children of devoting 3 or 4 months to the management of one episode of resistance. Throughout this time the therapist persevered, trying one technique, waiting, trying another, waiting and so on, until the resistance was resolved, disconnecting one strap of the strait-jacket that held the child in a pathological stance with respect to information and helping persons.

REBUILDING THE ALLIANCE

One technique that frequently helps to rebuild the alliance is role reversal or, in psychoanalytic terms, inviting the child to identify with the aggressor by assuming his role. Here the child is asked to present the therapist with cognitive tasks or another activity the child prescribes. We saw an example of this in the case of the therapist asking the child who had crawled under the table to present the therapist with lines to judge.

With children whose resistance is protracted and hostile, it is also sometimes helpful if the therapist is vigorous and direct in making connections between factors in the office causing the stress and resistance and those in the environment known by the therapist to be causing the child considerable suffering. For example, over a number of sessions one boy curled up on floor and faced a corner of the treatment room. The therapist pointed out that he was asking the child "to concentrate and do school work just like the teacher," that the boy sat angrily in the corner "just like you do almost every day in the principal's office," that he must be suffering every day in school, and that the therapist would like to help him not suffer that way. This line of commenting relates to the next consideration.

The therapist may have valid knowledge about traumatic experiences the child has had with caretakers, and the therapist may have reason to believe these experiences are implicated in the resistance. We have found it helpful, sometimes, to point out that the therapist is not the feared person who traumatized the child, in an attempt to clarify the therapist as a separate, helping person. For example, one child had been beaten a number of times by his alcoholic father for refusing to do school work. The therapist pointed out several times that he was not going to beat the child for refusing to engage in the tasks, as father had done, and that the child would believe this in time, when he saw that beatings and anger were not forthcoming from the therapist.

REDUCING STRESS FROM THE COGNITIVE TASKS

We have consistently responded to resistance by the technique of shifting to a less complex task in the hierarchy. For example, if the child has been working with a series of tasks from the program *Find the Shapes,* the therapist shifts to a series of tasks from the program *Which Is Big, Which Is Small?* The latter would be experienced as less complex and more neutral by the child. Or if the child has been working with the program *Remember Me,* the therapist would shift to the less complex program of *Find the Shapes.* The technique is also effective if the therapist shifts from one task level to another less complex one with the same program.

CROSS MODALITY STIMULATION: THE SEARCH FOR ORGANIZERS AND DISORGANIZERS OF COGNITIVE FUNCTIONING

Presenting tactile, auditory, and visual stimulation while the child is dealing with a hierarchy of cognitive tasks has proved useful in resolving the resistance of cognitively disabled children who also showed major character disturbances, developmental ego deviations, or disturbances in organizing and regulating anxiety and affects. For example, one first grade boy simply could not sit or stand still long enough to look at two rods and determine which was taller. He buzzed about the room, verbalizing a constant, scattered stream of thoughts, and touching, squeezing, and manipulating one object after the other. Taking his cue from the child's almost frantic need for tactile contact, the therapist asked the boy "to feel a lot of different things" with him, so they could find out which the boy liked and disliked. Over several sessions, therapist and child examined a wide range of textures and densities (e.g., sandpaper, glass objects, fur, wood, rubber balls, metal, finger paints). The child established that he did not find pleasure in some textures and that he enjoyed most moving his hands through wet corn starch. In the following sessions, the therapist asked the child to return to the hierarchy of tasks from the program *Which Is Big, Which Is Small?* and to look at the rods presented while running his hands through corn starch. This tactile experience appeared to organize the child's otherwise diffuse tensions and resulted in the child's dealing with the task. He sat reasonably still, running his hands through the corn starch, yet at the same time actively directing his attention at the rods before him.

We have followed this procedure in exploring various stimuli that might serve as organizers of diffuse affects and cognitive functioning while the child is engaging the cognitive task (e.g., levels of illumination; sound recordings of marching bands, rock music, classical music, machine guns, locomotives, airplanes; and various tactile stimuli). The particular modality is selected from behavioral cues provided by the child and data from the history. The child always participates in the search for stimulations that both organize and disorganize his cognitive functioning. The technique is primarily a nonverbal one. When indicated, however, the therapist helps the child become aware of his unique state of cognitive disorganization and in turn the stimuli that bring organization and competence or further disorganization.

We have also employed cross-modality stimulation, when appropriate, to help a child master and gain insight into stimuli that uniquely disorganize his cognitive functioning (e.g., particular sounds or sound levels, particular visual distractions). The use of cross modality stimulation to induce cognitive disorganization and the mastery of disorganization is considered in the discussion of each treatment program in the following chapters.

PLAY AS RESISTANCE IN COGNITIVE THERAPY

With children who are less impaired by character disorders and more by neurotic conflicts, but nonetheless have major cognitive deficits, play frequently emerges as an activity in cognitive therapy. The therapist has the task of determining whether the play activity is in the service of resistance or in the service of working through some emotional conflict that would facilitate progress in cognitive therapy. Moreover, in my experience in training others in the method of cognitive therapy, this issue is a potential stumbling block, especially for those who have conducted psychodynamic play therapy with children. Experienced play therapists, when first conducting cognitive therapy, often gleefully pursue for many sessions some fantasy, puppet play, or form-board game the child introduces, especially if the activity appears to be "dynamically rich." One therapist immediately responded with interest and pleasure when his patient (a 6 year old girl with major cognitive control deficits and a school problem) arrived for a session and announced that she had had a dream the night before. The child and therapist were soon eagerly drawing a picture of the dream, and they remained submerged in this activity for a number of sessions. Initially the therapist rejected his supervisor's proposal that the child was engaged in resistance (albeit in a very charming and clever way). Future developments supported the supervisor's hypothesis. How does a therapist conducting cognitive therapy determine whether play is serving resistance? Several interrelated guidelines should be considered.

1. The therapist must ensure that his or her interest and attention are being maintained on the child's cognitive deficits and on the behaviors that relate to them. The therapist must be cautious not to become interested in some "dynamic" activity or play as an end in itself, rather than in terms of its relation to the cognitive deficits and school failures. The assumption here is that the therapist intends to treat the cognitive disability, whose exclusive source is not an underlying neurotic conflict. As discussed in previous chapters, if neurotic conflicts are a source of the cognitive deficit, the rationale of cognitive therapy proposes that to treat the deficit, the content of treatment must emphasize systematically designed cognitive tasks.

2. Several features of the play itself provide clues to resistance. If over several sessions the play appears stereotype and repetitive, failing to elaborate and organize around an issue that would require resolution, the play is very likely resistance. In the example just cited, the child added more and more details to the dream. Describing the dream became repetitive, did not organize around issues, and became an end in itself. Other examples would include playing the same form-board game many times, carefully coloring and drawing flowers and trees, cutting out numerous "snowflakes" from sheets of paper, repeating the same puppet play, and discussing with the therapist one incident after another, involving family trips, grandparents, neighbors, and the like. These behaviors are viewed as controlling the therapist and avoiding the cognitive tasks that have been effectively abandoned.

3. A related consideration involves whether the play eventually includes elements of the cognitive tasks that have been abandoned. If the activity continues over several sessions with no ingredients related to the cognitive tasks or to the child's learning disability, resistance is inferred. On the other hand, the boy who sat under a table drawing "designs" eventually began to draw lines, and this activity was related to the comparison of rods in the cognitive tasks. It was here the therapist made a bid to reenter the relationship and return the child to the cognitive tasks.

4. Obvious changes in the child's affect when abandoning the cognitive tasks for play activity offer another clue. If a child seems sleepy or irritated when surveying displays of cutouts while engaging the task of removing particular

shapes, then hums with obvious pleasure while drawing the tenth tulip with a carefully selected crayon, he is very likely engaged in resistance.

One last comment seems to be indicated from my experience with therapists in training. Therapist who argue that the cognitive tasks “are in fact boring for children” frequently become seduced by the child’s play activity. Perhaps the therapist becomes bored by the specificity and analytic vigor required in cognitive therapy. These therapists find relief in following the child’s “more interesting” (but, I would add, more global) “dynamic” activity. I would also add that from the viewpoint of treating the child’s cognitive disability, the therapist who retreats into play is responding much like the cognitively disabled child who retreats to drawing, games, and listening to records, to escape the demands and stress of processing information for the sake of processing information. Analyzing and re-forming cognitive deficits is meticulous and sometimes tedious work, but no more tedious than the work involved in playing the same “puppet show” for the hundredth time with a neurotic child who is also stuck in his resistance to becoming aware of internal emotional conflict.

When play appears to represent resistance, the therapist conducting cognitive therapy is always faced with the charge of finding ways to integrate the play into the hierarchy of cognitive tasks and eventually return the child to the focus of treatment.

PLAY AS A MEANS OF RESOLVING RESISTANCE

Although play may represent resistance, play and other activities may of course also be useful in resolving resistance and returning the child to the hierarchy of tasks that should be engaged to treat the cognitive disability. Play is usually initiated by the therapist when it seems apparent that the progress of treatment is being blocked by some impulse or fantasy about which the child is conflicted or anxious. In making this decision, the therapist relies on his dynamic understanding of the child and of the treatment process to that point. Several guidelines are followed in employing play to resolve resistance in cognitive therapy.

1. The therapist infers the underlying interpersonal and emotional issue and conflict contributing to the resistance.

2. The therapist designs and introduces a game that in form and content *(a)* integrates the underlying conflict in some way with an element of the cognitive task with which the child is dealing, (*b*) permits the cognitive activity to dominate the impulse or fantasy, and (*c*) enables the cognitive activity to gain control over and organize the impulse or fantasy.

3. After the game has been played a number of times, the therapist points out how the impulse is being organized and controlled by the cognitive activity.

4. The therapist invites the child to elaborate the game, following the elements designed by the therapist.

A vignette from the treatment of a boy, also mentioned in Chapter 15, illustrates these guidelines. Diagnostic examination revealed that the boy had a severe deficit in field articulation function. Other test data and history also indicated that mechanisms of defensive and coping behavior were not successfully managing and subordinating aggressive impulses and fantasies. Projective testing showed a preoccupation with war, guns, and soldiers, fantasies that often won out as relevant information in competition for the child's attention. Teachers reported that he frequently sat at his desk imagining army battles, while school work remained unfinished ; he sometimes acted out his fantasies in violent, aggressive outbursts directed toward peers, and such behavior resulted in various forms of punishment, including temporary suspension from school.

The boy reached a point in treatment when he silently, but angrily, refused to continue for a number of sessions. He had been working with a task in the hierarchy of the field articulation program that required him to survey a matrix of cutouts set up in stacks. He was asked to remove particular cutouts from the top (or middle or bottom) of the stacks. For example, the therapist asked the patient to find a small yellow circle, a medium blue diamond, a small green triangle, and a medium red circle within the stacks. The other shapes in the stacks are conceptualized as distracting, irrelevant information from which the child must withhold attention (see Chapter 15).

To resolve the resistance, the therapist invited the child to play a new game with the cutouts. Certain stacks of cutouts would be bombs that might explode unless they were found and "diffused." The bombs would be placed in the "defusing box" (a shoe box), there to be "dismantled" by child and therapist. The child readily accepted the invitation, his silent irritation quickly giving way to a feeling-state of pleasure. The therapist set up a display made up of towers of cutouts and gave the child a description of the "bombs" ("they have a yellow square on top, a blue diamond in the middle, and a red circle at the bottom"). Some of the stacks qualified as bombs, others contained only some elements, and others contained no elements at all. For example, some stacks had a blue diamond in the middle and a red circle at the bottom but a yellow triangle at the top, rather than a yellow square. These stacks did not qualify as bombs.

It can be seen (following the rationale described in Chapter 15) that the game implicated vigorous field articulation functioning. Moreover the game provided the opportunity for cognitive activity to dominate, organize, and control fantasied aggressive impulses.

The child engaged the game enthusiastically. He made many errors selecting "bombs," but they were discovered by him and the therapist during the "dismantling" process. However the errors did not deter the boy as he scurried about searching for bombs, adding appropriate sound effects. In subsequent sessions when invited to elaborate the game, the boy gradually added a toy army truck that carried bombs to the "defusing shed," a hospital for soldiers wounded, a bomb "spotter" who was an expert at detecting bombs, and other details.

One detail in particular deserves attention because of its relevance for cognitive activity. The child introduced “time bombs,” which had to be detected within, say, 60 seconds, or they would explode. As the therapist counted, the child rapidly surveyed the stacks. By imposing a time limit, he had increased the complexity of the task. As the child eventually gained command of the game and the alliance became reestablished, the therapist began to draw the child into discussions of the aggressive fantasies and impulses that were interfering with his cognitive functioning, and they explored the possible solution to this difficulty.

When play is used as a means to resolve resistance, it should convey to the child (consciously or unconsciously) that the focus is the processing of information and the child’s unique cognitive control deficit, whether it be regulating motility, scanning, managing distractions, constructing memory images, or categorizing information. With play in cognitive therapy, the goal is always to use the play as a means of resolving resistance and returning eventually to the hierarchy of cognitive tasks.

CASE ILLUSTRATIONS

To illustrate these techniques, let us return to material described in Chapter 11 (section on Mother-Infant Negotiations and Transference and Resistance in Cognitive Therapy) and to two vignettes related earlier in this chapter.

In the first example, an 8 year old boy had been engaged in the treatment of tempo regulation and in the early phases of focal attention (passive tracking of moving objects). At one point in therapy the therapist introduced a new task. The child was asked to examine two rods visually and point to the taller one. This task represented a developmentally higher, more complex demand requiring the active, cognitive pursuit of information. The boy pushed the rods to the floor, shouting expletives, sat under a table, and busied himself drawing designs. He continued this behavior over a number of sessions. Locked in resistance, the child was clearly refusing to continue with treatment. Moreover his “play activity” was stereotyped and repetitive, controlling therapist and situation.

As described in the previous chapter, the therapist looked for opportunities to focalize on the child and thereby contribute to a solution of the resistance. When the child mumbled about needing particular crayons, the therapist obtained them, when the child broke a crayon, the therapist repaired it. In addition, the therapist busied himself drawing designs (imitation as reciprocation) and patiently waited. The child assimilated these interventions and began to dissolve the resistance, as evidenced by new behavior (i.e., he began drawing lines), which was viewed as related to the task of judging the length of rods he had abandoned.

The therapist used this behavior as an entrance into the relationship. To rebuild the alliance, he reversed roles and asked the child to draw two lines and present them to him for determination of which was longer. The child responded to this intervention, and to the therapist’s request that he “make the job as hard as possible,” becoming very involved in meticulously drawing lines that varied in length but only very slightly. The therapist genuinely struggled and puzzled in making his decisions. The child was the aggressor and the therapist the passive victim.

As this activity was repeated and rapport rebuilt, the therapist suggested they take turns drawing and judging lines, and the child accommodated. The working-alliance was now reciprocal.

From this activity, the therapist returned to the cognitive task, but reducing cognitive stress by setting rods closer together and selecting rods that were very different in height. The resistance was resolved over several weeks. The child continued with the hierarchy of tasks until the next episode of resistance weeks later, which again required thoughtful intervention and negotiation.

Our second example, described earlier in this chapter, concerns a patient who had been working with tasks that address the management of distractions from the program *Find the Shapes.* The therapist introduced a more complex level in the hierarchy (locating cutouts placed in stacks). After a short while the girl abruptly walked to the window, protesting with anger that the game was boring. They should do something that was "more fun!" She persisted, debating (which was her style) why the tasks were stupid and of no help and how so many other activities would be more interesting. She interrupted these tirades, looking out the window for many minutes in silence, apparently watching children who were playing outside. When she initially ruptured treatment, she had commented that it was difficult to handle the task present "with all that noise outside." Her debates, tirades, and periods of silence persisted for several sessions.

After several unsuccessful attempts to find entry, the therapist asked the patient to describe a game they could do that she felt would be "better" (role reversal). The child responded, suggesting a game of hide and seek. Therapist and child played this game several sessions, despite obvious limitations presented by the playroom. The child's interest in the game, however, was not deterred by the fact that therapist and child could only pretend to be hiding behind a chair or a table. Each time the child "found" the therapist, or vice versa, the patient would exclaim with glee. This play activity, which has its roots in the peek-a-boo game of infants, not only permitted the child to initiate and direct activity but may have also contributed to a negotiation of reciprocal exchange and of ensuring the therapist's availability.

When the alliance seemed to be reestablished, the therapist suggested that they take turns in a new hide-and-seek game. One person would hide a geometric cutout (used in the cognitive task) and the other would try to find it. The therapist was using the technique of integrating the play with the cognitive task. The child participated with pleasure. Later the therapist asked the child to elaborate the game, and she directed that several cutouts be hidden but only one would be designated as "the right one to find." Still later, the therapist suggested that stacks of two shapes be hidden, with a particular pair designated as the right set to find. In this way the therapist was phasing back into the cognitive task that had been abandoned. Several sessions later the child returned to the hierarchy of tasks, with the therapist reducing the complexity from the level the child had rejected (stacks of two cutouts rather than three).

Our last example concerns the boy who became agitated and "itchy all over" while visually tracking a moving target. He showed this behavior when the therapist increased the complexity of the task by requiring the child to stand still while tracking, rather than walking along the target. This anecdote illustrates the technique of using cross-modality stimulation to organize affects and cognition. The therapist engaged the child in examining a wide array of textures. This young boy eventually settled on a piece of towel as "feeling the best." With the piece of towel in hand, the patient seemed to be more able to stand still and visually track targets. Moreover, the therapist reduced the stress of the task by moving the target over a shorter distance than previously. It is interesting that after several sessions the child asked if he "could have a bigger one."

The therapist brought in a face towel. During subsequent sessions the child sat visually tracking objects, holding one end of the towel with the other fixed to his shoulders like a cape. The towel also helped him later when he actively tracked pairs of wooden rods. The therapist suggested to the teacher of the child's special class that he be permitted to carry the towel to class. The teacher's report suggested that the towel served as an organizer in the classroom as well. With towel in hand, the child seemed less agitated and restless. Although this severely cognitively impaired young child could not gain insight into his states of irritation, tactile stimulation did facilitate his developing more extensive and active scanning.

MAKING UP AFTER AN EPISODE OF RESISTANCE

Following Sander's model of mother-child negotiations, we suggest that the making up process after an episode of resistance provides the child with an opportunity to make further gains in establishing autonomy and a sense that his achievements can be accepted. Making up also contributes to the child's internalizing the therapist's standards for aggressive behavior, strengthening the alliance as well. The therapist should be on the alert for bids from the child to make up and should look for opportunities to initiate making up.

If the resistance has included destructive, aggressive behaviors, the therapist should always attempt to engage the child in repairing or witnessing the repair of a damaged object. For example, the therapist engaged one patient in gluing together a wooden rod the child had angrily snapped in two, several weeks earlier at the start of an episode of resistance. In another treatment the therapist engaged a child for several sessions in the task of repainting cutouts that had been thrown about and hammered by the child during a long period of resistance.

Examples of children's bids to make up following periods of intense, aggressive resistance include a child who arrived for a session bearing a sack of cookies, a child who began to tidy materials arrayed on shelves in the treatment room and a child who became preoccupied with a small tear in a rubber hand puppet and wondered if it could be repaired. In response to behaviors such as these, the therapist introduces activity, and comments where appropriate, indicating that aggression can be undone and modified, and the relationship, interest, and availability of the therapist preserved.

SPECIAL CONSIDERATIONS FOR CHILDREN WITH SEVERE PSYCHOLOGICAL LIMITATIONS: COGNITIVE CONTROL THERAPY WITH RETARDED AND AUTISTIC CHILDREN

We have had experience applying the method of cognitive therapy as an adjunct in the treatment of children who are severely retarded, autistic, or psychotic, as well as nonverbal or minimally verbal children. With these patients we have used most often the methods designed to treat focal attention and the earliest stages of field articulation. Retarded or autistic children, in particular, could be viewed as representing severe attentional deficits. They remain withdrawn from reality, defensively withholding attention from persons and things in the outer environment. Or they are deficient in the cognitive function concerned with actively tracking information and sustaining attention on information in the environment. In applying therapy in focal attention and field articulation, our question has been whether such therapy would break through the autism and bring the child more in contact with reality or would modify the attentional deficit of the retarded child. Chapter 18 presents findings of a study of cognitive therapy with severely retarded children as well as a case report of cognitive therapy with an autistic boy.

In our experiences to date, we have found the first levels of the program *Find the Shapes* to be the most promising as the basic cognitive therapy approach to these children. As might be expected, however, modifications in the method (Chapter 15) are necessary. We first outline these modifications, and then indicate how aspects of focal attention therapy are used as supplements.

With retarded and autistic children and others having severe psychological limitations, therapy is introduced by placing one white (or black) medium square (from the program *Find the Shapes)* on a table. The child is asked to take the cutout and place it in the "answer box." Let us assume for discussion's sake that the child is nonverbal and severely autistic. The child does not respond but sits with a vacant stare before the cutout. Of course some children from these populations do not sit at the table but may run about or stand, rocking rhythmically. In these cases the therapist's first task is to teach the child to sit before the cutout even for a few seconds and to convey that the cutout is the "piece of reality information" the child is expected to register and engage. Because the child does not respond, the therapist employs the following technical steps:

1. Take the cutout and slowly place it in the box, making appropriate comments such as, "See, put this in the box." Repeat the demonstration several times.

2. If the child does not handle the task in response to the demonstration provided, take the child's hand, guide it gently but purposefully to the square, and place it over the square so that the child grasps it. Then lift the child's hand, causing him to lift the square from the board. Guide the child's hand to the box, and help him release the square into the box.

3. Place before the child a second square the same color (white or black) as the first. (The same color is maintained until the child can perform purposefully the task of placing a cutout in the box.) Tap the cutout and make

appropriate comments, again asking the child to place the cutout in the box. If the child does not respond, repeat step 2. Also, place the cutout in the child's hand; pass it along his palm and fingertips.

4. If the child still has not responded repeat combinations of steps 1 and 2. In addition, if the child is obviously not viewing or registering the demonstration (e.g., head is turned away from the cutout throughout), take one hand and gently direct the child's head toward the cutout while removing the cutout with the other hand or guiding the child's hand.

5. Repeat these techniques until the child purposefully completes the task (placing the cutout in the box) three times in succession, on request and without assistance. In repeating these techniques until the criterion is achieved, care should be taken not to make excessive use of physical guidance. After administering several trials with physical guidance, administer a trial using only a verbal comment or pointing, to determine whether the child now performs some aspect of the task. For example, a child may reach and take up the cutout and then hold it to his nose. Here, coach the child only in releasing the cutout into the box. Or use more moderate degrees of physical guidance (e.g., nudge the child's elbow or place the child's hand near the cutout, to determine whether this degree of initiative from the therapist is sufficient to induce the child to continue with the response). The goal is to cultivate initiative, directedness, and purposefulness in the child's attentional behavior and motoric responses.

We have found that many autistic and severely retarded children can achieve this response, then proceeding with the next level in the hierarchy of tasks.

6. Once the child has satisfied the criterion of removing the cutout three times in succession on request and with purpose, place a black and a white cutout on the table. The child's task now is to place into the box the cutout that the therapist touches or points to. With each trial the left-right location and the physical proximity of the cutouts are varied according to the guidelines described in Chapter 15. Initially point to or request the same square used during the first level. Gradually request that the other square be removed, shifting from one to the other at random. If a child takes the incorrect square, return it and repeat the request. If the child begins not to respond during this stage, introduce demonstration and physical guidance as already described. It may also be necessary in some cases to reduce the complexity and return to work using only one cutout.

When the child has removed the designated cutout three times in succession, purposefully, on command, and without disturbing the other cutout, proceed to the next step in the hierarchy.

7. Place three squares on the table. Two may be "answer shapes" (e.g., black) and one a "distractor shape" (e.g., white), or the reverse. The same procedure is followed. When the child has successfully handled this stage, treatment proceeds systematically, increasing the number of answers and distractions (square, circles, triangles, etc.) the degree of order and randomness in the pattern formed by the cutouts, the distance between cutouts, and so on, following the guidelines described in Chapter 15.

Whenever the child's ability to relate permits, this treatment program can be supplemented with tasks from the programs *Follow Me* and *Which Is Big, Which Is Small?* (Chapter 14). Having tried several cognitive therapy programs with these children, we have found that the surface of a table, the concrete specificity of one cutout, and the potential for systematically adding others defines a highly structured environment and task around which patient and therapist can negotiate a relationship and a commitment to work with a hierarchy of tasks designed to modify the child's attentional states.

All the considerations we have given to the issue of transference and resistance in conducting cognitive therapy apply equally when treating autistic and retarded children. The case report presented in Chapter 18 contains graphic descriptions of transference and resistance displayed by an autistic boy who was treated with cognitive therapy, as well as illustrations of the therapist's technique in managing the resistance.

APPLICATION OF COGNITIVE CONTROL THERAPY PROGRAMS WITH GROUPS OF CHILDREN

We have had considerable experience conducting therapy with groups of children ranging from the ages of 3 years to adolescence. These children attended public schools or day care centers or were hospitalized in a psychiatric facility. The treatment programs presented in the next chapters are described primarily with individual therapy as the focus, but each chapter gives some consideration to applications in group therapy. Here we review considerations that apply to all treatment programs when used in a group situation.

Fixed guidelines cannot be set to establish the number of children who can be treated effectively in a group situation. We have found that a group consisting of five or six children is optimal. The number would vary depending on the severity of the cognitive control deficits and of the character disturbances, especially the degree of hyperactivity evidenced by the children.

The groups should be formed of children who are diagnosed as showing the same general cognitive control deficit or deficits, therefore requiring the same treatment programs and hierarchies of tasks. Once a group is formed, observations during the first weeks will help determine whether issues a given child presents, other than the cognitive control deficit, render him more appropriate for another group. For example, a group may be formed of children all needing therapy in field articulation. However one child may be much more hyperactive than the others in a group situation, running about the room and disrupting the group's work. This child may need to be reassigned to a group receiving therapy in tempo regulation, or even handled in individual treatment, before taking therapy in field articulation.

Group cognitive therapy almost always requires two therapists. One assumes the responsibility of administering the hierarchy of tasks, determining the pace at which the group moves through the hierarchy, and initiating any modifications and detours that seem to be indicated by the cognitive needs of the children and by the need to maintain a group identity. The other therapist assists, focusing on handling individual children as needed.

This brings us to the management and resolution of resistance. Dealing with resistance is viewed as critical in group cognitive therapy as in individual cognitive therapy. We have observed resistances in group cognitive therapy as severely aggressive as those seen in individual work. In the middle phase of therapy the cotherapist is usually very busy doing individual work with one child or another in an attempt to resolve resistance.

The group situation, however, permits enlisting the children as assistants. This has proved to be a very effective technique, not only in serving to maintain a group identity but in teaching the children about their cognitive deficits and needs for change. One child might be assigned the task of displaying the therapy materials needed, another using the stopwatch, another observing the child or children performing the cognitive task and discussing observations with the group, and so on. Other specific suggestions in this regard accompany each program.

CONCLUDING REMARKS

The following chapters describe the materials, methods, and instructions used to provide therapy in each of the cognitive controls. In reviewing these program descriptions, the reader may develop the impression that cognitive therapy is a series of “mechanical exercises” because the presentations sometimes are limited to the briefest possible description of the content of each hierarchy of tasks. However the programs are presented with the hope that the reader will integrate the description of each with the technical considerations discussed in this chapter and with the theoretical considerations of Chapter 11. When integrated, these five chapters describe a treatment method for cognitively disabled children that embraces and holds the following as critical aspects of the process: interpersonal transactions and negotiations, management and resolution of resistance, and the integration of affects with cognitive activity, all serving the restructuring of cognitive control functioning.

Part 5
THE COGNITIVE CONTROL THERAPY PROGRAMS

13

COGNITIVE THERAPY WITH THE BODY EGO-TEMPO REGULATION COGNITIVE CONTROL

Chapters 13 to 17 describe the specific content and technical procedures that make up the respective cognitive therapy programs designed for the several developmental levels of cognitive control functioning. In considering these treatment programs it is essential that the reader have some familiarity with the rationale of cognitive therapy and general technique discussed in Chapters 11 and 12. As noted, these cognitive therapy programs should not be administered in a mechanistic manner but rather with clinical flexibility, with skill in interpersonal relating, and with careful management of transference reactions and resistances, therapeutic activities that are hallmarks of psychodynamic psychotherapy. These earlier discussions also help to make clear how and why the therapist maintains the child's cognitive activity as the focus of the treatment, while at the same time including his emotional reactions and coping strategies as part of the therapeutic work.

The number of each program corresponds to the number used in Table 1, Chapter 11, which lists the programs in terms of the developmental hierarchy of cognitive controls (see Chapter 8) and in terms of the cognitive control for which the program is prescribed.

Two programs have been developed to provide for children therapeutic experiences that promote the development of images and schemata articulating body experiences (body ego) and the development of ego-cognitive regulation of motility. These programs are, respectively, *Who Is Me, Where Is Me?* and *Moving Fast and Slow.*

If the child's diagnostic evaluation indicates the need for cognitive therapy at the developmentally early level of body ego-tempo regulation, we have found it effective to include parts of both programs in each session. In the first session the first part of *Who Is Me, Where Is Me ?* should be administered, along with the first part of *Moving Fast and Slow.* In the subsequent sessions the therapist continues to combine aspects of both programs that seem to him to best meet the child's needs for ego-cognitive development at this level and to take into account the progress and structural changes the child reveals.

As noted in the chapter on general technique, the therapist should use the program names in introducing the tasks to be worked with and in referring to them in future meetings. He also should engage the child immediately in the task, relying on the child's contemporary experience to cultivate the meaning of the name of the program. With children from about the ages of 3 to 9 years, we have found it useful to supplement the name of the program *Moving Fast and Slow* with *I Make Engine Stop and Go.* By drawing a parallel with an engine that is regulated by a driver, the latter game name helps the very young child construct the orientation that motility and body tempos can be controlled.

We have found that extremely hyperactive children experience much difficulty working with *Who Is Me, Where Is Me ?* because of the program's demands that the child focus his attention on and notice various kinesthetic and proprioceptive sensations. In these cases we have limited the first months of treatment to the program *Moving Fast and Slow.* When the child demonstrates some capacity to delay motility and to regulate different motor tempos involving the total body, the program *Who Is Me, Where Is Me ?* is introduced.

Both programs are guided by a common goal and make use of the same basic procedure. The twofold goal is to train the child to direct attention at and register body sensations and movements experienced and to cultivate increasingly differentiated images, symbols, and schemes that represent these sensations and movements cognitively. In achieving this goal the child is provided with images and schemata that are the cognitive "steering wheels" to guide motility and give psychological meaning to movement and body in space. On first glancing at the content of the program *Who Is Me, Where Is Me ?* the therapist who has not conducted this form of therapy may not appreciate the importance of repeatedly and patiently directing the child's attention to some aspect of body sensation. Remember that children who require therapy at this developmental level have not yet differentiated clear, body boundaries and a sense of body-self. If the therapist sits in a chair, he may readily notice (bring his attention to) the sensation of his back pressing against the back of the chair. We have observed, however, that children requiring this treatment do not necessarily register that sensation while sitting. Moreover they fail to perceive many body sensations, and the perceptions they do make are vague, reflecting the global, diffuse body ego with which they engage their environment.

PROGRAM 1a.
WHO IS ME, WHERE IS ME?

PURPOSE

To provide experiences that promote the construction and differentiation of cognitive schemes representing body experiences, from those involving the total body to those involving small parts of the body.

MATERIALS

Chairs; table; pictures of children standing, running, sitting, hopping, and stepping over and under objects.

INTRODUCTION

The program (Table 1) consists of five groups of body experiences. In general, each group should be administered in the sequence described. The child is asked to engage in positions and movements involving the entire body, then large parts of the body, then small parts of the body, then the body in relation to objects, and then identifying left and right parts of the body. These experiences are then repeated, using pictures representing the same body positions.

Table 1. Summary of Steps in Cognitive Therapy with Body Ego Tempo Regulation Cognitive Control: Who Is Me, Where Is Me ?

Part I. Perceive, describe, and represent in fantasies and symbols experiences with the entire body.	
Phase A. Static body positions	
Step 1.	Lying down
Step 2.	Standing
Step 3.	Kneeling
Step 4.	Sitting
Phase B. Dynamic body positions	
Step 1.	Crawling
Step 2.	Swaying
Step 3.	Twisting
Step 4.	Jumping
Step 5.	Hopping
Step 6.	Running
Part II. Perceive, describe, and represent in fantasies and symbols experiences with large body parts.	
Step 1.	Bending from the waist
Step 2.	Bending from the knees
Step 3.	Turning head
Step 4.	Shrugging shoulders
Step 5.	Shaking and raising arms and legs
Part III. Perceive, describe, and represent in fantasies and symbols experiences with small body parts.	
Step 1.	Opening and closing mouth
Step 2.	Blinking eyes
Step 3.	Opening and closing hands
Step 4.	Spreading fingers
Step 5.	Tapping feet
Step 6.	Wiggling toes
Part IV. Perceive, describe, and represent in fantasies and symbols experiences in relation to objects. Examples of steps: step on, off, around, under, toward, over, away from chair; step into, out of circle	
Part V. Differentiate left and right body parts and describe and represent them in self and others.	
Part VI. Perceive, describe body experiences represented by dolls, pipe cleaner figures, and pictures.	
Repeat Parts I through V with dolls, pipe cleaner figures, and pictures.	

Most children are able to perform easily the body positions and movements required by each part. Remember that the goal is not to teach the child, for example, how to step over a book (see Part IV) but to give the child *the experience* of stepping over a book many times, while articulating the body sensations that accompany the activity and the images and symbols the child associates and ties to them.

Occasionally a child is unable to perform the posture or movement required. Here time should be taken to help him achieve the response before the child is encouraged to attend to the feelings experienced and to construct cognitive schemes of the experience. Another child may refuse the task and become "negativistic". We have observed negativism most frequently with the earliest programs. It appears that the task of assuming body postures and regulating body movement is likely to bring into sharp focus early conflicts experienced by the child in transactions with mother or other caretakers. Here, the therapist must be especially sensitive to the "parent-child negotiation" involved (e.g., focalization, self-assertion; see Chapter 11) and engage the child accordingly.

In the instructions below, only the most basic statements made by the therapist are noted. Of course verbalizations by the therapist that facilitate articulating body sensations and differentiating cognitive schemes of body experiences should be constructed to suit the developmental status of the child, the level of his language skills, and the nature of the therapeutic relationship.

Introducing the Child to the Program and General Procedure

If diagnosis has indicated a need for this program, the child is very likely already hyperactive or passive-withdrawn, in addition to showing lags in the developmentally early cognitive control concerning articulating body experiences and representing them by images. Moreover, he is likely to have little cognitive awareness (or awareness at a global level) of body boundaries and sensations, and few words or concepts to represent them. Accordingly, verbal introductions to the program should be kept to a few remarks, since words are not likely to be particularly effective or meaningful at this stage. For example, begin by saying, "Johnny, we're going to work with a game called *Who Is Me, Where Is Me ?* Let me show you." At this point the therapist might begin by standing at attention and asking the child to assume the same body position. Then the therapist would direct the child's attention to sensations experienced by the total body. For example, "Johnny, notice what you feel all over . . . What do you feel?" (The child replies "Tight" or "Squeezed.") "That's good; 'squeezed' is a feeling. Where do you feel squeezed?" The child may reply "in my hands" or "in my stomach." At this moment and in future sessions the therapist may ask the child to continue directing his attention at his body and its sensations, to ensure that the word "squeezed" becomes closely tied to these sensations, which become the *focus of attention.* The therapist adds, "Do you see, we're going to learn how and what we feel and notice with our bodies . . . . What we feel and notice, like squeezed, is part of who we are. Now notice your head, . . ."

This general procedure, which involves using the body as a source of information that is increasingly differentiated, is repeated while the child experiences various body postures and sensations. With each part of the program, then, the child is asked to assume some position, or move his body in a particular way. While the body experience is ongoing, the therapist asks the child to bring his attention to his body and describe what he notices and feels.

The first goal is to train the child to become more perceptive of body sensations and experiences and more articulate in describing them. This involves both bringing the child's attention to body experiences and helping the child build a vocabulary that serves to describe the sensations. As the child shows the capacity to attend to and describe body sensations, the therapist initiates work with the second goal of this program—namely, developing images, symbols, and representations associated with body experiences. The basic method used in image building is to ask the child, while he is experiencing some body position, what the perceptions remind him of.

Following our first example, the therapist might say at one point, "Johnny, when we stand at attention you notice a feeling you call 'squeezed.' What does that feeling make you think of that you have seen before or done before?" The child is encouraged until he produces an image. For example, Johnny may reply "My mother squeezes flowers in books." When the child first produces images or associations, the therapist should point out to the child how the image relates to the body sensation being perceived. Gradually the child is helped to construct many and more differentiated images. With some children it may be appropriate at a latter stage in therapy to relate the many images constructed with an interpretation. The example above, if supported by other images, could lead to an interpretation that for Johnny, *Who Is Me, Where Is Me ?* includes feelings that his body is pinned down or constricted by his mother.

The therapist would choose to terminate this program and phase into the next when the child has shown stage-appropriate capacity to perceive body sensations and to represent them by images, symbols, and memories.

Especially from ages 4 to 8, the images children construct in association to body experiences frequently depict animals in various contexts. If a child has difficulty initially in constructing images, the therapist should ask him to think of an animal that "does what we are doing." If this technique of suggestion is not sufficient, the therapist should provide animal referents for various body positions or movements experienced. Then he can engage the child in considering and discussing these and in grasping the way in which the animal mentioned represents the body sensations perceived. Whenever possible in offering possible representations, the therapist should draw from knowledge of the child's unique living situation and history of experiences.

In the discussion to follow, only the basic instructions are given concerning the body position the child is asked to experience. With each part it is assumed the therapist would follow the twofold goal of training the child to attend to body sensations and helping the child construct increasingly differentiated images related to the sensations. In administering each part of the program, the therapist should, as indicated, demonstrate the body position, join the child in assuming the body position, or physically guide the child in assuming the position. Ideally, the therapist shifts from one part or subpart to the next (e.g., from movements of the entire body to movements of large body parts) over many weeks, as the child shows growth in perceiving, labeling, and representing the body experiences in question.

Part I. Movements of the Entire Body

MATERIALS

Chair, low table.

A. Articulating Body Positions When Stationary. The progression of experiences is from lying and standing to kneeling and sitting. This progression can be modified to suit a given child. Kneeling and sitting provide opportunities for more differentiated perceptions of body sensations and locations than do lying and standing. As noted already, with each body position the therapist first gives the child the initiative to articulate the various sensations experienced. These instructions provide only suggestions of the perceptions each position uniquely permits.

1. *Lying Down.* Have the child lie on his back, either on the floor or on a low table. This position gives the child opportunities to bring attention to the pressure of body parts touching the floor (e.g., back of head, buttocks, calves of legs) and to contrast these perceptions with those involving, for example, the curve of the back, which does not make contact with the floor. Have the child lie on his stomach and bring his attention to body feelings and also contrast the sensations between lying on one's back versus lying prone. This position also allows the child to perceive that all parts of his body are located in the horizontal plane.

2. *Standing.* Ask the child to stand. This position provides the child with opportunities to perceive and articulate the body parts that make contact with the floor (feet) and to compare this sensation with those of other body parts (arms, head, shoulders). These perceptions in turn could be related to those registered while lying down. Perceptions can be articulated further by bringing attention, for example, to the feet inside the shoes while standing versus lying. That the body is located in the vertical plane while standing can also be registered and related to the perceptions made while lying.

3. *Kneeling.* Ask the child to kneel on the floor. This position makes it possible for the child to attend to the sensations of body parts such as knees and toes touching the floor, versus parts that do not. These perceptions can be compared with those of other positions. The perception that some body parts are in horizontal plane (legs) and some in the vertical plane (upper trunk and head) can be registered and compared with perceptions of standing, sitting, and lying.

4. *Sitting.* Ask the child to sit on the floor and then on a chair. The position gives the child chances to attend to sensations of body parts that make contact with the chair and with the floor and to compare these to perceptions made during other positions.

As the child perceives and directs his attention to parts of his body while assuming these four body positions, the therapist can foster more differentiated perceptions by asking the child to bring his attention to only one part of the body (e.g., feet, hands, arms) during each of these positions.

B. Articulating Body in Motion. The progression of experiences is from crawling to swaying, to twirling, to jumping, to hopping, and to running. This progression can be modified to suit the individual child. The images constructed by the child to represent these body movements should begin to include persons, animals, and things in states of motion. Again, perceptions and images produced in response to one body motion should be compared with those of another.

1. *Crawling.* Ask the child to crawl across the room. With this task the child's attention is brought, for example, to the sensation of the hands and knees as they make contact with the floor, to changes in breathing, and to the sensation of air making contact with the face.

2. *Swaying.* Ask the child to sway, shifting his body from the left leg to the right and back again. The child's attention is directed, for example, to the sensation of shifting body weight while the feet remain firm against the floor, to sensations in the torso, neck muscles, and so on.

3. *Twirling.* Ask the child to twirl himself around. The child's attention is brought to air rushing across the face, to sensations inside the head, to the arms pulling away from the body and so on.

4. *Jumping.* Ask the child to jump up and down. The child is helped to perceive and articulate especially the sensation of gravitational pull when the body is above the floor, and the sensations registered by the body and feet when the child lands on the floor.

5. *Hopping.* Ask the child to hop on one foot. The child's attention is directed, for example, to the sensations of the leg and foot held above the floor, to the sensations associated with thrusting the body upward by the use of one leg, and to the sensations that are part of balancing the body.

6. *Running.* Ask the child to run across the room. The child's attention is focused on the movement of the legs and arms, on the position of the left arm relative to the left leg, and so on, and on the sensations of propelling his body through space.

Part II. Movements of Large Parts of the Body

The sequence presented here need not be followed. As in Part I the therapist first encourages the child to bring his attention to the information his body is providing and to describe in his own terms what he notices. Again this activity is followed by requests for images representing the body movements. Demonstration and physical guidance are used whenever indicated. The instructions only illustrate the body perceptions each movement uniquely provides. The therapist should encourage the child to relate and compare perceptions and images constructed in response to one movement with those of another.

MATERIALS

None.

1. *Bending Forward and Backward from the Waist.* Ask the child to bend forward and backward from the waist. Bring the child's attention to the sensations of the back of the legs and stomach and to the changes in gravitational pull as the body is shifted from leaning forward to standing upright.

Bending the Knees. Ask the child to lower himself by bending his knees. Bring the child's attention to the sensations of the back, shoulders, and arms, as balance is maintained during a knee bend.

2. *Turning Head.* Ask the child to turn his head to one side and to the other, to lower his head forward and thrust it backward. Bring the child's attention to sensations in the neck muscles and inside the head.

3. *Shrugging Shoulders.* Ask the child to shrug his shoulders. Bring the child's attention to kinesthetic sensations and to the fact that the shoulders are nearer the ears when they are raised.

4. *Shaking and Raising Legs and Arms.* Ask the child to raise and then shake each limb, one by one, contrasting the sensations. For example, when an arm is raised, point out the weight and pull felt in that arm versus the other. Work with the right and left arms and legs.

Part III. Movements of Small Parts of the Body

The sequence of movements presented here need not be adhered to. Again the therapist first encourages the child to bring his attention to the movement being experienced and to initiate descriptions of what he perceives. Images representing the movement are also encouraged. The instructions present only illustrations of the sensations and perceptions unique to each activity.

1. *Opening and Closing Mouth.* Ask the child to open and close his mouth. Bring the child's attention, for example, to sensations in the jaw muscles and the skin of the face, and to the fact that the teeth and tongue are visible when the mouth is open.

2. *Blinking Eyes.* Ask the child to blink his eyes. Point out the pressure created in the eyelids.

3. *Opening and Closing Hands.* Ask the child to open his hands and then to make a fist. Point out sensations in the palms and fingers unique to each position of the hand. Articulate the sensations of the fingertips pressing into the palm when a fist is made.

4. *Spreading Fingers.* Ask the child to spread his fingers apart and then to set them side by side. When fingers are stretched apart, point out, for example, the sensations in the fingers and palm and note that the fingers are not touching each other. When fingers are close together, point out the sensations along the inside of the fingers, as one

finger presses against the other.

5. *Tapping Foot.* Ask the child to tap one foot on the floor. Point out the sensations in the toes when the foot makes contact with the floor.

6. *Wiggling Toes.* Ask the child to remove his shoes and to wiggle the toes, first of one foot, then the other, then *both* feet. Articulate the sensations.

Part IV. Movements of the Body in Relation to Objects

MATERIALS

Small chair, book, long piece of string, table.

Ask the child to perform the following actions in relation to objects. Follow the same general procedure described in the previous parts of the program. Make appropriate comments articulating the concepts of on, off, over, under, next to, and so on, as experienced.

1. Have the child step *on* a small chair.

2. Have the child step *off* a small chair.

3. Have the child step *over* a book.

4. Have the child walk *around* a chair.

5. Have the child step *into* a circle made of string.

6. Have the child step *out* of the circle.

7. Have the child crawl *under* the table.

8. Have the child walk *toward* the wall.

9. Have the child walk *away* from the wall.

10. Have the child walk *up to* the chair.

11. Have the child walk *beyond* the chair.

12. Have the child stand *along side, in front of,* and *behind* a chair.

13. Where indicated, some of these experiences can also be introduced in relation to the therapist's person.

Part V. Differentiating Left and Right

MATERIALS

Pictures of children in various activities and postures.

A. Identifying Left and Right. Ask the child to raise his right and left hand and foot. Repeat this procedure, varying the sequence and introducing left and right ear and eye, shoulder, and so on, until the child can consistently identify the right and left sides of the body. Training in constructing images here can involve, for example, having the child recall which hand his brother (father) uses when holding a pencil (hammer).

B. Experiencing Left and Right with Child and Therapist Facing in the Same Direction. Stand so that you and the child are facing in the same direction. Hold up your left hand (or foot) and ask the child whether it is your left or your right. Repeat by using eyes, ears, and so on.

C. Experiencing Left and Right with Child and Therapist Facing Each other. Repeat step B, but with the child facing you.

Part VI. Articulating Body Experiences Represented by Dolls, Pipe Cleaner Figures, and Pictures

After the child has shown adequate cognitive development in perceiving and describing various body experiences and in constructing images representing them, each of the preceding five parts is introduced when appropriate, using as stimuli dolls, human figures made of pipe cleaners, and magazine pictures of children, lying, running, raising their arms, closing their eyes, and so on. The therapist asks the child to examine the doll, figure, or picture, and to describe what he imagines or thinks the doll or figure is "noticing his body doing and feeling his body doing." As the child shows adequate articulation of body sensations in question, the therapist may again ask the child to associate to animals, persons, or things that would represent the body experience in question. The progression from the body to dolls to stick figures to pictures requires increasing use of fantasies and representations.

Consideration of Transference Reactions During Who Is Me, Where Is Me ?

We have observed that sexual and aggressive tensions and behaviors are especially aroused by the program, *Who Is Me, Where Is Me?* very likely because the child is encouraged to focus his attention on his body feelings, because the therapist is physically active in demonstrating a body position, and because the therapist sometimes makes body contact with the child. These tensions sometimes result in a sudden increase in diffuse hyperactivity and restlessness, or in specific aggressive or sexualized behavior directed at the therapist (e.g., the child suddenly kicks the therapist, hugs the therapist, or presses his genitals against the leg of the therapist).

Therefore the therapist should be especially alert while conducting this program for behavioral clues that suggest that aggressive and sexual tensions are escalating to a level of intensity the child cannot delay and organize. If the tensions lead to behavioral expressions such as kicking that are too direct and developmentally primitive in terms of the form of gratification the child is seeking, the working alliance can be meaningfully disrupted. Therefore the therapist should modify his behaviors—for example by avoiding physical contact or introducing substitute behaviors (e.g., kicking a pillow)—until the tensions are better organized and regulated. Of equal importance, the therapist should bring the child's attention to the behaviors in question and attempt to do some therapeutic work with them. In cognitive therapy this does not involve asking the child "why" he behaved the way he did, nor offering an interpretation such as "You're mad at me," or "You want to get close to me," more characteristic of psychotherapy. In cognitive therapy, if the child has just pressed his body against the therapist, the child could be asked if he noticed the behavior, and if so to describe it and the feelings he noticed in his body at the time. These feelings would be labeled, as are the other sensations registered during therapy and representations constructed. The goal is to provide the child with cognitive mastery of the tensions by directing attention to them and articulating them, reserving "conceptual understanding" (insight) for the time in the treatment when the child can make use of the interpretation.

An example may help to illustrate this issue. The diagnostic work-up and presenting problem of 6-year-old Tommy indicated that the program *Who Is Me, Where Is Me?* might benefit the boy. The program was administered, and over a period of months, while Tommy was experiencing and working with the various body positions and movements, he gradually showed a unique reaction. In addition to sometimes directly refusing to participate and insisting that he and the therapist do something else that was more fun, he sometimes fell to the floor while assuming a position; sometimes he bumped into furniture, sometimes he assumed a "sailor's gait" when he walked, and sometimes he thrashed in anger or tried to kick and punch the therapist. At the same time, he often refused to try to call up images representing the body position in question. These various behaviors were viewed as resistance reflecting the tension and body confusion Tommy experienced when encouraged to focus his attention on body experiences and to articulate and associate to them. Gradually Tommy was helped to register these tensions and body sensations, including his bumping into furniture or stumbling. It is interesting to note that he was not always aware that he was walking with a sailor's gait, that he had stumbled, or that he had bumped into a chair while walking across the room. In this way he was taught to notice his body movements and sensations and to recognize the confusion in coordination and the aggressive tensions he experienced. At the same time Tommy gradually constructed and offered a number of associated images at first involving, for example, a cup tumbling out of the cupboard at home, then animals he had seen on TV toppling over when "shot with sleeping medicine," and finally associations of his father, intoxicated and stumbling around the house. It was only when Tommy reached this level of representing his own, contemporary body experiences that the therapist was able to introduce with effectiveness the conceptualization or insight that Tommy's confusion and stumbling "was doing with your body what your daddy does when he is drunk."

When a child reaches levels of functioning with this program (and with the program *Moving Fast and Slow)* that reflect differentiated perceptions and representations of body boundaries, and differentiated body tempos, the therapist may begin to phase in the program designed to treat the cognitive control focal attention.

Group Administration

We have had experiences following the foregoing procedures with groups of three to six children. Two therapists are needed: one who determines the direction, sequence, and pace of the treatment, and the other who assists by moving from child to child and handling management problems a given child may present that could disrupt the group. The procedures can be varied to take advantage of the group situation. For example, the children can take turns assuming a posture or performing an activity, then describe the sensations perceived, and the sensations perceived by each child are compared with those of the first child. Here one focus could be on how individuals differ in the sensations they experience and in the images they associate to these sensations.

PROGRAM 1b.
MOVING FAST AND SLOW

PURPOSE

To provide experiences in differentiating and regulating various body tempos: from moving the body through space, to moving objects across a table, to moving a pencil across a sheet of paper.

MATERIALS

Paper, tape, pencil, dolls, cars, mazes.

Introductory Remarks and General Procedure

For children who show a developmental lag at the cognitive control level body ego-body motility, this program may be administered alone or combined with aspects of Program la, *Who Is Me, Where Is Me?* as indicated by an individual's needs and makeup.

The eight parts of this program should be conducted, when possible in the sequence described. In this way the experiences and tasks represent a developmental transition from experiencing macrospace to experiencing microspace: that is, from the child's moving his body through "free" space, to moving his body through space defined and confined by a pathway on the floor, to moving objects freely over the surface ("space") of a table top, to moving a pencil in a paper maze. The eight parts also represent a transition from global to differentiated regulation of motor tempos and from experiences involving the self-body to experiences involving representation of the self-body. Moreover, each part provides the child with experiences moving his body or body representations at various tempos and while changing tempos. Table 2 summarizes the program.

Table 2. Summary of Steps in Cognitive Therapy with Tempo Regulation Cognitive Control: Moving Fast and Slow

Phase A. Move total body through open space at various tempos and construct related fantasies and images.

Part I.	Move at regular tempo.
Part II.	Move at tempos slower than regular tempo.
Part III.	Move at tempos faster than regular tempo.
Part IV.	Shift from one tempo to another on command in response to images already constructed.
Phase B. Move total body through restricted space defined by objects and pathways and construct related fantasies and images.	
Parts V and VI.	Repeat Parts I through IV, differentiating tempos and associated imagery when moving through restricted space.
Phase C. Move objects across the surface of a table and construct related fantasies and images.	
Part VII.	Repeat Parts I through VI, differentiating tempos and associated imagery when moving objects across a table top in open and restricted space.
Phase D. Move a pencil across the surface of a sheet of paper and construct related fantasies and images.	
Part VIII.	Repeat Parts I through VI, differentiating tempos and associated imagery when moving a pencil across a sheet of paper in open and restricted space.

As with the technique for *Who Is Me, Where Is Me ?* the therapist follows two broad guidelines: (1) he provides the child with body ego experiences (in this program, moving at various tempos) and assists the child in giving attention to and describing the body sensations experienced; and (2) he assists the child in constructing images representing the body tempos experienced. In pursuing the first guideline the goal is to help the child learn to give attention to his body sensations, to view his body tempos as a source of information, and to differentiate his vocabulary in describing body tempos.

In relation to the second guideline, the therapist encourages the child to construct increasingly differentiated images representing the body tempos experienced and to use these images as "gears" or "transmissions" that regulate motility, smoothly shifting the body from one tempo to another slower or faster one. For example, if a child associates to a turtle in representing his experience of moving slowly, he could eventually add the image of a snail, which moves more slowly yet. Or the child could differentiate the image of a turtle, in articulating that a turtle can move slower and faster than "his regular way". These images are then employed in subsequent stages of therapy as the *cognitive regulators* of tempos. For example, the therapist says "turtle" and the child assumes a tempo as he walks along a pathway; than without warning the therapist says "snail," and the child is to change tempos while continuing his walk.

As with Program 1a, the therapist may find it necessary to offer images to teach the child that tempos can be represented in fantasy. Here, too, it is helpful to select images as illustration for the child that draw on the child's unique history and life situation.

When working with the child in the task of "building" images, care should be taken to accept the child's representation even if it appears inappropriate to the therapist. We have observed hyperactive children who associate to a horse or lion when moving as slowly as they can. The therapist accepts the representation and works with the child in differentiating the image. For example, the child would be asked to pretend being that horse in walking across the room "regular," "fast," and "slow." When the child has achieved some degree of differentiation in *his body motility,* the therapist can encourage the search for another animal that moves slower (or faster) than a horse. In this way the child's pool of representations is elaborated, beginning with those he constructs first.

Verbalizations and body postures assumed by the therapist often serve to emphasize and further articulate the feelings and sensations experienced by the child, especially in contrasting one tempo with another. The therapist should also be alert to the "issues" the child is proposing for negotiation in the course of treatment, as discussed in Chapters 11 and 12. Verbalizations made by the therapist should suit the cognitive status and chronological age of the child and the nature of the relationship. If space in the therapy room permits, the distance the child traverses in the first four parts should be at least 15 feet, preferably longer.

When introducing this program, include in the first session at least a few experiences defined below in both Parts I and II. Say to the child, "Jimmy, today we are going to work on a game called *Moving Fast and Slow.* Watch me. First I'm going to walk across the room in my regular way." (demonstrate) "Now you try it." (child walks) "Fine. Now I'm going to walk slower than my regular way. Watch me." (demonstrate) "Now you try it." Typically children who require this program show little or no difference between "usual" and "slow" tempos. Do not bring attention to this in the early phase. Once the child has performed, following your demonstration, ask him to walk across the room again at a regular tempo and then construct a representative image. This is repeated, having the child walk slower than the regular tempo. As the instructions below indicate, the therapy continues differentiating these tempos more and more, and bringing to the child's attention, at first in a variety of nonverbal ways, the body sensations, the passage of time, and the speed of each tempo.

Part I. Moving Through Open Space at Regular Tempo

Ask the child to walk from one wall of the room to another wall or to a designated point, "in your regular way," demonstrate as needed. As the child performs, do not yet mention that he has been wandering in a circle, for example, or moving from one wall to the other by means of a very indirect route. The focus should be to bring to the child's attention his "usual" tempo and the body sensations experienced. Ask the child to articulate with words and gestures his sensations experienced. If a child wanders through an indirect route, gradually assist him in walking directly from the start to the end point. If the child understands numbers and time, use a stopwatch to time the walk and record the time taken. Save the time sheet and have the child examine it at each session when a new time is recorded. If the child does not understand time, the therapist can count aloud as the child walks, to bracket the time span used by the child to traverse the room. Begin training the child in constructing images associated with his motility and "usual" tempo. Care should be taken throughout this phase not to generate the idea that a fast tempo is "good" or "bad." The task is to help a child discover, cognitively and experientially, his unique, "usual" tempo and the body sensations and images associated with them.

Part II. Moving Through Open Space More Slowly than Regular Tempo

This task is usually introduced during the same session as Part I. However with children who show severe difficulty in tempo regulation it may be necessary to spend several sessions on Part I alone. To administer Part II, ask the child to walk from one wall to the opposite wall, or to some designated point in the room, as slowly as possible. Once again, focus on the body sensations the child is experiencing as he attempts to delay his body tempo. Point out the body sensations related to “wanting to move forward” and the sensations experienced in delaying this movement and in trying to hold back. Again record the time taken and have the child compare one time with another. It is sometimes helpful if the therapist provides a model by having the child walk alongside, taking a step when the therapist takes a step. With each step the therapist says “slow . . . slow . . . slow,” providing a cadence. It is also helpful at times to introduce an element of competition by asking the child to walk alongside the therapist to the end point, saying that the last one to reach the end “wins.”

When dealing with this task, young and older children impaired in regulating body motility often show various and unique body postures and movements that seen to be the first global attempt to translate regulating a “slow tempo” into behavioral terms. For example, some children walk, stop, remain still, walk again, and stop, and have a difficult time maintaining continuous forward motion. Other children maintain forward motion (often as fast as their “regular” tempo or faster), but they hunch their bodies and stoop over. Others show “peculiar” gaits, such as a camel walk or the sway of a “sailor’s gait.” These behaviors are understood on the one hand as reflections of the ego’s inability to organize behaviorally a smooth slow tempo and, on the other, as the ego’s attempt to translate the cognitive demand of “slow” into behaviors that would produce that tempo. The behaviors, postures, and gaits a child reveals when attempting to walk slowly should be gradually articulated and described so that the child becomes aware of these behaviors. Again, the therapist engages the child in constructing images representing the various gaits and postures experienced and in elaborating, differentiating, and modifying them. For example, one boy, when managing the task of walking slowly, used a stiff-legged, jerky walk to which he eventually attached the image “chicken walk.” Gradually, he involved himself in trying to move his legs smoothly and slowly “like a turtle.” As he showed changes in his leg movements, he introduced a modification of the image representing his walk.

Once the child has settled on an image representing his slow tempo (e.g., cow), the therapist asks the child, over a number of sessions, to walk “your regular way like a horse” and “your slow way like a cow,” allowing the child gradually to differentiate two tempos behaviorally. In this phase of the treatment the goal is to stabilize the images “horse” and “cow” and bind them with the respective associated body tempos. In asking the child repeatedly to experience the image and related tempo, we assume that the cognitive schema or image is becoming firmly attached to and in control of the tempo in question.

Music, metronomes, drum beats, counting out loud, and so on, may also be used to help the child establish a tempo slower than the “regular” tempo. If this technique is employed, the therapist would gradually eliminate the external cues asking the child "to think the music and walk to it." If a child has constructed an image of a ticking clock while walking to a drum beat, for example, it is very helpful to invoke that image in asking the child "to walk like that clock ticking; think of the clock ticking and walk like it." The ultimate goal is to establish regulation of a slow tempo under the direction of "a cognitive cadence" and without the assistance of external cues.

In the latter phase of Part II the therapist should initiate more often asking the child to experience the regular tempo, then the slow, and to compare the experiences. As the child cultivates a slow tempo and associated imagery, and compares these with the regular tempo and associated imagery, he should begin to get an *emotional and cognitive* sense of the control he holds over his body—that like an engine, with its gears, he can regulate his body and have it go as slow or as fast as he decides. The child is asked, for example, to do his "horse walk"; then at some later time his cow walk and his turtle walk.

If the child executes tempos that are consistently different, cognitive image and body tempo have been integrated, and cognition now controls and regulates motility. When this has been achieved to some degree, the child is ready to develop varying degrees of delay.

DEVELOPING DEGREES OF DELAY

Once the child has established a stage-appropriate degree of regulating slow body motility, the therapist introduces the task of cultivating *several* "slow" paces (i.e., differentiating degrees of delay). Again, it is helpful to use names of animals as cognitive guides. The therapist begins with the tempo and associated image the child has defined as "slow" (versus regular) and asks the child to walk "a little bit slower than the cow walk," or "a little bit faster," if the child has, for example, evolved a very slow "snail walk" as his slow tempo. At the same time the therapist asks the child to think of an animal (or object) that moves a little bit slower (or faster) than the animal or object used as the original referent for slow.

It is helpful to record the times taken by the child to walk the distance while pretending to be a cow and then a turtle, which the child has identified as the slower walker. If the child understands time, he can examine the times recorded over a number of sessions and determine whether he is in fact walking more slowly as a turtle than as a cow. If a child does not understand time, the therapist can count as the child walks and when necessary point out, for example, that the child needs to move a little bit more slowly to walk like a turtle, which is slower than a cow. As the child works on differentiating degrees of delay from his typical slow pace, the therapist continually brings the child's attention to the proprioceptive and kinesthetic sensations unique to one tempo and contrasts them with those of the other. The therapist should also continue to encourage the child to construct images and recall associated experiences.

Once the child has differentiated and stabilized a slower tempo (turtle walk), which he reliably distinguishes in performance from his previous slow tempo (cow walk), the therapist asks the child to differentiate a third, slower tempo with its cognitive representation (e.g., snail). The work should continue in this manner until the child can reliably differentiate in motility at least three tempos slower than his regular tempo. This goal is compromised of course, by the age and clinical status of the child. With children between 3 and 5 years of age who are very hyperactive, it is sufficient to achieve one tempo slower than the regular before proceeding to the next phase.

Part III. Moving Through Open Space More Quickly than Regular Tempo

In general the procedure described in Part II is followed here. Begin by asking the child to experience his regular tempo, and its related image, a number of times. Then ask him to walk just a little bit faster and again cultivate related images. As with Part II, music and other sources of rhythm can be used initially to help the child experience a tempo that is quicker than his regular one. The external cadence should gradually be withdrawn as the cognitive image becomes the pacemaker more and more. This phase of the therapy should continue until at least one tempo (and its related image), quicker than the regular tempo, has been stabilized. Again it is preferable to differentiate more than one "fast" tempo. With some very hyperactive children we have found it effective to first train in differentiating fast tempos and then, benefiting from this cognitive advance, train in differentiating slow tempos.

Part IV. Moving Through Free Space Shifting from One Tempo to Another

In this phase of the treatment the therapist combines tempos and their associated images constructed in Parts I, II, and III, and emphasizes the experience of change from one tempo to another. In this way further differentiation, regulation, and modulation of body tempo are achieved. The general procedure is to ask the child to engage in one tempo and then to change to another, without advance notice, at the therapist's request. At first, pair the child's regular tempo with his slow tempo (or regular with a fast). For example, the child would be asked to walk across the room with his usual walk ("like a horse"); then at some point the therapist says, "Now change to the cow walk," and later the therapist says, "Now do your horse walk." With some children, the therapist initially may forecast the tempos to be engaged. In addition, the experience could also be repeated, with the child deciding and announcing in advance the tempos he wishes the therapist to request. Gradually the child is asked to respond without advance notice and only to the cue of the associated cognitive image. As the child shows cognitive mastery over shifts from the regular tempo to slow, or to fast tempos, more complex combinations can be introduced, such as shifts from one slow tempo to another slow tempo, in keeping with the child's developmental status and clinical needs. With a child who has particular difficulty differentiating and shifting tempos, music may be used as a guide, but again the goal should be to help the child regulate and change tempos without the aid of external cues. In general, each new combination of tempos introduced by the therapist should represent a developmentally higher level of regulation than the previous one.

These therapeutic experiences, which emphasize *changes* in tempos (i.e., interruption, reorganization, and regulation of some body tempo and rhythm) frequently stimulate a new set of associations in the child that gradually describe experiences suggesting discordance and conflict between the caretaker's rhythm and tempo and that of the child. Much useful therapeutic work can be done at this time. For example, one 8 year old, a very hyperactive boy, showed that he was very stressed by the task of changing tempos. While engaged in this phase of the program, he gradually introduced a series of new associations, which when integrated could be characterized as follows: "From the time I got up, to the time I fell asleep, my mother was doing three things: rushing off to classes in college, driving somewhere to do an errand, or talking about what her professor said in class." These associations refer to a one-year period in this boy's life (the fourth year) when his mother returned to graduate study. They suggest that an important disruption took place in the rhythm between himself and mother, which the boy assimilated and attempted to manage; this disruption represented the psychologically absent mother as moving about rapidly and out of phase with the boy's tempo.

Part V. Moving Through Space Defined and Limited by Objects in Space

Part VI. Moving Through Space Defined and Limited by a Pathway on the Floor

Both these parts of the program serve to introduce the first restrictions in space through which motility is regulated. Parts I through IV are viewed as providing the child with experiences in regulating motility in macrospace (i.e., all the space in the treatment room). With Part V the first step is taken in moving along the developmental line of space, from regulating motility in macrospace to regulating motility in microspace (i.e., space represented by a sheet of paper). Up to this point the child has been regulating motor tempos while moving through any sector of space he chose. With Part V the child is asked to move through *designated space* defined by three-dimensional objects—for example, chairs, desks, books, wooden blocks, dolls, which are set, in pairs and rows, with some distance between them, to delineate the space through which the child is to move. The therapist first introduces a wide (about 5 feet) linear pathway, then gradually narrows the space bracketed by the objects. The therapist should also gradually change the pathway the child follows from a linear pathway to a C-shape, then to an S-shape, and there should be increasingly complex definitions of space. The length and complexity of the pathway are of course determined by the stage and developmental needs of the child. With each of these pathways, the therapist in general follows the procedures of Parts I through IV in establishing and differentiating regular, fast, and slow tempos, with related images, and in working with reactions and associations produced by the child.

In this phase of treatment the therapist can covary two dimensions: the combination of tempo changes the child is asked to experience, and the degree of restriction imposed in the space through which the child moves. Artful orchestrating of these two dimensions should provide the child with growth-fostering therapeutic experience at a higher level of development concerning body ego and tempo regulation.

HANDLING EGO REGRESSION AND RESISTANCES IN RESPONSE TO CHANGING TEMPOS

We have observed that ego regression and new resistances frequently characterize the functioning of a child when Part V is introduced and space is restricted and defined. For example, one child, who had mastered Parts I through IV in developing stage-appropriate regulation of various tempos, frequently stumbled and fell when asked to regulate motility through defined and restricted space. Another severely hyperactive child, having gained some ego mastery over regulating various body tempos, frequently asked to go the bathroom when the task presented a restriction of space, and on a few occasions, in the early phases of Part V, experienced several wetting accidents. The mismatch that is represented by the child's level of cognitive competence and the newly introduced restrictions on space often results in a heightening of stress and anxiety, which in turn is viewed as producing regressions in ego competence. For other children the increased anxiety and stress leads to new resistances. The child may refuse to "play the game," insist that the game be played in the old way, or angrily topple the objects set up by the therapist to define the pathway. In working with ego regressions and resistance, the therapist makes every effort to relate these behaviors to the stress created by restrictions on space. As discussed earlier in the section on managing resistance (Chapter 12), the therapist should make connections, whenever possible, between the new task demands and aspects of the child's everyday world. For example, the therapist could point out, "I'll bet you feel the same way when you have to sit in one part of the classroom, or walk in line from one room to another." As the child stabilizes connections between the stress he feels in treatment and the suffering he experiences in the classroom, he can be helped to see that mastering restricted space in the office will relieve the suffering experienced in school.

Relative to Part V, Part VI restricts space further and makes additional demands of cognitive regulation of motility in defining space more representationally by tape or string placed on the floor. When the child has shown appropriate cognitive development in managing space restricted by objects, the same procedure is followed using a pathway defined by tape or string.

Part VII. Moving Objects Across the Surface of a Table

The child who has shown appropriate cognitive development in mastering the preceding phase is ready to experience regulating motility within the space defined by the surface of a table. The same general procedure is followed replicating Parts I through VI. The child is asked to move a toy car (or some other suitable object) across the table at regular tempo, while constructing images. Then other vehicles or objects are selected by the child as representing slower and faster tempos. In this way tempos are differentiated and related to images but now experienced within the microspace of a table top.

Gradually the therapist shifts from the use of "free space" involving the total table top to very specific pathways, first defined by objects, then by tape or string. As space is restricted, the therapist phases in the task of changing the movement of a single object through various tempos. It is sometimes useful to begin this part having the child stand at the table, then eventually sit.

Several higher developmental levels of the cognitive control in question are introduced in this phase. The child is required to subordinate total body motility through space. In addition, he is representing his body motility in the movements of the object used. The domain in which the child experiences regulation of motility is now shifted more toward "space in microcosm." As always, the therapist should be alert to new ego regressions and resistances that must be worked through.

Part VIII. Moving a Pencil Across a Sheet of Paper

In the last phase the child experiences the regulation of tempos (regular, fast, and slow), the differentiating of tempos, and changes in tempos while moving within the microcosm of space defined by a sheet of paper.

The therapist should prepare sheets of paper on which are drawn linear, U-shaped, and curvilinear pathways. The general procedure described for the preceding parts of the program is followed. The child is asked to draw a line with a pencil from one end of the paper to another ("free space"), then from the start to the end of a linear pathway, and then through various curvilinear pathways, at his regular tempo, slowly, and fast. The child is asked to construct associated images and to direct his attention to the kinesthetic and proprioceptive sensations he registers in his total body and in the arm and hand moving the pencil. Then, as before, these tempos are differentiated, as are the associated images. If the child has participated from Part I to this phase of the program, he may make use of the same imagery. Here the therapist might point out, for example, "The cow can walk slow even in a very small space." In keeping with the child's performance, the pathway traversed is gradually made more complex in combination with the differentiation of tempos and with changes in tempos introduced.

As we considered in the preceding parts of the program, further restriction of space through which the child is asked to move frequently produces ego regressions and new resistances that should be worked with until the child can modulate and regulate several "slow and fast" tempos and changes from one to another.

This phase of treatment represents further shifts to higher developmental levels concerning the regulation of motility. Body movements are now subordinated maximally. The pencil is now representing the total body, and the sheet of paper, the macrospace of the room or playground.

During this phase of the treatment program, the therapist should become active in drawing connections for the child between his various experiences in treatment. The therapist relates the contemporary experience of moving a pencil across a sheet of paper to the child's experience in moving a car across the table top, to his experiences moving his total body through the room along defined pathways, and in free space. This work is facilitated by asking the child to recall the images he used to represent movement during each of these phases and to recall particular therapy experiences, with their associations and discussions. These now serve as points of condensation, reflecting both the child’s unique difficulties in regulating motility and his mastery of them.

An example is provided by the child discussed earlier, who frequently stumbled and fell during the earlier phase of this program. Over the course of treatment this boy articulated the cognitive-emotional backdrop of this behavior in the many representations he assigned to his body experiences. These representations included unstable objects in the home that frequently toppled (a lamp), TV programs involving the Three Stooges stumbling about, and finally his father, who stumbled about the house when intoxicated. During the last phase of treatment, this child sometimes dropped his pencil or drew a line that swerved off the pathway. The therapist was able to help the boy see that his pencil, which he was controlling, was acting like the Three Stooges and that he was doing with his pencil what he sometimes did when he walked across the room.

Another boy during the early phase of treatment included “a chicken taking small steps” in his images representing “slow” and “a cheetah who broke his legs” representing “fast.” He was observed in the last phase to make jerky, steplike lines when trying to move his pencil slowly along the maze, and he would stop before reaching the end of the pathway. This behavior was gradually brought to his attention and related to the earlier body experiences, images, and discussions about the fear of bodily harm and the use of inhibition in approaching the demands of learning and knowing, which were emotional fibers in his regulation of motility.

Establishing such connections provides the child with a complex set of thoughts, images, and memories of body experiences articulated and shared in the treatment room. This configuration represents a form of insight or understanding that is available to the child to guide and direct future regulations of body tempos in various real-life contexts. Establishing connections between *contemporary* body regulation experiences and fantasy, images and words provides the glue that binds cognitive schemes (fantasies of animals, spoken words) to body regulation, thereby giving cognition control over kinesthetic cues and body motility.

During each phase of the program the therapist invites and encourages the child to draw relationships between the ongoing experience, with its definition of space and set of requirements, and situations in real life, especially those involving school. For example, the transition from regulating the body in free space to regulating the body on a pathway, to regulating motility on a desk top, and finally on a sheet of paper, can be related to the transition from the playground, to the school corridors, to the classroom desk, to the workbook assignment. In this way the therapist should be active in training the child to generalize his experiences in the treatment room to related reality experiences requiring the cognitive control in question.

With severely hyperactive children, who show major lags in body ego, we have found that it is useful to begin this therapy outdoors, where the same procedure described in Part I can be followed. The first restriction of space occurs when the treatment shifts to a therapy room.

When a child shows the capacity to regulate several tempos, and changes among tempos, which are securely tied to words and fantasied images, and when he can to some extent generalize aspects of his treatment experiences to his environment, especially the school situation, he is ready to move to therapy at the next higher level, focal attention.

Group Administration

We have found that Programs la and lb require a therapist and cotherapist in group administration if the group is made up of seven or eight children. Much use can be made of the group context to achieve the goals of this treatment program. For example, as the group members walk from one end of the room to the other at regular tempo during Part I, the therapist gradually teaches the children to notice that some reach the end sooner, that their regular tempos differ, that all children differ in modulating tempos, that one tempo is not good or bad, and that the task for everyone is to learn to move at different tempos for different situations, so that they can run as fast as they would like in the playground, yet be able to sit and finish their workbooks when in the classroom.

Some members of the group can be asked to regulate a particular tempo while the others observe, with the observers articulating the behaviors for the participants. The roles can then be reversed. In addition, if the age and skills of the children permit, we have found it helpful to have one member record the time taken by another child to regulate a tempo or call out the tempo the rest of the group is to regulate. The children also benefit from learning each other's images representing a tempo. In this way John's slow walk as "a turtle" can be compared with Jimmy's as "a cat." A discussion of the differences observed is often helpful in assisting the children to differentiate cognitively the concepts "slow," "fast," and "regular."

CONCLUDING NOTE

With some children it may be advisable to combine aspects of the techniques concerned with body ego and body regulation (Programs la and lb, respectively). For example, if a child is asked to move his arms from his side to the front or overhead, he might then be asked to perform this task at various tempos. In our experience, young children, or children who are severely impaired in body regulation, may need to experience four or five months of four half-hour sessions per week with body ego and body regulation. With children less impaired in body regulation, we have found that a month or two is sufficient to permit effective therapy at the higher levels.

If a child has not made sufficient gains in body regulation after five months, the therapist can introduce therapy in focal attention while still devoting a portion of each session to therapy in body regulation.

COGNITIVE THERAPY WITH THE FOCAL ATTENTION COGNITIVE CONTROL

To benefit from the programs designed to promote the development of focal attention, a child should have achieved—in the course of his development or with the assistance of Programs 1 a and 1 b—stage-appropriate levels of body schema and the regulation of body tempos. The experiences provided by therapy programs in focal attention represent a major shift along the development line (proximal-distal) from the body to the external world, as the primary source of information. With the developmentally earlier programs concerning body ego-tempo regulation (Chapter 13), the child's attention is repeatedly directed to kinesthetic and proprioceptive cues and related imagery and feelings. With the focal attention programs the child's attention is repeatedly directed to, and he is asked to manage and regulate, information (e.g., moving targets, the length of rods) more distal to and outside the body-self. In addition to representing this shift in source of information, the programs in focal attention represent an increase in the differentiation of self from world.

Two programs of therapy are employed for children who show deficit or lagging focal attention functioning, each emphasizing a particular aspect of the process of this cognitive control. The program *Follow Me* provides experiences in sustaining attention on information that moves through space (passive tracking), an attentional activity that is viewed as representing an early phase in the development of focal attention. The program *Which Is Big, Which Is Small?* gives the child experiences in directing attention actively at information (active tracking), a component of focal attention that emerges from passively following information. With active tracking, the intention to articulate and register the properties of information dominate, as does the active pursuit of information.

PROGRAM 2a.
FOLLOW ME

PURPOSE

To provide experiences directing and sustaining visual attention while tracking moving targets (passive attention deployment).

GOAL

To promote sustaining visual attention (focal attention).

MATERIALS

Any object can be presented as a moving target, for example: toy animals, animal hand puppets, toy vehicles, dolls, colorful wooden blocks, unpainted wooden blocks, a ball, a flashlight. The objects should vary in terms of the extrinsic interest value they provide from items the child selects and finds "very interesting" to those he indicates are not "fun to look at."

GENERAL CONSIDERATIONS

In this program the child is asked to follow with his eyes a target the therapist moves through space. The therapy experiences vary along three dimensions: (1) the distance the target moves through space (from narrow to extensive), (2) the nature of the target pursued (from objects that are extrinsically interesting to objects that are extrinsically of less interest), (3) the modalities permitted the child in following the target (from the total body pursuing and tracking the target, to body and head remaining stationary with only the eyes tracking the target). Table 1 summarizes the steps in this program.

Although described separately, the three parts to this program should be administered simultaneously. To provide the child a series of developmentally ordered experiences, the therapist selects at each phase in therapy some combination of levels concerning type of target, mode of tracking, and distance tracked that best suits the unique makeup and needs of the child.

TECHNIQUE

At the start, the therapist begins with a target that the child has been asked to select. The child is told that in the game *Follow Me,* he is to follow something, keep track of it, keep his mind on it, as it moves about. He is then asked to select an object from several made available. While standing before the child, the therapist takes the object in one hand, moves it slowly from the far left to the far right, and in the reverse direction, asking the child to walk along and follow the object and to keep his gaze fixed on it. Very young children, and those with severe difficulties in directing and sustaining attention, may walk along but direct many brief, erratic glances at the object. The therapist should encourage the child to maintain continuous visual contact with the target. If the child's age permits, this can often be done successfully by animating the moving target saying, for example, "Look at me, Jimmy, I'm Leo the Lion. Watch me, follow me everywhere I go."

From the child's initial handling of the first administrations of tracking, the therapist plans the progression of subsequent administrations in terms of the following three parts.

Table 1. Summary of Steps in Cognitive Therapy with the Focal Attention Cognitive Control of Passive Tracking: Follow Me

Visually Track a Moving Target: Three Techniques Are Integrated Throughout Therapy

Part I. Modes of tracking moving target.		
	Step 1.	Child walks alongside moving target while visually tracking target.
	Step 2.	Child stands and visually tracks moving target.
	Step 3.	Child sits and visually tracks moving target.
	Step 4.	Child sits, holds head still, and visually tracks moving target.
Part II. Distances traveled by moving target.		
	Step 1.	Short distances.
	Step 2.	Gradually increasing distances.
Part III. Types of target tracked.		
	Step 1.	Object selected by child as interesting.
	Step 2.	Object designated by child as uninteresting and stressful.

Part I. Mode of Tracking

Initially the child is asked to walk along and follow the moving target. Emphasis from the start should be placed on the child's maintaining continuous visual contact with the moving target while walking. Then the child is asked to remain standing and to follow the target with his visual gaze. He is permitted to turn his body and his head as needed. In the next stage of therapy, the child is asked to remain seated and to follow the target with his visual gaze and his head. In the last stage of this progression the child is asked to sit, maintain his head in a forward position, and pursue the target only with his visual gaze.

Part II. Distance Traversed by Object Being Tracked

At first the child is asked to track an object that is moved by the therapist, while standing before the child, in a horizontal pathway of about 5 feet from the far right to the far left and in the reverse direction. Other pathways and directions are added, intersecting the person of the therapist: *(a)* from overhead, in a straight line, to the knees and back again; (*b)* diagonally from top right to lower left (and in the reverse direction) and from top left to lower right (and in the reverse direction); and (c) in a circle, from overhead to the far right, across the knees, to the far left, and overhead again.

In the next step the therapist begins walking with the target to increase the distance traveled by the object being tracked. The distance should be increased gradually, from 10 feet, then to 15 feet, and so on. As the distance traversed is increased, the therapist may move the target along a linear pathway, then up and down, defining a curvilinear pathway.

In the final stage, a flashlight is used to direct a spot of light which the child tracks across the walls, ceiling, and floor of the room.

Throughout this progression the child is encouraged to sustain his visual attention on the moving target. This is facilitated by manipulating the target and asking, "What is the light (doll, etc.) doing now?"

We have observed that for some children who lag significantly in sustaining attention, the progression described must be altered. These children tend not to look at the face and eyes of the therapist. Often their histories suggest that parents and caretakers have related to the child with considerable anger and irritation, and many demands.

The therapy, therefore, begins with the tracking of objects far from the therapist's person. In addition to using a spot of light, a clothesline can be set up from one wall to the other. Objects are then clipped to the line and moved across the room. Gradually the therapist locates his person closer to the target. And in the last step the therapist holds the target, asking the child to track the target as it passes across the therapist's face and person. When the child is able to sustain attention on an object held by the therapist, the therapist can begin the procedures already described and, holding the target, move it through increasing distances.

Part III. Changing Target Used in Tracking

Two lines of consideration guide the choice of targets used in tracking. The goal is to facilitate a shift (1) from much anxiety and stress in looking at particular objects to less, and (2) from little vigor and pleasure in sustaining attention on objects that are extrinsically uninteresting to more vigor and pleasure in sustaining attention on uninteresting objects.

While prescribing the distance the target moves and the mode with which it is tracked, the therapist systematically varies the objects used as targets. The therapist begins with a target the child selects, presumably because it is "interesting" (e.g., a favorite toy animal, doll, toy truck) and gradually changes targets, using objects that provide less and less extrinsic interest (e.g., plain wooden blocks, a printed letter). The goal is to help the child direct and sustain attention on information that has little or no particular extrinsic interest (see Chapter 11).

This sequence has been reversed for children with severe lags in focal attention who have been observed to track a wooden block for 10 seconds, for example, but to give only split second, anxious glances to a doll or puppet the therapist is using as the target. With these children it appears that focal attention and the information it engages do not operate outside intrapsychic conflict and anxieties involving the perception of persons. These children are presented initially with a target that for them is "neutral" or "conflict free"; gradually the therapist introduces targets that are anxiety arousing.

Dimensions of targets, as well as interest to the child, can be varied to meet the unique needs of children with focal attention deficits. The following examples of targets we have found effective for particular children are suggested here to encourage the therapist to innovate targets for each patient. (1) The initial target is the lid of a cooking pot 12 inches in diameter. Gradually the size is decreased until the target is a marble held between the fingers. (2) A wooden cube is attached to a stick. The child is to track the side of the cube presented him. As the cube is moved through space, the therapist rotates the stick and cube, presenting another side to the child. The sides of the cube can be painted different colors; numbers, letters, or pictures of animals can be tacked to the sides of the cube. The child is asked, while tracking the cube, to call out the name of the color, letter, animal, or number presented. This device has been very effective not only in helping children sustain attention but in providing a means by which the therapist can determine if the child is “seeing” and “registering” the target. For children who do not know numbers, letters, and colors or for whom these are stress-arousing stimuli, the sides of the cube can be painted black and white in a checkerboard fashion. One side can be painted white, another divided into halves (black and white), another thirds, another fourths and the child calls out, for example, the number of squares.

In our experience, all children administered this therapy program show anxiety and stress while attempting to sustain attention on a moving target, the degree of anxiety and stress varying according to the target used. For some children anxiety is less with targets such as wooden shapes and more intense with dolls, puppets, and animals. With other children the reverse holds: anxiety and stress are lower while tracking and sustaining attention on animals, dolls, and so on, and higher when looking at targets with no particular meaning or interest for the child (i.e., geometric shapes).

The same relationships concerning degree of pleasure experienced when sustaining attention have been observed. On first observation children severely impaired in focal attention frequently appear to experience no pleasure but only stress when asked to sustain attention. On closer observation they reveal subtle differences and shifts in affect in response to types of objects used as targets. Accordingly, one of the first tasks of the therapist, in addition to determining the child’s mode of tracking and the target’s pathway and distance, is to determine which class of targets tends to arouse pleasure and which anxiety or stress. This is done by asking the child to select targets and introducing others. As noted earlier, the therapist typically begins with a target that provokes little anxiety or stress and arouses the most pleasure, gradually introducing other targets that arouse more anxiety or less pleasure. In this way the therapist brings into the treatment situations, for therapeutic work, not only the cognitive control function of directing and sustaining attention but also the affects of anxiety and pleasure that accompany, disorganize, or facilitate the function. The goal is to facilitate awareness and mastery of the tensions and the flight behaviors triggered by tensions, and to promote an increase in positive affects while directing attention at information with much or little interest value.

THE TREATMENT PROCESS

As the therapist artfully combines mode of tracking, the distance the target travels, and the type of target, the therapeutic work involves asking the child repeatedly to notice and describe his attentional behavior and his general behavior. This work parallels that described in the earlier programs, *Who Is Me, Where Is Me ?* and *Moving Fast and*

Slow, and it is a hallmark of cognitive therapy. While moving a target, for example, the therapist may notice that the child looked away and "absentmindedly" gazed out the window or at a picture on the wall. The therapist pauses at this moment and asks the child to try to notice and describe what happened, "while you were trying to look at the puppet." As this is done over and over again, the child gradually becomes more observant of his behaviors while attempting to sustain attention. The therapist should not assume that the child is aware of even gross behaviors that take place during the act of sustaining attention. We have observed that a child may interrupt his attending, pick something off the floor, or take something from his pocket, and not be aware of the behavior until inquiry and discussion, initiated by the therapist, makes the behavior available to the child. In this process the therapist should begin by drawing attention to large behaviors (e.g., walking away) and gradually draw attention to smaller behaviors as the child increases his capacity for self-observation.

At first the therapist may select for discussion any behavior that has interrupted focal attention and appears "obvious" or easily articulated. Gradually the therapist should focus this work on the unique habitual coping style that is revealed by the child. When observed over many therapy sessions, some children show that they habitually blink their eyes while attempting to sustain attention in passive tracking; others direct a rapid series of dartlike glances, others run or walk away from the target, and still others keep the head and body turned away from the target while trying to keep the eyes on it. The therapist's task is to try to capture the habitual behaviors unique to the patient that represent attempts to manage the task of sustaining attention and the stress it arouses but also interfere with focal attention; then gradually these strategies are brought to the child's awareness.

When the child shows some capacity to sustain attention and to observe and describe accompanying behaviors, the therapist becomes active in asking the child to associate to, recall, and describe some behavior in school and home situations that is related to some behavior the therapist and child have just articulated. For example, the therapist could say, "That's right, Jimmy, you noticed again that you looked at the picture on the wall when you were following the square. Does that happen in school. . . ?" In the middle and later phases of therapy with this program, the therapist becomes increasingly active in elaborating connections between attentional behavior in the office and attentional behaviors in the classroom. This work should foster the child's awareness of his difficulties of sustaining attention in school. The work should also facilitate the child's transferring changes achieved in focal attention behavior from the office to the classroom.

As with other cognitive therapy programs, the therapist is alert to and actively works with ego regressions and resistances the child typically shows each time demands are introduced that require the organization of focal attention at a higher level. For example, after settling down and working with the task of tracking a target while walking across the room, a child may resist anew, refuse to work, run about the room, or become aggressive or silly when the therapist now requires him to sit and track the object, moving only head and eyes, or asks him to hold his head still and track only with his eyes. In handling these ego regressions and resistances, the therapist actively points out to the child that the new demand (e.g., “sitting down and paying attention”) is very difficult for him to handle—that, for example, he is kicking the chair because sitting and paying attention make him very tense, that this upset must happen in school, and that he can learn to sit and pay attention just as he learned to pay attention when the spot of light moved across the whole room.

We have observed that most children can reorganize focal attention in shifting from directing brief, erratic glances at information to sustaining attention over long periods of time on information moving through space. This reorganization of focal attention is achieved by the therapist’s encouraging and supporting the child to repeatedly sustain attention while the therapist skillfully varies targets, distance, and mode of tracking, providing for the child a developmental sequence of experiences involving acts of focal attention.

We have observed that in many cases this reorganizing of focal attention is facilitated by the children’s becoming aware, at least to some degree, of the unique ways they use to sustain attention in passive tracking, of the tensions they experience when directing attention, and of the coping styles they have developed to lessen those tensions by removing attention from information (e.g., blinking eyes, turning away).

Group Administration

We have found that the foregoing procedures require only slight modification for group administration. One therapist can work with three or four children, but two are needed for five or six, especially if they are hyperactive.

At the start each child selects a target, and the children learn one another’s choices. All children are asked as a group to track each target in turn. The therapist (and cotherapist) should be active in asking the children to notice the attentional and general behaviors of each child. In other sessions each child alone tracks each object while the rest of the group observes. Here the therapist becomes active in training the group members to notice the different coping styles unique to each child in response to various targets, modes of tracking, and distances. For example, the group would be asked if anyone noticed what Johnny did when he followed a cube versus a doll. If the children notice that Johnny turned his head away from the cube more often, the group could be engaged in a discussion of the purpose served by this behavior, and so on.

Group identity and alliance are often fostered by asking each child to take a turn carrying the target while the other members observe. This technique is also effective in handling group regression and resistance.

The group situation can be used in a variety of ways to serve the goals and purpose of the program. For example, when the children are asked to sit, hold the head still, and track only with the eyes, let each child choose a partner. While one partner tracks, the other stands behind and holds the first child’s head so that it does not move. They then exchange roles.

PROGRAM 2b.
WHICH IS BIG, WHICH IS SMALL? (WHICH IS MORE OR LESS? WHICH IS HEAVIER OR LIGHTER?)

PURPOSE

To provide experiences in focusing, sustaining, and directing attention when actively pursuing and comparing information.

GOAL

To promote active and extensive visual scanning (focal attention).

MATERIALS

Wooden rods set on stands, varying in length from 4 to 12 inches; marbles; clay; glasses filled with water and varying in diameter and height.

INTRODUCTION

In this program the child is asked to look at, actively examine, and compare two sets of information that vary in terms of height, weight, mass, volume, or number, and to indicate which of the two is taller (shorter), heavier (lighter), greater in mass, volume, or number (or less). The comparison and judgment the child is asked to make is the means used to supply repeated cognitive experiences involving the active pursuit of information. The goal is to promote the reorganization of the cognitive control of focal attention, so that the child habitually scans more actively and broadly. Thus when compared with the task of passively tracking information set before the child by the program *Follow Me,* the treatment program *Which Is Big, Which Is Small?* is viewed as setting before the child a task that requires cognitive functioning at the next developmental level, which calls for the active pursuit and examination of information. In asking the child, for example, to compare and indicate which of two rods is taller, the aim is not to train him to estimate accurately the relative heights of objects. Rather, the aim is to provide the child with an opportunity to actively scan and examine information. The child should show age-appropriate levels of sustaining attention and following moving information (passive tracking) before this treatment program is introduced. Table 2 summarizes the steps in this program.

GENERAL PROCEDURE

The materials are pairs of wooden dowels varying in height. The same procedure can be followed using marbles (so that number is compared), clay (so that mass is compared), beakers of water (so that volume is compared), or objects of varying density (so that weight is compared). The therapist selects the content of information to be compared that best fits the child's cognitive status. Five aspects of the presentation are systematically varied: (1) the distance separating the two rods, (2) the heights of the two rods compared, (3) the amount of time the child is permitted to examine the two objects or sets of information, (4) the type and degree of irrelevant, distracting information surrounding the information compared, and (5) the types of information compared.

Using the comparison of rods as the prototype of this program, the child is asked to compare two rods that vary considerably in size (e.g., one is 4 inches tall and other is 8 inches tall) and to point to the taller (or shorter) one. Gradually the difference in height between the two rods is decreased, requiring the child to direct more intensive, sustained visual examination of the information.

In terms of the second aspect of the treatment program that is systematically varied, initially the rods are set side by side. Gradually they are set farther apart, eventually as much as 8 or 10 feet. Moving the rods apart requires that the child maintain in memory, for a longer period of time, the height of the rods as he shifts his gaze from one to the other. Moreover, increasing the distance between the rods requires broader scanning.

In terms of the third aspect systematically varied, time permitted to examine the information, initially the child may be allowed to examine the two rods for as long as he chooses. Gradually the therapist asks the child to make his comparison and decision as rapidly as possible, trying to better his speed. This technique promotes more active scanning. These three aspects of the treatment program are considered separately in some detail.

Table 2. Summary of Steps in Cognitive Therapy with the Focal Attention Cognitive Control of Active Tracking: Which Is Big, Which Is Small?

Phase A. Direct acts of focal attention on two wooden rods: four techniques are integrated throughout therapy.	
Part I.	Judge the sizes of two rods located near together and far apart.
Part II.	Judge the sizes of two rods very different and very similar in height.
Part III.	Judge the sizes of two rods without and with time restrictions.
Part IV.	Judge the sizes of two rods without and with the presence of distracting, nonrelevant information.
Phase B. Directing acts of focal attention at sets of information increasing in complexity.	
Part V.	Steps in Parts I through IV are repeated. The two sets of information compared by directing acts of focal attention may include balls of clay, beakers of water, clusters of marbles, cards with letters, and geometric shapes and designs.

Part 1. From Rods Near Together to Rods Far Apart

Stand two rods, one approximately 12 inches tall and the other approximately 4 inches tall, side by side, about 6 inches apart. Say, “We are going to play *Which Is Big, Which Is Small?* Look at these two sticks (trees).” (If indicated, the therapist should give the rods a fantasy name that would appeal to the child.) “Which one is the big one?” Or, “Which one is the small one?” After the child has pointed to a rod, set cardboard screens before the rods and say, “Now the sticks are going to stand behind these walls. When I take the walls down, look at them again and point to the one that is big.” The therapist proceeds in this fashion administering a series of trials. During these presentations the left-right position of the designated rod is randomized (whether the taller or shorter one), encouraging the child to direct attention at both rods before making his response.

As the child shows that he can handle the task efficiently and with appropriate levels of anxiety and restlessness, the therapist moves the rods 3 feet apart. When this happens some children direct attention primarily at one rod and glance only briefly at the other. This behavior is brought to the child’s attention with appropriate comments, indicating that he must direct his attention at both rods as often as is necessary before making his choice.

When the child has shown that he can direct his attention more or less equally at each rod and successfully select the designated rod, the rods are located 6 feet apart. Following the same procedure, the rods are gradually shifted over a number of session—9, 12, and 15 feet apart, or farther if the size of the treatment room permits.

ACTIVE TRACKING WHILE HOLDING THE HEAD STILL

When the child shows that he is ready, the steps just outlined should be followed again, requiring the child to hold his head stationary, moving only eyes as he directs attention at the objects. If the child has been administered the program *Follow Me,* he may rely on past experience with holding the head still when this technique is introduced. If the child has no prior experience, explain that the game will now be played in a different way. He must now try to keep his head in the same position and still, moving only his eyes as he looks from one rod and to the other and decides which is bigger.

DEVELOPING SYSTEMATIC DEPLOYMENT OF ATTENTION

Many children who require this therapy program reveal that they direct their attention unsystematically. For example, the child looks at the 4 inch rod for 3 seconds, glances up at the ceiling, looks at the 12 inch rod for 1 second, looks at the therapist, looks at the far wall, looks again at the 4 inch rod, and so on. An important aspect of this therapy program is to promote in the child the habit of directing attention systematically, now at one rod, then at the other, then back to the first, for more or less equal lengths of time. As might be expected, these children are not aware of their style of attention deployment. One technique, therefore, is to point out how the child is managing the task of examining the two rods, that he glances briefly at one rod, looks at the floor, and so on.

As the therapist carefully introduces these observations, and the child shows that he can accept them and tries to modify his attentional behavior accordingly, the therapist gradually turns over to the child the task of observing his own focal attention behavior. For example, after administering a pair of rods the therapist asks the child whether he noticed his behavior and asks him to describe it if possible. If the child correctly reports that he looked up at the ceiling, ask him to reflect further to see whether he can retrieve other behaviors. If the child can recall only one or two behaviors that to the therapist are particularly relevant to the child's unique disability in focal attention, the therapist might mention one of his observations. For example, it can be pointed out to the child that after looking at the floor he scratched his shoulder, then turned his head to one side. Engaging the child in conducting this type of self-observation provides increasing awareness of the individual's unique behaviors that interfere with the efficient directing of attention. This increased awareness contributes to the child's re-forming his habitual way of directing attention actively at information.

Another technique that promotes change in the child's unique focal attention control involves using an aspect of the passive tracking technique described in the program *Follow Me.* When the child has become sufficiently aware of his tendency to direct his attention unsystematically at the two rods, he is told that a light will be flashed by the therapist now on one rod, then on the other. The child is to look at each rod as long as the spot of light is on it. The therapist further explains that this devise will help the child learn to direct his attention systematically at the rods and to gradually give up his habit of looking elsewhere.

The therapist then directs a flashlight beam at one rod for some number of seconds, then at the other for the same length of time, back again, and so on. This technique is employed for as long as seems necessary. When the child has demonstrated that he can direct and sustain attention with the help of the beam of light, the therapist suggests that the tasks be handled by the child without the aid of the light. Therapist and child continue to join in observing and discussing the child's behavior. If they agree that the light is still necessary, it is reintroduced for some number of sessions, then again omitted. The beam of light is used as often as necessary throughout the program to foster systematic directing of attention.

Part II. From Rods Very Different in Height to Rods Very Similar in Height

The dimension of relative height is varied in combination with the dimension of proximity of rods (Part I). As noted previously, the therapist initially places two rods, one 12 inches tall, the other 4 inches tall, 6 inches apart. We have employed rods varying in height from 4 to 12 inches in ½ inch steps. When the child responds correctly several times with the first pair of rods, the therapist replaces the 12 inch rod with an 11½ inch rod and presents the pair to the child. In this manner, over as many sessions as necessary, the difference between the rods is gradually decreased so that the child is eventually asked to select the taller (or shorter) rod when the rods examined are 4 and 4½ inches tall. The administration of the entire series may be repeated, with the 4 inch rod replaced by the next taller one, and so on, until the child is comparing the 11½ and the 12 inch rods.

When the child shows appropriately systematic and successful scanning with rods differing in height by a half inch placed side by side, he is presented the 12 and 4 inch rods paired again, but now standing 3 feet apart. The therapist again gradually decreases the difference in height between the rods by replacing the tallest by the next shorter one, or vice versa. The same procedure is followed with each of the other settings defining proximity from near to far (rods 6, 9, 12, and 15 feet apart).

Part III. From No Restriction on Time Given to Examine the Rods to Restricting Time

In the early phases of therapy with this program the therapist encourages and permits the child to direct attention at the rods until the correct rod is designated. Moreover the therapist helps the child develop the habit of systematically directing attention at each rod, as described earlier, taking as much time with each presentation as seems appropriate. When the child has developed efficient, systematic attention deployment and maintains it without the aid of the flashlight, the therapist introduces a restriction on the time the child has to survey the two rods. This can be presented to the child as a game and a challenge. Pointing to the child's progress and success in directing attention, the therapist notes that now the child is to decide which rod is big or which is small within a short period of time. The therapist may begin, for example, with a 20-second presentation, after which the screens that had been placed before the rods are raised. The child is then asked to indicate which rod is the taller one. Gradually the time of the display is decreased, as the child shows appropriate progress. At each step the therapist shares with the child the gains made, pointing out, for example, that some weeks ago the child required 30 seconds to compare 4 and 5 inch rods but now he makes the comparison in 5 seconds. Restricting the time allowed promotes more active attention deployment. The child tends more and more to direct a rapid series of visual acts at the rods under the stimulation of having a limited time to come to a decision.

Part IV. From Judging the Size of Rods with Little Surrounding Irrelevant Information to Judging the Size of Rods with Much Surrounding Irrelevant Stimulation; From Judging the Size of Rods in the Face of Distractions that Arouse Little Affect and Emotional Conflict to Judging the Size of Rods in the Face of Distractions that Arouse Much Affect and Emotional Conflict

This aspect of the program is viewed as a transition from therapy involving the cognitive control of focal attention to therapy involving the early levels of field articulation (i.e., selectively deploying attention at relevant information and withholding attention from irrelevant information). In meeting the task of estimating the height of two rods, the relevant information is, of course, the distance in space defined by the two ends of each rod, top and bottom. The color of the rods, the diameter or thickness of the rods, or materials surrounding the rods are irrelevant bits of information in terms of the task and intention of estimating the heights.

We have used two general classes of "irrelevant information." One concerns changing properties (other than height) of the rods used. The other concerns attaching information to the rods, or presenting information around or behind the rods. We have started the treatment using gray rods, 1 inch in diameter. When the child has developed his focal attention to a level where within a few seconds he can successfully direct acts of attention at two gray rods, nearly equal in length, and 12 or 15 feet apart, we introduce rods of different colors (red, yellow, blue, green) and diameters Q, 1, 2 inches). Here the focus of the therapeutic work is to gradually impart the notion that each cognitive task contains information that is both relevant and irrelevant in terms of the solution. This is illustrated by pointing out that the colors of the rods, or the diameters, have nothing to do with the length; therefore these properties are irrelevant information and should be ignored. A child can gradually learn and understand that he can intentionally withhold attention from some particular bit of information. The child can also come to understand that when dealing initially with a cognitive task, as with rods of different colors and diameters, one must make a conscious effort to ignore or withhold attention from some information. This is best done while the child is engaged in a contemporary experience provided by the introduction of the colored rods of different diameters.

Let us now take a closer look at introducing distractions into the treatment experience. Having dealt to this point with gray rods, 1 inch in diameter, when the child examines an 8-inch red rod, 2 inches in diameter, and a 7-inch blue rod, ½ inch in diameter, he readily notices the differences in color and thickness. Moreover, he usually finds this new information distracting and tends to have difficulty in judging which rod is taller. As already noted, it is in the context of such contemporary experiences that the therapist engages the child in becoming aware of the notion of irrelevant information (which is therefore distracting) in terms of the task solution and the notion that he can learn to withhold attention from irrelevant information and direct it only at what is relevant.

We have found it helpful during the therapeutic work to point out to the child, for example, that while he is looking at the therapist and listening to his comments about the color and thickness of the rods, he is not paying attention to the light switch on the wall or the doorknob. Children often experience a sense of discovery when surrounding information is brought to their attention that up to that moment had existed in the visual field but was not given attention. The therapist goes on to point out that if the child has the intention of opening the door or turning out the lights, the doorknob and light switch will become relevant and receive attention, and the colored rods will become irrelevant (i.e., attention will be withdrawn from them). Furthermore, the therapist explains to the child that he “automatically” withheld attention from the doorknob during the discussion of the rods—that he probably was not aware of “trying” to ignore the doorknob, yet he “automatically” withheld attention from it. The child is told that in a similar way he can learn to ignore the colors and diameters of the rods, at first being aware of his efforts to ignore them, but gradually withholding attention automatically and without awareness.

At this level of therapy some children can benefit from therapeutically timed comments that begin to help them understand “how we use our minds to gather information” and “how our minds control information.” We have found that after months of therapeutic work conducted in the context of contemporary cognitive experiences provided by this program, some children are ready to develop a meaningful understanding of “cognitive control over information.” They begin to understand that as our minds control the attention given to the color and thickness of rods while we examine the length, in the same way our minds control the notice paid to children walking around the classroom while we examine number problems in a workbook.

To recapitulate, during this phase of the program the therapist pairs rods of differing diameters and colors, while at the same time varying differences in length and the distance between rods. In general, the rods paired should represent a sequence from the presence of relatively little irrelevant information to the presence of much irrelevant information subjecting the child over and over again to the experience of trying to actively withhold attention from some information while directing it at other information. In constructing the progression of experiences, the therapist needs to learn which color and diameter combinations seem to represent for a given child little distraction and much distraction. The therapist may observe that his patient, whose color perception is quite adequate, is especially distracted when examining a blue rod and green rod, one 2 inches in diameter, the other ½ inch. The therapist would reserve these combinations for later and begin with the less disruptive color-diameter pairings.

As noted earlier, another way of providing experiences in directing attention actively and extensively in the face of irrelevant information involves attaching information to the rods or placing information around them. Almost any material can be used. In selecting distracting, irrelevant information, the therapist should try to use his understanding of the way in which cognition and affects interact for the patient. We have placed the following items alongside or behind the rods: toy animals, human figure dolls, toy vehicles, toy furniture, hand puppets, pictures of soldiers, policemen, children, and athletes; and various scenes depicting social interaction, affiliation, punishment, affection, and aggression. We have taped paper cutouts of letters, words, and geometric shapes to the rods. For a given child, one type of material may represent a low degree of distractibility (e.g., geometric shapes). Yet we may learn that as the same child associates to his experiences with this program (see section below on Work with Associations to Active Tracking) trying to direct attention to information on the blackboard in school, he tends to experience fantasies and memories related to the regulation of aggression in general, and to aggression associated with sibling rivalry in particular. In this case, one would gradually locate material around the rods (dolls, pictures) that more and more directly represent aggression and sibling rivalry. The therapeutic work conducted around the child's management of this "irrelevant," intrusive information would focus on resolving and mastering the affects and issues in question and on suppressing and repressing these affects and issues *while cognition is engaged in work.*

Both lines of work are critical if the child is to be aided in developing cognitive functioning (in this case, focal attention) that operates free of conflict and intrusive affects and issues. We have found that a child can learn, for example, that angry feelings and thoughts associated with sibling rivalry are as irrelevant to the task of estimating the length of rods as are the diameter and color of the rods. The goal is to promote efficient focal attention, which remains dominant over fantasies and affects when the task at hand requires a cognitive solution. As discussed in the section relating cognitive therapy and psychotherapy, more direct work with resolving emotional conflicts is usually postponed with cognitively impaired children until cognitive structures have developed sufficiently and are then available in working through the conflicts and constructing insights. The work just described involving affect-arousing distractions is similar to defense analysis in psychotherapy. That is, the child is taught what disrupts cognitive efficiency and how such distractions can be managed to permit effective focal attention.

Part V. The Use of Information for Comparison: From Three- Dimensional to Two-Dimensional and from Less Complex to More Complex

The procedure outlined in the preceding four parts can be used as the prototype for constructing cognitive tasks that better fit the level of cognitive complexity required by the child's stage of cognitive development and his unique therapeutic needs. We have found the cognitive task of comparing the length of rods to be useful as a means of conducting therapeutic work with the cognitive control of focal attention when children are young, or with older children who reveal marked cognitive immaturity. With older children or children whose cognitive functioning is more mature, the following materials and tasks can be substituted for the rods.

1. Present two masses of clay and ask the child to judge which is more (or less). Initially the two globs of clay are presented as spheres, one containing much greater mass than the other. Gradually the mass of one ball of clay is decreased (or increased), and eventually the difference in mass is very slight. At the same time, the shape of the two balls of clay can be altered so that one is a sphere and the other an ellipse or a flat circle, making the cognitive task to be solved (judging relative mass) much more complex.

2. Present two volumes of water and ask the child to judge which is more (or less). Two identical beakers can be used, with one containing much more water than the other. Gradually the difference in the water levels can be decreased. In addition, beakers varying in height and diameter can be used, with the water levels identical, or different, increasing the complexity of the cognitive task to be solved.

3. Two clusters of marbles are presented, one having more marbles than the other and both arranged to cover the same space. The child is asked to judge which contains more (or less) marbles. Gradually the color and size of the marbles and proximity of the marbles forming each cluster can be varied, increasing the complexity of the cognitive task to be solved.

4. Present two cards on which are drawn some numbers of lines, dots, circles, or glasses containing a liquid. The child is asked to make the appropriate judgment (i.e., which line is longer, which cluster of dots contains more dots, which circle has more mass, which beaker contains more liquid). In these presentations the child deals with information that is two-dimensional rather than three-dimensional as with the rods, marbles, clay, and beakers of liquid.

The therapist, of course, can design in the same way any presentation of information that best suits the needs of the child. With each type of information used, the same steps are followed with respect to the degree of distance between the two items, the time permitted to examine them, and the presence or absence of irrelevant information. It is emphasized again that the cognitive task is viewed as a means to an end, not as an end in itself. By repeatedly directing attention at rods, globs of clay, clusters of marbles, and so on, the child engages in a therapeutic experience aimed at promoting the development of focal attention (i.e., directing attention systematically, broadly, and actively at information) and increases his awareness of his unique experiences with focal attention.

Work with the Associations and Affects Produced by the Child When Engaged in Focal Attention

As has been discussed elsewhere, the therapist not only presents the child with developmentally ordered experiences in directing attention but has the task of bringing to the child's attention the affects, memories, and fantasies that are uniquely related to the experience of directing attention. As might be expected, children who are particularly deficient in focal attention and have settled on the habit of directing brief, unsystematic acts of attention at information, reveal a range of affects and associations when asked to engage in that very cognitive process. Some children show fear and anxiety as their characteristic affect accompanying attention deployment; others display anger and irritation, others silliness and erotic behavior. In terms of associations, children spontaneously associate—for example, to classroom situations, to struggles with reading, to the teacher insisting that they pay attention, or to a parent's criticism because they cannot find an item they have been asked to locate.

Regardless of whether the child volunteers memories and fantasies involving past experiences, the therapist gradually encourages him to describe what the contemporary experience with the rods brings to mind. These requests for associations should be more or less focused on the school situation and related experiences such as homework. Gradually the therapist helps the child to understand that if he looks away from the rods, or moves his body about while trying to judge which rod is longer, the same behaviors must take place in school when he is supposed to be looking at something the teacher wrote on the blackboard, and looking away and moving about interfere with judging the size of the rods and with registering what the teacher wrote. One goal, then, is to teach the child how the behaviors observed in the office are expressions of similar behaviors that occur in school.

This work also includes training the child to retrieve "internal distractions" that draw attention away from the task. The most appropriate moment in therapy to engage in this work occurs when, for example, the child turns away from the rods and starts looking at the floor, or stands up to get a drink of water. The therapist should point out that sometimes a feeling and some "pictures" pass through the mind at that moment, that we are not aware of what it is, and we have to work to catch it. The child is asked to reflect and try to capture what crossed his mind as he looked away a moment ago. Gradually some children cultivate the capacity to retrieve these "internal distractions" and share them. The meaning of these distractions can be woven into the cognitive task as noted previously. The goal here is twofold: to help the child learn that affects and fantasies occur when he is trying to pay attention and when paying attention creates stress, and to learn that attention can be withheld from these distractions.

The extent to which this type of therapeutic work can take place is a function, of course, of the child's ability to represent his affects and concerns and to give them expression in memories and associations. With children who show major neurotic conflicts as well as cognitive disabilities, considerable working through and conflict resolution can take place *in terms of conflict the child experiences between his cognition and the demands of the information.* We have found that children with major cognitive disabilities and relatively minor emotional conflicts can also learn to some degree that intrusive affects and associations do take place and that attention can be withheld from them.

Working with the Child's Resistance

The introduction of each level of focal attention functioning higher than the preceding one that has been mastered by the child frequently brings a new wave of resistance. In this program we have found resistance peaking when the bits of information to be compared are shifted from being located near together to far apart, when the information begins to differ only in some small degree, when irrelevant distractions are introduced, or when time to examine the information is sharply restricted. Each phase of resistance is actively worked through as described in the general section dealing with this topic. In terms of this program, the therapist points out, for example, that the child wants "to play a game instead of looking at those stupid sticks" because now the rods are farther apart (have toys next to them, etc.), making the task of directing attention more difficult and creating more stress, which the child typically handles by running away from the task. It is emphasized again that interpretive work with resistance focuses on the child's having to function at a higher level of focal attention.

Group Administration

We have found that the several phases described here can be followed in group therapy with children as young as 3 years old to adolescence, with modifications as indicated. The children are seated before the rods presented for comparison and the task is explained as needed. Initially all the children may point and shout as they indicate which rod they feel is the big one or the small one. They should, of course, be permitted to respond in this way. Gradually train the children to wait until they are called on. This provides experience in maintaining attention on the therapist and rods, as well as in waiting one's turn (i.e., not reciting before being called), in listening to others recite, and in learning to evaluate what is being said.

As the children learn to respond when called on, ask one child to make the decision about a given pair of rods. Ask the others to observe the child who is working and to react to the decision that is made. In this way conduct discussions to promote among the children increasing observance of the manner in which each one uniquely handles the task of directing attention. Behaviors unique to each child can be compared with behaviors already articulated by the group as facilitating or interfering with attention deployment.

It is useful to assign to the children various tasks that aid the therapist in administering the program. For example, one child could be given the task in one session of locating the pairs of rods to be presented; another child could be assigned to locate the distraction, and a third child might be the "watcher" (i.e., observer of relevant behaviors). In terms of the latter, it is often helpful to train self-observation in a group situation by asking each child, in turn, to be the observer, to report what behaviors are noticed that relate to active tracking.

In addition, the group situation can be useful as with the program *Follow Me* during the phase when the children are to direct their attention at the rods without moving their heads. The children can be grouped into pairs, each pair representing a team. One member of each team is asked to stand behind his partner, who is seated, and to hold his partner's head while the "tracker" looks at the rods. With other presentations, the children can exchange places. During the phase of therapy that decreases time allowed to examine the rods, an element of competition can be introduced by asking each pair of children in turn to make a decision about "which is big and which is small." A record can be kept of the reaction times of each team.

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COGNITIVE THERAPY WITH THE FIELD ARTICULATION COGNITIVE CONTROL

To benefit from the program designed to promote the development of field articulation, a child should have achieved in the course of development or with the assistance of the programs already described, stage-appropriate levels of body schemata and the regulation of body tempos and of broad and extensive scanning (focal attention). The experiences provided by the therapy program in field articulation represent a further shift along the developmental line from the body as the dominant source of information to the external world as the source. Moreover, experiences provided by the therapy program introduce a major emphasis in information (its complexity and organization) serving as "nutriment" for elaborate cognitive activity and for increasingly differentiating cognitive schemata (see Chapter 11).

In general with therapy in field articulation, the child surveys a field of information that is more complex than that managed in the programs of focal attention. This field of information contains many bits of information that continually shift and change in terms of relevance for the task at hand. At one moment, particular information is experienced as relevant, while other information is irrelevant in terms of the defined task. At another moment the same information is experienced as irrelevant, with other information becoming relevant, when the task is redefined. In solving the task presented, the child actively scans this field of complex information and *cognitively* manipulates the many bits of information it contains by sustaining attention on relevant information and withdrawing attention from irrelevant information, over and over again. At this level of cognitive therapy, therefore, sensori-motor accommodations to organizations of information are subordinated and relatively minimal, whereas cognitive accommodations are dominant and are emphasized.

At first the task presented represents a simple organization of information. Gradually, in a systematic fashion, each task presented is organized to be slightly more complex than the last. In asking the child to manage each task presented, it is assumed that the field articulation structure gradually differentiates. Taking these several considerations together, it is assumed that with experiences provided by the field articulation therapy program, the child is assisted in developing the capacity to derive cognitive nourishment from organizations of information and the capacity to experience ego affects involving "seeking information," "pleasure," and "curiosity" associated with the *microcognitive* activity required by the task.

The program of field articulation introduces a level of microactivity in cognitive functioning, more so than the earlier programs. This level of microcognitive activity is much closer to the level characteristic of managing and learning content presented in the first two or three grades of school.

PROGRAM 3.
FIND THE SHAPES

PURPOSE

To provide experiences in actively and selectively directing attention at complex configurations of information contained in limited space and bearing relevant and irrelevant information.

GOAL

To promote the development of the field articulation cognitive control.

MATERIALS

(*a*) 288 plywood, cardboard, or plastic cutouts representing four geometric shapes (square, circle, triangle, diamond) in three sizes (2 x 2, 3 x 3, and 4 x 4 inches) and in six colors (red, yellow, blue, green, white, black). For each shape and size there are four cutouts of each primary color and four white and four black cutouts, resulting in 24 cutouts of each size and shape. For convenience, the 4 x 4 inch cutouts are referred to as "large shapes," the 3 x 3s as "medium shapes," and the 2 x 2s as "small shapes." (*b*) 8½ x 11 inch sheets of paper on which are printed geometric shapes, pictures, letters, or words, arrayed in rows and randomly.

GENERAL REMARKS

The therapeutic experience provided by this program is viewed as a shift to a higher developmental level than that provided by the program *Which Is Big, Which Is Small?* when the child directs attention more and more actively and broadly, at first without the presence of irrelevant information located in macrospace then with distractions. In the program *Find the Shapes*, the child engages in cognitive activity but now confined in microspace. The activity takes place, for the most part, in relation to information arrayed on the surface of a table and subsequently on a sheet of paper.

In addition to representing a developmental progression in terms of the space within which attention is directed, the program *Find the Shapes* also represents a developmental shift from processing less complex to more complex information. Generally speaking in the program *Which Is Big, Which Is Small?* the child directs attention at two units of information (e.g., two rods), in terms of a single dimension of information (e.g., height). In the present program, the child directs repeated attentional acts at geometric shapes contained in an array, which in its physical makeup represents a more complex configuration and organization of contours, colors, and spatial interrelationships to be surveyed, processed, and registered.

The third difference between the content and experiences provided by *Find the Shapes* and previously described programs in focal attention is major and concerns the twofold process of selective attention deployment and withholding attention from irrelevant information, the hallmark of the cognitive control field articulation. With therapy in focal attention the child is asked first to pursue visually a moving target and later to direct visual gazes at, for example, two rods. In performing these responses, it is acknowledged that the child increasingly withholds attention from various stimuli (e.g., pictures on the wall, some object or the floor) while limiting the attentional act more and more to the moving target or to the rods. Therefore the child does obtain some experience in selectively deploying attention (i.e., the process of field articulation) while handling tasks that primarily emphasize and require increasingly active and broad visual scanning (i.e., focal attention). With the program *Find the Shapes,* the child employs the developmentally earlier function of active and broad scanning, but now the task to be handled requires the dominant use of *selective* attention deployment, of withdrawing and withholding attention from irrelevant information while sustaining attention on and responding to information that is relevant. This is achieved by presenting a task in which are embedded many bits of information that are irrelevant and from which the child is to withdraw and withhold attention, over and over again, while sustaining attention on what has been designated as relevant.

Imagine a child scanning a display of 16 geometric shapes, guided by the request to remove all the green triangles. A close examination of the child's cognitive activity while performing this task helps illustrate the point being made. The child's attention registers a square and then is withdrawn (because the square has been designated by the task as irrelevant); then the child's attention registers a blue triangle and is withdrawn because although the shape is relevant, the color is not. Then a green diamond is registered, and again attention is withdrawn because now the color is relevant and the shape (though angular and similar to a triangle) is irrelevant, and so on. When attention then registers a green triangle, it is sustained as the child removes the piece from the display. In this way the task and the cognitive process it calls for require that particular information be subordinated and attention withdrawn and withheld from it, over and over again, as attention is continually directed toward information designated as relevant.

During early phases in therapy with this program, many various behaviors show that the child is not efficiently performing the process of directing attention, withdrawing and withholding attention and redirecting attention. For example, in the foregoing illustration the child may reach for and remove a green diamond and recognize the error only when it is pointed out by the therapist. Or the child may reach for and touch a green diamond, then withdraw his hand, and so on. Later in therapy with this program one can observe the child sweep his attention over the display, quickly picking up the designated shapes. In doing so it is important to note that irrelevant information is being rapidly and successfully subordinated and attention is being rapidly withheld from it over and over again.

The program *Find the Shapes* consists of two phases. Phase I makes use of geometric cutouts as information, and Phase II employs information arrayed on sheets of paper. The same technical considerations apply to both parts. The distinguishing feature of Phase II is that the child deploys attention selectively in the microspace represented by a sheet of paper. This experience is presumed to relate very closely to the context and form in which much school work is presented.

The general procedure in administering *Find the Shapes,* Phase I is as follows. The therapist places an array of geometric shapes before the child and asks the child to remove particular shapes or colors or sizes (or some combination of these attributes) from the display. It is convenient and helpful if the shapes designated by the therapist as relevant information are referred to as “answer shapes.” In addition, the child is provided with an “answer box.” The therapist asks the child to find the answer shapes named and place them in the box.

In following this general procedure, the therapist is guided by 11 variables or developmental lines in selecting the shapes presented to the child for processing and in selecting the cognitive activity in which the child is to engage in solving the cognitive task. The broad therapeutic goal in following and combining these guidelines is to provide the child with carefully prescribed, developmentally progressive cognitive experiences—from the child directing attentional acts that are relatively passive and aimed at narrow, simple segments of information embedded in few irrelevancies, to directing attentional acts that are active and aimed at extensive arrays of complex information embedded in many irrelevancies.

The 11 guidelines fall into two groups. One group concerns the content and organization of the shapes presented to the child. The other concerns the cognitive-attentional response the child is asked to experience, that is, the nature and quality of the process of deploying attention selectively. The therapist selects a starting point along each of these guidelines and a combination of guidelines best suited to the child’s status with regard to the cognitive control of field articulation. Table 1 summarizes these guidelines.

Table 1. Summary of Steps in Cognitive Therapy with the Field Articulation Cognitive Control: Find the Shapes

Phase I. Patterns of geometric cutouts are presented as information to be articulated.

Part A. Guidelines for content and organization of information presented to the child

Step 1.	From few to many cutouts.
Step 2.	From cutouts located close together to cutouts far apart.
Step 3.	From an ordered array to a random array.
Step 4.	From cutouts of one size to three sizes.
Step 5.	From cutouts of two geometric shapes to four.
Step 6.	From achromatic displays to displays of six colors.

Part B. Guidelines for prescribing the cognitive process the child experiences in managing the information presented.

Step 1.	From one to many attributes designated as relevant information.
Step 2.	From patterned to randomized relevant information.
Step 3.	From less to more nonrelevant information surrounding relevant.
	a. Patterned cutouts as nonrelevant information.
	b. Stacked cutouts as nonrelevant information.

c. Peripheral, emotionally toned stimuli as nonrelevant information.

Step 4. From little to much delay before engaging relevant information.

Step 5. From few to many tasks interpolated between instructions and solution.

Phase II. Patterns of geometric shapes; pictures of persons, animals, and objects; letters of the alphabet, and words printed on sheets of paper are presented as information to be articulated.

Part A. Guidelines for content and organization of information presented to the child are the same as for Phase I.

Part B. Guidelines for prescribing the cognitive process the child experiences in managing the information presented are the same as for Phase I.

Technique of Administration

PHASE I

The various techniques that make up the program are discussed separately to articulate the issues involved. Following this discussion, a hypothetical example is presented to illustrate how these techniques can be combined.

A. Guidelines for the Content and Organization of Shapes Presented to the Child

1. From Presenting Displays Containing Few Shapes to Displays of Many Shapes. With a child who has not had experience with the programs in focal attention or is very limited in deploying attention selectively, it may be necessary to begin by placing as few as two shapes on the table. Ask the child to remove one of them (e.g., the white square) and place it in the answer box. Then return the shape to the table, reverse the left-right location of the shapes, and repeat the procedure (see section on Special Considerations for Children with Severe Psychological Limitations, Chapter 12).

With other children the therapist may begin by setting out 8 or 10 shapes and asking the child to remove all the circles, or all the yellow shapes, for example. In all cases, when the child has successfully handled the task presented at least three times in succession without assistance, the examiner adds two or more shapes to the display, thus gradually increasing the number to be surveyed. The greater the number of shapes, the longer the child is required to sustain attention and deploy attention selectively as the task is being performed. Theoretically all 288 shapes could be arrayed at once, although in practice the largest arrays have contained about 50 shapes.

2. *From Presenting Displays Containing Shapes Located Close Together to Shapes Located Far Apart.* The therapist may begin by locating shapes only 2 inches apart on the table. Gradually the distance between shapes is increased to about 12 inches. Increasing the area covered by the shapes provides the child with opportunities to scan more broadly and actively as he engages in handling relevant and irrelevant information.

3. *From Presenting an Ordered Array of Shapes to Random Arrangement.* Initially the shapes are presented to the child in rows and columns, but the therapist locates them in increasingly disordered arrays. This can be done by gradually altering displays over many sessions from presenting shapes in straight rows and columns to placing them

in uneven rows and columns. In a later phase of therapy the shapes can be spread out randomly, so that they do not form rows and columns.

4. *From Presenting Displays that Contain Shapes of One Size to Displays of Three Sizes.* Typically the therapist begins with the medium-sized shapes (3 x 3). When the child shows appropriate selective deployment involving all colors and shapes in this size, as described below, large shapes (4 x 4) are introduced along with the medium, then eventually small shapes (2 x 2) are added to the other two sizes.

5. *From Presenting Displays Containing Two Geometric Shapes to Displays of Four Shapes.* Squares and circles are usually used first. As the child displays increasing competence in handling these, with all colors present, triangles are added, and later diamonds.

6. *From Presenting Displays that Contain Only Achromatic Shapes to Displays of Colored Shapes.* The first presentations are of black and white shapes. When the child successfully handles removing white or black shapes designated by the therapist, shapes of one color are added to the presentations, then another, and so on.

B. Guidelines for the Cognitive Response the Child Experiences in Managing the Information and Task Presented

1.*From One to Many Attributes Designated as Relevant Information* (i.e., answer shapes). The number of attributes the therapist designates as relevant is related, of course, to the complexity of the display of shapes presented to the child. For example, in a simple display made up of four white and four black squares, the therapist could ask the child to place all the black squares in the answer box. With this task black is relevant and white is irrelevant. As the presentations and tasks increase in size and complexity, the number of attributes combined to designate the answer shape can be increased. To illustrate, let us assume that a 50 object display is presented containing four shapes, six colors, and three sizes. The therapist could ask the child to remove any one of the following shapes designated as "answers": (*a*) all the red shapes; (*b*) all the squares; (*c*) all the red squares; (*d)* all the small red squares; (*e*) all the small red and large red squares; (*f*) all the small and medium blue and red squares; (*g*) all the medium yellow triangles, small red diamonds, and large green circles, and so on. These examples are intended to illustrate the many possible attributes defining the "relevant information" and to demonstrate that a systematic progression should be followed in moving from one attribute to many. We have found that usually it is best to begin by asking the child to remove one or another color. This task is repeated a number of times, changing from color to color, so that the child experiences withdrawing and withholding attention from and subordinating particular colors while directing attention to the color designated. Then one or another shape is introduced as the designated answer shape until all four shapes have been handled; then combinations of shape and color, and finally combination of shape, color, and size. The material permits many combinations to provide a graduated series of increasingly complex combinations of attributes that define the relevant information, and accordingly designate the irrelevant information.

Gradually the child reaches a level of functioning where he is removing successfully cutouts that satisfy combinations of shape, color and size. That is, he does not reach out and touch or pick up incorrect shapes, his level of anxiety is appropriate to the task, and the task is accomplished in a reasonable length of time. When this point is reached, two additional techniques are used to provide experiences at even more advanced levels of field articulation. With both techniques particular shapes are specified rather than asking the child to remove all the cutouts satisfying some combination of attributes.

Designating an Answer Shape in Terms of Its Spatial Relations to Other Shapes. With the first technique the therapist combines spatial relations with shape, size, and color. For example, at a simple level the child is asked to locate a red square that is above a blue diamond. At a more complex level he is asked to locate a medium blue triangle that is below a large red square and to the left of a small blue diamond. The therapist could construct the display so that the designated answer shape is located in three places, with two of these satisfying only parts of what has been defined as relevant, and one meeting all relevant attributes. In terms of the more complex task just described, the child may find a medium blue triangle below a large red square, but it is to the left of a large blue diamond rather than a small one. Once this cluster of information has been registered, attention must be withdrawn and withheld from it and directed elsewhere until the appropriate cluster, defined as relevant, is registered.

Designating a Specific Series of Answer Shapes. The second technique providing therapy experience at advanced levels of field articulation functioning is also viewed as providing a bridge to the next cognitive control program, *Remember Me,* which concerns memory functioning (i.e., the leveling- sharpening cognitive control). Here the child removes a series of shapes in the exact order in which they are named by the therapist. Moreover, the child is not to remove any shapes until all the shapes to be removed have been designated by the therapist. This technique requires the child to hold information in memory while engaging in the process of selectively deploying attention. Typically the therapist begins with two shapes. For example, the child is asked to find a large blue diamond and small yellow square. If the child locates and places them in the answer box in the reverse order, this is pointed out, and the child is encouraged to listen carefully to the sequence and to remove the shapes in the same order in which they were named by the therapist. When the child masters a series of two shapes, three are requested, then four, and so on, until the child can locate four or five cutouts involving various combinations of shape, size, and color (e.g., “Find a large red square, a small blue diamond, a large yellow circle, and a medium green square.”) In constructing a progression of experiences for the child, begin by using one size and one color (e.g., “find a yellow square, a yellow diamond, a yellow triangle, and a yellow circle, in that order”). Then gradually add colors, and later sizes.

2. *From Presenting Displays that Contain Answer Shapes Located in a Pattern to Shapes Located Randomly Within the Display.* The location the therapist assigns answer shapes in the display presented contributes to the level of complexity experienced by the child in selectively deploying attention at relevant information and withholding attention from irrelevant information. Let us begin with the most simple level of this guideline. If eight squares (four

black and four white) are presented to the child in two rows and four columns, the black squares may be located in the top row and the white squares in the bottom row. When the therapist asks that all the white squares be removed, the child directs his attention at the top row of black shapes, withdraws and withholds attention from them, redirects his attention at the bottom row of white shapes, and removes these cutouts. At the next level of complexity two white shapes may be located in the first two columns (from left to right) of the top row, and two in the third and fourth columns of the bottom row. At another level the top row might alternate white and black shapes, beginning with white, and the bottom row might alternate colors beginning with black. In moving from one pattern of complexity in displaying answer shapes to the next, subtle but nonetheless more advanced levels of selective attention deployment are required.

To illustrate this guideline further, we can next imagine a 16 cutout display, with the shapes in a 4 x 4 arrangement. The answer shapes can be located along the top or bottom rows, along the left or right hand columns, forming a diagonal, or in each of the four corners. Again when the answer shapes define a pattern within the display, they are likely to be perceived as a “Gestalt” or registered as a group, permitting the remaining shapes to be subordinated more readily as irrelevant background, as attention is deployed selectively at the designated shapes.

Gradually, as the child gains competence in managing displays within which the answer shapes are located to form a pattern, the therapist begins to form partial patterns (e.g., the answer shapes may be located in the top row, with one shape located “randomly” in the bottom row). Eventually all the shapes are “scattered” at random throughout the matrix. When answer shapes are located randomly, many more acts of selective attention must be directed at the display, with now one and then another shape registered and then subordinated, until the answer shapes have been retrieved.

Whether the attribute designated as relevant is color only (all the red shapes), color and shape (all the red squares), or color, shape, and size (all the small red squares) (see guideline Al), the answer shapes can be located in the display to form a pattern or randomly. Moreover, as the therapist follows guideline A2 in locating the shapes near together or far apart, and as he presents displays that are ordered and then more random (guideline A3), it is still possible at the same time to locate answer blocks to form a pattern (e.g., four red squares forming a diagonal line within a random array of 20 shapes), to form a partial pattern, or to form no pattern at all.

3. *From Less to More Irrelevant Information Contained in the Display.* As we have noted, there is both relevant and irrelevant information in each display presented to the child, and in the content and form of the task. For example, if a child is surveying four red and four yellow squares and is asked to remove the yellow ones, these receive his attention, as attention is withdrawn and withheld from the red squares, once the desired response has been announced. While facing the same colors, but now presented in the form of two shapes (e.g., two red squares, two red circles; two yellow squares, two yellow circles), if yellow squares are designated as answers, the child now withdraws and withholds attention from the yellow circles, as well as from the red shapes, and continues directing his attention in search of

yellow squares. Thus the content of each display, and the answer designated, serve together to define the degree and complexity of relevant and irrelevant information managed by the child. There are, however, three additional techniques, that can be used to increase the complexity of irrelevant information, therefore requiring more vigorous deployment of selective attention. Two of these techniques make use of the same geometric shapes, the third employs information other than shapes.

The Technique of Arranging Irrelevant Shapes in Patterns. With the first technique the cutouts having the colors, sizes, and shapes that are *not* "answers" are arranged in some pattern that dominates the field of information to be surveyed. Accordingly, more vigorous field articulation functioning is required to subordinate this background pattern and withhold attention from it, while directing attention at the remaining information to be able to register the answer shapes. For example, a 4 x 4 field of 16 shapes can be framed in a border of large red shapes. When some children survey this field, the red border continually competes for attention and often dominates. Accordingly, attention must be more actively withheld from the red "frame," to ensure that attention is directed at the other shapes, within which the answers have been located. In other examples involving the same 4x4 matrix, a diagonal of small yellow shapes can be located within the display, or two columns can consist entirely of blue shapes with the remaining two colors containing shapes of different colors. In both these examples the diagonal or the solid parallel columns of color serve as powerful distractions that compete for attention by virtue of the pattern they form and because the pattern becomes the dominant "figure," subordinating the remaining shapes as "background." Whenever selected irrelevant shapes are arranged in a pattern in this manner, they typically become compelling information in the visual field. Accordingly more cognitive vigor is required to withhold attention from them in searching for the answer shapes.

The Stacking Technique[20] Sometimes the matrix displayed is formed of stacks made up of two or three shapes. For example, the large shapes are used to form a 4 x 4 matrix. Then a small shape is placed on each large shape. The child is to find the answer shapes designated from among the small shapes on top. It can be seen that in processing this field of information the child must repeatedly withhold attention from and subordinate the underside figure, to be able to articulate the top figure and decide whether it is an answer shape. If the child has been asked to remove all small red squares, for example, and directs attention at a small blue square placed on a large red square, the latter may compete for attention because it is the correct shape and color, but then it is subordinated because it is the wrong size, as attention is directed to the small blue square, which is processed. With this example, we have observed children reach for and even remove the blue square, showing dysfunction in cognitively withdrawing attention from and subordinating the irrelevant information—that is, the background (large red) square.

A more complex variation of this same technique involves stacks of three shapes. The large shapes are placed at the bottom, the medium next, and the small on top. Suppose that the medium shapes are designated as the answers. In this situation both the large background shapes and the small foreground shapes are irrelevant, and attention must be continually withheld from them if attention is to be directed at the medium shapes located between them. Similarly the top small shapes or the bottom large shapes might be designated as answers. In each instance answer shapes are competing for attention with two other bits of information. With the top small shapes as the answers, attention must be continually withheld from the large and medium shapes forming the background. When the large shapes are designated as answers, attention must be continually withheld from the foreground (the small and medium shapes on top)—a more complex cognitive task, requiring more vigorous selective deployment of attention.

By combining various shapes, sizes and colors, the therapist can construct very complex fields of information to be processed, fields that would activate, over and over again, the cyclical process of directing attention, withholding attention, directing attention again, and withholding attention again, since this process is unique to the cognitive control of field articulation. Usually stacked combinations of linear shapes are more complex to manage than combinations of linear and curvilinear.

Information Outside the Shapes as Irrelevant Distractions. Another technique used to emphasize the process of withdrawing and withholding attention from irrelevant information involves presenting visual, auditory, or tactile information that is irrelevant to the task while the child handles a given matrix of shapes. With this technique the therapist deals more directly with the affects and fantasies that uniquely disrupt the child's attention. For example, if a child shows that tensions involving aggression or nurturance uniquely interrupt the selective deployment of attention, we might array pictures of aggressive or nurturing themes around the matrix of shapes or glue small pictures representing these affects directly on shapes. By carefully and therapeutically introducing such external stimuli that uniquely arouse affects and fantasies in the child, the therapist supplies opportunities not only to develop the cognitive capacity to subordinate affects that are irrelevant to the cognitive work at hand but also to work through related conflicts, misperceptions, and so on, which the child is capable of resolving. As discussed in the introduction to these cognitive therapy programs (Chapters 11 and 12), the point of reference in such work is always the child's unique cognitive functioning. The therapist's interest in and work with the child's affects and fantasies are maintained primarily in terms of how these internal affects and fantasies disrupt cognitive work.

An example may help to illustrate this point. The diagnostic evaluation of a child showed that his failure to regulate and subordinate aggressive tensions and fantasies uniquely disrupted the efficiency of field articulation. This formulation was supported by subsequent observations during therapy. When pictures of aggressive themes (e.g., soldiers marching through the jungle) were placed around the matrix of shapes, the child had much more difficulty in finding the answer shapes designated, he also became very restless and anxious and quickly grew preoccupied with fantasies of bombs exploding. Gradually the therapist introduced the following elaborations of the field articulation therapy technique. The therapist arrayed a matrix of stacks of shapes and asked the child to pretend that certain stacks were bombs that would explode unless they were found and defused. The child was told that the stacks representing bombs had a large blue square at the bottom, a medium yellow circle in the middle, and a red diamond on the top. The display was presented as a game, and the child was asked to look for "bombs," remove them from the matrix, and place them in the "defusing box," where child and therapist "dismantled the bombs."

In presenting this game the matrix sometimes contained two or three bombs, three or four stacks that contained some elements of a bomb, and stacks that contained no elements at all. For example, a stack containing some elements of a bomb might include a large blue square at the bottom (correct element), a medium yellow square (the color is correct but the shape is incorrect), and a red diamond on top (correct element). Other stacks contained some elements of a bomb but did not completely meet the qualifications given.

If we imagine the child dealing with this task and its requirements, it can be seen that vigorous application of the field articulation process is called for. For example, when performing efficiently the child directed attention at a stack (large blue square, medium yellow square, and small red diamond), registered the properties, registered that the medium cutout was not the correct shape, withdrew and withheld attention from this stack, directed attention at another stack, and so on.

This example illustrates several of the principles considered in Chapter 12 that pertain to dealing with affects and fantasies in cognitive therapy. First, the example illustrates that in cognitive therapy the cognitive activity of the child remains the focus of the work. Second, the *cognitive process* the child is asked to experience *joins cognitive activity on the one had with affects, impulses, and fantasies on the other and enables cognition to gain control over and to give cognitive organization to affects, impulses, and fantasies.* In his work then, the therapist not only comments that aggressive feelings and fantasies disrupt cognition, but gives the child experiences in framing impulses with cognitive activity and points out how affects, impulses, and fantasies can be organized and controlled by cognition.

The same rationale applies to the use of auditory and tactile information as sources of irrelevant stimulation. When some children have shown unique vulnerability in selectively directing attention in the face of competing auditory or tactile stimulation, we ask them to work with displays of shapes while records of various noises and voices are played, or while handling materials of various textures (e.g., burlap, fur, cooked corn starch).

4. *From Little Delay to Much Delay Before the Child Removes the Shapes Designated.* At the start of treatment with this program, the child is permitted to remove answer shapes immediately after they have been designated. Gradually the child is asked to delay, for increasing periods of time, before removing the shapes. For example, the therapist would ask the child to survey the shapes presented and to remove the small blue diamonds and the medium red squares, at the time indicated. The therapist then waits 15 seconds and tells the child to go ahead. This technique requires that the child (*a*) retain the instructions and sustain the cognitive set over time and (*b*) develop the capacity to postpone.

The capacity to postpone and delay is considered to be a critical prerequisite to developing the ability to construct clear, stable images in memory of information and instructions to work (see Chapter 5). It is assumed that the child who participates in this therapy program has already developed the capacity to delay and postpone gross and fine motility, either in normal development or with the assistance of the program *Moving Fast and Slow.* The focus in the program *Find the Shapes* is on postponing and delaying a cognitive set to remove particular shapes, and the mini-actions required to remove the shapes designated. Therapy in field articulation is the major locus at which therapeutic work first takes place with the function of delaying *cognitively.* In all applications of the program *Find the Shapes,* the therapist should include formal work with delaying, as discussed here.

Initially the delay introduced (from the instruction to the child's removal of shapes) can be as little as 5 seconds. Gradually the therapist increases the period of time, in 5 or 10 second increments, until the child is able to delay approximately 15 minutes. With some children we have introduced delays involving the entire session. At the start of a session a display is introduced and answer shapes are designated. Then the child leaves this task and goes on with others. At the end of the session the child is returned to the display and asked to complete the task designated without the instructions being repeated. This technique also relates to the next guideline which involves the use of interpolated experienced. Finally, the technique of delay gives therapist and child the focused opportunity to deal with the issue of waiting and with the thoughts and feelings that emerge while waiting, which sometime interfere with selective attention deployment.

5. *From Fewer to More Experiences Interpolated Between Instruction and Removing Answer Shapes.* After the child has developed capacity to delay 30 or 60 seconds before removing the answer shapes designated, he is asked to engage in some additional task during the delay. Interpolated experiences that best suit the child's therapeutic needs would be selected. We have used, for example, reading pages from a book, solving arithmetic problems, free play, and form-board games. As noted in the previous section, cognitive therapy tasks themselves can be used as interpolated experience. For example, the child may be presented with instructions and a display located on a table at one end of the room. Then he is asked to deal with several displays on another table. After the designated period of time has elapsed, the child is returned to the initial display, where he is to complete the task without benefit of repetition of the instructions.

The technique of interpolated experience permits the therapist to focus therapeutic work on the issue that school demands often require a child to shift from one task to another while retaining a set and information given earlier.

A Program of Therapy To Illustrate How the Guidelines Are Combined

With discussions before us of all the guidelines and techniques comprising the program *Find the Shapes,* it may be helpful to consider a hypothetical treatment program that combines these several techniques. Reference to Table 1 would aid in following the illustration.

In using this program, a starting point should be selected that presents information and a task the child can handle easily. Let us imagine a 6 year old whose cognitive functioning with regard to field articulation permits him to handle a matrix of information consisting of four white and four black squares only. The medium shapes (representing one size, one shape, and no color) are arrayed in two rows and four columns (ordered), about 2 inches apart (near), with black squares in the top row and white in the bottom (patterned).

When therapist and child have seated themselves before the table, the therapist says, “Johnny, you and I are going to work with different cutouts that I will put on the table. Do you see this, Johnny? What is it?” The therapist points to one of the squares and waits for the child to reply; it is acceptable if a very young child calls the square a “box.” If the child makes no mention of the color, the therapist should add this property to his reply: “That’s right, it’s a white square, isn’t it? I want you take them all off the table and put them in this box. Leave the black squares on the table.” The therapist gestures, pointing first to the square and then to the box. If the child is verbal but does not reply, the therapist makes the same general comment.

If the child performs successfully, the therapist places a second row of white squares on the table, now located above the black squares saying, “That’s fine, Johnny; now let’s do it again; take off each white square and put it in the box; white squares are the right answer.” The procedure is followed a third time, with the therapist now asking that the black squares be removed: “Now the black squares are the right answer.”

The general rule for the successful completion of any task level is that the child handle the demand three times in succession, without assistance, without a high degree of restlessness or anxiety, and without false starts, before moving on to the next part.

A child may not respond to the verbal command to remove the squares. He may, for example, ask about something in the room, walk away, push the shapes away, or brush the material off the table. At these times the therapist replaces the cutouts, as needed and accompanies his verbal instruction with a demonstration. While making the request, the therapist takes the squares from the table and puts them in the box. Other squares are then placed on the board and the therapist says, “See, I want you to do the same; put the white squares in the box.”

If demonstration is required to assist the child in engaging the material, it is still necessary for the child to remove the squares three times in succession without assistance and in response to a verbal request only before going to the next part.

If the child does not perform successfully, the therapist continues readministering the same display of eight cutouts, following the guidelines in Chapter 12 (Special Considerations For Children with Severe Psychological Limitations). If the child performs successfully, the therapist then says, “Fine, now let’s try it again, but now I’ll put the shapes on the table in a different way.” The therapist places the shapes in four columns and two rows again, but now about 6 inches apart (far), and with black and white squares alternating in both rows (less ordered). Again the child is asked to remove one type of square three times in succession: “Find the black squares.”

It is important to note that although the child may be handling the task of removing the designated shape easily, repetition is necessary because with each administration the child is give the opportunity to engage in the process of field articulation. As discussed elsewhere, the task is a means to an end, and repetition of the cognitive process is critical. Moreover, these early tasks allow the therapist to observe the child's unique abilities and difficulties in directing attention selectively. For example, if the child reaches for a black square, then takes a white square (which was designated as the answer), the therapist might pause and ask the child if he had noticed how he handled the task. Thus immediately the therapist is beginning the process of teaching the child to observe his cognitive behaviors and the accompanying affects and associations. In the example before us, once the child has registered with self-observation that he reached for a black square before taking a white one, the therapist introduces a theme that is returned to over and over again in the course of therapy with this program: that in handling the task now presented, the white shapes are the answers and the black shapes are not related to the current task (e.g., they were the answer shapes last time); therefore attention must be pulled away from the black shapes and focused on the white ones.

Because the child made several false starts with the display described earlier, the therapist would readminister the task as indicated until the child had performed efficiently three times in succession. Then, with the next task the therapist would locate the shapes (more) randomly over the table and with the shapes about 12 inches apart (instead of 6), asking now for the white shapes, and in another trial for the black. The therapist would proceed in this fashion, over many sessions, introducing the following levels, each representing a more complex field of information, and each requiring a higher level of the field articulation process than the last.

1. The eight black and white circles are added to the squares, the 16 cutouts are presented in four columns and four rows (more shapes). In introducing this increase in information, the therapist first shifts back to earlier levels involving order and distance. That is, the shapes are located initially 2 inches apart, forming four rows, one for each shape and color. This matrix is presented a number of times, with circles or squares serving as answers as well as all black shapes and all white shapes. This display is readministered, with the presentations gradually shifting from a close-ordered display to a far and random display. Note that this step combines guidelines 1, 2, 3, 5, and 6 of Part A (Table 1).

2. In the next phase of treatment, the eight black and white triangles are added to the circles and squares to form a matrix of 24 shapes. Again guideline 5 (adding another geometric shape) is combined with guidelines 1,2, 3, and 6 of Part A in presenting a series of tasks, each designating one shape or color as the relevant information to be removed.

3. This procedure is repeated with the eight black and white diamonds added to form a matrix of 32 shapes (guideline 5, combined with guidelines 1,2, 3, and 6 of Part A).

4. At this point the therapist may use the same 32 shapes in a series of presentations introducing both an increase in the attributes that define the answer shapes (guideline 1, Part B) and the patterning of the answer shapes

and irrelevant shapes (guidelines 2 and 3, Part B). For example, in terms of the former, the therapist might ask for the black diamonds and the white triangles. In terms of the latter, he might construct a matrix with the 32 shapes that is not only far apart and ordered, but black squares and white diamonds are placed to form a diagonal through the matrix. The child would be asked to remove the black diamonds and the white squares. Gradually the answer shapes would be located within the matrix in random positions.

5. Still using only black and white shapes, the therapist now introduces two each of the small white and black cutouts of each of the shapes. Here guideline 4 of Part A is introduced (i.e., from one size to two sizes). Presentations of these 40 cutouts serve to vary the dimensions of proximity, order of display, and pattern of relevant and irrelevant shapes, and the child is asked to remove answer shapes now defined by more attributes (e.g., remove the small white squares and the large black diamonds). Gradually the therapist would introduce all the small shapes, and in the next phase all the medium shapes.

6. These shapes may be used in varying conditions of proximity of the shapes, order of the display, and pattern of answer shapes, and designation of answer shapes in terms of their spatial relations or in terms of a series. The latter introduces advanced levels of guideline 1, Part B. With each combination, more complex levels of the field articulation process are required (e.g., “Remove only: all the medium black diamonds, all the small white squares, and all the small black triangles”; “Remove in this order: one small white circle, one medium black square, two medium black diamonds, and one small white triangle, and one small black square that is under a large white diamond and to the left of a medium black circle”).

7. At this stage in therapy some experience with delay and interpolated experiences may be introduced (guidelines 4 and 5, Part B). When introducing delay and interpolated experiences, the therapist should at first *decrease* in complexity both the display and the task, relative to previous sessions. For example, if the child has been working as described in step 6 with three sizes and various combinations of guidelines, begin here with a display containing only one size of two or three shapes arrayed in rows and columns, near together. The child would be asked to delay removing the answer shapes designated for 10 seconds, then 20, then 30, and gradually he would be asked to handle some interpolated task during the delay. As cognitive competence with the 10 second delay and interpolated experiences is shown by the child, the therapist gradually increases the delay, and step by step, the complexity of the field of information and the response required. This is accomplished by adding other shapes and sizes, by introducing randomness in the display and in the location of answer shapes, and by varying proximity of the cutouts. That is, steps 1 through 6 would be repeated, orchestrating combinations of guidelines, as the delay and degrees and nature of interpolated experiences are increased.

8. At this point when the child has shown cognitive growth in field articulation that involves some delay, the therapist may increase the complexity of irrelevant information by introducing the stacking technique (guideline 3, Part B). Again, when a new dimension is introduced, there is an initial decrease in complexity of the display and task:

the number of the shapes used is reduced, the shapes are arrayed in rows and columns and near together, and so on. Black and white shapes may be stacked on black and white shapes to create different levels of complexity (e.g., white circle stacked on black circle, white triangle stacked on white diamond). With stacks of blocks forming the field of information, the steps described previously are repeated, but the content presented is varied (near-far, ordered-random, few-many, two shapes-four shapes), and the -response process required is varied (patterned to random answer shapes, few to many attributes of the answer shapes, delay without and with interpolated experiences). As the therapist follows these steps, the degree of irrelevant information contained in the display is increased by arraying irrelevant shapes in a border around the display or by placing pictures around the display as described in guideline 3, Part B.

For some children, for whom black and white shapes represent a low level of complexity, the same steps are followed by introducing colored shapes, one color at a time. In general, the levels of the program are administered that will bring the child to stage-appropriate field articulation. With young children only a 90-second delay might be the goal of treatment—for example, involving the interpolated task of reading a first grade story book, and the main task of dealing with a random array of 20 shapes in which the child must locate specific pieces of information (e.g., small red square, medium blue triangle, and large white circle—in that order). For an eighth grader the goal might be to survey a display after a 20-minute delay and to locate the following stacked answers in the order requested: a small blue diamond on top, a medium green square in the middle, and a large blue circle at the bottom.

Work with Affects, Associations, and Resistance

As with the other programs, the therapist encourages and trains the child to notice affects and tensions that arise while performing the task, and to describe them and the accompanying associations. In response to the experiences provided by this program, children often elaborate their difficulties with paying attention in school and with concentrating while doing school work. As the child learns to generalize from the contemporary experience with a given display to experience in the classroom, he gradually articulates for the therapist a recent classroom experience. For example, he may report that while trying to read at his seat the other day, he noticed that his attention went to a messenger who had entered the room, then to the sound of a book falling to the floor, then to pictures on the classroom wall. As these experiences are detailed, the therapist helps the child to see that actively withholding attention from, for example, the red diagonal that has been constructed in the display now before the child, is the same as actively withholding attention from those several bits of classroom information, all of which were irrelevant to reading the assigned page. Again, the degree of clarification and interpretation of these connections varies with the developmental status of the child being treated.

SUMMARY OF PROCEDURES

1. To complete a level satisfactorily, the child is required to remove the answer forms from the display three times in succession without assistance, without disturbing the distraction forms, and in response to a verbal command only.

2. In presenting a group of shapes and tasks, the therapist makes use of four general techniques: (*a*) giving verbal instruction to indicate what the child is to do with the material, (*b*) demonstrating a successful response while giving verbal instructions, (*c*) physically guiding the child through a successful response while giving verbal instructions, (*d)* as indicated, restraining the child physically if he reaches for an incorrect form.

3. The therapeutic experiences provided in the field articulation process attempt to vary systematically the content of information presented (number, proximity, degree of order, sizes, color) and the cognitive response required (number of properties of the answer shapes, location of answer and irrelevant shapes, delay in responding, interpolated tasks, and extent of irrelevant information).

4. Each shape, color, and size included at each level of therapy is used both as an answer form (relevant information) and as a distraction form (irrelevant information), depending on the task constructed.

PHASE II

This part of the therapy program affords the child the same experience involving the process of field articulation and follows the same guidelines outlined in Phase I. However the information to be processed is now two dimensional, including printed shapes, human and animal figures, letters, and words, and is contained on the microspace of a sheet of paper. Typically these four types of content are presented in the following sequence: from processing geometric shapes, to animal figures, to human figures and everyday objects, to letters, to words. In this way the operation of the field articulation cognitive control is eventually brought to bear directly on content involving academic skills such as reading and mathematics. It should be noted, however, that the primary goal in asking the child to process, letters, words, and sound-symbol connections is not to furnish training in reading, for example. Rather, the child is given many cognitive experiences requiring that attention be directed and withheld repeatedly (i.e., controlling information by means of field articulation), but now with letters and words as the information.

The materials used are tailored as much as possible to suit the unique cognitive needs of the child. The materials can be reproduced by means of mimeograph or other copying techniques, permitting the therapist to keep on hand a supply of various therapy forms to use with different patients as needed. The descriptions of materials and procedures here is intended only as a broad set of guidelines and to suggest the many variations possible.

A. Printed Shapes. The child is given a pencil and sheet of paper (8½ x 11 inches) on which are printed rows and columns of different geometric shapes and contours. At this level of therapy the primary geometric shapes used in Phase I are included. If the child’s cognitive status permits, other more complex geometric shapes can also be included.

Following Phase I, the child is asked to mark the answer shapes with a pencil—for example, all the squares or all the diamonds and circles. Using the guidelines of Phase I, the same information can be presented by means of sheets on which are printed few or many shapes of one to three sizes, arrayed in columns and rows or randomly, and located close together or far apart. Similarly, the irrelevant shapes and answer shapes can be patterned, and the child can perform without or with delay, and with or without interpolated experiences. The request can be as simple as marking all examples of one shape or as complex as marking a series of shapes in the order named.

B. Figures of Humans, Animals, and Common Objects. The child is presented with sheets of paper on which are printed schematic line drawings of adults, children, animals, birds, fish, and common objects. Some sheets may contain only one or the other type of figure, and others may show more than one type of figure. Again the figures can vary in terms of size, proximity, number, and degree of orderliness. The therapist follows the same guidelines concerning the response required of the child.

When figures of animals, humans, birds, and the like, are employed, the information the child receives is more complex than geometric shapes at which attention is directed and then withheld. For example, if the child is to mark only the children wearing sneakers, his attention is directed to, and then withheld from adults wearing sneakers, and also from children wearing shoes. The same applies, for example, to the task of marking fish with particular fin shapes or body shapes.

In addition to using pictures of animals, humans, and objects from which the child searches out designated objects and repeatedly withdraws attention from irrelevant objects, the same material can be used to bring reading readiness skills, such as sound-symbol relations, into the process of field articulation. For example, the therapist could ask the child to mark all the objects that begin with a “ba” sound or end with the “t” sound.

We have used this variation with children who show a major reading disability as well as a lag in field articulation development. After appropriate time has been spent with Phase I of this program, and the child shows stage-appropriate selective attention, further treatment following the same guidelines, and using printed letters and words has proved helpful in remediating the reading difficulty.

The sheet presented the child should contain objects the child already is able to identify by name. The child should be trained in the names of the objects used if he does not know them reliably. Then the task becomes one of searching out and marking the objects whose names fit the sound designated. The process experienced by the child in this variation of the program is viewed as the same as in the earlier one except that attention is now directed and withheld in terms of sound-symbol relations defined as relevant and irrelevant. For example, if the child is asked to mark all the objects whose names begin with the “ba” sound and he should direct his attention at the picture of a bicycle, then say the name aloud or to himself, register that the “bi” sound is irrelevant to the task at hand, withhold his attention from the bicycle, and direct it at another object.

C. Letters of the Alphabet. The child is presented with sheets on which letters of the alphabet are arrayed in terms of the same guidelines described for the geometric shapes. For example, the child marks all of the “Fs” or “t’s” or whichever letter is designated, and the response is made increasingly more complex, in that the child eventually must mark series of letters in the order mentioned. Materials can be constructed so that the letters are arrayed in rows, scattered about the page randomly, or rotated in space. We have found this variation to be of special value with kindergarteners and first graders who show letter reversals. Here the therapist asks, for example, that all “t’s” be marked, “whether they are standing on their heads, or lying on their sides.” With other trials the request is that only “t’s” that are “standing on their feet” be marked. Here the child would direct attention at the letter “t” printed upside down, then withdraw the attention because the spatial relation has been registered and the letter has been perceived as irrelevant, then direct attention at other letters in search of “t’s” that are right side up.

A higher level of this procedure involves sheets of paper on which are printed vowel-consonant combinations. Therapeutic work using this material would bring field articulation to bear on reading readiness skills that are at a level higher than letter recognition or recognition of sounds and object names.

D. Printed Words. In another variation words obtained from the child’s reading level are printed on sheets of paper, following the foregoing guidelines concerning the content displayed. However here responses are possible in addition to those considered in the guidelines previously outlined. For example, at the most simple level the child would be asked to mark all the words “boy” or “girl” or “run.” Or the response process required of the child might emphasize vowel-consonant blendings, with the child being asked to mark all the words that begin with the “ca” sound or end with the “da” sound. Other usages would implicate parts of speech. For example, the child may be asked to mark all the words that tell that something is being done (verbs) or words that are things (nouns).

Again using words as stimuli, the emphasis in cognitive therapy is not to help the child acquire the skill of reading, but rather to develop increasingly higher levels of selectively deploying attention at relevant and irrelevant information, when the information being processed is printed words.

SPECIAL CONSIDERATION

For hyperactive children who lag significantly in delaying and regulating gross and fine motility, we have found that the program *Find the Shapes* can be administered with the following modification, along with the program *Moving Fast and Slow.* In the first phases of the treatment the shapes are located on the floor throughout the treatment room. The child is then asked to walk about and obtain the shapes designated. Gradually the floor space covered by the shapes is reduced, and eventually the shapes are located on a table top. With displays located on the floor, the therapist would follow the guidelines described in Phase I.

NOTE

[20] I am grateful to Steven Berk, who devised this elaboration of the method.

COGNITIVE THERAPY WITH THE LEVELING-SHARPENING COGNITIVE CONTROL

The cognitive control principle of leveling-sharpening concerns the manner of managing information that changes or remains stable over time. The programs described here, referred to as *Remember Me,* have been developed to provide for children who show deficiencies in leveling-sharpening functioning therapeutic experiences that promote the development of this cognitive process. In general, the technique of this program calls for the therapist to present the child with a configuration of information. The child is asked to examine the information, which is then screened from the child's view. A change is introduced by the therapist, the information is presented again, and the child is asked to determine on the basis of the memory image he has formed of the information whether the information has changed. If the information has changed, the child is to restore it to its original state.

To benefit from the programs designed to promote the development of leveling-sharpening, a child should have achieved (in the course of development or with the assistance of the programs described previously) stage-appropriate levels of the cognitive control functions that are subordinate to and integrated within the function of leveling-sharpening, that is, body schema and the regulation of body tempos, broad and extensive scanning, and selective deployment of attention in the face of relevant and irrelevant information. The experiences provided by the leveling-sharpening therapy programs represent a major shift along the developmental hierarchy of cognitive control functioning.

With the cognitive therapy programs to this point, the information managed is contained for the most part in body experiences and in external, visually present stimuli. With the technique employed here the information being managed is contained mainly in memory images, though also in the external environment. Moreover, the technique induces the child to experience, over and over again, the process of relating present information with memory images of past information.

It may be recalled that the process of leveling-sharpening consists of two components. One concerns the construction of a memory image of information. As we have seen in the discussions of factor analytic and age studies, when cognitive control functioning is developmentally immature, memory images constructed of information are global, diffuse, and undifferentiated. With cognitive maturity, the memory images constructed are more articulate and differentiated, including more and more details and nuances of the information. The second component of the leveling-sharpening process concerns the stability of the memory image. When cognitive functioning is immature, memory images are unstable and undergo change, with the result that present information is confused with past information.

With cognitive maturity, memory images are held stable over time, permitting clear perception and articulation of the relations between present and past information.

The techniques employed in leveling-sharpening therapy are intended to foster growth and development in both these component functions in children who lag behind stage expectation in that they habitually construct global, diffuse memory images of information and/or that the memory images constructed are unstable and undergo change over time. Initially the child is asked to examine and construct a memory image of a simple configuration of information that contains a few elements. Gradually, in stepwise fashion, the child is asked to examine and construct images of information that represents increasingly complex configurations, containing many elements. Paralleling these requirements, initially the child is asked to hold the image in memory for only a few seconds, but as the therapy proceeds, the time of holding the image in memory grows longer and longer.

The therapy program in leveling-sharpening consists of three phases (Table 1), all using the same general methods and guidelines. However Phases I and II involve constructing memory images of information on the basis of visual examination of the information, and in Phase III memory images are to be constructed on the basis of tactile examination of the information. In general, the treatment program of Phase I is administered first, followed by the program of Phase

Phase III is used to meet particular needs of some children, and aspects of this phase are sometimes administered along with the programs of Phases I and II. The materials, techniques, and guidelines for Phases I, II, and III are discussed in turn, followed by a discussion of a hypothetical treatment program to illustrate combining the three parts in the treatment of a child.

When examining this program it may be helpful to keep in mind that the advanced levels of *Find the Shapes,* the previous program in field articulation, represent a bridge to treatment in leveling-sharpening, with the program *Remember Me.* The advanced levels of field articulation therapy, emphasizing the selective attending to relevant and irrelevant information, ask the child to remember a series of cutouts and find them in a display. This therapeutic experience prepares the child for and phases into the early levels of treatment in leveling-sharpening, with its emphasis on constructing differentiated, stable memory images. Similarly, the advanced levels of treatment in leveling-sharpening bridge to the early levels of the next treatment program, which concerns the principle of equivalence range, in preparing the child for and phasing into therapy in conceptual thinking.

PROGRAM 4.
REMEMBER ME

PURPOSE

To provide experiences in constructing increasingly elaborate memory images of information and in maintaining stable memory images over time.

GOAL

To promote the development of the leveling-sharpening cognitive control.

MATERIALS

(a) The same 288 plywood or plastic cutouts used with the program *Find the Shapes', (b)* a gray cardboard screen, 2x3 feet, mounted on a stand; (c) 2 x 3 inch cards on which are printed letters, words, and silhouette drawings of persons, animals, and common objects; (*d)* keys of various shapes, squares of sandpaper of various grains, squares of cloth of various textures, wooden sticks of various lengths, cubes of various sizes.

Table 1. Summary of Steps in Cognitive Therapy with the Leveling-Sharpening Cognitive Control: Remember Me

Phase I. Information to be remembered consists of patterns of geometric cutouts.

Part A. Guidelines for constructing information the child is asked to remember

Step 1.	From few to many cutouts.
Step 2.	From one color to several.
Step 3.	From one geometric shape to four.
Step 4.	From one cutout size to three.

Part B. Guidelines for introducing changes in the information the child is asked to remember

Step 1.	From introducing replacements to introducing exchanges.
Step 2.	From one change to several.
Step 3.	Replacing and exchanging colors, then shapes, and then sizes.
Step 4.	From changes located close together within the pattern to changes located far apart.

Part C. Guidelines to help the child construct articulate memory images

Step 1.	Pattern to be remembered is explored by means of touch, drawings, and verbal labels.
Step 2.	Pattern to be remembered is examined visually, for decreasing periods of time.
Step 3.	Cutouts forming patterns are located increasingly farther apart.
Step 4.	Patterns to be remembered are increasingly random.
Step 5.	Patterns to be remembered are embedded in or surrounded by distracting, irrelevant information.
Step	Therapist coaches child to use a system to articulate attributes of the pattern to be remembered.

6.

Part D. Guidelines to help the child construct stable memory images

Step 1. Child reexamines the pattern to be able to detect a change, after waiting increasing periods of time (delay).

Step 2. Child handles interpolated tasks during the delay period.

Step 3. Therapist introduces changes or additional information while child is examining a pattern and relating it to the previous pattern.

Steps in Therapy with Leveling-Sharpening: Combine Parts A-D

Step 1. Child remembers increasingly complex patterns of colors with shape and size held constant.

Step 2. Child remembers increasingly complex patterns of shapes with color and size held constant.

Step 3. Child remembers increasingly complex patterns of sizes with color and shape held constant.

Step 4. Child remembers increasingly complex patterns of colors and shapes with size held constant.

Step 5. Child remembers increasingly complex patterns of sizes and colors, sizes and shapes.

Step 6. Child remembers increasingly complex patterns of colors, shapes, and sizes.

Phase II. Information to be remembered consists of patterns of geometric shapes, pictures of objects, numbers, and letters printed on cards and sheets of paper.

Guidelines of Phase I are followed in each step.

Step 1. Child remembers increasingly complex patterns of geometric shapes printed on cards and paper.

Step 2. Child remembers increasingly complex patterns of pictures of humans, animals, and common objects.

Step 3. Child remembers increasingly complex patterns of letters and numbers.

Step 4. Child remembers increasingly complex patterns of words.

Phase III. A supplement: information to be remembered consists of shapes and textures perceived with touch perception only.

Guidelines and steps follow those of other phases.

PHASE I. GEOMETRIC SHAPES

General Procedure. Geometric shapes used in the field articulation program *(Find the Shapes*) serve as the information the child is asked to process in memory : squares, circles, triangles, diamonds, each in three sizes (2x2;3x3;4x4 inches), and in six colors (red, yellow, blue, green, white, and black). As with the earlier program, the 4x4 shapes are referred to as "large shapes," the 3 x 3s as "medium shapes," and the 2 x 2s as the "small shapes."

In administering *Remember Me,* Phase I, the therapist begins by placing an array of geometric cutouts on a table. The child is asked to look over the array so that he can remember it and determine whether it changes. After the child has studied the display, the therapist sets a screen on the table between the child and the cutouts, hiding them from view. The therapist then introduces a change in the array, either by replacing one or more shapes with cutouts not contained originally in the array or by interchanging the positions of two shapes (or more) in the initial array. The therapist then removes the screen (either immediately or after a delay) and asks the child to examine the cutouts again and to determine whether they have changed. If the child detects a change, he is asked to rearrange the cutouts, or replace cutouts, as necessary to make the array look the same as before. If the child is unable to detect the change or if he responds incorrectly, the therapist points out the change and restores the display to its original configuration.

Then the child is presented with another display of cutouts representing the *same level of complexity.* That is, the new display contains the same number of details. If the first display consisted of six cutouts—three squares and three triangles, one each of red, yellow, and blue—the next display, similarly, contains six cutouts, three colors, and two shapes. Further trials are administered at the same level of complexity until the child shows a developmental advance in leveling-sharpening functioning. When a child has demonstrated the ability to handle a given level of complexity well enough to correctly detect the change introduced in three successive displays, we say the child has made sufficient growth to that level. The therapist then presents the child with slightly more complex configurations of cutouts to remember.

One detail concerning general procedure deserves attention at this point. Typically, at the start of any given level of task complexity, the therapist administers the same display several times, especially if the child did not detect the first change introduced. If the child has failed the previous trial, the therapist points out the change and makes the necessary correction. The display remains on the table, and the child is given another opportunity to look it over. Then the screen is set up again and another change is introduced; when the screen is removed, the child is asked to detect the change. The same procedure is followed when the child perceives a change correctly. In both cases the child receives several exposures to the same display of information and several opportunities to construct a differentiated memory image of it. During these trials with the same display of cutouts, the therapist is able to determine when a child is ready to handle a display that is different but contains the same elements of information. For example, if the child has been examining and remembering a display containing six medium cutouts of two shapes (squares and circles) and two colors (yellow and red), the therapist would shift to another combination of these basic elements [e.g., six medium cutouts of two shapes (diamonds and circles) and two colors (green and blue)].

Sometimes the shift to new combinations of elements takes place fairly rapidly, especially if the level of complexity of the display is below the child's cognitive status. Other times it may be necessary to use the same display during 15 or 20 administrations before a new combination of shapes and colors can be introduced.

Criterion for Advancing to a New Level of Complexity. Whether a given display has been used a few times or many times, the therapist continues presenting the same combination of elements until the child can detect changes in three successive displays, each containing a new combination of the same elements. To satisfy the requirements of the level of complexity in the example we used, the child would have to correctly detect the change introduced in each of three different displays containing six medium cutouts of two shapes and two colors; for example, yellow and green squares and circles in one display, blue and white circles and diamonds in the next, and red and green triangles and squares in the next.

When the child has developed competence with one level, the therapist increases the complexity of information to be remembered, increasing the number of cutouts, colors, shapes, or sizes to be remembered. Bear in mind that the goal of having the child repeatedly experience the construction of memory images of information at one level of complexity is to foster the growth (differentiation) of the leveling-sharpening function until it matches the complexity (degree of differentiation) of the information being managed. When this match is achieved, the information to be remembered is made slightly more complex (differentiated) and is presented over and over again to promote further growth (differentiation) in leveling-sharpening. The basic technique involves introducing changes in the information the child has examined and is asked to remember, but at appropriate points in therapy the therapist may choose to administer a trial display in which no change is introduced. However the program is discussed in terms of the introduction of changes with each display.

In following this general procedure, the therapist is guided by a number of techniques in selecting both the array of shapes presented to the child for processing and the cognitive activity in which the child is to engage and the cognitive task to be solved. The broad therapeutic goal in following and combining these guidelines is to provide the child with carefully prescribed, developmentally progressive cognitive experiences—from constructing simple, global memory images that are maintained over a brief period of time, to constructing elaborate, highly differentiated memory images that are maintained stable over long periods. We ask the child, over and over again, to form memory images of information that gradually increases in complexity, and to compare an array of present information with a memory image of past information. By doing this, and by working through affects, association, and resistances that accompany this cognitive activity, we attempt to reorganize the child's leveling-sharpening cognitive control—that is, to modify the child's habit of constructing global, fluid memory images so that he habitually constructs articulate, stable memory images of information.

The guidelines followed by the therapist fall into five groups. (1) The types of information represented by the cutouts, which the child is asked to hold in memory. (2) The types of change that can be introduced in the original array of information, which the child is asked to detect by comparing the information now present with memory images of the previous information. (3) The steps to be followed in combining types of information displayed and changes introduced, permitting the child to deal with tasks that increase in complexity in a stepwise fashion. (4) The therapeutic techniques used to help the child construct increasingly articulate and differentiated memory images, (5) The therapeutic techniques used to help the child construct increasingly stable memory images that sustain over longer periods of time. The therapist selects a starting point along each of these guidelines and a combination of guidelines best suited to the child's status with regard to cognitive control functioning in leveling-sharpening.

In introducing therapy in leveling-sharpening, the highest levels of the previous program, *Find the Shapes,* are used as a preliminary, preparatory phase of treatment. (See explanation of the technique of designating a series of shapes in the program *Find the Shapes.)* The child is asked to remove from an array of cutouts that remains before him a series of shapes, in the sequence named by the therapist, and after some delay. From a display of 25 cutouts, for example, he would be asked to remove a large blue square, a small green diamond, a medium red circle, and a small blue triangle, in that order, and after a delay of 3 minutes, during which time some other activity is interpolated (e.g., looking at pictures in a book). This advanced level of field articulation therapy is seen as a bridge to the early levels of leveling-sharpening therapy, since the child must maintain in memory the sequence of shapes requested as he surveys the display before him. If the child's treatment has included therapy in field articulation with the program *Find the Shapes,* the therapist would phase into the program *Remember Me,* as indicated. If the child's major cognitive control deficit is with the principle of leveling-sharpening, and if he is just beginning therapy, the treatment should begin with the advanced levels of the program *Find the Shapes.* After some weeks or months of this preparatory phase, and when the child has shown successful cognitive competence required by the tasks, the content of therapy is shifted formally to the guidelines discussed here.

Introducing the Child to the Leveling-Sharpening Therapy Program. The therapist tells the child that he will begin working on a new game called *Remember Me.* As discussed in the introduction to the cognitive therapy programs, using the name of the therapeutic activity makes it easier to orient the child to the domain of cognitive functioning that is now the focus of the treatment for child and therapist. The therapist also states that the task is to learn what is involved in forming clear, stable memory images of information. To get this notion across to children, we have found it useful to use the metaphor of a camera and picture taking in a preliminary discussion and task tailored to suit the individual child. The therapist's comments might go something like this.

"Sally, when we look at something, like that lamp on the table, our minds take a picture of it. Take a look at the lamp. Now turn around so you can't see it. What color is it? . . . Fine, it's blue. Are there any other colors on it? . . . What shape is it? . . . Do you see? Your mind took a picture of that lamp, and you use that picture to remember what the colors and shape are. Sometimes a person's mind takes a clear picture of what she studies and sometimes a fuzzy picture. And sometimes when a person's mind takes a picture, the picture changes so the person isn't sure what the thing was like." (At this point, to personalize the discussion, the therapist introduces some experience the child had during the diagnostic work-up. "Remember when you took that test for me," [i.e., Leveling-Sharpening House Test] "you weren't sure if the Christmas tree got taller or not, or if the presents under the tree changed places?" To further personalize the discussion here, the therapist could introduce some experience the child has had in school: "Remember you told me about the time when you weren't sure if the teacher wrote 3 x 2 or 3 x 4 on the board? Those are times when your mind took a fuzzy picture, or when the picture your mind took changed. The games we are going to work on now will help you take clearer pictures in your mind, pictures that don't change. Here, let me show you one. Look at this design." (The therapist arranges the first display of cutouts on the table.) "Look it over so you can remember it —remember everything that’s there.” Allow the child about 30 seconds, or more if necessary. Now I’ll set up this screen so you can’t see the design, and I’m going to change the design.” (Therapist sets up screen, introduces a change, then removes the screen.) “Now look the design over. Do you notice any change?”

If the child detects a change, the therapist notes, “You took a clear picture of that design, let’s try another.” If the child is unable to detect a change or reports an incorrect change, describe the change to the child and restore the cutouts to the original display. Comments here would point out that a clear picture was not taken that time, but a person can learn to take clear pictures. The therapist explains or structures the content of therapy as needed in the course of treatment, especially when the child begins to describe experiences involving remembering school work that generalize from his work with remembering displays in the treatment room.

Once therapy has been satisfactorily introduced, the therapist proceeds, following the guidelines discussed below.

SPECIFIC TECHNIQUES

The various guidelines and techniques that make up the program of *Remember Me,* Phase I, are discussed separately to articulate the issues involved. In practice, they are employed in combination. A concluding section of this chapter discusses a hypothetical treatment program to illustrate the combining of these several techniques and those contained in Phases II and III.

A. Guidelines for Constructing Information Displayed: From Simple to Complex Configurations of Cutouts

1. *From Presenting Displays Containing Few Cutouts to Displays of Many Cutouts.*

If a child shows a severe lag in leveling-sharpening or has had no experience with the program *Find the Shapes,* it may be necessary to begin with a level of complexity as simple as two cutouts (e.g., two large red squares). For other children, it may be appropriate to begin by setting four or six cutouts on the table to be surveyed and remembered. In all cases, when the child has successfully handled the level of the task being presented three times in succession, the therapist adds two or more cutouts to the display, gradually increasing the number. The greater the number of cutouts displayed, the more elaborate and differentiated the memory image the child is asked to construct and to relate to the subsequent array. Typically, configurations of four cutouts are displayed either in a row or in a 2 x 2 matrix. When the number of cutouts used becomes greater than four, the shapes are arrayed in rows and columns (the exception to this occurs when the cutouts are arranged randomly, as discussed below). In practice, the largest arrays have contained about 30 cutouts, representing combinations of shapes, sizes, colors, and patterns.

2. *From Presenting Displays Containing One Color to Several Colors.* With children severely limited in leveling-sharpening, the first displays of two cutouts (e.g., squares) may be black and white. As the child becomes successful in

remembering the initial display, and as the number of cutouts increases, the number of colors contained in a display is increased to three (e.g., two red circles, two blue, and two green), and eventually to four colors. Again, the greater the number of colors displayed, the more elaborate and differentiated the memory image the child is asked to construct and to relate to the subsequent array. With children who can handle more than two cutouts at the start of treatment, one color and one shape are still employed initially, as discussed below.

3. *From Presenting Displays Containing One Geometric Shape to Displays of Four Shapes.* The first configurations of information presented are formed of cutouts of one shape (usually squares). In later stages of therapy the displays contain two shapes, then three, and eventually four. Again, the greater the number of shapes in the display, the more differentiated and articulated is the memory image the child must construct to be able to detect subsequent changes.

4. *From Presenting Displays Containing Cutouts of One Size to Displays of Three Sizes.* Typically the large cutouts (4 x 4 inch) are used at the start of treatment. When the child has had appropriate experience dealing with displays that increase in complexity in terms of the numbers of cutouts, shapes, and colors used (see guideline B), a second size is introduced. Now the child faces displays containing large and small (2 x 2) cutouts, then large and medium (3 x 3) and medium and small. Eventually the displays to be remembered contain all three sizes. The greater the number of sizes contained in a display, the more differentiated is the memory image that must be constructed if the change introduced is to be detected.

B. Guidelines for Introducing Changes in Information Displayed.

After the child has examined a configuration of cutouts displayed on the table, the therapist places a screen before them and introduces one of two types of changes in the display. One type involves replacing a cutout in the display with another cutout that has not been used in the display. For convenience, these changes are referred to as *replacements.* The other type involves taking two or more cutouts within the display the child has examined and switching the locations of these shapes. Such changes are referred to as *exchanges.*

Replacements and exchanges can vary in terms of color, shape, or size and combinations of these variables; in addition, the number of exchanges, the replacements introduced, and their location in the display can be manipulated. The broad goal in selecting the sequence of changes introduced is to provide the child with a step-by-step increase in complexity—from changes that are simple and easy to detect to changes that are more complex and difficult to identify. A simple change in information displayed, can be detected if a global memory image has been constructed, but a highly differentiated memory image is necessary to detect a complex change. By skillfully increasing the complexity of the changes introduced, the therapist fosters the tendency to construct memory images of information that are more and more differentiated, articulated, and stable. In considering the program guidelines, it should be kept in mind that the complexity represented by a change is a function not only of the type of change used but also of the organization of the display presented.

To facilitate discussing guidelines for changes of all types, the display presented in Figure 1 is used as an example. This fairly complex configuration of information (i.e., nine cutouts, three colors, three shapes, and two sizes) would be used at the advanced level of therapy discussed in the next set of guidelines. The principles discussed in using Figure 1, however, apply to simple or complex displays.

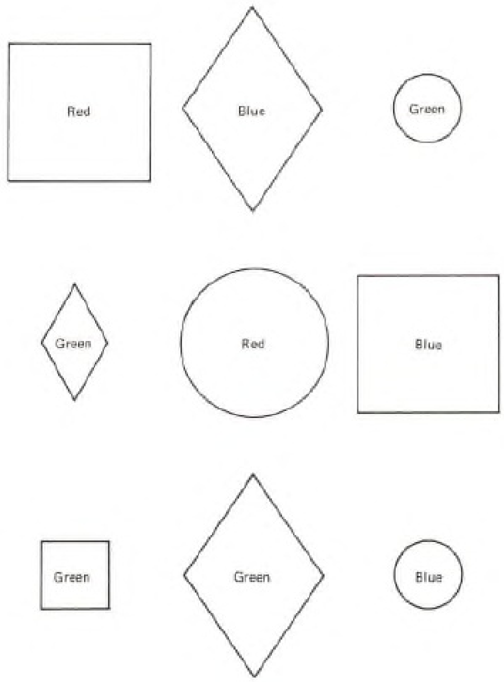

Figure 1

1. *From Changes that Represent Replacements to Changes that Represent Exchanges.* Most children experience replacements as less difficult than exchanges. Consider the display in Figure 1, and suppose that the red square in the upper left-hand corner has been removed and *replaced* by a red diamond. Then the child reexamines the display. Once this change has been introduced, he must relate his memory image of the original display to the present information and detect that a new detail (red diamond) has been introduced. An *exchange* would involve, for example, shifting the red square from the upper left-hand corner to the lower right-hand corner and the blue circle from the lower right to the upper left. On reexamining the display after this change has been introduced, the child must relate his memory image of the original display with the present information and detect that the parts that made up the original configuration have remained the same, but the positions of two parts have changed. Since detecting the introduction of a new element (replacement) is usually easier than detecting the rearranging of existing elements, the first phase of treatment should make use of replacements. Gradually, as the child demonstrates the ability to construct increasingly articulate and stable memory images of displays presented, exchange-type changes are introduced. Replacements and exchanges can be varied in complexity by manipulating the color, shape, and size used and the location of the change.

Varying the Complexity of Replacements and Exchanges. The capacity to perceive color and remember color as information is usually better developed than the ability to perceive and remember the shape and size of information. Thus changes in the colors of a display are introduced first. Detecting a change in one color represents a more simple cognitive function than detecting changes in several colors. (Of course the number of color changes possible is a function of the number of colors contained in the original display.) Moreover, detecting a color change represented by introducing a color that was not a part of the original display is a simpler cognitive task than detecting a change involving a color that was and still is part of the original display. To illustrate, again referring to Figure 1, replacing the center red circle with a yellow circle (color not previously present) is a simpler change than replacing it with a green circle. In terms of number of changes, replacing only the red circle would represent a simpler change (and could be detected by means of a relatively global memory image) than would replacing the red circle by a yellow circle, the red square (upper corner) by a green square, and the blue square (center right) by a green square.

The same principles apply to changes in shapes. These are introduced following work with colors because usually the achievement of perception and remembering of configurations of shapes follows competence with the perception and remembering of configurations of colors. Replacing the green diamond (Figure 1, lower center) with a green triangle (a shape not previously a part of the display) would represent a less complex change than would replacing it with a green square. And detecting one shape change would be a simpler cognitive requirement than spotting several shape changes.

With regard to size changes, assuming the shapes in Figure 1 are large and small, replacing a medium shape for a large or small shape would represent a less complex task than replacing one size for a size that is already a part of the display. Again, detecting a change in one size would require a less differentiated image than would spotting multiple size changes.

Exchanges can be viewed along similar lines. Exchanging the blue diamond (upper center) with the green diamond (lower center) would be an exchange in colors, therefore more easily detected by most children. However, exchanging the blue diamond (upper center) with the blue square (right center) would be an exchange of shapes, with color remaining the same, typically a more differentiated memory image would have to be constructed if this change were to be detected. A size exchange would be illustrated by exchanging the small green diamond (left center) with the large green diamond (lower center). It can be seen that exchanges involving sizes are more complex and cannot be detected unless a highly differentiated memory image has been constructed.

The location of changes introduced can also contribute to the complexity of the task and the degree of differentiation the child must impose on the image of the information displayed. We have found that when the shapes are displayed in an orderly matrix, the corner cutouts are typically articulated and differentiated first and most readily. Therefore, at the start, using the display in Figure 1, the red square, green circle, blue circle, and green square, would be replaced first, one at a time, during a series of presentations. At this level in therapy the child needs continued work with the same display. If successive displays are modified, changes still could be introduced in the corners first. Following this, changes would be introduced in the center of the matrix (red circle), then in the remaining shapes in the center of the rows and columns. When changes are introduced systematically, over a series of presentations from the corners to the center, then to the other segments of the informational field, the child is helped step by step to articulate and differentiate more and more of the total information displayed at the level of complexity being addressed in therapy.

The same general approach could be employed when cutouts are displayed in an array more random than an orderly matrix (see guidelines DI-D6). We have found that with random arrays, the cutouts (information) in the periphery tend to be articulated first and more readily. Then changes can be introduced in various sectors within the display.

The same considerations apply to exchanges and replacements alike. Exchanges of cutouts in opposite corners or in corners on the same side (e.g., green circle and blue circle, Figure 1) would be introduced first, followed by exchanges of other pairs (e.g., blue circle and blue diamond). With each exchange the child is give an opportunity to articulate and differentiate further the memory image of the information displayed.

When therapy reaches a level at which two or more changes are introduced into the display, we have further opportunities to vary the complexity of the task by manipulating the location of a change, thereby promoting the growth of the function concerned with articulating memory images with increasing differentiation. If two replacements are introduced, these should be located side by side initially. With the display in Figure 1, for example, the red square would be replaced by a yellow square (a color not originally a part of the information), and the blue diamond by a green diamond (a color originally a part of the information). In locating the changes side by side, that "sector" of the memory image is spotlighted, and two replacements introduced in the present display are made more vivid and noticeable. With later trials, the blue circle (lower right) could be replaced by a small blue square, and the small green diamond (center left) by a small blue diamond; the detection of such a multiple change would require a more extensive and articulated memory image.

Along the same lines, initially the cutouts exchanged should be located side by side (e.g., green circle exchanged with blue diamond). Later cutouts originally located far apart are exchanged (e.g., blue diamond exchanged with green square).

C. Steps in Cognitive Therapy with Leveling-Sharpening: Combining Guidelines A and B.

By combining guidelines A and B, cognitive therapy with leveling-sharpening follows a particular sequence. First the child is trained in constructing increasingly differentiated memory images of patterns of colors—thus colors are the information to be retained in memory. Then training focuses on the construction of increasingly differentiated memory images of patterns of shapes, followed by patterns of sizes. These three basic steps precede therapy in remembering displays that combine first, shape and color as the information to be remembered, then size and shapes. In the final phase, the displays the child is asked to articulate in memory combine color, shape, and size as information. In each of these steps, the number of cutouts used is gradually increased, to augment the complexity of the task.

The displays of cutouts described in the following steps are intended as illustrations. The therapist would decide the particular level within a step at which a child should begin. However criteria are suggested to determine when a child has evidenced sufficient growth in leveling-sharpening functioning within each step.

1. *Therapy in Forming Memory Images of Patterns of Colors*. In the first step the displays presented vary colors as information to be remembered, shape and size are held constant. Suppose the therapist decides, based on the child’s cognitive status, that the first display should be four cutouts of two colors, and he sets up the matrix using large squares (Figure 2). The therapist has assumed that this level of complexity is well below the present leveling-sharpening functioning of the child, therefore he should be able to construct a sufficiently differentiated image to detect the change that will be introduced. In keeping with the guidelines concerning types of change, the therapist sets up the screen, replaces a red square with a yellow square (i.e., replaces a color with a color not part of the original display), removes the screen, and asks the child whether the design has changed. In subsequent displays of two colors, the replacements are introduced involving both colors not originally present and colors originally present. In the display of Figure 2, a red square could replace a blue square. Note that in these presentations the therapist may use a different shape (circles) and size (small) but these must be held constant within a given display, varying only the two colors used.

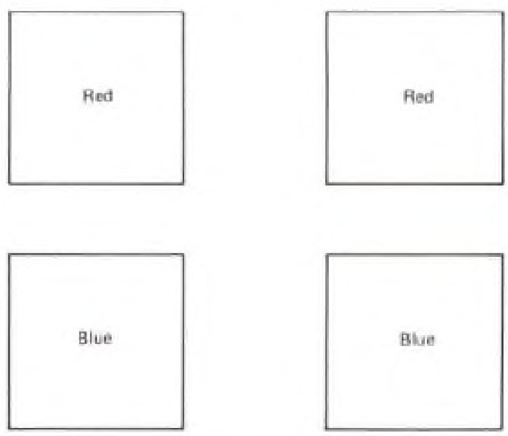

Figure 2

As the child comes to handle this level of complexity successfully, the therapist introduces exchanges—using Figure 2, a red square and a blue square are exchanged, so that the colors form diagonals. Or the two blue squares are put in the top row and the red squares in the bottom row.

If the child constructs appropriately differentiated memory images to detect changes at this level of complexity, the therapist next constructs more complex displays by increasing the number of cutouts. Now the child is presented with a 3 x 3 matrix of cutouts containing two colors (Figure 3); this display of information includes six cutouts, two colors, one shape, and one size. (Note that the therapist may increase the number from four to six and then to nine cutouts.) The therapist may now replace one of these circles with a white one (a color not contained in the original display). Detecting a white circle requires a memory image that is differentiated at a relatively low level. The therapist may also replace one of the yellow circles with a green one (color contained in the original display), leaving the remaining eight circles unchanged. This gives the child a much more complex cognitive task. A more articulated and differentiated memory image of the pattern of the two colors, in nine locations, is required if the child is to examine the display and detect whether a change has been introduced. At a still higher level of complexity, exchanges of two or more cutouts can be introduced. For example, the positions of the green circle (upper left) and the yellow circle (top center) are exchanged, and those of the yellow circle (lower right) and green circle (lower center).

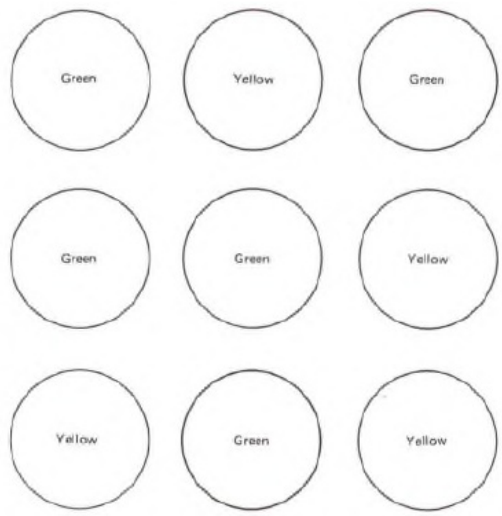

Figure 3

Further in treatment, three pairs of cutouts can be exchanged, and so on. As discussed earlier, the therapist may use the same display in several presentations involving different changes; or the colors and patterns may be altered over a series of presentations.

When the child can remember patterns of two colors contained in a display of 9 to 16 cutouts, the therapist introduces a third color. With the addition of a color, the number of cutouts should be reduced to about four (Figure 4). Following the same procedure of introducing replacements and exchanges, the number of cutouts is gradually increased, when indicated, until the child can handle displays of 9 to 16 cutouts of three colors (Figure 5). The number of cutouts depends on the age of the child.

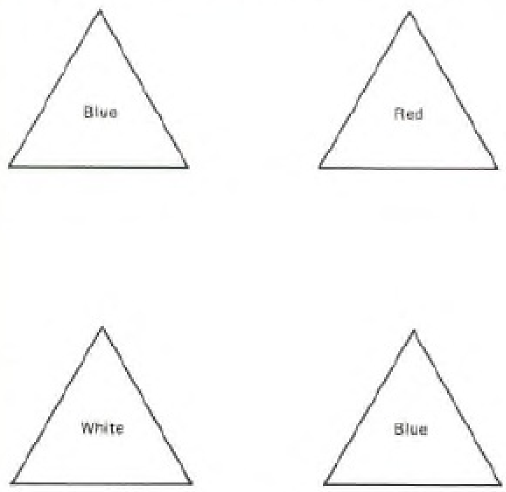

Figure 4

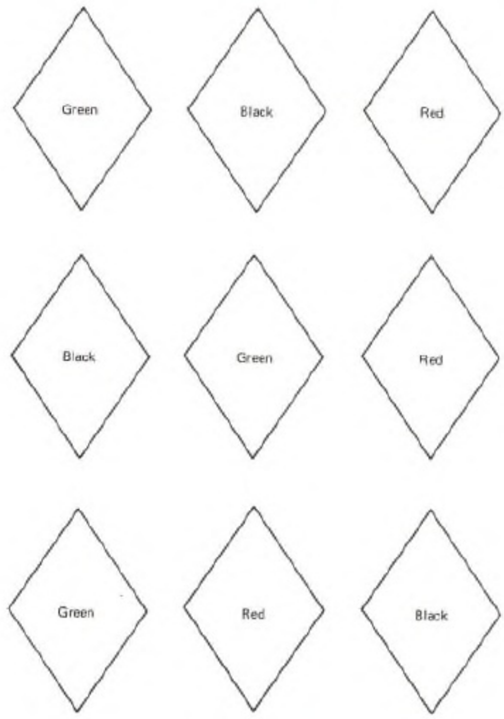

Figure 5

The therapist proceeds in this way until the child can construct a sufficiently differentiated memory image of 9 to 16 cutouts of one shape and size and containing at least four colors, permitting at least two exchanges to be detected. When the child's leveling-sharpening functioning can manage this level of complexity, the therapist moves to step 2, which involves constructing memory images of patterns of shapes. [With some adolescents, therapy in constructing memory images of patterns of color may proceed until all six colors are employed in a given display.]

2. *Therapy in Forming Memory Images of Patterns of Shapes.* Displays in the second step vary shapes as information to be remembered, with color and size held constant. When beginning a new step, the number of cutouts used at the start is reduced from the 9 or 16 the child had been handling to two or four, as indicated. Let us assume that the first display consists of four large cutouts of two shapes and one color (Figure 6). The therapist would start with lower level replacements—for example, removing a square and replacing it with a green diamond. These changes would be followed by replacing a shape with another shape that is already part of the information presented. In our example, a green triangle might be replaced by a green square. As the child demonstrates competence with replacements, exchanges are introduced into displays of four cutouts and two shapes (e.g., a square might be switched to the top row and a triangle to the bottom row). This level of therapy would continue, using various combinations of two shapes, one color, and four cutouts, until the child could construct a memory image sufficiently differentiated to detect various exchanges. At this point the number of cutouts would be increased to six, then eight, and more as indicated. The displays presented would still include various combinations of two shapes and one color (as in Figure 7). Again the therapist introduces various replacements and exchanges, at first one at a time, then two at a time.

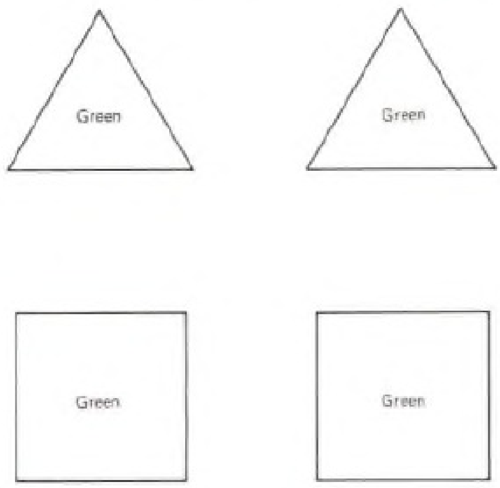

Figure 6

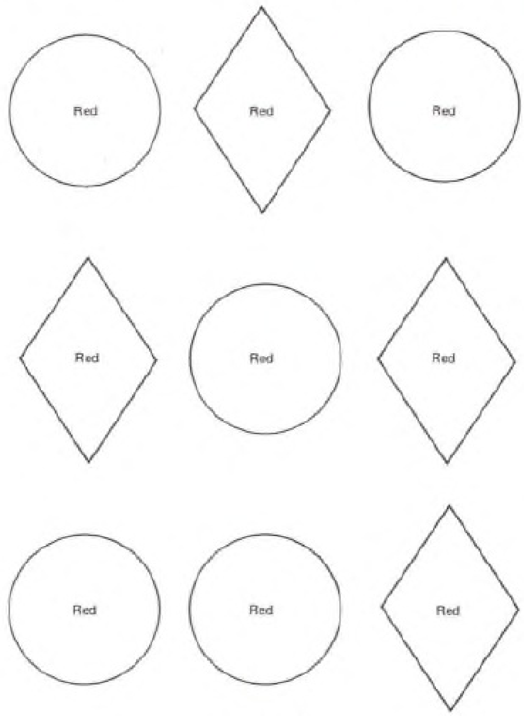

Figure 7

When the child can retain memory images of 9 or 16 cutouts involving two shapes, combinations of three shapes and one color are presented as the information to be remembered. Again with the introduction of a new dimension (a third shape), it is usually necessary to reduce the number of cutouts to fit the complexity of the task to the child's cognitive competence. For example, the therapist may begin with a 2 x 2 matrix containing two squares, one diamond, and one triangle, all of one color (Figure 8); subsequent displays would involve first various replacements, then exchanges. As the child masters this level of complexity, the number of cutouts would be increased over many presentations to 6, 8, 9, and 16 as indicated, in stepwise fashion; thus over and over again the child must form a memory image of patterns of three shapes of one color (e.g., Figure 9), and he must cope with a gradual increase in number of cutouts. When the child can construct memory images of displays of at least nine cutouts containing various combinations of three shapes of one color with sufficient differentiation to detect exchanges of at least two pairs of cutouts, he is ready to begin therapy in constructing memory images that articulate the sizes of cutouts. With older children and adolescents, therapy with constructing memory images differentiating patterns of shapes may proceed until all four shapes are employed in a given display.

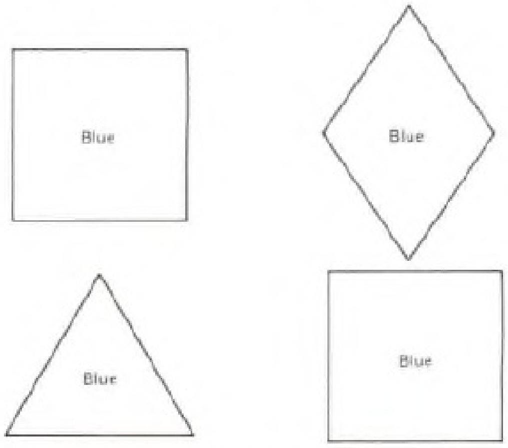

Figure 8

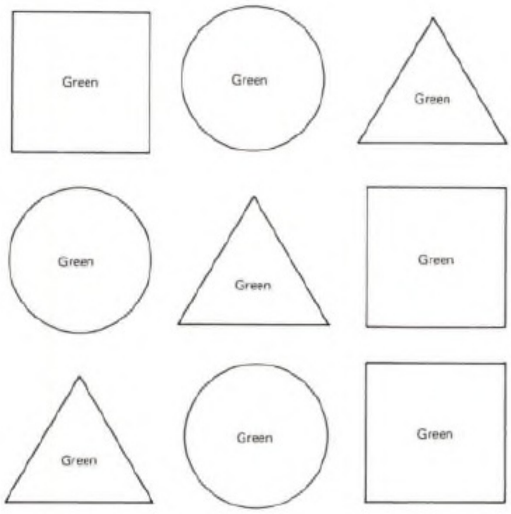

Figure 9

3. *Therapy in Forming Memory Images of Patterns of Sizes*. In the third step of therapy the displays presented vary in size, but the information to be remembered with color and shape is held constant.

Again, a new issue is introduced with a small number of cutouts—for many children, a display of four is acceptable. Children severely lagging in leveling-sharpening cognitive functioning, however, may be have to begin with as few as two cutouts. Initially it is helpful to combine large and small cutouts of the shape being use, to emphasize the difference in size. For example, the therapist might display a 2x2 matrix with two large diamonds in the top row and two small ones in the bottom row, all of one color (Figure 10). It can be seen that when introducing replacements, a large diamond replacing a small one, and vice versa, would represent lower levels of complexity than the replacement of a medium diamond for either the large or the small shape. As treatment proceeds, the display presented might come to include both large and medium shapes or medium combined with small, representing a more subtle difference in size. When the child has gained cognitive competence in remembering four cutouts that contain combinations of two sizes of one shape and one color, the therapist heightens the complexity of the task by increasing the number of cutouts displayed from four, to six, to eight, to nine (Figure 11). As before older children should be trained to handle 16 cutouts. Each of the larger displays would also contain one shape in two sizes, all in one color. At each step, replacements are followed by exchanges that represent obvious, then more subtle differences in size between the original cutout and the change introduced.

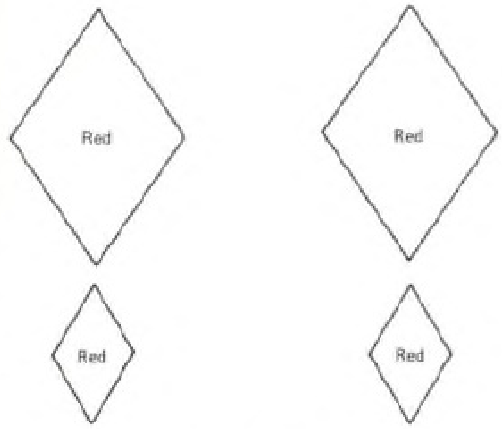

Figure 10

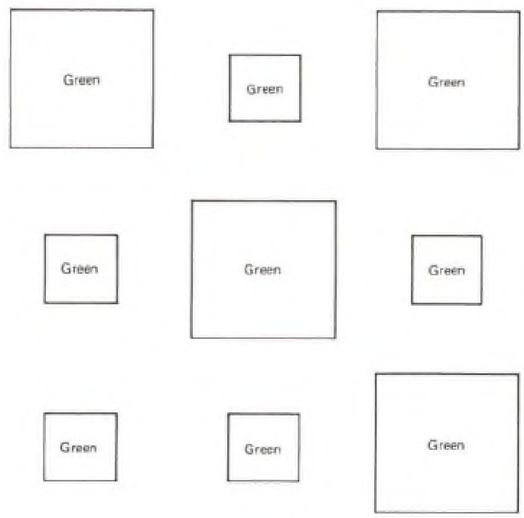

Figure 11

When the child can construct memory images of a display of about nine cutouts containing various combinations of two sizes of one shape and one color, displays are introduced that contain three sizes. Again, at this point the number of cutouts displayed is reduced to three or four of one shape and color (Figure 12) and is gradually increased (Figure 13) as the child shows competence.

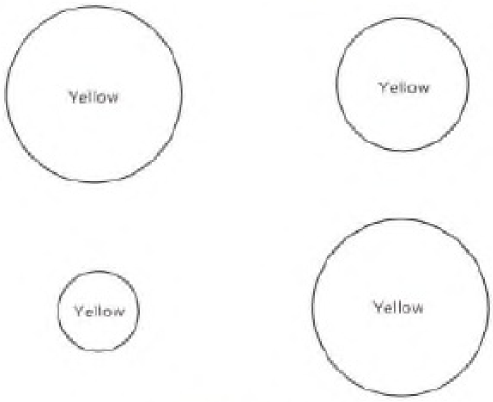

Figure 12

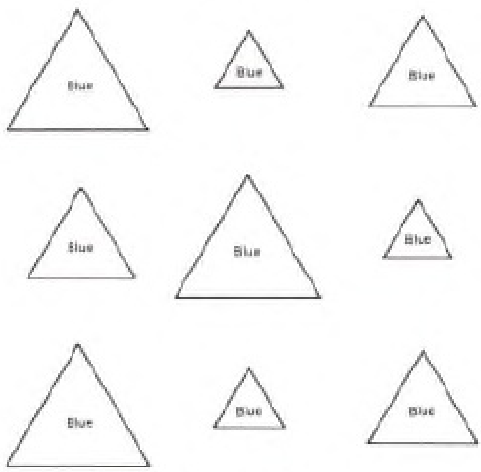

Figure 13

This phase of treatment is complete when the child can consistently construct memory images of displays of about nine cutouts, containing three sizes of one shape and color, with sufficient differentiation to detect exchanges of at least two pairs of cutouts. The child is now ready to move to the next level, which involves constructing memory images of displays that consist of combinations of colors, shapes, and sizes. Accordingly, these displays require the child to detect changes that involve combinations of colors, shapes, and sizes.

With some children it is helpful to conduct a “review” before moving on to the next step. That is, revisit the advanced levels of each of the three steps and present the child with displays that contain several colors of one shape and size, several shapes of one color and size, and several sizes of one shape and color. Following this review of the construction of memory images of information that consists of patterns of colors, of shapes, or of sizes, the treatment proceeds to the next step, in which the memory images the child constructs must differentiate combinations of these dimensions.

4. *Therapy in Forming Memory Images of Patterns of Colors and Shapes Combined.* In the first level of this phase of treatment, begin with a 2 x 2 matrix of two shapes and two colors (holding size constant); for example, use two squares and two circles, one each of red and yellow, as in Figure 14. Given the previous therapy, most children can handle this level of complexity easily, and for some it may be appropriate to begin with a 3 x 3 or a 4 x 4 matrix.

The therapist begins with replacements—for example, substituting a yellow square for the red square or a yellow circle for the red circle. This procedure is repeated using other matrices that combine two other shapes and two other colors. When the child has demonstrated appropriate competence detecting replacements, exchanges are introduced. Using Figure 14, the red and yellow circles would be exchanged in one trial. Using other matrices that combine two other shapes, and two other colors, the child would be asked to detect various pairs of exchanges.

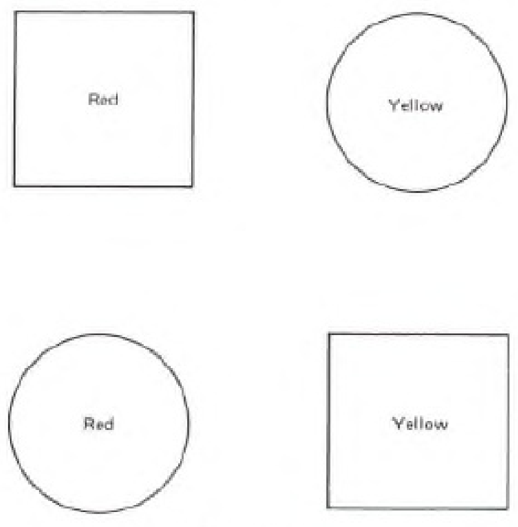

Figure 14

When the child can repeatedly construct memory images of displays made up of two shapes and two colors, the information presented is made more complex by increasing the number of cutouts to 6, 9, 12, and 16, and using two shapes and two colors (see Figure 15). Again the therapist begins with replacements and gradually shifts to exchanges over many trials, using various combinations of two shapes, and two colors, to form the display. The next level of therapy, presenting two shapes and three colors, is introduced when the child has constructed memory images of three successive displays of six or nine cutouts (of two shapes and two colors) sufficiently differentiated to detect pairs of exchanges.

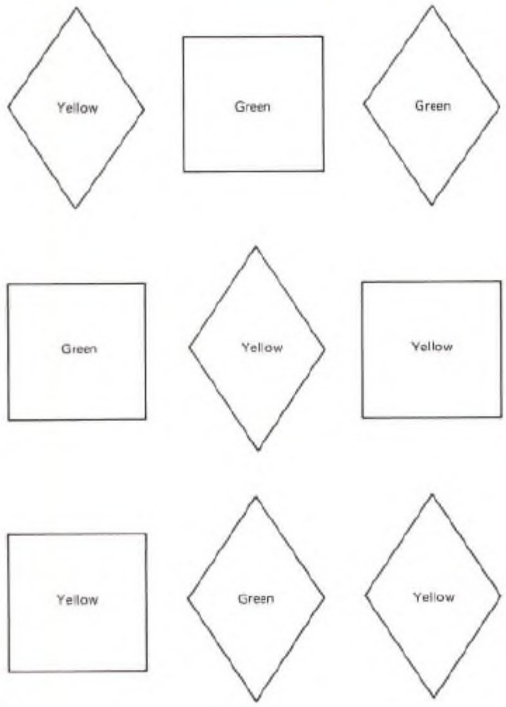

Figure 15

Again it may be necessary at the start to reduce the number of cutouts to accommodate the additional information of another color. The same procedure is followed; that is, replacements and exchanges are introduced, and the number of cutouts is gradually increased to 9 or 16.

At this point a third shape appears in the display, along with three colors; Figure 16 illustrates the most simple level of this set of information and Figure 17 a more complex level. The child should be able to remember three successive displays of nine cutouts consisting of three shapes and three colors before moving to the next step, which introduces size as information to be held in memory. Again, with some children, especially adolescents, it may be appropriate to pursue this step up to a matrix of 16 cutouts, consisting of four shapes and four colors.

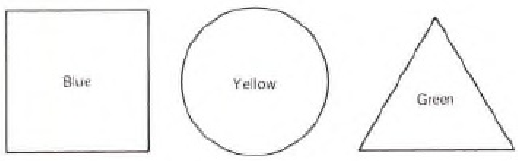

Figure 16

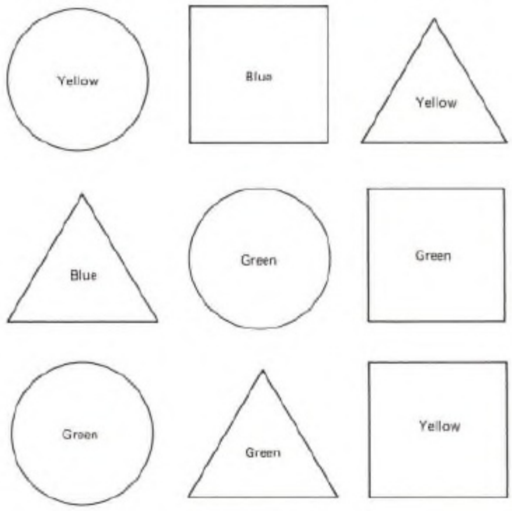

Figure 17

5. *Therapy in Forming Memory Images of Patterns of Size and Color Combined and Size and Shape Combined.* At this phase the child is presented first with displays that combine color and size, holding shape constant. Figure 18 illustrates a simple configuration of two colors and two sizes of one shape. Initially large and small sizes may be used to emphasize the difference in size and facilitate differentiating this detail in memory. Beginning with replacements, a relatively simple change would involve replacing the small yellow square by a small red square; a more complex change would be the replacement of the small yellow square by a large yellow square; and as a still more complex change we could replace the original small yellow square by a medium yellow square. With various displays that combine two sizes and two colors, the child is given repeated experiences, with the number of cutouts to be remembered gradually increasing from 4 to 9 or 16. The entire procedure is then repeated, introducing a third color combined with two sizes, then a third size; eventually the child is constructing much more differentiated memory images of three colors and three sizes contained in 9 or 16 cutouts (e.g., Figure 19).

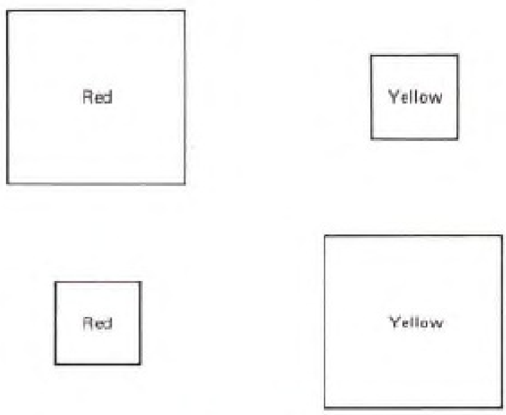

Figure 18

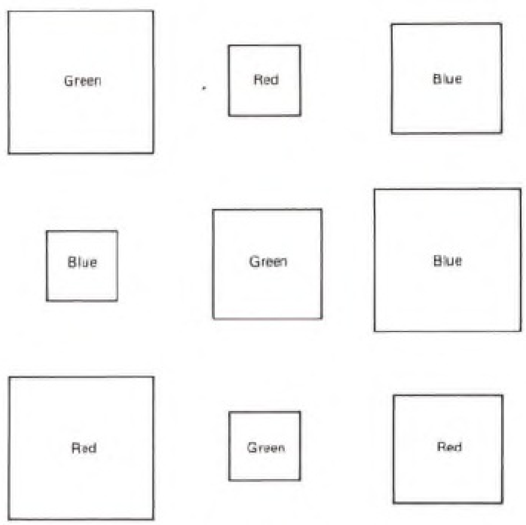

Figure 19

At this point the child begins to construct memory images that differentiate size combined with shape, with color held constant. The same guidelines are followed at the start; with a simple configuration of information (Figure 20), gradually working toward a more complex configuration that must be remembered. Again a third shape and size is introduced to give the child repeated experience in constructing memory images of 9 to 16 cutouts consisting of three shapes and three sizes (Figure 21). When the child has achieved sufficient mastery in constructing memory images of information combining color with size, and shape with size, the therapist presents information combining color, shape, and size.

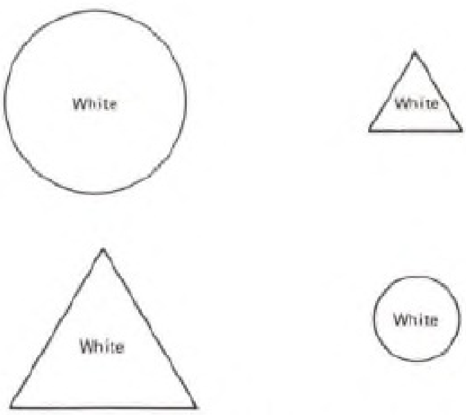

Figure 20

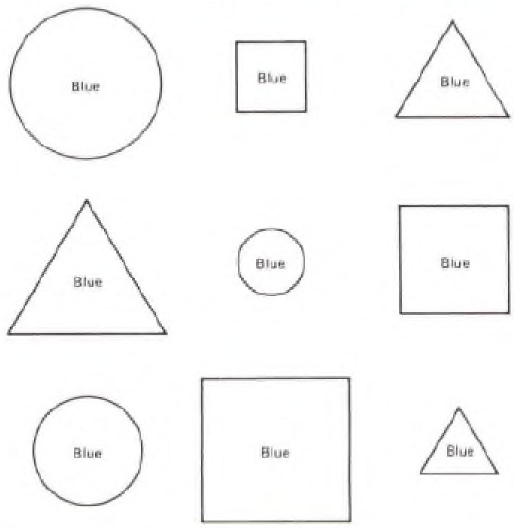

Figure 21

6. *Therapy in Forming Memory Images of Patterns Combining Color, Shape, and Size.* A matrix of six cutouts is needed to combine two colors, two shapes, and two sizes (Figure 22). The same guidelines are followed. Initially the child is presented displays containing different combinations of two shapes, two colors, and two sizes. When he is consistently successful in constructing differentiated memory images, the number of cutouts is increased in stepwise fashion to 9 or 16, as indicated. At advanced levels of this therapy the child deals with displays that contain three shapes, three colors, and three sizes. The therapist should work toward this by increasing one dimension at a time. First a third color is added and combined with two shapes and two sizes; then a third shape, along with three colors and two sizes, and so on. Figure 23 illustrates a display of information characteristic of this level of therapy. A child is considered as having sufficiently benefited from this therapy program if he consistently constructs memory images of 9 or 16 cutouts containing three shapes, three sizes, and three colors, with sufficient differentiation to detect two or more exchanges. In our experience children 8 or 9 years old can develop their leveling and sharpening processes sufficiently to manage displays of nine cutouts. Older children have reached a level of memory differentiation enabling them to handle 16 and 20 cutouts.

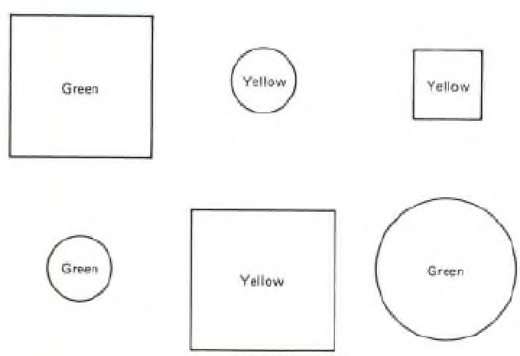

Figure 22

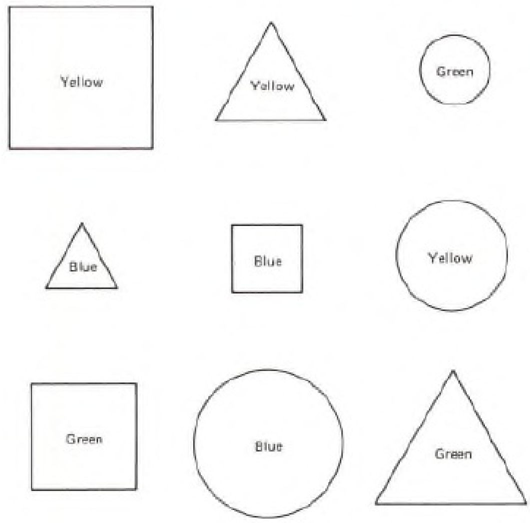

Figure 23

The discussion to this point has considered guidelines for determining the degree of complexity of information the child is asked to remember, as well as the changes the child is asked to detect. As we have seen, these guidelines define a gradual progression from simple organizations of information to be remembered and changes to be detected, to more complex ones. In addition to manipulating the complexity of information in the service of facilitating the development of the leveling-sharpening cognitive control, there are available to the therapist several other technical interventions that relate specifically to the two major components of the leveling-sharpening process: namely, the degree of articulation and differentiation contained in a memory image of information, and the stability of that memory image over time. The next guidelines apply to these technical interventions.

D. Guidelines to Facilitate the Construction of Articulate and Differentiated Memory Images. Seven techniques have proved useful in promoting the habitual construction of memory images that are maximally articulated and differentiated. Although the therapist should choose those that fit the child's needs, we have found that employing each at one or another phase of treatment has resulted in more effective treatment.

1. *From Sensorimotor Exploration, Labeling, and Drawing the Cutouts to be Remembered to Labeling the Cutouts Mentally.* This technique is especially suited for children with severe deficits in leveling-sharpening functioning: such a deficit is the general inability to construct a memory image of information consisting of two or three cutouts with sufficient differentiation to detect changes introduced a moment later. This technique is also especially suitable when a child shows difficulty in remembering information at a point in therapy at which a new level of complexity is introduced. For example, a child who has worked with configurations of colors and sizes, and shapes and sizes, may experience considerable difficulty and show much resistance to the task when then asked to construct memory images of displays that combine color, shape, and size. In such a case the technique of sensorimotor exploration, labeling, and

drawing would be introduced.

The technique consists of five steps representing a developmental progression. Ideally, the therapist should employ the first step, which involves sensorimotor and verbal exploration of the information along with visual. As the child grows able to construct consistently articulate images of the information (as evidenced by his detecting changes), the therapist employs the second step, and so on, until the child can remember the information displayed by examining the information only visually.

Trace the Cutouts Tactually, Label Aloud Their Shapes and Colors, and Draw a Picture of the Display. Ask the child to feel each cutout systematically, from left to right, and from the top row to the bottom, if a matrix is displayed. Ensure that the child traces the perimeter of each shape with his fingertips. As each cutout is handled, have the child say the shape and color aloud. Then give the child a sheet of paper and crayons and ask him to make a picture of the display (while it is still in view). Then remove the drawing and set up the screen, introduce the change, remove the screen, and ask the child to determine the change.

Touch the Cutouts, Label Aloud Their Shapes and Colors, and Draw a Picture of the Display. This step is the same as the previous one except that child touches the cutout with his forefinger as he verbalizes its shape and color and does not trace the perimeter. Again, the display is drawn with crayons and the drawing removed; then the child continues with the task.

Touch the Cutouts and Label Aloud Their Shapes and Colors. With this step the child touches in turn each cutout displayed, labeling aloud the shape and color of each. The display is not drawn.

Label Aloud the Shapes and Colors of the Cutouts. Here the child is not permitted to touch the cutouts but is asked to name aloud, systematically, the shape and color of each.

Label Silently the Shapes and Colors of Cutouts. In the last step the child is asked to verbalize to himself (silently) the shape and color of each cutout in a systematic way.

2. *From Much Time to Look Over the Display to Less Time.* This technique is employed at all levels of therapy. Early in treatment the child is given as much time as he needs to examine the display of information, and he tells the therapist when the screen may be set up and the change introduced. As the child shows growth in remembering displays at some level of complexity, introduce a time limit for the examination of a display at that level. For example, the child is told that he will have 30 seconds to look over the displays. In subsequent sessions the time would be reduced to 20 seconds, then 15 seconds, and less if indicated. Manipulating the length of time permitted for examination of a display is usually coordinated with the type of examination the child is conducting (tracing, labeling, or drawing vs. labeling mentally) as well as with the complexity of the display (e.g., 4 cutouts vs. 25).

When the treatment shifts to a higher level, including a more complex configuration of information (e.g., combinations of shape, color, and size vs. shape and color), the therapist permits the child as much time as he prefers to examine a display. Gradually a time limit is introduced. With most children, time-limited examination of the display can be introduced as a game or challenge. Children usually experience a sense of accomplishment and competence as they remember a display of some complexity after looking it over for 20 seconds, instead of the 30 seconds that was necessary previously.

3. *From Presenting Shapes Located Near Together to Presenting Shapes Located Far Apart.* At the beginning of leveling-sharpening therapy, the cutouts displayed are located about 2 inches apart. Gradually, as the particular display of attributes is repeated (e.g., four cutouts of two colors and two shapes), the distance between shapes is increased stepwise with increments of about 2 inches. At the advanced level of this technical dimension, the shapes are separated from one another by about 5 or 6 inches.

When a higher level of complexity is then introduced in the display presented (e.g., six cutouts of three colors and two shapes), the cutouts are again located near together initially. The new configuration of information is presented a number of times, whereupon the distance between cutouts is gradually increased. The therapist usually begins increasing the distance between cutouts after the child has shown that the memory image being constructed is sufficiently differentiated to permit him to detect changes reliably. The technique of locating shapes near together or far apart can be introduced with each configuration of cutouts or at each level of complexity.

Moving the shapes apart usually requires that the child construct a more differentiated and articulated memory image of the total display. Sometimes a child experiences extra difficulty remembering a display when the cutouts are far apart, although he has already developed competence in remembering the same configuration of elements if the cutouts are close together. In such cases it is appropriate to introduce the technique of touching, labeling, and drawing the display (discussed above) to aid the child in constructing a memory image of all the elements in the display.

4. *From Presenting Ordered to Random Displays.* In the early phases of therapy cutouts are arranged in orderly and symmetrical patterns (e.g., four cutouts displayed in a 2 x 2 matrix in rows and columns). As the child works with remembering displays at a particular level of complexity, the therapist, in successive displays, locates the cutouts with less order and symmetry and more randomness. In the last phase of the technique, the cutouts are “scattered” about the table. When the treatment shifts to information at higher level of complexity (e.g., from four to six cutouts), the displays are again arrayed in a symmetrical and orderly fashion, then gradually arranged more randomly. In this way the variable of order and randomness can be introduced with each new display or new level of complexity. It can be seen that constructing a memory image of a display of cutouts that are randomly arrayed requires more articulation and differentiation.

5. *From Less to More Irrelevant Information Present in the Display.* The tendency to construct articulated memory images is also fostered by introducing irrelevant information in the display to be remembered. Here the techniques

described in the program *Find the Shapes* can be employed. Two techniques make use of the cutouts as a source of irrelevant information, and a third uses information other than cutouts.

Displays Containing a Vivid Pattern. The display constructed contains a vivid pattern that tends to dominate the perceptual experience when the cutouts are examined. For example, a 3 x 3 matrix might contain a diagonal of green cutouts that “stands out” and takes some attention away from the task of surveying and registering the other cutouts. The change introduced would involve cutouts not in the diagonal. Children often remark that they have to “work harder” to remember all the cutouts when the display contains a vivid pattern of colors. Other competing, irrelevant stimulation might be introduced by forming a frame around the display of one color or one shape, or by setting one or two cutouts to one side of the display.

Stacking Technique. The stacking technique described in connection with the program *Find the Shapes* is another very effective clinical intervention that helps foster the tendency to construct articulated, differentiated images of information. For example, a 2 x 2 matrix can be constructed of large cutouts, with a medium cutout placed on each. The child is asked to look over and remember the medium cutouts, because he will be asked to detect a change that is going to be introduced in one or more of them. Similarly, the child may be asked to remember the cutouts at the bottom of the stack because changes will be introduced in them, instead. At a much more complex level, stacks of three cutouts may be used; the child is asked to remember the large ones at the bottom, or the medium ones in center, or the small ones on top. Moreover, the combinations of cutouts placed in a stack may also be varied to construct degrees of distracting, irrelevant information that works against the formation of an articulate memory image. For example, remembering a medium green square set on a large yellow diamond would be easier than remembering a medium green square set on a large green diamond.

Information Outside the Shapes as Irrelevant, Distracting Information. A wide variety of distracting stimuli other than distractions constructed of cutouts may be introduced at several points in the treatment process: (1) while the child is examining the display presented, (2) while the child is waiting to reexamine the display in order to detect a change (see guideline E—the technique of delaying the reexamination of a display), and (3) while the child is reexamining a display.

The introduction of distractions during the process of examining information is the same as the technique discussed in the program, *Find the Shapes,* were distractions are used during the process of selective attention. The particular distraction introduced should be selected on the basis of some understanding of affects and issues the child experiences as especially disruptive while trying to remember school work. These distractions may be visual, auditory, or tactile stimuli that are irrelevant to the task of constructing a memory image of information. With this technique the therapist deals more directly with the affects and fantasies that uniquely disrupt the child’s remembering information. For example, when a child shows that tensions involving aggression uniquely disrupt the process of constructing and maintaining memory images, we have arrayed pictures of aggressive themes around the matrix of cutouts to be examined or around the changed display in which the child is asked to detect changes. By way of another example, if the child shows an unusual sensitivity to loud sounds, records are played during the examination of matrices. In the course of therapy with one child, we learned that the voices of children in the classroom and corridor particularly disrupted him when he was forming memory images. Accordingly, the therapist began to play tapes of a group of children talking during the administration of *Remember Me* tasks.

By carefully and therapeutically introducing such external stimuli that uniquely arouse affects and fantasies in the child, the therapist provides opportunities for the child to become desensitized to the stimulation, that is, to develop the cognitive capacity to subordinate the external stimuli and the internal tensions they arouse, while involved in the task of constructing memory images.

This technique allows some children to examine the source (or conflict) that renders the stimuli disruptive and to work through and resolve the conflict with an understanding that contributes to mastery. Moreover, in accordance with earlier discussions on dealing with affects and fantasies in cognitive therapy, this technique attempts to give the child therapeutic experiences that join cognition with affect and enable cognition to organize and control affect.

To illustrate this point, let us consider further the child who was uniquely disrupted by the voices of other children when trying to remember information. Early in the use of distractions, the therapist played tapes of children's voices, focusing the work on helping the patient to perceive fully the tensions and cognitive disruptions he experienced. Then the therapist used tapes in which four or five voices could be distinguished. It was suggested to the child that he let each of the voices represent one of the shapes in the matrix being examined. While examining a matrix, the child was asked to take each voice and to "tie" the voice to the shape to which it belonged "instead of letting the voices bounce around and mix you up." The child worked with this task over a number of sessions, gradually becoming quite proficient in connecting the various voices (dog barks and cat meows were also used) to specific shapes in the matrix he was trying to remember. In this phase the child began to joke, saying, for example, "That's the triangle voice," showing a change in affect from tension and confusion to humor and competence as each bit of information (shapes, colors, sizes) became "glued" to one or another vocal sound. Moreover, in this phase the child also made spontaneous comments to the effect that "The voices don't mix me up any more . . . they don't bounce around inside of me when I'm trying to concentrate and remember."

After a while the child was remembering displays of cutouts while recorded voices were played, exerting little conscious effort to tie each vocalization to a specific shape. Cognitive control was gained over the distractions, which were now subordinated during the process of constructing memory images. The same child was able to go beyond this point with the help of therapeutic work (clarifications, questions, interpretations) in learning about the source that had rendered the particular stimulus of voices so distracting. When the child reached the level of being able to remember displays without giving specific attention to the voices, which were now subordinated automatically, the therapist began to wonder why, for example, voices made the child mixed up and confused but not the sounds of cars or trucks. The therapist also wondered what the voices made the child think of. Gradually, with associations and memories, the child articulated the envy and competitiveness that he felt toward his younger sibs. He recalled, for example, how angry and upset he felt when he could hear his sibs chatter in the kitchen with mother, or in the den with father. This 10-year-old patient was able to gain some insight into the dynamic that the tension and confusion he experienced while trying to remember school work when children were talking, was related to the anger and envy he felt toward his sibs.

We have observed that most children with severe cognitive control deficits can reach the level at which cognition joins with and organizes the distraction (e.g., as when the child worked at tieing sounds with cutouts), thereby reducing the impact on cognition of disrupting tensions. We have also observed that some children with severe cognitive deficits can reach the higher level, gaining insight into the conflict or source that renders the particular stimulus a major disrupter of cognitive activity.

The following are examples of stimuli we have found to be useful as distractions with various children: pictures of aggressive or passive and vulnerable animals; pictures of animals being fed or being injured; pictures of children being reprimanded by authority figures; recordings of voices, automobiles, trucks, jet planes, machine guns firing; materials that present various textures the child feels while examining a display, such as sandpaper, burlap, fur, wet cornstarch.

Typically, it is only in the later phases of therapy in leveling-sharpening, after the child has had considerable experience constructing memory images of information presented relatively free of affects and conflicts, that distractions are introduced. Again, during this phase, therapeutic work first focuses on helping the child to articulate, feel, and become aware of the unique tensions aroused by the stimuli and to learn how these tensions disrupt the remembering of neutral information. Following this, the work can focus on helping the child learn the conflict that renders the stimuli intrusive.

6. *From the Therapist Providing Guidelines in Constructing a System for Remembering a Display to the Therapist Providing no Guidelines.* In the early phases of therapy with leveling-sharpening, the therapist may have to show the child how he can develop systems for remembering the cutouts displayed, teaching him that the colors and shapes that form a display can be grouped mentally to represent familiar objects or patterns. For example, after the child has studied a particular display, the therapist would ask whether the colors are arrayed in such a way that they “could be something,” and he would point out that the pattern of colors is retained more easily (“You can make a clearer picture in your mind of the cutouts”) if the colors are remembered in terms of their defining familiar patterns. Using Figure 5 as an example, the therapist might point out to the child that the green diamonds form “a tent” or “Christmas tree” or “V” with the “tip in the middle,” the black diamonds form one with the tip on the left, and the red diamonds form “a line that comes down straight but ends in the middle of the design.” Grouping and articulating the display in this manner, along with the verbalizations, helps the child to learn that what appears at first glance as a “scramble of information”

can be organized and remembered more easily if a system is invented and used.

Using systems that animate the cutouts is helpful to some children. For example, colors can be arranged so that two yellow squares are seen as the eyes of a person, the red square the nose, and the blue square the mouth. With another display the square could be viewed as forming the trunk of a tree and the circles, the branches.

By suggesting how the cutouts displayed form familiar patterns and objects, the therapist helps the child learn that strategies can be developed for articulating and differentiating a configuration of information in memory. Initially, the therapist suggests various strategies and encourages the child to verbalize aloud the system he employs to articulate each display. Gradually the child is offered less guidance and is asked to go over the scheme mentally while he examines the shape.

This technique should be emphasized in the early phases of therapy; however it is often useful to reintroduce it whenever the child is presented with new, more complex levels of information (e.g., when size is first included as an attribute along with color and shape).

E. Guideline to Facilitate the Constructing of Stable Memory Images. The techniques discussed in guideline D are designed to foster the development of the part of the leveling- sharpening process that involves constructing articulated and differentiated memory images. The techniques considered here are designed to promote the development of the other major component of the leveling-sharpening process, namely, the maintaining of stable memory images over time. These techniques are introduced after the child has become competent to examine a display (consisting of at least two colors, two shapes, and two sizes) and to construct a memory image sufficiently differentiated to permit the perception of two exchanges or replacements introduced into the display. Now the therapy phases in experiences that emphasize maintaining memory images stable over time.

1. *From Little Delay to Much Delay Before Reexamination of a Display.* When this technique is introduced, the child is at the following level: he has been examining 3x3 displays consisting of two colors, two shapes, and two sizes, reexamining the display after a very brief delay (the few seconds necessary for the therapist to introduce a change). The therapist now explains to the child that the game will be played in a slightly different way, that he is to wait for some period of time before the screen is removed and the display can be reexamined, that now therapist and child will begin to pay attention to the issue of holding a memory image over time, and that therapist and child will decide together when and how much to increase the time of delay. Usually the child is asked to begin with a delay of 10 seconds. This time period usually equals the time the child has been waiting, up to this point, for the therapist to introduce a change. One starts without actually increasing time delay because specifying and emphasizing the issue of delay often results in a higher level of tension and new resistances. With the technique of delay, the therapist constructs a display in terms of one of the previous guidelines, asks the child to examine it, sets up the screen, and introduces a change. At this point he starts a stopwatch, which is on the table; the device has already been shown and

explained to the child. After the specified time has elapsed, the screen is removed and the child is asked to reexamine the display and determine what the change is. When the child has shown proficiency with maintaining memory images of a display over the designated time, the delay is increased to 20 seconds, then to 30 seconds, and so on, in 10 or 15 second increments as indicated.

When introducing the technique of delay, it may be necessary to reduce the level of complexity of information with which the child has been working. For example, if the child was dealing with a nine-cutout display of two colors, two shapes, and two sizes, the display to be remembered could be made less complex by shifting two nine cutouts of two colors and two shapes, but only one size.

During the delay children frequently make spontaneous comments and show behaviors that permit the therapist to begin to bring their attention to the tensions they experience and problems they encounter in holding a memory image stable over time. Moreover, when a child identifies a cutout as having changed when in fact it was not changed, the therapist has an opportunity to begin to address with the child the issue of fluidity or fabulizing of memory images. At this point child and therapist can examine the issue within the contemporary experiences of the *Remember Me* game, and relate and associate to analogous experiences in the classroom. For example, one child related his tendency to rotate numbers and letters in classroom work with his tendency to rearrange in memory the image of the display presented.

The maximum length of time a child is asked to delay varies in terms of the individual's developmental status. All children should be given experiences of holding an image in memory for at least 2 or 3 minutes without interpolated experiences (see next guideline). With longer periods of delay, one could interpolate activities for the child to engage in before reexamining the display.

2. *From Fewer to More Experiences Interpolated Between Examining and Reexamining a Display.* After the child has developed the capacity to maintain an image of information in memory over a period of 60 seconds or more, the therapist asks the child to engage another activity before reexamining the display. Almost any activity will do, but interpolated activities should be selected to suit the child's therapeutic needs and to relate to unique difficulties with memory (see also discussion of this issue in the program *Find the Shapes).* Examples of interpolated activities are reading, solving math problems, listening to music or various sound effects, free play, form-board games, matching various textures with touch perception only, and working with clay. With older children, we have introduced an advanced level of this technique: the child examines a display at the start of a session and does not reexamine it until the end of the session to detect a change. Along the same line, the child is shown a display at the end of one session and reexamines it at the start of the next session, to determine whether a change has been introduced.

3. *Introducing a Change in the Display While the Child Reexamines the Display.* This technique has also proved useful in permitting focused work on the stability of memory of images. The child is told that when the screen is

removed, the therapist will add cutouts on the table or will change one or more cutouts, while the child is reexamining the display and before he decides whether a change was introduced. Immediately after the screen is removed, the therapist places a large red diamond, for example, next to the display. In another example, the therapist removes a blue circle and replaces it with a blue square, or exchanges two shapes.

Many children experience these ongoing changes as disrupting the memory image and as stimulating them to "work hard to keep the picture in my head straight," as one child put it. Another child said that perceiving the additions or changes the therapist introduced just before or during reexamination of the display, "juggles all the pieces around in my mind."

To this point, the basic technique of the program *Remember Me* involves asking the child repeatedly to construct memory images of information consisting of patterns of cutouts that gradually increase in complexity. The information manipulated (i.e., the geometric cutouts) is three-dimensional and, relatively speaking, is without meaning or relevance for the everyday world of the child. Moreover, the space covered by the information is relatively large—a table surface of about 2 x 3 feet.

When the child has gained sufficiently in leveling-sharpening function to be able to remember a configuration of 9 to 16 cutouts of several colors, shapes, and sizes, after a delay and in the face of distractions and interpolated activity, the material and format used in leveling-sharpening therapy become more related to the child's everyday world, and especially to the form and content of information presented in the school situation. The information the child is now asked to remember (e.g., pictures of human and animal figures, printed words) is two-dimensional, represents things and people about which the child has thoughts and feelings, and contains the basic symbols used in learning and communicating (letters and numbers). Moreover, the space covered by the information is now relatively small (a sheet of paper) and is more like the space that typically contains information to be learned in school.

All children from the ages of 4 or 5 years through adolescence who require treatment in leveling-sharpening should receive some experience with the next phase of therapy, which makes use of two-dimensional information. The complexity of the material used, of course, must vary according to age. Parenthetically, we have found the advanced steps of this treatment program, described in Phase II, especially useful with older adolescents and adults who present major deficits in remembering information.

PHASE II.
PRINTED GEOMETRIC SHAPES, PICTURES, NUMBERS, LETTERS, AND WORDS

This part of the cognitive therapy program *Remember Me* follows the same general guidelines described in Phase I. However the information presented is two-dimensional, including printed shapes, figures of animals, humans, and common objects, and letters, numbers, and words. Moreover, the information to be remembered is limited for the most part to the microspace of a sheet of paper. Typically the content of Phase II is presented to the child in the following sequence: from printed geometric shapes, to animals, humans, and common objects, to letters and number problems. Printed geometric shapes are used first to provide a transition from the therapy of Phase I to that of Phase II. Animals, humans, and common objects are usually used as the next information, bringing the perception and memory of contours and shapes to bear on the child's affective, day-to-day world. Letters, words, and numbers are typically used last, returning perception and memory functioning to the contours and shapes of symbols that now, however, have elaborate meaning and are the basic information for learning. Thus the goal of Phase II is to bring the functioning of the leveling-sharpening cognitive control gradually to bear directly on content pertaining to academic skills and demands such as reading and number work.

The materials used are tailored as much as possible to suit the unique cognitive needs of the child. They can be constructed on cards or on sheets of paper, and by means of currently available reproducing methods, the therapist can keep on hand a supply of various therapy forms to use with different patients. The materials described here are illustrative of the many variations possible.

Each technique considered in Phase II includes an advanced phase in which the child experiences categorizing information to be remembered. That is, the memory image formed is guided not only by the perceptual attributes of the information, but also by the class or category represented by the information. In this way a therapeutic bridge is formed from therapy in leveling-sharpening functioning to therapy in equivalence range functioning, the next cognitive control in the hierarchy.

Printed Shapes. Printed shapes are presented in various configurations, following the guidelines discussed in Phase I. In the first steps of this level of therapy, the shapes used are drawn or printed on 2 x 2 inch cards, one shape on each card. However each shape should occupy a space 1 inch square. The basic shapes (square, circle, diamond, triangle) are used, and the primary colors plus black and white. Having one shape on each card enables the therapist to use the same deck of cards in arranging various displays to be remembered. Changes are introduced in each display also following the guidelines discussed previously. If the child's cognitive status permits, other more complex geometric shapes can be included, such as various polygons and ellipses.

In the latter steps of this level of therapy, displays of geometric shapes are drawn or printed on a standard sized sheet of paper (8½ x 11 inches). The child studies the display, the screen is set up, and a prepared sheet of paper, containing the display with some change, is substituted for the original sheet. Many different displays can be constructed on sheets of paper, according to the guidelines discussed in Phase I, making possible the systematic variation of number, shape, color, and size of the geometric figures arrayed, and the proximity, degree of orderliness, and presence of distracting information present. Each sheet of paper containing a display to be presented is accompanied by another sheet containing that display with some type of replacement or exchange.

In the advanced stages of this phase, the therapist should present displays that encourage and permit conceptual thinking as part of the process involved in constructing the memory image. For example, a display might contain figures that vary in shape, but all have five sides, and the change introduced involves a shape that does not belong to this class (e.g., because it has six sides). At a higher level of categorizing, the display could be constructed so that figures that are both linear and curvilinear form a "V" in the display, figures that have five sides form a diagonal, and so on. Following the Phase I guideline in which the therapist helps the child develop a system to remember the pattern of information, the therapist now points out how grouping the shapes by categories can help the child to remember the display.

Figures of Humans, Animals, and Common Objects. The child is presented, as information to be remembered, with configurations of adults, children, animals, fish, birds, and common objects, represented in schematic line drawings on a sheet of paper (8½ x 11 inches). The number and type of figures, degree of orderliness, and proximity can be varied, following the Phase I guidelines. The use of drawings of humans, animals, and the like, provides the child opportunities to form memory images of reality-related information that may sometimes require a more complex, differentiated memory image than does the information represented by geometric shapes. For example, the type of clothing worn by one of 10 human figures portrayed could be changed, or the shape of the dorsal fin of one of 10 fish.

Moreover, in using drawings of persons, animals, and things, the process of constructing memory images of information is more closely joined with affects, fantasies, and real-life experiences. We have observed children who reached an advanced level of development in remembering complex configurations of geometric shapes, then become stressed and incompetent in remembering much simpler configurations of information involving pictures of persons and objects. In this phase of treatment the therapist clearly has a special opportunity to revisit affects and conflicts he and the child have already addressed, and to work further with issues unique to the child that interfere with the construction of memory images. The schematic line drawings of adults and children, typically bring up associations to parents, sibs, and teachers present and past, especially when these persons have played some part in traumatic incidents involving learning and school work.

While the child grapples with remembering configurations of drawings of humans, animals, and objects that arouse many interfering affects and associations, the child has available and can rely on leveling-sharpening growth achieved in remembering geometric shapes. The hypothesis guiding this phase of therapy is that if a child has reached a point of leveling-sharpening development at which displays of 9 or 16 cutouts are remembered, that competence, achieved with neutral information, will serve the child in dealing with information that is potentially conflicted for the child, therefore disruptive. The goal in this phase of treatment is to help the child render neutral the information that is represented by everyday objects.

If a child looks at a display of human figure drawings, has a difficult time remembering the information, and too readily becomes emotionally aroused and preoccupied with some real event, it is assumed that the same experience is repeated when he is looking at a school book. That is, the information in the book (or in the display) is not dealt with as "neutral information" or as "conflict free" but is too readily personalized.

Information to be remembered is experienced as conflicted rather than neutral for two basic reasons. First, because the child's lagging cognitive controls have been out of phase with the informational demands of the environment and in conflict with them. The second reason involves children with neurotic conflicts as well as cognitive disabilities, for whom the task and process of remembering stir up anxiety and guilt because that process has been tied to fantasied taboos and violations that must be kept out of awareness.

The therapist would focus his work on the feelings, persons, and incidents that represent the environment's negative reactions to the child's failure to learn. It is assumed that these reactions have accumulated over the years and have added stress to the process of remembering, combined with the stress associated with the mismatch between the child's lagging, undifferentiated cognitive control and the more highly differentiated demands of the environment. Where indicated the therapist could also include therapeutic work on fantasies and conflicts between wishes and prohibitions that are related more to the child's neurotic problems and are aroused by the task of remembering.

The use of pictures of persons, animals, and objects as information also may be organized to include conceptual thinking in the process of constructing a memory image. For example, a display might incorporate drawings of animals that live both on land and in water, and objects that are used on land and in the water. The figures could be positioned to facilitate the formation of a memory image of the display by grouping the animals and objects in terms of the concepts of land and water, and remembering the spatial location of members of each group. Then the replacements introduced would involve animals that live only on land, or objects that are used only in water or only on land.

Letters of the Alphabet and Numbers. The information to be remembered in this phase of treatment consists of patterns of letters or numbers. Again the therapist may vary in terms of the Phase I guidelines the number of items included on the sheet of paper (8½ x 11 inches,) the type of item, the degree of orderliness, the proximity, the type of distraction, the degree of delay, and the interpolated experiences. Following the same general procedure, an original display of letters (or numbers) is presented, this sheet is removed, and the child is given a second display to examine, to determine whether a change has been introduced in the information.

To include conceptual thinking in the process of forming a memory image, displays can be constructed, that include, for example, only particular vowels, only odd numbers, or only numbers that increase by increments of 3. Thus one display to be remembered might contain, in a particular pattern, even numbers that increase in value by 2 and, in another pattern, odd numbers that increase by 3. When examining this display the child would be asked to look over the numbers and "think of a way they belong together," and to remember the numbers as belonging to one group or another. The child would be asked to examine the second display with the help of these categories, to determine whether a change had been introduced.

A higher level of this procedure would involve presenting sheets of paper on which are printed pairs of letters representing vowel-consonant combinations. The memory image constructed would be assisted, for example, by remembering the pattern formed by pairs of letters in the display that make a “ba” sound and the pattern formed by those that make a “ca” sound, and so on. Along the same lines, in terms of numerical skills, the display might contain pairs of numbers that sum to either 4 or 6, categories that could guide the construction of the memory image of the numbers displayed. Therapeutic work with such material brings the leveling-sharpening process closer to the reading and number skills required in school.

Printed Words. Presenting displays of printed words according to the basic guidelines of the leveling-sharpening therapy program has proved useful with children who are several grades behind in reading skills and lagging in leveling-sharpening cognitive control functioning, as well. The therapist should first have the child read lists of words (e.g., Dolch Word List, 1945) to establish the basic words the child reads reliably and those he misreads. For example, if a fourth grade child is reported to be reading for the most part at the second grade level, one would establish the second and third grade words he is able to read reliably and those he reads incorrectly some or most of the time. The words would be printed or typed on 3 x 5 inch cards; which then would be presented in various configurations of two, four or six words, like the geometric shapes discussed in Phase I. Number of words, type of words, proximity, degree of orderliness, delay, and so on, would be prescribed and modified according to the same guidelines, as would the changes introduced. As a rule, each display should include both words the child reads reliably and words the child often reads incorrectly and tending to see them as something else. The goal in this phase is to help the child develop the habit of articulating differentiated, stable images of basic sight words. As this is accomplished with words of one grade level, basic sight words of the next grade level are introduced.

The program used with a third grade boy who was reading primarily at the first grade level serves as an illustration. Jimmy frequently read the word “nest” as “next” or could not read it at all, and he often read the words “money” as “monkey” and “begin” as “began.” The goal was to help him develop the habit of articulating differentiated stable images of words and their meaning and sounds. With one presentation, the therapist arrayed four words: “nest” and “money” in the upper row, and “hop” and “begin” in the lower row. Jimmy examined the display, the screen was set up, and the word “monkey” was substituted for the “money” (a replacement). The screen was removed and Jimmy was asked to determine whether the display had changed. With another display, now containing eight words in a 2 x 4 matrix, the words “story” and “store” were interchanged (an exchange). At first changes such as these went undetected. Gradually, as Jimmy constructed more articulate and stable images of configurations of words displayed, he was able to detect these changes.

At higher levels of this procedure, the child is encouraged to construct a memory image of the display with the assistance of a category or concept that now includes, in the process of remembering, the cognitive control of equivalence range. For example, a display might involve nouns and verbs, each of which forms a particular pattern in the total matrix. Or a display might be organized and remembered in terms of analogies such as run-fast and walk-slow.

It should be emphasized that the use of words as information in leveling-sharpening therapy is not intended to help the child acquire reading skill as such. Rather, the words serve primarily to help the child cultivate the tendency of habitually articulating differentiated and stable memory images of words, a tendency that should assist the child in making use of reading training.

PHASE III A SUPPLEMENT

This aspect of leveling-sharpening therapy, intended as a supplement to the therapy described in Phases I and II, provides the child with experience in constructing memory images by means of touch perception. It is especially indicated for children who, in addition to lagging significantly in leveling- sharpening functioning, show poorly defined body ego, confusion with spatial relationships, confusion and inefficiency in representing information graphically, whether in copying Bender Gestalt designs or in printing and writing letters or numbers. This supplement is also indicated for children who show disorders with regard to the regulation of motor behaviors—either severe motor inhibition and an exaggerated capacity to delay fine motor movements or a tendency to be restless and impulsive and to engage information with an exaggerated fast tempo. It has been our experience that these children benefit from leveling-sharpening therapy that includes and emphasizes the touch modality by which information is registered and mental representations are constructed.

Therapy using touch perception could be included over a number of meetings along with therapy using visual perception as outlined in Phases I and II. Or the therapist may decide that several weeks or months must be exclusively devoted to touch perception therapy. The principles and guidelines discussed earlier can be applied in prescribing and conducting leveling-sharpening therapy with touch perception—that is, principles concerning number, type, and configuration of textures or shapes to be remembered, the proximity and degree of randomness with which the material is arranged, the duration of a delay from the first examination of the material to reexamination, the use of distractions, and the use of interpolated experiences.

We have used the same geometric shapes in this phase of therapy. However the child examines by touch perception only a display that is covered with a cloth. We have also used squares of sandpaper and wooden cubes as materials, for the most part because they permit relatively systematic manipulation of the information involved. To illustrate the technique, let us consider eight grades of sandpaper which, for convenience, we designate by the numbers 1 through 8, from very coarse to very fine. At the start, a child might be presented with four squares of 1 sandpaper, placed in a 2 x 2 matrix, covered with a cloth. The child touches and feels each square. Then one of the squares in the matrix might be replaced by a square of 7 (fine) sandpaper, a relatively simple exchange, or by a square of 3, which is only slightly less coarse than the original and represents a more complex exchange. The child would then be asked to reexamine the matrix and determine whether it has changed.

Still more complex configurations of information to remember would be matrices made up two textures, and three or four textures, respectively. Similarly, four squares of sandpaper of two textures organized in a 2 x 2 matrix would represent a simpler configuration than a display of eight squares of sandpaper consisting of two textures arrayed to form a particular configuration. With two or more textures in a display, exchanges involving pairs of sandpaper squares can be introduced as changes, in addition to replacing a square or squares by a texture not present initially or one that is part of the initial display.

Other materials (pieces of cloth—burlap, cotton, wool, rayon, etc.) can be used in a similar way to form configurations of information to be remembered. We have also made use of wooden cubes that range in size from l x l x l to 4 x 4 x 4 inches in quarter-inch increments. Door keys of unlike lengths involve a high level of touch perception and are useful with some children, as well as rubber balls that differ in size and density.

With leveling-sharpening therapy involving touch perception, the therapist must be resourceful in selecting a type of material that suits the unique needs of the child and in prescribing displays that gradually increase in complexity. As might be expected, the use of touch perception brings into the treatment situation the opportunity to work with new affects, associations, and resistances related to the articulation of memory images.

A Program of Therapy Illustrating the Combining of Guidelines

With the foregoing discussion of the guidelines and techniques that comprise the therapy program *Remember Me,* it may be helpful to consider a hypothetical treatment program to demonstrate how these several techniques could be combined.

Let us imagine a second grade girl who shows a severe lag in leveling-sharpening functioning and has had a number of preparatory sessions with the advanced levels of the previous program *Find the Shapes,* where she removed series of shapes designated by the therapist.

When therapist and child are seated at the table, the therapist says, “Sally, today we are going to begin a new game, with the same cutouts, that is called *Remember Me.”* The therapist makes a row consisting of three large cutouts (red square, yellow square, and blue square), each about 2 inches from the next on the table, representing a display of three cutouts, three colors, one shape, and one size. Following the guidelines for starting all phases the therapist has calculated that the child can easily handle this level of complexity.

“The game *Remember Me* goes like this. Look over these cutouts so that you can remember how many there are, the colors, the place each color has in the row, the shape, and the size. Try to make a picture in your mind of all of these cutouts. OK? Do you think you can remember them? Fine.” (Therapist places the screen before the display.) “Now I put up the screen so you can’t see the cutouts. Fm going to change one of them. When I take down the screen, look at the cutouts again and tell me if you can notice which cutout I changed.” (Therapist replaces the red square with a yellow square—a replacement with information already involved—and removes the screen.) “Look over the cutouts. Has anything changed?”

If the child responds with “This was red,” say, “that’s right, it was red. What shape is it?” If the child replies “square,” return the red square to the display, removing the yellow one. Then say, “Let’s try that again.”

Repeat the procedure using other combinations of three cutouts and three colors of one or another shape and size. Let us assume that the child continues to identify the replacements correctly. The therapist now introduces exchanges. For example, with a display of blue, red, and green diamonds, the blue and green diamonds are exchanged. At this point the child may err in identifying the change, or she may say that nothing has changed. The therapist shows the child the change made, and explains, “Sally, there’s a way you can make clear pictures in your mind of the cutouts on the table.” Here the therapist presents another display and introduces the technique of examining the cutouts by feeling, labeling, and drawing them. Say, “Sally, feel this shape. . . .Fine. Now say its name. Fine. . . . Now do the same with the next shape, and the next. . . . Now take this paper and crayons and draw a picture of the cutouts.” As the child draws, point out that touching, naming, and drawing the shapes helps to make “a clear picture in your mind of them.” This procedure is repeated as needed during the following presentations.

As the child succeeds in detecting exchanges, the cutouts are moved further apart and gradually located randomly rather than in a straight row. During these sessions the technique of touching, naming, and drawing is modified, as described earlier. Next the child only names and draws the shapes, then only names the colors, and finally only names the colors mentally.

When the child is successful with three presentations in a row involving different combination of three colors, the number of cutouts displayed is increased to four, then to six, and then to nine, using two colors and one shape and size in each case. With each larger number of cutouts, the displays are presented first in the near condition, then with cutouts far apart; and at first the cutouts are arrayed in an orderly matrix, then located more at random. Moreover, touch, labeling, and drawing are introduced as needed with each larger display. Throughout all these sessions the therapist also coaches the child in developing systems for remembering the patterns of colors.

When the child is able to remember configurations of 9 to 16 cutouts of three colors and one shape and size, arranged far apart and randomly, the therapist introduces the technique of limiting the time the child is given to examine the display.

“Sally, let’s try something new. You have been taking all the time you need to look at the design you have to remember. Let’s work on remembering designs after you have looked at them for a little while. I’ll put out a new design and you look at it until I put up the screen. Let's try 30 seconds." The therapist sets up the screen and constructs the display behind it. He then removes the screen, asks the child to look over the display, and returns the screen after 30 seconds. A change is introduced, and the usual procedure is followed. Let us assume that the introduction of a time limit causes the child to become confused and to fail to detect the change. The number of cutouts in the next display is reduced from 16 to 12, and the time limit of 30 seconds remains. Over a number of sessions the number of cutouts is increased again and the time limit increased gradually by 5 second units to about 60 seconds.

After the child has had appropriate success with time-limited examination of displays, the therapist introduces the technique of delay: "Sally, now we are going to work on keeping the picture you make in your mind for a long time. After you look at the cutouts, I'm going to put up the screen, and ask you to wait before you look at them again. So you have to work on keeping the picture clear in your mind while you wait." Therapist then proceeds, using at first a short delay (10 seconds), then longer delays. Note that in the first phases of this work it may be necessary to increase the length of time the child is given to examine a display, and it may be necessary to reintroduce the technique of touching, labeling, and drawing, especially when the cutouts are arrayed far apart and randomly and the delays are long.

When the child has demonstrated the ability to delay for about 2 minutes, the technique of interpolated experiences is introduced, to supply experience in holding memory images of configurations of colors while engaging in another task, the therapist says, "Sally, now I want you to work on some things while you wait to see the design again." After the display has been examined and the screen set up, the therapist asks the child to read a page from a book. Then the screen is removed and the child is asked to determine the change. During the first trials the therapist is active in helping the child to notice the influence of the interpolated experience and to recall similar school experiences in which some activity came between studying some material and recalling it.

In the final phase the therapist introduces the technique of distractions using the cutouts themselves (e.g., stacking technique) or other stimuli (e.g., pictures or sounds) as required by the case.

Sally has now had repeated experiences in constructing memory images of configurations of colors involving 9 to 16 cutouts, arranged near together and far apart, and in rows and columns and randomly. Moreover, Sally has learned to remember configurations of colors after brief examinations of the display and after a delay with interpolated experiences and in the presence of distractions. Following this, the therapy shifts to remembering configurations of two to four shapes of one color. The same general procedure is followed to the point of introducing distractions and interpolated experiences. The focus of the therapy again shifts, now emphasizing recall of configuration of sizes. The same general procedure is followed to the point at which distractions and interpolated experiences are introduced. After Sally has had experiences in constructing memory images of displays of colors, shapes, and sizes, the program presents her with displays that combine color with shape, color with size, and color with shape and size. At each stage the therapist systematically increases the number of cutouts and utilizes the by-now familiar techniques (touch, label, and draw; time-limited examination; and delay), eventually including interpolated experiences and distractions.

Let us assume that after a year of weekly visits, Sally is able to remember a display of 12 cutouts of three colors, three shapes, and two sizes within a time-limited examination and after a delay of 5 minutes with interpolated experiences. The therapist now works in Phase II, presenting Sally with two-dimensional displays, first using geometric shapes drawn on a sheet of paper. Let us assume again that when the treatment shifts to the microspace of a sheet of paper, Sally experiences appreciable difficulty in remembering the display of geometric shapes printed on paper, and the therapist chooses to supplement the therapy with tactile perception. Half of each session is now devoted to an examination of geometric shapes by means of tactile perception only.

As Sally reaches an appropriate level of competence in remembering patterns of geometric shapes printed on a page, the therapist introduces configurations of human and animal figures, then letters and numbers. Again Sally experiences appreciable difficulty and again the therapist introduces tactile perception as a supplement. The therapist modifies the technique by asking Sally to remember, by touch only, displays of letters and numbers cut out from sheets of sandpaper. When Sally shows appropriate competence in remembering displays of letters and numbers after visual examination, touch perception is phased out and the work shifts to displays of printed words as discussed earlier. Sally has now worked her way to the advanced levels of this therapy program.

Work with Affects, Associations, and Resistances

As with each cognitive therapy program, the therapist trains the child to notice affects, such as aggressive tensions, lethargy, boredom, and strain, that arise while the child is working with the task of forming memory images. The goal, guided by the model described in Chapter 11, is to help the child recognize these affective reactions and achieve optimal understanding that these affects are related to the conflict or mismatch that exists between the habitual way he functions in terms of the cognitive control process of leveling and sharpening, and the demand that the child form a differentiated memory image of information and hold it over time. The child should gradually achieve some awareness of his tendency to “level” information (i.e., to form global, fluid images) and he should come to realize that this tendency puts him at odds with school demands to remember, resulting in tensions and avoidance behaviors. Helping the child to gain awareness of his unique way of remembering information and of the accompanying affects and behaviors relates to the therapeutic goal of generalizing from the contemporary experience with some display of cutouts to school tasks that emphasize remembering information. With the *Remember Me* program, children above the third grade frequently associate to experiences with classroom quizzes and their difficulty in calling up clear images of the information in question. The associations of younger children often involve forgetting to take some item to school or the teacher’s exact instructions for some task.

In the middle and late phases of treatment the therapist should be active in asking the child to associate to and to analyze a contemporary experience with forgetting. To illustrate this point, let us consider a vignette from the treatment of a fifth grader who was reexamining a display of cutouts after a delay of 2 minutes. He became flustered, unsure whether the four corners of the matrix were all yellow squares. He began to tap one of the yellow squares on the table, but the tapping shifted to aggressively rapping one shape against another. Then he mumbled, with agitation, “This is a stupid game anyway.” He stood up, walked toward the toy shelves in the office, and handled a puppet. He stretched, raised his arms to the ceiling, and yawned loudly. He returned to his seat, laid his head on the table, and complained of being tired. He did not want to work any more that day with “those stupid shapes.” He wanted to play “Superman” (a form-board game) because “it’s more fun.”

Considerable work had already taken place, bringing the child’s attention to his unique pattern of emotional and coping responses in the face of cognitive stress in remembering (i.e., escalating angry feelings directed at the information he could not remember and master; avoiding the task, first by removing himself from it, then a feeling of fatigue and sleepiness, followed by interest in taking up something else).

The therapist again pointed out to the child this particular pattern, which by this time had become familiar to them both, and each part of the pattern had been articulated over a number of sessions. The child genuinely perceived and acknowledged the pattern once again. At this point, because the child had available to him the full course of his feelings and behaviors in response to remembering information, the therapist noted that since this behavior had been observed by them both in the office, it probably also took place in school. The child associated to a recent incident in school when he had been sent to the principal’s office because he had used “bad” language. An exploration of the event revealed that his bad swearing followed a reading comprehension quiz in which the teacher had asked the class to answer in writing questions about a story she had read aloud. The patient was able to see the parallel with his banging the cutouts and calling them “stupid” and to perceive that he was again experiencing and expressing anger when faced with the cognitive strain associated with remembering information. Therapeutic work in later sessions focused on generalizing the reaction of “sleepiness” and wanting to do “fun things,” as well as on the reaction of anger.

Parenthetically, it should be noted that the child’s choice, as an alternative to working with *Remember Me,* was a form-board game involving Superman. We could speculate that in avoiding the demands to remember information, and the stress thus aroused, the child turned to more simple cognitive activity (which this particular game represented to him). More important, the choice of game suggested that he turned to a “fun game” that brought with it the fantasied sense of “super power” to compensate for the incompetence he felt in the face of cognitive demands to remember information as information. This speculation was supported by other observations made during treatment. However the therapist chose not to include this issue in the therapeutic work at this time. The focus remained that of drawing connections between affects and coping behaviors articulated in the treatment room, while the child was engaged in the process of forming and holding memory images, and analogous experiences in school and with homework. The issue of not pursuing the dynamic of “Superman” is considered in the earlier discussions of the rationale of cognitive therapy and the ways in which it resembles and differs from psychotherapy. Here we note only that the guiding hypothesis in treating this boy was that he would feel less incompetent, and more a “superman,” as his cognitive functioning differentiated and developed with regard to forming clear, stable memory images. That is, with remediation in the source of his incompetence (i.e., the mismatch between his habitual cognitive control functioning in leveling-sharpening and the complexity of information to be remembered in his environment), that aspect of his self-concept would change toward a sense of competence, without having to label and discuss the issue at the start.

Group Administration

The *Remember Me* program can be conducted in group therapy format in keeping with most of the guidelines discussed. One approach is to present displays of cutouts and to call on one child to note whether a change has been introduced. The child's response then may be discussed by the other members of the group. Similarly, when examining the initial display, the group can engage in a discussion of ways in which the display could be organized mentally, thereby remembered more easily.

As with the program *Find the Shapes,* we have found it useful in group therapy to give each child a task during any given trial. For example, one child arranges the cutouts as prescribed by the therapist, another child works the stopwatch and signals the end of a delay, and another observes the behavior of the child engaging the task, for later discussions. The children may rotate among tasks during any one session.

The procedures described in Phase II also lend themselves to group administration. The children are seated at tables, and each one is given a sheet of paper containing the initial display. After the time designated for examining the information has elapsed, the sheets are collected and the changed displays are distributed. Each child then marks the second sheet of paper with the change he perceives. The group is then engaged in a discussion of the issues involved in the particular display and at that level of therapy.

COGNITIVE THERAPY WITH THE EQUIVALENCE RANGE COGNITIVE CONTROL

The cognitive control principle of equivalence range concerns the manner in which an individual groups or categorizes information in terms of relationships or concepts that tie the bits of information together. As considered previously in discussions of factor analytic and age studies, the process of equivalence range contains three component processes that undergo change with cognitive development: (1) number and width of categories an individual uses to relate information, (2) the level of abstraction of a category, and (3) the use of atypical or unrealistic relationships to group information. In most general terms, when cognitive functioning is developmentally immature, information is related and conceptualized in terms of many, narrow (or conceptually low-level) categories, and in terms of categories that also include unrealistic relationships between properties of information. With developmentally mature cognitive functioning, information is related and conceptualized in terms of few, broad (conceptually high-level), categories and unrealistic relationships between properties of information are not used in forming conceptions.

Using performance with the Object Sort Test, an illustration of developmental immaturity would be a child who clusters the 46 objects into 15 groups. The objects of one group are located together because “They are all yellow”; in another because, “You can put the key in the lock”; in another because “They are both sugar cubes” (i.e., identities), and so on, each group showing that a narrow and relatively concrete concept has guided the membership of information in that group. Moreover, the same child locates the toy dog and the 3x5 index card together because “You can lean the card on the dog like this,” revealing the use of unrealistic relationships in constructing categories of information.

In contrast, an illustration of equivalence range functioning associated with more cognitive maturity would be a child who clusters objects into seven groups (fewer categories). The objects of one group are located together because “They are tools”; in another because “They are things you use when you eat supper”; in another because “You can eat them,” and so on. Thus the groups show that a broader, more abstract concept has guided the choice of members in the different sets. Moreover, this child does not reveal the use of unrealistic relationships among the properties of objects to construct categories.

The treatment program described here *(Where Does It Belong?)* has been developed to provide children who show deficits in equivalence range functioning with therapeutic experiences that promote the growth and development of the several component processes. In general, the therapist presents various familiar objects and asks the child first to articulate their properties and uses, then to locate and group other objects in the room that have the same properties and uses, each group of objects representing a category. The child is then asked to take these groups of objects, dissolve the groups, and use the same objects to form new groups that represent broader and more abstract categories. Throughout this procedure the therapist works formally with the issue of using realistic and unrealistic relations between the objects and their properties.

To benefit from the programs designed to promote the development of equivalence range functioning, a child should have achieved, in the course of development, and with the assistance of the programs already described, stage-appropriate levels of the cognitive controls functions that are subordinate to and integrated within the function of equivalence range (i.e., body schema and the regulation of body tempos, broad and extensive scanning, selective attention deployment, and the constructing of differentiated and stable memory images of information).

With the cognitive therapy programs to this point, the information managed is contained for the most part in body experiences, in external, visually present stimuli, and in memory images. Moreover, the cognitive therapy programs to this point concern the regulation of motility, surveying and registering the attributes of information, and holding these attributes in stable memory images. The experiences provided by the equivalence range therapy program represent a major shift on the developmental hierarchy of cognitive control functioning. The experiences now require that information surveyed and registered, as well as information held in memory, be related in terms of categories or as members of a class of information.

At this point it may be helpful to take a closer look at the process of equivalence range functioning, to illustrate how the several cognitive controls become orchestrated in a complex interplay that results in conceptual thinking. Imagine a child presented with a red ball, a yellow poker chip, a 3 x 5 lined index card, a red plastic saucer, and an eraser. When asked to place together the objects that belong together in some way, the child stands relatively motionless (regulation of body tempo), and actively scans the objects (focal attention), registering the attributes of the ball (red, round, and soft), the poker chip (yellow, round, flat, corrugated edges, hard), and so on. Field articulation is also a part of the process involved in grouping the objects in terms of categories. For example, the child may register a ridge along the perimeter of the ball, then withdraw attention from this attribute as he reaches out, takes, and squeezes the ball, registering its density. Then the ball is placed on the table, attention is withdrawn from it and directed to the index card. The card is registered, and attention selectively directed at the blue lines on the card. Then attention is withdrawn from the card and directed at the plastic saucer, and so on.

As the child begins to consider how one object belongs to another, memory images of the attributes registered become a major part of the process. For example, as the child directs attention selectively at the "red" attribute of the saucer, the memory image of the red color of the ball is called up and is related to the color of the saucer being perceived. At this point the child reaches for the ball at the far end of the table, picks it up, and sets it by the saucer, saying that they go together because they are both red. Here it should be noted that the softness of the ball and the hardness of the saucer are subordinated as attributes, and the color of each is given dominance in relating the two objects.

The child now withdraws attention from the ball and the saucer and redirects attention to the index card. Now the card being perceived is related to a memory image of the child at school erasing a line on a sheet of paper, and to the memory image of the eraser that was detected earlier on the table. The child picks up the card, sets it by the eraser, and says they belong together because "You can erase the card." Again, it should be noted that at this moment the child subordinates attributes of the eraser (e.g., rectangular, grey, made of rubber) and of the card (e.g., rectangular, white with blue lines) in forming the relationship between the two items. Moreover, while engaged in relating the eraser and card, the child is withholding attention from the yellow poker chip and from the other objects in the groups already formed.

To illustrate equivalence range functioning that is atypical or unrealistic, let us assume that the child instead experiences the eraser's attribute of rubber as dominant, ignoring its function. The eraser is taken from its place by the card and located next to the ball and saucer. When asked how these objects got together the child says, "This (eraser) is soft like this (ball), and the ball is red like this (saucer)." Such conceptual thinking reveals a "chain" of concepts, and a shifting series of physical properties has been used to tie the objects together rather than a single unifying property. Or the child may take the poker chip and set it upright, on its rim, on the card. When asked how the two belong together the child says, "It can go like that on the paper," a concept and group of objects indicating that the properties of one object are "forced" on the properties of the other in an unrealistic way (see the discussion of forced groupings in Chapter 10).

The examples of typical categorizing behavior illustrate the interplay of tempo regulation, focal attention, field articulation, and leveling-sharpening in the process of equivalence range functioning. The examples of atypical or unrealistic categorizing behavior illustrate how deficits in field articulation (subordinating irrelevant information) or in leveling-sharpening (maintaining differentiated stable images of information) can play a role in derailing conceptual thinking.

While integrating these several cognitive controls, the control of equivalence range is unique in employing language in its process. Once attributes have been articulated as dominant and perceived as related, the child must construct a label that defines the attributes and the relationship generated.

The therapy program in equivalence range functioning consists of four parts. Part I involves using familiar objects as initial stimuli, examining them through the tactile, visual, and auditory modes, and constructing increasingly broad and abstract groupings of objects that are physically present or recalled from memory. In Part II unfamiliar objects are used as initial stimuli, and the child forms increasingly broad and abstract groupings of objects that relate to the initial unfamiliar object. Part III involves the formation of categories with objects that are examined by means of the tactile mode only. The categories of objects formed in Part IV are examined through the auditory mode only. Parts I and II are administered to all children and form the basic program. Parts III and IV are used as supplements to meet the unique needs of particular children.

The advanced levels of *Remember Me,* the previous therapy program in leveling-sharpening, represent a bridge to treatment in equivalence range, with the program *Where Does It Belong?* At the advanced levels of *Remember Me,* the child repeatedly constructs memory images of displays of information, and the construction is assisted by concepts or categories that guide the organization of the memory image. If a child's cognitive treatment is to focus on the equivalence range principle, a number of weeks or months, as indicated, should first be devoted to a preliminary phase of therapy following the advanced levels of the guidelines and techniques discussed in the program *Remember Me.* Following this preparatory treatment, the program *Where Does It Belong?* is phased in. If the child has already experienced a course of therapy with the *Remember Me* program, the treatment shifts to *Where Does It Belong?* when indicated.

In general, we have provided cognitive therapy in equivalence range functioning to children ranging in age from 5 years through adolescence. However this program is indicated most often for children from the ages of 8 or 9 years through adolescence. The same guidelines and techniques are followed in treating children of all ages. The content and material used are modified to suit the individual's cognitive status. Similarly, the level of conceptual thinking the therapist holds as the goal for a given child is set in terms of the child's developmental status.

The guidelines for conducting each of the four major parts that make up the program *Where Does It Belong ?* are discussed in turn. Then a case illustration suggests how the various guidelines may be combined in the treatment of a child. The closing sections cover work with affects, associations, and resistances unique to this program, as well as issues of group administration.

PROGRAM 5.
WHERE DOES IT BELONG?

PURPOSE

To provide experiences in constructing increasingly broad and more abstract categories of varied information.

GOAL

To promote the development of the equivalence range cognitive control.

MATERIALS

For Part I, objects of various shapes, colors, textures, densities, and uses, familiar to children and typically found in homes, stores, and schools. For Part II, objects of various shapes unfamiliar to children. Objects used in homes and on farms before 1940 typically serve as unfamiliar objects. The same materials are used for Parts III and IV.

Table 1, which summarizes the basic steps in cognitive therapy with the equivalence range cognitive control, may be a useful guide in following the discussion of the program.

Table 1. Summary of Steps in Cognitive Therapy with the Equivalence Range Cognitive Control: Where Does It Belong ?

Part 1A. Conceptualize information physically present: familiar objects used as stimuli.

Phase 1. Conceptualize information in terms of physical properties.

Step 1.	Describe as many physical properties as possible of the stimulus (starter object).
Step 2.	Locate in the room objects (response objects) that contain one or more physical properties of the starter object.
Step 3.	Describe as many physical properties as possible of each response object located.
Step 4.	Group the response objects gathered, placing together objects that share some physical property.
Step 5.	Regroup the response objects, forming new groups that share some physical property. Strive for broader and more abstract groupings. Compare new groups with old groups. Repeat regroupings as often as objects in use permit.

Phase 2. Conceptualize information in terms of functional properties or usages.

Step 1.	Describe as many usages as possible of the stimulus (starter object).
Steps 2-5.	Follow steps 2 to 5 with the usages of objects as the focus in locating, describing, and conceptually relating the response objects gathered.

Phase 3. Conceptualize information in terms of physical and functional properties.

Follow steps 1 to 5 with both the physical properties and usages of objects as foci. Strive for groupings that are more broad and abstract than those achieved in Phases 1 and 2.

Part IB. Conceptualize information physically absent: familiar objects used as stimuli.

Follow Phases 1, 2, and 3. Objects are described that exist outside the treatment room and share one or more physical or functional properties (or both) of the starter object placed before the child.

Part II. Conceptualize information with unfamiliar objects as stimuli.

Follow phases 1, 2, and 3, using unfamiliar objects as starter objects. Emphasize recall in memory of related objects and whether relationships constructed are realistic.

Part III. Conceptualize information examined by means of the touch mode. Follow the general procedure of Part I.

Part IV. Conceptualize information examined by means of the auditory mode. Follow the general procedure of Part I.

Specific Techniques Employed in All Parts of the Program

1. The number of starter objects used varies systematically from one to many.
2. The starter objects used vary in containing from few to many physical and functional properties.
3. The starter objects used vary in containing familiar attributes and less familiar ones.
4. The child is required at first to locate and group few response objects and gradually to locate and group many objects that share an attribute with the starter object.
5. The child is coached in exploring, labeling, and relating the physical and functional attributes of objects following three successive steps:

   a. The child is guided in physically exploring and/or using the object and labeling its attributes.

b. The therapist demonstrates exploring and using the object. The child labels its attributes.

c. The therapist labels the physical and functional attributes of the object.

6. The child is assisted in constructing realistic perceptions of attributes and conceptual relations among them.

Part I A. Conceptualizing Information Physically Present: Familiar Objects as Stimuli for Conceptual Thinking

Part I of the therapy program *Where Does It Belong?* involves having the child articulate and categorize information generated by familiar objects. Part I has two broad subparts. In the first, the child conceptualizes information generated by familiar objects that are physically present in the treatment room. In the second, the child conceptualizes information generated by familiar objects that are not physically present in the treatment room but do exist at home, at school, or elsewhere, and are recalled from memory. The general procedure for Part IA (objects physically present) is also followed for Part IB (objects physically absent), and with some modification it also serves for Parts II, III, and IV, as discussed in the sections dealing with those aspects of therapy.

The three-phase general procedure of Part IA of *Where Does It Belong?* serves as a paradigm for therapy in equivalence range. The phases concern, respectively, grouping objects in terms of physical properties, grouping objects in terms of common usages or functional properties, and relating objects in terms of both physical and functional properties. Each phase is conducted in five steps or levels.

PHASE I. RELATING OBJECTS IN TERMS OF PHYSICAL PROPERTIES

Step 1. The therapist places a familiar object (referred to as the *starter object* or stimulus) on a table and asks the child to describe and articulate as many *physical* properties of the object as he can determine. During this process the child is encouraged to examine the object by means of the visual and tactile modes (and auditory when indicated). Therapist and child make a list of the physical attributes articulated.

Step 2. The child is asked to look about the room and locate other objects (referred to as *response objects)* that possess one or more of the physical attributes listed for the starter object. Whenever possible these objects are then placed on the table along with the starter object. In all cases the physical property that links each response object to the starter object is articulated and discussed by therapist and child as the object is located and set on the table.

Step 3. The child is asked to review and point out the physical attributes that each response object shares with the starter object. Then the child is asked to take each response object in turn, and describe all the physical attributes of the response objects. Child and therapist list these attributes for each response object. In this step they highlight the observation that although each response object gathered shares one or more physical properties with the starter object, each response object also contains other attributes.

Step 4. The child is asked to place the objects gathered into groups, and he is told that the objects placed together should belong together for some reason. Each group is examined, and the construct that relates the groups is verbalized and noted.

Step 5. The child is asked to examine the groups constructed in step 4 and to review the objects, the physical properties, and the unifying relationship each group represents. The child is next asked to break up the groupings and form new groups, using the same objects but this time clustering and relating a greater number of objects and physical properties, in terms of a different concept. Each new group is examined, and the organizing concept is verbalized and articulated. The new groups are compared with the old groups. Child and therapist observe and discuss how and whether the new groups and concepts are broader in that they permit, as members, more objects that are diversified in physical properties, yet united by a more abstract concept. The same procedure is repeated, permitting the child to experience forming still another set of new groups and new concepts, using the same objects and guided by the goal of constructing concepts that are more abstract.

These five steps are repeated using another starter object that contains more physical attributes than the first object selected. (See guidelines below.)

PHASE 2.
RELATING OBJECTS IN TERMS OF FUNCTIONAL PROPERTIES

In the second phase of Part I a starter object is placed on the table (step I). Typically this is the same object, or one of the same objects, used in the first phase. The child is asked to describe all the uses of the object he can think of. Therapist and child list these and consider and evaluate each one. The child is then asked to locate response objects in the room that could be used in the same way (step 2). In step 3 the child is asked to examine each response object located, determining whether and how the object could be used in other ways. Following this, the child is asked to place the objects into groups so that each group contains objects that share a usage. Each group is examined, and the functional property that relates the objects is verbalized (step 4). The fifth step calls on the child to break up the old groups and form new groups each defining a usage that is broader (more abstract) and can contain more objects. These five steps are repeated with another starter object that represents more uses than the first object.

PHASE 3.
RELATING OBJECTS IN TERMS OF PHYSICAL AND FUNCTIONAL PROPERTIES

In the third phase a new starter object, one not used in previous phases, is placed on the table. Following the same five steps, the child is asked to articulate and describe both its physical properties and its usages. Other objects are then located that contain one or more of these physical properties and can be used in one or more of the same ways. Then as many as possible of the properties and usages of each object are described, in addition to the particular property and usage each one shares with the starter object. The response objects are divided into groups, and each group is conceptualized. The groups are examined, then dissolved, and new groups are formed. This procedure is repeated, and the child is urged to construct broader and more abstract categories with each regrouping. In conducting Phase 3 the therapist strives to assist the child in forming the highest conceptual realms possible, given the child's developmental status. Emphasizing both physical and functional properties facilitates the construction of high level concepts such as "tools," "wall decorations," and "toys."

With this overview of the general procedure before us, a special word is in order concerning materials needed to conduct the program *Where Does It Belong ?* It is obvious that the treatment room used should have available a wide variety of objects located on shelves, tables, and other furniture. Because many objects that are very useful in this work are typically not part of the usual treatment room, we have put some materials in a large cardboard box. At the start of a session, therapist and child can distribute the objects around the room, then gather them up at the close of the session.

Table 2 lists examples of household and school items, familiar in some degree to all children, used in conducting Parts 1A and IB, both as stimulus or starter objects and as response objects.

Table 2. Examples of Stimulus and Response Objects Used in Equivalence Range Cognitive Therapy

Plastic, rubber sheets	Wooden sticks; metal rods
Wool, cotton, rayon squares of cloth; paper towels	Thimble; gloves; plastic bags
Feather, ball of cotton, powder puff	Buttons (different sizes and colors)
Strings of colored yarn	Belts: leather, cloth, plastic, of different lengths
Colored sponges; blotter	Rubber, plastic or wooden balls (different colors and sizes)
Sandpaper of various grains	Screws; nuts; metal washers
Eraser, pieces of tire tube	Rubber rings and hose
Burlap, corduroy cloth	Wooden spools; pipe cleaners
Corrugated and smooth cardboard	Spoons; forks; knives
Steel wool, wire mesh; shoelaces	Tools, toy and real
Plastic hair roller; string	Measuring spoons; plastic containers
Sponge roller; emery board	Shoe brush; clothes brush; hair brush; whisk broom
Wire rug beater; keys	Bottle caps; corks; stoppers
Blocks of wood; scissors	Rubber bands; toothbrush
Netting; safety pins; hairpins	Tacks; nails; clothes pins
Rocks; pebbles; sea shells	Plastic, glass, and paper cups
Colored Kleenex tissues	Metal spring; measuring tape
Crayons; marbles; pens	Tweezers; paper clips; ruler
Clay; putty; caulking compound	Shoelaces; string; wire
Pencils (different colors)	Flashlight batteries

Part I B. Conceptualizing Information Physically Absent: Familiar Objects as Stimuli

When sufficient gains have been made by the child in categorizing the physical properties and functions of objects present in the room, treatment proceeds, following the same steps. Now, however, the child is asked to articulate and categorize objects that exist at home, in school, or in other familiar locations. The aim of this phase of treatment is to promote a shift along the developmental line from conceptualizing and managing information that is present and near the self (proximal) to conceptualizing information that is absent and far from the self (distal). Conceptual thinking then is moved into distant space and into the realm of the hypothetical. Moreover, this technique requires in its process the dominant participation and use of differentiated and stable memory images of information to be categorized. Conceptual thinking that is used to handle both information that is near and present and information that is distant and hypothetical is more like that required in the advanced elementary grades. The five steps described in Part IA are followed in conducting the first phase of treatment in Part IB.

PHASE 1.
RELATING ABSENT INFORMATION IN TERMS OF PHYSICAL PROPERTIES

Step 1. The therapist places a familiar object before the child and asks him to describe its physical properties. These properties are written down by the therapist (or the child, if appropriate). Each property is written at the top of a separate sheet of paper.

Steps 2 and 3. These steps are conducted together in the first phase of Part IB. The child is asked to think of objects he has seen at home, in school, or in some other familiar place, which contain one of the properties listed. When the child recalls an object, its name is written on the sheet of paper that is headed by the attribute that particular object shares with the starter object. The child is encouraged to describe the object as fully as possible. For example, if the starter object is a green ball, which leads the child to recall that he has a green lamp in his room, the child is asked to describe the lamp in some detail—the shape, the material, other colors present, height, and so on, and "lamp in bedroom" is written on the sheet of paper reserved for objects that share the attribute "green."

In working with this step the therapist may designate sections or rooms of the child's home, school, relative's home, and so on, and ask the child to reflect on the items in these particular locations. This technique is especially useful during the initial phase of this work with children who can think of only a few objects at home or in school that contain the stimulus attribute in question. To illustrate, let us assume that a child recalls only a yellow bread box in the kitchen and a yellow lamp shape in the living room, in response to a yellow poker chip that has been placed on the table as the starter item. The therapist would ask the child to focus his attention on the kitchen in his home (its walls, cupboards, utensils, etc.), to describe what he remembers, and to determine whether any other kitchen objects share some property with the starter item. The child may now articulate dishes and a clock on the wall "because they are round," a waste basket "because it is plastic," and so on. The therapist would then bring the child's attention to other areas of the home in a stepwise fashion. In terms of the school setting, the child might be asked to articulate the contents of his classroom, the main entrance, the secretary's office, the gym, and so on.

When at least two or three items have been recalled, described, and listed for each of the attributes of the starter object articulated by the child, the treatment process shifts to step 4.

Step 4. The child is asked to review each of the objects recalled and to think of ways in which they can be grouped. To facilitate this grouping, the sheets of paper containing the names of the objects are cut into strips with one object name on each strip. The child groups the strips of paper and verbalizes and conceptualizes how the objects grouped are related. Whenever a child experiences difficulty in locating an object in a group, the therapist encourages him again to consider and describe the object fully, from memory, to discover some attribute that could qualify the object as a member of one group or another.

The groups are then examined in terms of the concepts given. If a particular object appears not to belong, the therapist asks the child to picture the object again in his mind, describe it, and determine once more whether it belongs in the group. When indicated, the therapist points out why a particular object does not qualify for membership in a given group.

Step 5. The child is asked to examine the groups constructed in step 4 and to review the objects, physical properties, and unifying concepts represented by each. The child is next asked to break up these groupings and form new groups with the same strips of paper. Each new group is examined and compared with the old groups, and the discussion is focused on whether the new groups are broader, in permitting more objects as members, and are united by more abstract concepts. The strips of paper bearing the names of objects are regrouped further, until the child has made optimal use of the information at hand to develop concepts that are increasingly broad and abstract. Again, these steps may be followed with other starter objects as indicated.

PHASES 2 AND 3. RELATING ABSENT INFORMATION IN TERMS OF FUNCTIONAL PROPERTIES AND BOTH PHYSICAL AND FUNCTIONAL PROPERTIES

Following the work with information concerning physical properties, Phases 2 and 3 are conducted in accordance with previous instructions. A starter object is placed on the table, and the child is asked to articulate its functions or usages and to think of objects in familiar settings outside the treatment room that contain objects sharing one or more of these functions (Phase 2). The functions are grouped according to the five steps described. Then the child is asked to articulate both the physical and functional properties of a starter object and to recall objects outside the treatment room that share these (Phase 3). These objects are also grouped along the lines described in the five steps.

Specific Techniques

These phases of Parts IA and IB employ several specific techniques that serve to promote the development of equivalence range functioning. These techniques are intended to guide the therapist in providing the child with therapeutic experiences that increase in a stepwise fashion the complexity of the information to be conceptualized and, accordingly, the level of conceptual thinking required to manage the task at hand.

TECHNIQUE I.
FROM ONE TO MANY STARTER OBJECTS

At the beginning of treatment a child typically works with a single starter object during each of the three phases of Parts IA and IB. Most children became oriented more easily to the method of conceptual therapy if a different object is used for each phase—for example, a red square for Phase 1 (conceptualizing physical properties), a spoon for Phase 2 (conceptualizing uses), and a green rubber ball for Phase 3 (conceptualizing physical properties and uses). As the child gains experience in working with a number of starter objects, the therapist begins to use the same starter object for all three phases. For example, the child articulates and conceptualizes the physical properties of a paper clip serving as the starter object. These properties and the related objects gathered are subordinated and held to one side as it were, as the child then deals with various uses suggested by the paper clip. All children should receive experience working with starter objects in terms of a single issue (e.g., either physical or functional properties), then in terms of both physical and functional considerations.

After the child has made age-appropriate gains working with one starter object at a time, two starter objects are presented simultaneously for one or another phase of Part I. For example, the child is presented a wooden spring clothes pin and a strip of red cotton ribbon for work following Part IA. The physical properties of each starter object are articulated and objects are located in the room that share these properties. Later in treatment the child is shown three starter objects at a time, and so on. The greater the number of starter objects with which the child deals, the more extensive and intensive the therapeutic experience in categorizing information, and the more possibilities for constructing broad and abstract groups. Some children, especially adolescents, can eventually work with as many as 10 starter objects at a time.

The number of starter objects presented should be increased in a stepwise fashion as the child shows the conceptual growth needed to deal with information more broadly and at higher levels of abstraction. In a typical course of treatment, present one starter object for each of the phases in Parts IA and IB. Then return to the first phase of Part IA and repeat all phases using two starter objects, and so on, until the child’s maximum level of conceptual thinking is achieved. As the number is increased, starter objects are selected that contain an increasing number of possible physical and functional properties. Moreover, starter objects are introduced that are less and less familiar to the child. Varying the complexity and familiarity of starter objects is considered in the next two sections.

TECHNIQUE 2.
FROM STARTER OBJECTS CONTAINING ONLY A FEW PHYSICAL AND FUNCTIONAL PROPERTIES TO OBJECTS

CONTAINING MANY

At the commencement of treatment, the starter object used contains only a few physical (Phase 1) or functional properties (Phase 2) that are easily articulated by the child given his developmental status. As the child works through various phases, the therapist introduces new objects, each one representing a slightly more complex configuration of physical and/or functional properties. For example, a green square of wood (one of the shapes used in the program *Find the Shapes)* might be presented at the start, permitting the child to articulate a few physical properties (e.g., green color, square shape, wood material) and a few global functional properties (e.g., "can be used in a game," "can be placed in a square hole," "can be used to make a design"). As treatment proceeds, the child is presented with starter objects that contain increasing numbers of attributes. For example, the green square is followed by a large marble containing the attributes sphere, yellow, blue, white, and glass. And still later the starter object is a 12-inch wooden ruler with a metal strip on one edge, representing the attributes long, fiat, wood, tan, black numbers, black lines, metal edges, and so on.

The greater the number of possible attributes contained by the starter object, the greater breadth or scope of appropriate response objects the child can locate, from those in the room or elsewhere. The number of response objects identified, in turn, influences the number of groups that can be formed by them and the level of abstraction each group represents. By carefully prescribing the progression of starter objects used, the therapist provides the child with a developmental progression of conceptual experiences that become increasingly differentiated and abstract.

TECHNIQUE 3.
FROM STARTER OBJECTS CONTAINING FAMILIAR ATTRIBUTES TO OBJECTS WITH LESS FAMILIAR ONES

The degree of familiarity a child has with the starter object and attributes at hand relates to the vigor with which the child must work to articulate and relate other objects. When an object is unfamiliar, many children typically respond by dismissing it or withdrawing attention from it instead of vigorously exploring its properties. This is illustrated by the response displayed by some children when examining the toy wooden clapper used in the Object Sort Test described in Chapter 10. One child asked, "What is this?" and scratched his head and exclaimed, "I've never seen anything like that before! Whatever this thing is, it doesn't belong here!" He returned the item and continued scanning others. If this reaction had occurred in a treatment session, the child would have been encouraged to describe the object fully to facilitate discovery of how its properties could be related to those of other objects (e.g., wooden cubes at the end of black metal strips that slap against the wooden base when the whole object is moved).

In the beginning of treatment the therapist uses starter objects that are familiar to the child and present familiar physical attributes. This makes it easier for the child to locate other objects and relate them conceptually. In the last phases of treatment with Parts IA and IB the therapist introduces objects that are less familiar to the child, increasing the complexity of the conceptual task. The child must work harder cognitively to discover the attributes of the objects and to relate them to others. Selecting objects less familiar to the child requires, of course, detailed knowledge of the individual's background and experiences. One child may be less familiar with a pencil compass, another with a stapler, another with an Allen wrench. Providing the child with some experience in working conceptually with less familiar objects also prepares him for Part II of the program, which emphasizes this issue.

TECHNIQUE 4.
FROM REQUIRING MANY RESPONSE OBJECTS TO REQUIRING FEW

The therapist can vary the number of response objects the child is asked to locate after articulating the properties of the starter object. In all cases the child's cognitive status serves to set a limit on the number of response objects required. A seventh grader would be expected to locate many more response objects than a first grader. Beyond this factor, the therapist can use the number of response objects required as another technique to vary the complexity of the conceptual experience provided the child. Typically, in the early phase of treatment, the child is expected to produce only two or three response objects for each attribute articulated in the starter object. For example, if the starter object were a green wooden square, the child would be expected to locate two green objects, two wooden objects, and two square objects. Gradually throughout the treatment the number of response objects required is increased, and in the later phases the child might be asked to locate 10 or 15 items for each attribute. Moreover, a larger number of response objects is usually required of the child during Part IB, when he is locating objects that exist in locations outside the treatment room.

TECHNIQUE 5.
COACHING THE CHILD IN EXPLORING AND LABELING THE PHYSICAL AND FUNCTIONAL ATTRIBUTES OF OBJECTS

At all phases of treatment the therapist is active, whenever indicated, in helping the child articulate and label the physical and/or functional properties of starter objects and response objects. Three particular techniques are used:

Therapist Verbally Encourages and Guides Child in Discovering and Articulating Properties of Objects. Here the therapist uses verbal constructions that are global or very direct to aid the child in discovering and labeling a physical or functional property. Examples of this range of responses are: "Jimmy, do something with it—whatever you think it could be used for"; "Jimmy, pass your fingers over the edge; what do you notice?" "Jimmy, pick it up by this end with one hand and put the other end next to a piece of wood; does that give you an idea of how it could be used?" "Jimmy, pick this up and now pick this up; what do you notice?"

Therapist Demonstrates Exploring or Using Object. Following the demonstration, the child is asked to label the property or function. Flere the child is asked to observe the therapist carefully as he demonstrates exploring or using the object. For example, the therapist might pass his fingers along the surface of the object to bring attention to its texture; he might pick up the starter object, then another object, emphasizing that he is comparing their weights, or he might place a pipe cleaner in a test tube to illustrate that the tube can be used as a receptacle for long, slender items. With this technique the therapist provides only demonstration; the child is encouraged to find verbal labels that articulate the attribute in question.

Therapist Provides Label for Physical Property or Function in Question. This technique is used as a last resort.

These three techniques are viewed as interrelated and developmentally ordered experiences and whenever possible should be employed in the sequence described. First, the therapist should coach the child in exploring the object or performing a function with it; then the child is asked to label the attribute. If he fails to produce the label, the therapist should introduce the second technique (i.e., demonstrate exploring the physical properties or the function of the object). The child is again asked to produce the label, but if he is unable to do so, the therapist should provide the label, using a level of vocabulary that suits the child's status. The rationale for this progression follows developmental considerations. Initially the child is encouraged to engage in sensorimotor explorations and to make use of sensorimotor perceptions as the basis for discovering and labeling the attribute. If the child fails to experience the relevant sensorimotor perceptions, therefore cannot articulate the appropriate label, the therapist next makes available, from his own behavior with the object, a model from which the child might discover the attribute and construct the appropriate label. If the child does not perceive the label in the context of the therapist's perceptual-motor behaviors, however, the therapist supplies the label directly.

This series of coaching techniques is used whenever necessary to help the child articulate fully the properties or functions of the starter and response objects. Coaching is especially indicated in articulating response objects during step 4 of the general procedure when the child groups and relates the response objects gathered. When using coaching techniques, the therapist usually has in mind one property or function at a time that the child is to discover.

Let us consider an example. In response to a red wooden square as the starter object, the child articulates and labels the properties; "It's red and wood; that's all I can think of." The therapist says, "Johnny, pick it up, feel it, and look it over. Try to think of another thing like 'red' and 'wood' that makes it." (Note: the therapist avoids labeling attributes other than the ones already mentioned by the child.) The child picks up the item, looks at it, feels it for a moment, sets it down, shrugs his shoulders, and says, "I don't know." Now the therapist asks Johnny to watch him; he slowly passes a finger along the perimeter of the square, saying, "Johnny, what do we call this? What's the word for what my finger is noticing (feeling)?" Johnny replies, "It's getting cut." The therapist says, "No, my finger isn't cut. See; watch my finger. When it goes all around this, it makes a square (box)." At this point the therapist asks Johnny to trace his finger around the edge of the square and to repeat the label. Then John is asked to look around the room and locate other items that have "red," "wood," or "square" as attributes.

It should be noted parenthetically that the response "It's getting cut" is related by the therapist directly to reality considerations. The therapist then goes on with the task. Handling affect-dominated thinking and other forms of unrealistic thinking during equivalence range therapy is considered separately in a later section. At this point, the therapist does not respond directly to the unrealistic quality of the thought but only corrects the perception.

Let us consider another example that involves a child working with objects in terms of their functions (Part IA, Phase 2). In response to a 12 inch ruler as the starter object, the child points out only that it can be used to draw a line. The therapist encourages the child with the first technique. “Jimmy, pick up the ruler, and use it to do something. Try to think of something else you can do with it—another way you can use it that makes sense.” The child picks up the ruler, looks it over, taps it on the table, sets it down, and says, “Nothing else—it’s only to draw lines.” The therapist takes the ruler and, asking Johnny to watch, raises the window and lowers it so that the ruler supports it in a partially open position. Then he takes the ruler and uses it to prop open the lid of the toy box. Johnny says, “You can hold things up with it.”

In encouraging the child to explore and discover some property or function, the therapist can be direct or nondirective in coaching the child. For example, the child might be instructed to shake a wooden clapper near his ear to facilitate his articulating the property “it makes a sound.” Or the instruction might be to squeeze a rubber ball and an eraser, or to drop each one on the table, to discover the property of density or of bounciness. Again, in all cases the therapist provides the verbal label in question if the child is unable to form it.

The three coaching techniques are especially useful in helping a child regroup objects in terms of higher level concepts or broader concepts (step 5 of the general procedure). Very often, once some children have placed response objects into groups, they experience difficulty in dissolving these groups and seeing new ways in which the objects can be related. At this time the therapist should take an object from each of two of the old groups and focus the child in discussing a property or function that relates this pair in a new way. The techniques are also essential with children who, in the diagnostic evaluation, produced many groups of objects (seemingly related or unrelated) but could not verbalize how the objects belonged together (see Object Sort Test manual, Chapter 10).

TECHNIQUE 6.
DEALING WITH PROPERTIES AND FUNCTIONS THAT ARE UNREALISTIC

Children with significant lags or deficits in equivalence range functioning frequently reveal unrealistic and affect-dominated thinking both in the physical and functional attributes they articulate and in the relationships they construct to incorporate them. Chapter 4 gave the results of factor analytic studies suggesting that the regulation of fantasy anxiety concerning bodily harm and the control of aggressive tensions are particularly implicated in the process of managing information conceptually. Children who construct concrete and narrow concepts and relate properties and functions of objects in unrealistic ways tend to experience and express primitive anxiety and aggression in fantasy. For example, in response to the Fables Test they imagine at the end of the fable involving the monkey’s tail, the tail is cut off or in some way mutilated.

With these considerations in mind, we might expect children who are undergoing equivalence range therapy to articulate properties, functions, and relationships that reveal powerful aggressive and fearful fantasies and/or inappropriate or unrealistic perceptions of the properties or functions of the objects. One example of the former is provided by the clinical anecdote described earlier in which the child perceived the therapist's finger as having been cut as it traced the edge of the square, rather than perceiving the neutral, realistic property of squareness. In another example, a third grader said, "It can crack your head if someone threw it at you" when asked to describe the uses of a tan wooden rectangle.

Perhaps most frequently observed in therapy are emotion-free perceptions that do not discriminate realistically the unique physical and functional attributes of information at hand. These moments of unrealistic conceptual thinking do occur without evidence of overriding anxieties concerning aggression and injury. Consider the following examples of physical properties articulated by children when asked to describe each of the following starter objects: a red checker piece ("it's heavy"; "it's clean"); a hammer ("it's got an end on the handle"); a square of sandpaper ("it's got a corner"). The following examples illustrate unrealistic, nondiscriminating relationships produced by children in therapy when forming groups with response objects. A string was draped over a cup: "You can do that with it." A pipe cleaner was slipped into the keyhole of a lock: "It goes in the lock like that." A pair of scissors was placed on a toy dish: "You put it there so when you want it, it's there."

In one sense the foregoing examples do not reveal very bizarre or disordered thinking. However each example indicates that the unique and distinguishing properties of the objects involved had not been acknowledged. The relationship constructed between them was forced, to a greater or lesser degree, and did not articulate a realistic usage. Of course instances of more disordered thinking (e.g., syncretistic, chain, and fabulated groups) as discussed in Chapter 10, are also observed in the course of therapy. A child may show unrealistic thinking at any time in the course of therapy, given his developmental lag or deficit in this function. However we have observed that children show unrealistic conceptual thinking especially when the task becomes more complex, when shifting from three to six response objects required for each attribute, or when they must dissolve the groups already formed and find new ways to group the objects.

The broad strategy in dealing with moments of unrealistic thinking is to *remain focused on the perceptual and conceptual qualities of the objects* being managed. The therapist helps the child to discover the obvious physical or functional attribute being missed. He then teachers the child why the attribute or relationship he articulated is not realistic and fails to form a clean-cut guide by which he can decide which objects clearly could and could not belong to the group. Finally, the therapist helps the child to construct a more realistic relationship using the same objects.

This broad strategy is followed whether the child produces a drive-dominated sample of conceptual thinking (e.g., "It can crack your head open") or one that is less florid. In no case do we recommend that the therapist pursue early in treatment the possible dynamic issues behind a particular moment of disordered or drive-dominated thinking.

We have found that a child should build a solid, stage-appropriate level of equivalence range functioning before the therapist focuses on the feelings and motivation involved in the thinking. When this has been accomplished, the therapist begins to ask the child to associate to the particular fantasy or feeling expressed, in an effort to learn more about the possible source of the drive-dominated thinking, and to resolve it. For example, one child who was lagging severely in equivalence range functioning and was primarily a neurotic personality was able to do considerable work during the last phase of treatment in linking his frequent thoughts and perceptions that objects could break into pieces or be used to injure someone or something, to frequent beatings he had received when he was younger.

To illustrate the approach used in cognitive therapy to handle moments of unrealistic conceptual thinking, let us consider two of the examples already presented. When asked to think of a way in which a rectangular wooden block could be used, one child blurted out anxiously, “It can crack your head if someone threw it at you.” As noted earlier, initially the therapist ignored the emotional facets of the response and focused the child on the *cognitive-conceptual* aspects of the task. The therapist took the initiative and said, “Johnny, here’s one thing you can do with it.” The wooden block was set on several sheets of paper, which the therapist fanned with a piece of cardboard. “What would you call that? How are we using the block of wood?” The child replied that it was holding the paper down so it wouldn’t blow away. The therapist praised the child, then set four books upright and side by side on the table, placing a bookend at one end and the block of wood at the other. Again the child was asked to label how the block was being used.

With a child who was more verbally competent, the therapist might have begun by acknowledging that indeed the block could hurt someone badly if it were thrown against his head, but this is also true of a hammer, a stone, a large book, and many other items. The therapist would add, “Let’s see if we can find something the block can do with things that we have here that is special for the block of wood. Let’s look for ways we can use it with things in this room.” The therapist then would demonstrate the block of wood as a paperweight and as a bookend.

By following this approach in the early phases of treatment, the therapist fosters suppression of the aggressive fantasy by ignoring it, and fosters the attitude that the block of wood is a source of information that can be free of conflicted tensions and anxieties. Conversely, it is also assumed that if the therapist explores this response early in treatment and stimulates more associations by reflecting, for example, “You seem to be worried about getting hurt,” or “Somebody getting hurt is on your mind today,” the affects involved gain dominance and the child is not assisted in first developing cognitive and conceptual mastery over the information. The information is intrinsically a wooden rectangle, and it becomes a lethal missile only insofar as such properties are imputed by the child. As noted earlier the therapist may choose to pursue and do work with affect-ridden thoughts at a later phase of therapy, when the child has developed stage-appropriate capacity to manage information conceptually without fabulizing it with emotional fantasies.

Let us now consider one of the other examples of unrealistic conceptual thinking presented earlier, which contains virtually no emotional charge. In relating objects that had been gathered, one child stretched a piece of string on a cup, saying "It can go like that." The therapist said, "We could put a lot of things on the cup like that." He set a sheet of paper on the cup, then a pencil. "Let's see if we can find a way that makes the string do something with the cup the pencil or paper can't do." The therapist raised the cup by the handle by inserting his finger through it. "Watch what I'm doing. See, I'm lifting the cup with my finger because I want it off the table." The therapist next tied the string to the pencil and raised it above the surface of the table by holding the end of the string. The therapist then asked the child if he could now think of a way the string and cup could go together. At this point the child took the string, tied one end to the handle of the cup and other end to the cabinet knob, saying that the string can hold the cup up until someone uses it for a drink. This relationship and label represent more realistic conceptual thinking than did the child's original response.

As this example illustrates, in handling unrealistic groupings and responses the therapist attempts to demonstrate a more realistic relationship using the same objects, and whenever possible he engages the child in actively discovering the relationship. Although this type of therapeutic work is a large part of the treatment of children who are handicapped by severe character disorders or psychosis, as well as with deficient equivalence range functioning, it is also required at times with children who, though less impaired emotionally, also reveal moments of unrealistic thinking from time to time.

Part II. Conceptualizing Information with Unfamiliar Objects as Stimuli

When sufficient gains have been made by a child in categorizing physical properties and uses of familiar objects, the therapist administers a course of treatment employing unfamiliar objects as stimuli in the task of managing information conceptually. The technique of unfamiliar objects is useful in meeting the needs of some children who show deficits in particular aspects of equivalence range functioning. Beyond the fact that most children find an unfamiliar object a more complex piece of information to conceptualize, most children struggle vigorously to recall memories of objects encountered in the past in an effort to give meaning to the unfamiliar object. The technique then serves the child who needs extra help in promoting the use of memory images in the process of conceptualizing information. In addition, since unfamiliar objects tend to stimulate more instances of unrealistic or fanciful conceptual thinking, they furnish therapist and child with opportunities to work formally with the issue of evaluating whether relationships drawn between physical properties or usages "fit" reality expectations. The technique then also serves the child who needs extra help in grasping the difference between realistic and unrealistic concepts, given the information at hand.

To illustrate these points, let us consider a child dealing with something unfamiliar as the starter object. The child is asked to think of all the ways of using a twisted piece of driftwood, 3 feet long. The child picks up the piece of wood and handles it. He scratches his head and ponders. He comments that once he saw a lamp in a doctor's waiting room that was made of a piece of twisted wood. He concludes the wood could be used as a lamp stand. He continues handling the wood and grips the ends with his hands. At this point he says the wood could serve as the handlebar of a bicycle, that the shape is a lot like one. As he explores further, he articulates the following uses: tapping the object against the table, he says that the driftwood could be used to crack a walnut; placing the object on the windowsill, he says that the wood could hold up the window; swinging the object, holding it with two hands, he says that it could be used to bat a ball.

In the subsequent work the therapist helps the child to construct groupings of the uses articulated. For example, the therapist would guide the child in discovering that when related to both the lamp and the window, the piece of wood is holding something up; but when the object is used with a walnut and baseball, it is striking something. In addition, the therapist would address the issue of "fittedness" of the use as articulated—remarking, for example, that using the piece of wood to crack a walnut is more realistic than using it to bat a baseball.

In conducting this part of treatment the therapist needs to be imaginative and innovative in locating objects that reveal various physical properties and suggest usages and that, at the same time, are not encountered in the child's day-to-day experiences. We have found that the largest sources of such items are barn or attic sales and flea markets. The objects found there typically were used before 1940.

Using one or another of these unfamiliar items as starter objects, the therapist follows the procedures outlined in Part I A. At the start, the focus is on articulating the physical properties of the unfamiliar starter object, locating objects in the treatment room that share one or more of these properties, then grouping and regrouping the response objects as indicated. This is followed by a phase of articulating the uses suggested by the unfamiliar starter object. Objects in the treatment room that share one of these uses are again pointed out, and the objects are grouped. The therapist then follows the procedure of Part IB. The child is encouraged to think of objects that exist outside the treatment room and share a physical property or usage revealed by the unfamiliar starter object. These response objects are discussed and grouped.

Although this work emphasizes the role of memory images in recalling objects that are brought to mind as the starter object is examined, it also has as a goal the discussion of the degree to which a response object selected or a use described represents a realistic fit or is reality related.

Technique 5, which concerns guiding the child in exploring and labeling starter and response objects, is particularly indicated in this part of the treatment. When using unfamiliar objects as starters, it is frequently necessary for the therapist to be active in demonstrating how it would be possible to explore the physical and functional attributes of an object to articulate and label attributes. We have observed that children who lag in equivalence range functioning frequently become more passive in the face of "unfamiliar information." They do not physically explore the information in ways that would aid in discovering properties and uses.

To illustrate, let us consider a child who was presented with a metal weight used with post office scales years ago. The one-pound weight was cylindrical, larger at the base than at the top, and covered with rust. The child shrugged his shoulders and walked away saying "I never saw that thing before. It's a piece of junk. I don't know anything about it. I don't know how you can use it." The therapist passed his finger over the surface of the postal weight and then over the table top. The child was asked to do the same and to think of something that was special about the object. With this guidance and demonstration, the child articulated, "it's rough." When working on functional properties of the weight, the therapist lifted the weight with one hand, then lifted an eraser, and asked the child to do the same. With this guided demonstration the child articulated, "it's heavy," and later he noted that the weight could be used to "flatten clay" and to hold a door open. Experimenting, the child found that the object was not heavy enough to hold the door open, but, he concluded, it could hold down papers and keep them from blowing away.

It is recommended that all children for whom therapy in equivalence range is indicated receive some experience working with unfamiliar objects, following treatment with familiar objects. The starter objects used in Part I may be more or less familiar to a particular child, as discussed in the section on specific techniques, but the objects used in Part II should be maximally unfamiliar.

Part III. Conceptualizing Information Examined by the Touch Mode

This variation of the program, which provides the child with experience in conceptualizing information that is examined by means of touch only, follows the general procedure described for Part IA. An object is placed in a box or cloth bag for the child to examine by touch. Then the child is asked, without looking at the object, to describe its physical properties as fully as possible (Phase 1 of the general procedure) or its possible uses (Phase 2 of the general procedure). Then he is to feel and manipulate a number of objects placed in a box and to select those that share with the starter object a physical property or function. When the child selects one, the therapist places his hand in the box, takes the object from the child's hand, and removes it, preventing the child from seeing it. When the child has finished exploring the objects and selecting those that share some attribute with the starter object, the response objects chosen are examined again by touch, then placed into groups. If the child has considerable difficulty grouping the objects through touch examination only, the response objects are arrayed on the table and examined further both visually and factually before grouping.

In employing the touch method following the procedure of Part IB, the child is asked to feel, manipulate, and describe the physical or functional attributes of a starter object placed in a cloth bag. Then the child is asked to describe objects existing outside the treatment room that share one of these attributes. The therapist records these objects on cards or strips of paper, as in Part IB, and the child constructs groups with these objects, using the written materials.

Therapy in conceptualizing information examined tactually is used as a supplement to the programs described in Parts I and II and is usually introduced at the start of the treatment program. For some children part of each session may have to be devoted to the procedure outlined in Part I and part to the procedure outlined here. For other children, it may be useful to devote a number of sessions to the touch method exclusively, before introducing Part I.

The touch method is particularly useful as a supplemental or a preliminary phase with several clinical populations. Children who habitually are restless and hyperactive when dealing with information and cognitive tasks are helped by this method. Although the cognitive therapy program *Moving Fast and Slow* may have helped these children to differentiate tempos and to delay, their tendencies to move quickly and to make use of motor behavior to discharge tension interfere with exploring and conceptualizing information. Asking these children to manipulate objects without looking at them, in order to articulate and conceptualize attributes, helps them to linger longer with the information and to register in more depth the attributes at hand. In addition, it appears that physically manipulating information in the service of conceptualizing it permits some of these children to make use of their characteristic habit of discharging tensions through motoric behavior. When the starter object is presented on the table as described in Part I, some hyperactive children examine it for only a few seconds. When asked to examine the same object by means of touch only, however, they will manipulate and explore it for 2 or 3 minutes.

Brain-damaged, retarded, borderline, and psychotic children are also helped in grappling with the task of conceptualizing information if the treatment is heavily supplemented by the touch method. Again, encouraging these children to manipulate objects physically helps them to stay with the information longer and to articulate the properties of the objects in memory images. In using the equivalence range treatment program with psychotic or borderline children, we have found that the touch method helps the child learn to sustain contact with concrete reality for longer periods of time and affords child and therapist more opportunities to work on whether perceptions and categories are realistic, given the object at hand. The touch method is, of course, particularly indicated with blind children. Children who are partially or totally blind can be trained to improve their conceptual thinking if they are encouraged in a systematic fashion to articulate properties and uses of objects, to determine which attributes are shared by objects, and to evaluate whether a concept that relates attributes is realistic or unrealistic, broad or narrow, abstract or concrete.

The touch method is indicated, as well, for children who do not fall within any of the traditional clinical populations but show throughout therapy that their cognitive functioning is facilitated at all levels if sensorimotor encounters with information are part of the process. With the program, *Remember Me,* these children remember configurations of cutouts better if they touch each cutout before the screen is set up. And with the program *Find the Shapes* the same children are more successful in removing series of cutouts from the display on the table if they can touch each cutout as it is named. The ideal goal in equivalence range therapy is to bring a child to the level of cognitive development at which information not physically present can be articulated, analyzed, and grouped in terms of categories. With the "touch-oriented" child, however, this goal is compromised. The child is encouraged to make use of his need to engage information physically in the service of discovering and conceptualizing attributes. It is assumed that such a child will gradually need to touch information less and less in order to conceptualize and will gradually come to deal with the hypothetical more and more capably. However some children (like some adults), when they wonder "What is this?" may always have to reach out and touch the object that is "strange" and does not immediately fall into a category.

Part IV. Conceptualizing Information Examined by the Auditory Mode

This variation offers a child experiences in conceptualizing information that is examined by means of the auditory mode, following the general procedure outlined in Parts IA and IB. The stimulus or starter "object" is presented by playing a record, cassette, or other suitable equipment. The child is asked to listen to the sound and to describe the object or objects involved in making it. This activity would focus on the physical properties of the object, if Phase 1 of the general procedure is being followed, or in the usage of the object under the conditions of Phase 2. Then the child listens to recordings of other sounds, describes for each the object he imagines to be producing the sound, and determines whether each object shares an attribute with the starter object. It should be noted that here the attribute shared by the response object could be a physical or functional property of the object that is imagined to be making the sound, as well as some quality of the sound itself. The names of objects the child describes upon hearing each sound are written on cards by the therapist. The child then examines the objects listed, considers their properties, and groups them according to concepts or categories.

In Part IB of the general procedure the child listens to a recorded sound and imagines what object could produce the sound. Then without the assistance of recorded sounds to suggest response objects, the child thinks of objects that share attributes with the starter object.

Commercially produced sound effects records can be used in this form of treatment. In addition, the therapist may use office dictating equipment to record sounds that are especially suited for the child's age and needs.

This technique is used as a supplement with children who require special help in involving the auditory mode in the process of analyzing and conceptualizing objects. Along with the touch method, the auditory method is a particularly important supplement in treating blind children and children with severe (e.g., psychotic, borderline) ego disturbances. For these children, systematic use of the auditory mode serves to sustain contact with concrete reality and to foster the tendency to engage information by registering all its attributes, auditory as well as visual and tactile.

CASE ILLUSTRATION

A second grade boy was referred initially because he was performing below grade level generally, and despite average intelligence he was a nonreader. John's cognitive control diagnostic evaluation showed that he lagged significantly in leveling-sharpening and equivalence range cognitive control functioning. About a year was devoted to treatment in leveling-sharpening, guided by the program *Remember Me.* During this time John reached a stage in leveling-sharpening functioning at which he was remembering configurations of about nine cutouts, and pictures of humans, animals, objects, and words, after delays of 20 to 30 minutes. (See program *Remember Me.)* Moreover, as an aid in remembering the items in a display and the pattern they formed, he was beginning to group the items in a given display in terms of broad categories they suggested.

At this point the therapist decided to introduce therapy in equivalence range functioning. The sessions were divided in two parts, half to therapy with *Remember Me,* and half to *Where Does It Belong ?* The content of this treatment was governed by John's developmental status and needs, but his program illustrates how the various procedures and techniques just discussed can be combined.

Introducing the Child to the Program. The therapist said, "Johnny, today we're going to begin working on a new game. It's called, *Where Does It Belong?* We'll use a part of each meeting now for this new game. When you were trying to remember the words on the table a little while ago, you noticed that some words belonged to the 'a' family because they all started with the 'a' sound, and some to the 'b' family because they all started with the 'b' sound. With this new game, we're going to learn more about how to decide the family or group a lot of different things belong in. Here, take this." (therapist handed John a rubber ball) "Look at it; feel it. We want to find out what family of things this belongs to, how it belongs to other things." John spontaneously commented that the ball belonged in the toy box, that his mother didn't like toys lying around.

The therapist replied, "That's *where* it belongs, where you keep it. We want to learn how this belongs with other things—how it is the same or like other things. To do that, we have to find out what's special about the ball. Like the words you were trying to remember were special, they belonged together, because they all started with the 'b' sound. What's special about the ball? Look at it; feel it. Tell us all about it."

John handled the ball and said, "You play with it, you throw it." He set it on the table and walked away. The therapist called John back, pointing out that "throwing it" is what you do with the ball, and he continued preparing the boy in the task of conceptual thinking to be used in the treatment.

"John, first we want to find out special things about the ball that make it the way it is. Here, take it again. Look at it. Tell me what you see about it." (John replied, "It's red.") "Good, what else?" John noted that the ball was "small." To help John discover that this attribute is not sufficiently discriminating, the therapist introduced the special techniques involving guided exploration and demonstration. The therapist handed John a marble and asked him whether it was small or big. John replied "small." The therapist asked which was bigger, the ball or marble. John designated the ball. The therapist explained how the ball was big when placed next to the marble, but when the ball was alone on the table, John had thought it was small. The therapist further explained that the ball could be big or small, depending on what is next to it, and that seeing the ball as small was not seeing something special about it. At this point the therapist handed

John a cube, asked him to feel it and the ball, and to notice how they differed. John replied, “The ball is round and the cube isn’t.”

The therapist said, “That’s right. ‘Round’ is something special about the ball. It stays round no matter what you put it next to. But ‘small’ is not special because it doesn’t stay small when we put it next to the marble.” The therapist then helped John articulate the density of the ball by demonstrating. The therapist squeezed the ball, asked John to do the same, and to label what he noticed. John commented, “You can squeeze it, it’s soft rubber.”

Because John tended to examine and articulate objects at a relatively global level, the therapist decided to spend several sessions encouraging John to explore and describe a wide variety of objects. It was felt that a preliminary phase of this activity was indicated to prepare John for formal therapy with conceptual thinking.

Over a number of weeks John examined and discussed a wide variety of objects, and he became more articulate in distinguishing the unique properties of objects. Then the therapist reintroduced the red ball and asked John to mention “all the special things about the ball.” John noted the physical properties “red,” “round,” and “it’s made out of rubber.”

The therapist moved to step 2 of the general procedure and asked John to locate objects in the room, or in the game box, that had at least one of these special things.

John gathered a red cube, a piece of red woolen cloth, a marble (yellow and green), a wooden sphere, an eraser, and a cylindrical piece (part of a snap-on game) made of plastic and flat on each end. Each object was examined and discussed in terms of the property it shared with the red ball. When considering the snap-on piece, John noted it was round like the ball. To help him evaluate this relationship, he was guided in feeling the contours of the piece, to allow him to discover that while one surface was round like the ball, the ends of it were flat, the total shape forming a cylinder. Even with this coaching, however, John did not discover the flatness. The therapist then demonstrated, passing his fingers around the circular perimeter, and over each end (the second step of the coaching technique). John was asked to watch carefully and to describe the shape, noting whether it was like that of the ball. He persisted in calling it “round like the ball.” The therapist then employed the third step of the coaching technique and labeled the object: “It’s round here like the ball, but it’s flat here and here—so it’s like a pipe or a broom handled.” John handled the object and he seemed to understand the discussion of its shape. Then he noted the object was “still like the ball because it was rubber”. Next he was guided in exploring that attribute until he discovered and concluded that the object was made of plastic, and although it could be squeezed a little, like the ball, it was not made of rubber. At this point John removed the plastic piece, rummaged through the box of objects and obtained a yellow, rubber ring he recalled having located during his exploration of the contents of the box.

The therapist encouraged John to examine each object and note other attributes revealed by each (step 3 of the general procedure). He articulated “wood” and “square” for the cube, “cloth for a shirt” and “pinchy” for the piece of red wool, “wood” for the sphere, “yellow and green” for the marble, “gray” for the eraser, and “yellow and round” for the rubber ring. John was then instructed: “Now put all these things in groups or families. Put them together so that each one in a family has the same special thing as everything else in the family”. (Step 4 of the general procedure.)

John grouped the cube, the cloth, and the ball “because they are red,” the marble and the sphere “because they are round,” and the eraser and the ring “because they are rubber.” Each group was checked, and John was asked to find another way of putting them together. (Step 5 of the general procedure.) At first he had considerable difficulty considering the objects conceptually in any other way, saying “That’s the way they belong.” The therapist then guided John in revisiting the properties he had articulated with each object. In this way he was helped to see, for example, that the wooden sphere could be grouped with the red wooden cube because they were both made of wood, and “When we do this we don’t use the color red of the block and we don’t use the round of the wooden ball.” In the sessions that followed, the therapist introduced other starter objects, one at a time, again following the five basic steps of Part IA. Gradually the starter objects used represented less familiar and more complex information (e.g., a plastic cup, pipe cleaner, a plastic hair roller, the handle of a meat grinder).

As John developed competence in articulating the physical properties of starter objects and in locating and grouping response objects, therapy focused on the uses of objects (Part IB). John was presented with a square of white cotton cloth. As is typical of many children at his developmental level, he initially articulated physical properties (“it’s white”) as well as a functional one (“you can wipe off the table with it”). The therapist helped John focus exclusively on usages by demonstrating and inviting the boy to take the object and think of “all the ways you can do something with it.” With some exploring, John noted that “you can blow your nose with it,” and “you can cover something so it won’t get wet.” The latter usage was demonstrated and explored to clarify or determine the extent to which it was realistic. The response items John selected at this point included a sheet of Kleenex tissue and a bandana (“to blow your nose”), a Brillo pad and piece of burlap (“to scrub a pot”), and a sponge and a large ball of cotton (“to clean the table”). These objects were grouped and then regrouped. Several more sessions were devoted to locating response objects that could somehow be used in the same way as the starter object.

After John had experience with conceptualizing physical and functional attributes over a period of about two months, the therapist introduced two starter objects simultaneously. In some sessions the two objects were used as guides in locating response objects that shared physical properties of one or both starter objects. In other sessions they were used to explore and conceptualize functions. The use of two starter objects now resulted in John’s locating 10 to 20 response objects, which offered opportunities to construct more groups and categories. Moreover, in regrouping these objects John was guided in constructing fewer groups in which the response objects could be placed. To accomplish this, it was necessary for John to construct broader and more abstract categories. For example, objects that were designated as used in cleaning tables and in scrubbing pots and dishes were joined as objects “you use to clean in the kitchen.”

Work proceeded for several months, using two and then three starter objects. During this time the therapist introduced Phase 3, which required that John articulate both physical and functional attributes of the starter and response objects. This, in turn, permitted John to construct categories of increasing breadth and abstraction in an effort to form groups. The therapist also gradually introduced objects that were increasingly complex in terms of the task of articulating several physical and functional attributes (e.g., a piece of linked chain) and less familiar (e.g., an old wire rug beater).

From the start of treatment John gradually showed advances in equivalence range functioning. He moved from selecting one or two response objects for each attribute articulated in the starter object to selecting five to eight objects. Whereas he had at first formed groups that contained two or three objects that were related by narrow and concrete properties (e.g., red), he began to construct groups that contained about five objects, which were related more often by broader abstract concepts (e.g., "different things you use at the supper table"; "you can hold some water in all of them").

With this competence in conceptualizing physically present information, John was ready to work on information that existed outside the treatment room. Many of the same items already employed were used as starter objects in this phase of treatment. In a stepwise fashion John was encouraged to focus his attention on his home, taking each room, the basement, and the backyard, in turn, recalling objects that related to properties and functions of the starter object. Then he was encouraged to include other locations in the "pool" of information—his school, the homes of relatives, and so on. Whenever John introduced a new location (e.g., a state park where his family had camped for two weeks, the local aquarium), he was encouraged at different times to return mentally to that place and review it in order to articulate and conceptualize all the information contained by the setting that he could recall. In this phase John showed a trend typical of many children. In searching for information that existed outside the treatment room, he gradually moved from objects he could see outside the office window to objects that were located in his home, school, and neighborhood, and then to settings that were further away than these familiar ones.

John's cognitive therapy program concluded after this work. His therapist had decided that supplementary work with the tactile and auditory modes was not indicated.

Work with Affects, Associations, and Resistance

As with each cognitive therapy program, resistance typically occurs whenever the complexity of the task increases, thereby creating "conflict" between the child's cognitive organization and the demands of the information and task at hand. This conflict, as discussed earlier, results in affects and behaviors characteristically used by the child to resolve the conflict, that is, to avoid managing the information and cognitive task (e.g., angry outbursts, complaints of being bored, preferring to play or talk, refusal to cooperate, engaging the therapist in a long discussion about a trip the family took over the weekend). Here the therapist uses the same broad strategy employed to handle resistance in other programs. First the child is helped to observe the unique affects and behavior he is experiencing. Then he is helped to understand how these affects and behaviors are due to the stress and strain experienced because the information to be conceptualized is too complex at the moment for the child to handle. The affects and behaviors are shown to be attempts to avoid the strain by moving away from the task or by preventing the therapist from presenting new tasks. The last step in dealing with resistance involves relating the cognitive stress, and resulting avoidance behaviors observed in the office, to experiences the child has had in the classroom or when doing homework.

By way of example, John, the child considered in the case illustration, gradually conveyed that he uniquely experienced angry tensions when the complexity of the task put his cognition in conflict. The anger was most often directed at the materials used but also, on occasion, at the therapist in passive-aggressive ways. One occasion of this dynamic occurred when the therapist shifted from requiring one or two response objects to requiring at least four for each attribute of the starter object. When this requirement was introduced, John “accidentally” dropped and shattered a glass he was considering as a response object. On another occasion he took the therapist’s pen, jabbed it against the desk, and broke the point. With help, John gradually was able to recognize and become familiar with these angry tensions. At first he recognized them after they were fully released. Later he could perceive them among his feelings as they were emerging. For example, he came to recognize that when he clicked his front teeth together while humming a tune (a behavior he had shown from the start of treatment), he was beginning to feel a sense of frustration. He also learned that angry tensions and aggressive behavior would usually follow later in that same session.

Another example is provided in the treatment of a 12-year-old girl. From the start of treatment she frequently offered to “help” the therapist in some way, yet these behaviors gradually showed themselves as serving resistance and as resolving the conflict she experienced when the complexity of the conceptual task increased. For example, she would spontaneously offer to clean up the treatment room and straighten out furniture and materials. At times she would busy herself helping the therapist locate objects in the office that could be used in the treatment. On several occasions she arrived for a session with a shopping bag filled with odds and ends from home, and she spent the entire time taking out each item, showing it to the therapist, and carefully placing it on a shelf or in the object box. For many months the therapist carefully and gently pointed out the behavior to her, gradually adding the observation that the patient “got in her clean-up mood” most when the treatment task shifted to more complex levels—for example, from dealing with one to two starter objects, and when she had to find new groupings for the objects already grouped. These efforts bore fruit when the patient began spontaneously to acknowledge with an anxious laugh, “There I go cleaning again. What are we doing now that is so hard?” With further work this child was able to become familiar with the tensions and feelings that anteceded the “cleaning behavior.” She eventually related aspects of this office behavior to behavior at school and home. For example, she described how she would spend an hour straightening her desk before starting a homework assignment, a ritual that infuriated her mother.

Group Administration

Therapy in equivalence range can be administered on a group basis following many of the guidelines and procedures already described. We have found that groups of five children are workable in equivalence range therapy. A starter object is placed on the table before the participants, and each child is asked to articulate a physical or functional attribute, in keeping with the part of the program being administered. The children are then engaged in a discussion evaluating each attribute in terms of its relevance. Next each child sets out to locate at least one response object. When all objects have been gathered, each is discussed in terms of the properties and functions revealed. Then one child is asked to group the objects, and all the children engage in a discussion and evaluation of the groups formed. Another child is given the task of regrouping the objects. In the course of one or several sessions, each child in the group takes a turn forming groups with the objects. During Part IB of the program, items outside the treatment room are recalled and described by each child in turn, and written on cards. All the cards are combined for the process of grouping.

After the children have had considerable experience with the task and are familiar with its procedure, they can pair off. Each subgroup works independently with the same or different starter objects, gathering and grouping response objects. When the task is completed, the members of each pair examine, discuss, and compare the objects and groupings of one with those of the other, focusing on the breadth and level of categories used by each. For some groups of children this technique can be extended so that each child in the group begins with a different (or same) starter object. Working independently, each child gathers and groups response objects, and all the children discuss comparatively the objects collected and categorized.

Resistance can also be addressed in group cognitive therapy. Effort should be made to help the group observe the behaviors of all the children when the task complexity increases. All the children, as a group, may become more restless, silly, disorganized, and so on, when a new more complex starter object is introduced, for example. Work with this observation could proceed as in the individual treatment situation. The children are first helped to become aware of the behavior in question, then to understand it as an effort to avoid the task and to spare themselves the tension. Occasionally the makeup of a group permits the group to examine and discuss the behavior of one of its members who is especially engaged in resistant behavior.

Part 6
RESEARCH IN COGNITIVE CONTROL THERAPY

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RESEARCH STUDIES OF COGNITIVE CONTROL THERAPY

From discussions of cognitive control therapy, we turn to several studies conducted in an attempt to explore the efficacy of the method. As mentioned earlier, the rationale and techniques of cognitive control therapy have been evolving and undergoing change and development over the past 15 years. During this time, evaluations of the treatment method have been conducted primarily with individual cases, although there have been a few formal studies of groups of children, as well.

Following the twofold orientation guiding this book—namely, integrating research and clinical practice—this chapter considers only studies of cognitive control therapy that involve groups of children, conceptually guided formal assessments before and after treatment, and statistical analyses. The reader should keep in mind that each study represents an attempt to meet a clinical need, while at the same time data were being gathered about the effects of cognitive therapy. The studies, then, are compromised by at least two factors. Since the rationale and the technique have been undergoing continuous change, each study represents the state of the art at the time the research was conducted, yet the clinical needs the study addressed shaped and influenced the experimental design. Clinicians and researchers providing consultation to schools and clinical programs should nevertheless find the studies useful in guiding their application and explorations of cognitive control therapy.

My colleagues and I have formally examined the clinical functioning and test findings of each child and adult treated in cognitive therapy, before and after treatment. Whenever possible we have obtained follow-up data on these individuals. We have been especially interested in patients who were first treated with psychodynamic psychotherapy or with psychoanalysis and for whom treatment was then reorganized and conducted along the lines of cognitive therapy. From studies of individual cases we began to learn when cognitive control therapy is indicated, when and how cognitive therapy and psychoanalytic psychotherapy can be conducted in alternating phases, the number of treatment sessions required to achieve structural re-formation of a child's cognitive control habits, and the importance of working through resistance in order to reorganize cognitive functioning. These studies of individual cases are being reserved for a future book.

This review of three studies of cognitive control therapy includes two investigations of retarded but educable children who received cognitive control therapy individually from their mothers at home, as well as research in which kindergarten public school children were treated in group cognitive therapy by special educators.

After discussing these studies, we make one exception in reporting the application of individual cognitive control therapy with an autistic boy. This brief case report offers an opportunity to explore the responses of very severe cognitive dysfunction and lags to the method of cognitive therapy. The report also illustrates the criticality of resolving resistance in conducting cognitive therapy, even with severely handicapped persons.

The last section of this chapter reviews the work of others that is closely related to the method and principles of cognitive therapy as defined in this book.

THE FIRST STUDY: COGNITIVE CONTROL THERAPY WITH RETARDED CHILDREN ATTENDING A DAY CARE PROGRAM: PARENTS AS THERAPISTS.[21]

Several years ago I was the director of research at a youth guidance center that included among its services a state-funded and coordinated day care program for retarded children. During meetings held for parents of children attending this program, center staff observed that parents frequently expressed feelings of being "left out" and helpless in the task of providing growth-fostering experiences for their retarded children. Staff had also observed that these parents typically related to their children with avoidance, rejection, and sometimes inaccurate perceptions of the child's unique assets and limitations, an observation recorded by others (e.g., Appell, Williams, and Fishell, 1964).

At the same time, staff asked whether cognitive training experiences could be of help to the children in addition to the day program. To explore this, retarded children were administered cognitive control tests to determine whether their cognitive control functioning was characterized uniquely by one or another lag. Our observations suggested that young retardates were especially deficient in focal attention and field articulation.[22] This impression converged with the careful laboratory studies by Zeaman and House (1963), who concluded that retardates seem to suffer from the inability *to observe relevant and nonrelevant dimensions of stimuli* more than from the inability to learn which of two cues is correct. We agreed, then, that if cognitive therapy experiences were made available to the children in the day program, the focal attention and field articulation therapy programs (described in previous chapters) should be followed.

When we set out to plan the therapy program, we found that staff therapists did not have enough time to carry it out. Accordingly, the decision to provide cognitive therapy was joined to the issue of mothers wanting an opportunity to contribute to the intellectual development of their children. A program was organized in which mothers would administer individual cognitive therapy to their children at home and a staff member would provide group supervision to the mothers at the center. The design also included evaluating the children before and after treatment with tests suitable for severely to moderately retarded children, and comparing their test performances with those of children attending similar day care programs who would not receive cognitive therapy.

HYPOTHESES

The program attempted to address two broad hypotheses. The first derived from the view presented in earlier chapters that cognitive controls are the structural base for various cognitive activities and skills. Would therapy in focal attention and field articulation advance the efficiency of the cognitive functions evaluated? The second hypothesis derived from the rationale of the process of cognitive therapy. If the prescribed cognitive therapy program promotes a child's tendency to attend to relevant and nonrelevant information more selectively, and accordingly also renders the child more receptive to (less defended against) information presented by the environment, would the prescribed cognitive therapy cause the retardates to show a greater degree of cognitive plasticity—that is, a greater capacity to assimilate guidance and information provided by an examiner (teacher)—and as a result, could the children shift from one level of cognitive efficiency to a higher one?

SUBJECTS

Thirty-one mothers and their retarded children participated in the program. The children were enrolled in the day care program of the Worcester Youth Guidance Center. There were 17 boys and 14 girls with a group mean IQ of 54.40 as measured by the WISC. Their ages ranged from 3.5 to 7.8 years (mean, 5.6 years), but two children were considerably older (9 and 14 years). A comparison group of 32 children was selected from four similar day care settings located in neighboring cities, which were participating in the same statewide mental health program for retarded children.

GENERAL PROCEDURE

The project was presented at a group meeting of mothers. All volunteered (though three dropped out shortly after the project began). Then experienced examiners administered a battery of tests individually to each child, in a room at the school. A second parent meeting was held, during which the therapy program was discussed in detail. Each mother received training materials, a printed manual, and a form on which to keep a brief daily diary.

Mothers were asked to conduct therapy at home five half-hour sessions per week. Home training took place for a period of four months. During this time group meetings were held with mothers to discuss questions and problems, and mothers were invited to telephone the investigators at any time. At the end of the period the materials were collected and the children were reevaluated. The children serving as a comparison group were evaluated with the same tests before and after a 4-month period. Their parents did not have contact with the investigators.

Therapy Program in Focal Attention and Field Articulation

The therapy consisted of the early levels of the program *Find the Shapes* (Chapter 15), modified in keeping with special considerations for children with severe psychological limitations, discussed in Chapter 12. These tasks made available therapeutic experiences with the advanced levels of the focal attention process and the earliest levels of the field articulation process.

The materials consisted of plywood cutouts of squares, circles, triangles, and diamonds, painted white or black, and in 4 and 1 inch sizes.

To aid the parents in conducting therapy, a special manual was prepared according to the guidelines discussed in Chapters 12 and 15. In brief, the program consisted of 22 main levels, each having six subparts. The parents were instructed to begin with the first subpart of level 1 and proceed to the next only when the child had satisfied the requirement of removing the answer shape three times in succession on request and without assistance.

In the first part of level 1 a single square (black or white) was set before the child, who was asked to take it and place it in the answer box. In subsequent levels the number of geometric shapes and sizes presented was systematically increased, gradually making more complex the display the child was required to survey. The manual instructed the parents to locate the cutouts close together, then far apart at each level; the latter display of course called for broader and more extensive scanning. Also following the guidelines of this program, the parents were instructed to gradually increase the complexity of the task the child was asked to perform at each task level—remove from the display all the white or black cutouts displayed, then only designated shapes, then only cutouts of a designated size, then cutouts of a designated shape and size combination. The most complex tasks involved removing a series of designated cutouts of various shapes and sizes, in a stated sequence, both without a delay and after some delay.

In keeping with the special techniques for psychologically limited children discussed in previous chapters, mothers were instructed to use pantomine, demonstrations, and physical guidance throughout the therapy, to convey to the child what was expected. They could, of course, accompany the demonstrations with appropriate verbalizations. If the child failed to respond, mother was instructed to take the child’s hands in hers and guide them through the correct response. If the child reached for or removed incorrect cutouts, mother was to restrain the child’s hands gently but firmly, then guide them to the correct cutouts. We asked mothers to participate in the training on the basis of the assumption that physical participation (with interest) would be a critical aspect of the nurture contained in this experience for the retardate. To complete each sublevel satisfactorily, the child was required to remove correct blocks from the display three successive times without assistance and without disturbing irrelevant cutouts.

THE CRITERION TESTS

A battery of five tests was used in the pre- and postevaluations. Two of these represented modifications of tests reported in the literature, and three were devised by us for the population studied because the cognitive functioning of young retarded children seemed difficult to assess with the usual clinical procedures (Schucman, 1960).

The tests were devised to meet three general requirements: (1) no verbal response by the child is necessary to handle the item, (2) the item can be administered by pantomine, (3) only white, black, and gray materials are used because of possible difficulty in color perception.

To study whether cognitive therapy was associated with the child's showing a greater degree of cognitive plasticity, each criterion test included coaching trials in the administration, a procedure successfully used by others (Budoff and Friedman, 1964; Schucman, 1960). If a child's first attempt to deal with an item fell below a predetermined level of performance, the examiner coached the child by physically guiding his arms and hands in manipulating the materials through a successful response. Therefore the procedure followed in administering each test item consisted of (1) demonstration of the item by the examiner, during which he physically manipulated the material through a successful response, and (2) administration of the item; if necessary, the procedure was supplemented by (3) coaching by the examiner in handling the item correctly, and (4) readministration of the item.

The following is a brief description of each test and what it presumed to measure.

1. *Maze-Trail Test.* The child is asked to draw a line through a double-S maze from a starting point to an end point; performance is presumed to involve, in addition to visual-motor coordination, directionality and a sense of distance through space bracketed by a starting point and an end point.

2. *Picture Discrimination and Matching Test* (adapted from the Stanford-Binet, Form M Picture Vocabulary Test). The child is asked to find each of a series of common objects, presented in picture form, among a number of other objects displayed in picture form on a card. The test is assumed to assess discrimination and matching of familiar objects as well as visual scanning and searching.

3. *Buttons Test* (adapted from Schucman 1960). The child is asked to place single (and subsequently multiple) white, black, and gray buttons in specified containers. The test is assumed to assess the earliest elements of categorizing behavior and a sense of location in space.

4. *Object Sort Test I.* The child is asked to group square, round, and triangular plywood cutouts, painted white, black, or gray, according to some commonality (e.g., by shape or color) and to verbalize how the objects grouped belong together. The test is assumed to require conceptual thinking.

5. *Arm Movement Imitation Test.* Standing and facing the examiner, the child is asked to move his arms through specified single and multiple movements, imitating the examiner. The test is assumed to assess the child's ability to attend to and understand the body movements of others and to translate these perceptions to his own body.

6. *Gain Score.* To evaluate the child's capacity to assimilate, retain, and make use of coaching offered by the examiner in handling test items, two "gain scores" were computed for each child. These represented the effects of coaching during the pretherapy evaluation and during the follow-up, respectively. Essentially, a gain score was defined by the following ratio: the number of items the child "failed" and for which he then received coaching by the examiner,

divided into the number of items the child correctly solved after having received coaching. Therefore gain scores could range from 1,indicating that with coaching the child improved his handling of every item he had originally "failed" to 0, indicating that no items showed improvement with coaching.

It should be emphasized that although concrete aspects of a few of these tests (e.g., placing black and white buttons in containers) resembled the training procedures used by mothers, the response process required by each criterion test was presumed to involve various intellectual skills, representing higher levels of functioning than did the home therapy procedure, which essentially involved scanning and registering cues designated as relevant and nonrelevant.

RESULTS

Statistical analyses of the results obtained with the criterion tests are presented first. These are followed by observations concerning the effects of the program on the mothers.

The criterion test performance of 28 experimentals (15 boys and 13 girls) and 27 controls (14 boys and 13 girls) could be quantified according to scoring standards. To explore whether the therapy and control children were comparable, they were compared in terms of WISC IQ, age, and pretherapy test scores. As Table 1 shows, the two groups did not differ on these dimensions.

Table 1. Analysis of Variance of IQ, Age, and Performance With Criterion Tests Before Cognitive Therapy

	Mean Group Score			
Measure	Experimental	Control	F	*p*
IQ	54.40	50.70	0.59	NS
Age (months)	73.44	63.37	1.88	NS
Maze-Trail Test	3.59	3.11	0.35	NS
Picture Discrimination and Matching Test	21.33	21.14	.00	NS
Buttons Test	7.37	6.55	0.25	NS
Object Sort Test I	3.77	3.07	0.69	NS
Arm Movement Imitation Test	9.59	11.37	1.27	NS

A measure of change was obtained for each child on each test by computing a difference score between pre- and posttherapy performances. A positive difference indicated an increase in test efficiency, and a negative difference, a decrease. With all measures except the Arm Movement Imitation Test, the children treated with cognitive therapy showed significantly better performance after therapy than the comparison group (Table 2). The difference scores of the comparison group clustered around 0, indicating that their test performance during the postevaluation was very much like that observed initially.

Table 2. Analysis of Variance of Difference Score: Postevaluation Minus Preevaluation

Measure	Group Mean Difference Scores		F	p
	Experimental	Control		
Maze-Trail Test	1.93	0.81	4.33	.05
Picture Discrimination and Matching Test	6.19	0.19	9.24	.01
Buttons Test	2.48	-0.04	7.40	.01
Object Sort Test I	1.67	-0.11	7.58	.01
Arm Movement Imitation Test	2.11	0.22	2.99	NS'

To evaluate the child’s capacity to assimilate and use the examiner’s coaching in handling test items, a gain score was computed for each child, representing the effects of coaching during the pretherapy evaluation; another gain score was calculated during the follow-up. As noted previously, the ratio of the number of items the child “failed” and for which he then received coaching by the examiner, divided into the number of items the child correctly solved after having received coaching, constituted the gain score: a 1 indicated that with coaching, the child improved in handling every item originally “failed,” and if no item showed improvement with coaching, the gain score was 0.

Before therapy, treated and untreated children showed no difference in their capacity to use coaching offered by the examiner. Both groups improved their test performance with about 50% of the items for which they received coaching. However after therapy the experimental group showed significantly greater capacity to assimilate and use guidance compared to the controls, who exhibited about the same gain capacity observed four months earlier (Table 3).

Table 3. Analysis of Variance of Pre- and Postevaluation Gain Scores

Gain Score	Group Means		F	p
	Experimental	Control		
Pretherapy	0.53	0.47	0.63	NS
Posttherapy	0.63	0.45	5.76	.05

The results obtained with the gain scores take on increased meaning if examined in terms of the number of items for which each group needed coaching. It should be recalled that criteria (test performances below a specified level) determined when a child received coaching to handle an item. At the start of the program both groups required coaching for a mean number of nine test items (Table 4; experimental range: 3-17, control range: 3-15). After therapy, however, treated children required guidance from the examiner for significantly fewer items than did controls, who needed about the same degree of coaching they had received four months previously (experimental range: 1-11, control range: 1-17). Thus even though the treated children required coaching with significantly fewer items after therapy, they showed greater improvement in test performance as a result of such coaching. That treated children required less coaching to handle items also suggested that they had returned for the postevaluations at a generally higher level of intellectual efficiency.

Table 4. Analysis of Variance of Number of Test Items for Which Children Received Coaching by the Examiner

	Mean Number of Items			
	Experimental	Control	F	*p*
Pretherapy	9.04	9.11	.00	NS
Posttherapy	5.37	8.89	9.54	.01

Mothers as Cognitive Therapists and Observations of Children Made at Home

My observations of the mothers made during group meetings, from their daily diaries, and from telephone conversations converged on two broad issues. First most parents reported feeling stressed and anxious while conducting cognitive therapy. A closer look at what was happening when they became anxious indicated that their children were expressing some form of resistance to therapy. Within the time available in group meetings, and during telephone conversations, every opportunity was taken to explain to mothers the concept and importance of resistance: that resistance was inherent to a therapeutic process that was confronting old habits of attention deployment with the request to change those habits, and that the resolution of resistance was critical in effecting change in the way a child directed his attention at information. These discussions were somewhat successful in helping most parents continue with the therapy, but by and large, the mothers were anxious about conducting therapy throughout the program.

When a child's resistance mounted, so did that of mother. The mother's resistance took several forms. The most common was the request by a mother for permission to have an older sib or the father conduct the therapy. The request was usually accompanied by elaborate rationalizations—for example, the older sib got along better with the retarded child, mother was too busy with housework to find 30 minutes a day to conduct therapy, and father could be more firm in responding to the child's angry outbursts, stalling, and the like. Some mothers did not conduct the sessions for several days, until a meeting or phone call enabled them to continue. Other mothers "misplaced" the equipment, and others decided that the child was too irritable or too tired on a given day to engage in therapy.

The focus of the second issue that emerged was the gains many mothers made in noticing their children's unique cognitive functioning. Because the program was structured in terms of levels of tasks, each with a specific number of cutouts and a specific requirement, some mothers expressed surprise that their children could find and remove, for example, three specified cutouts from a matrix of nine. Others were equally surprised that their children were confused and stressed by such a task.

As a result, many mothers became more articulate in their perceptions of a child's unique way of paying attention around the home and more understanding of the individual's unique cognitive functioning. For example, one mother noted that in the past she had become enraged when her child could not select a particular canned food from a cupboard. She exclaimed, “If he’s having problems finding the right shapes out of a pattern of nine, how can he find a can in the middle of all those cans!” This mother reported that as a result of her observations during cognitive therapy, she was beginning to fit the cognitive requests she made of her child more to the child’s cognitive level.

Toward the end of the fourth month the spontaneous comments by mothers, as well as their diaries, suggested that the therapy experience was generalizing to tasks embedded in household routine. One mother noted with pride that when her child helped set the table, she did not confuse two dishes that differed slightly in size. Another observed that her son no longer stood in a “confused trance” before his closet but seemed more ready to pick out the clothing mother asked him to retrieve in preparation for school. Another reported that her child was now placing trash in one can, paper in another, and tin cans in a third, rather than throwing the items into one or another haphazardly—behavior she had viewed previously as stubbornness. It is possible that rather than becoming less stubborn, this child and the others were now attending more to relevant dimensions of stimuli. The reader interested in the issue of parents as therapists may find useful a review by Berkowitz and Graziano (1972) of studies that trained parents as behavior therapists.

CRITIQUE

Although treatment was conducted only for four months and by nonprofessionals (i.e., mothers), the results of the pre- and postevaluations suggested that therapy with retardates in the early levels of focal attention and field articulation generalized and promoted more efficient intellectual functioning. Moreover, cognitive therapy seemed to promote more cognitive plasticity. The children who were treated assimilated an examiner’s coaching in solving test items and improved their test performance to a great degree. These formal findings were supplemented by and converged with observations made by mothers of their children.

Because the children in the nontreatment group were participating in the same day care activities and special education program, they constituted a legitimate base for comparing the effects of cognitive therapy, especially since formal assessments of them revealed the same level of intellectual functioning, at the start, as the treatment group. However a more critical test of the effects of cognitive therapy would compare children who received one form of cognitive therapy with children who received some other prescribed activity, such as games or tutoring, or who received another form of cognitive therapy. There was clearly need for further research.

The finding that therapy in field articulation did not influence performance on the Arm Movement Imitation Test also pointed to another need for further study. We speculated at the time that although the developmental model of cognitive controls hierarchically linked cognitive activity involving body ego with cognitive activity related to the management of information more distant from the body (e.g., focal attention, field articulation), perhaps therapy generalizes from a lower developmental level to a higher one but not in the reverse direction (see, e.g., Rose, Blank, and Bridger, 1972, for work related to this issue). We wondered whether body ego therapy versus therapy in focal attention and field articulation had different effects on the management of intellectual tasks depending on whether the information represented by the task was near to or far from the body. The next two studies were conducted in part to address these apparent limitations.

THE SECOND STUDY: A COMPARISON OF TWO COGNITIVE CONTROL THERAPY PROGRAMS WITH RETARDED CHILDREN ATTENDING A DAY CARE PROGRAM: PARENTS AS THERAPISTS[23]

Given our experience with the first study, the staff of the youth guidance center decided that it would be useful for retarded children enrolled in the day program to continue having available cognitive therapy administered at home. It was also decided that we should continue evaluating the efficacy of cognitive therapy while offering the services. Therefore in the second clinical program we attempted to take our work a step further by comparing the effects of two cognitive therapy programs.

We reasoned that in our best clinical judgment, cognitive therapy programs in body ego (see Chapter 13), as well as in focal attention and field articulation, would be helpful to young retarded children because both programs address developmentally early levels of cognitive control functioning. By offering therapy in body ego and in focal attention we could compare the relative effects of the two treatment experiences, while extending treatment services to all the children. Such a comparison might provide information useful in prescribing particular cognitive therapy programs for retarded children as well as in exploring the effectiveness of cognitive therapy in general. If we explained our thinking and interests to parents and obtained their written consent, it would be ethical to assign children at random to one or another treatment program. Moreover, we wanted to know whether tests that tapped intellectual functions along a continuum from those dealing with proximal information to those dealing with distal information would show that the two types of therapy differentially affect the efficiency with which these intellectual tasks are handled. (For a discussion of the concept proximal-distal, see, e.g., Gillis, 1971.)

HYPOTHESIS

As discussed in earlier chapters, it was assumed that therapy in body ego concerned management of (proximal) information located in kinesthetic body experiences, whereas therapy in focal attention and field articulation involved the management of (distal) information located at some distance from the body and in the environment. If the tests used to evaluate therapy were conceptualized and constructed to tap intellectual management of information, ranging from proximal to distal stimuli, would the two types of therapy show different effects on different intellectual activities along this continuum?

GENERAL PROCEDURE

The project was presented at a group meeting of parents whose retarded children were enrolled in the center’s day care program. The parents and children had not participated in the first program conducted two years earlier (the first study). We explained that two types of cognitive therapy program had been devised to help retarded children (and others with severe cognitive disabilities) deal more effectively with classroom tasks. One program furnished training in directing visual attention at relevant cues actively, broadly, and selectively. The other stressed training in body awareness, which included perception of body parts, a sense of direction and laterality, and tactile perception. We pointed out that each program contained methods and materials that had been already used widely by professionals in teaching retarded and learning-disabled children. However our program attempted to organize the methods to provide a developmentally ordered, stepwise progression of experiences in one or the other mode (body touch and visual attention). We also explained that we had studied the effects of the visual attention program and had found that it improved the test performance of retarded children, but we had every reason to believe that therapy in body awareness and touch perception should also improve the test performance of retarded children. Our interest was in learning whether a given treatment experience affected one area of intellectual activity more than another. If we could learn more about this, we would be better equipped to prescribe therapy programs for a child on the basis of our diagnostic understanding of the individual's cognitive deficits. When a mother gave us her written permission to participate, we explained, the mother-child pair would be randomly assigned to a treatment program to be conducted by the mother, at home, with weekly group supervision. Initially 33 mothers consented to participate.

We decided to form three treatment groups: one involved focal attention-field articulation therapy, another body ego therapy, and the third a combination of the first two. As with the first study, each group was to receive 16 weeks of therapy conducted at home in five weekly sessions, at least a half-hour apiece.

Eleven mother-child pairs were assigned randomly to each of the three groups. Group 1 was assigned 16 weeks of therapy in focal attention and field articulation; Group 2 took 16 weeks therapy in body ego (which included 8 weeks with tasks involving large and small body parts followed by 8 weeks with touch perception tasks). Group 3 received 8 weeks of body ego therapy followed by 8 weeks of therapy in focal attention and field articulation.

Each mother received training materials, a manual of instructions, and forms on which she was to keep a brief daily diary of the treatment.

In a room at the day program center, a battery of tests was administered individually to each child before therapy was begun. The battery was readministered after 16 weeks of therapy had been completed.

During the first weeks of the program, 11 mothers elected to drop out because they found the task of administering a structured treatment program to their children too stressful. The remaining 22 mothers completed the treatment programs, and complete test data were obtained from their children.

SUBJECTS

Group 1. Cognitive therapy in focal attention and field articulation (16 weeks): four boys and four girls, age range, 3.6 to 8.2 years; mean age, 5.6 years; mean IQ, 51.

Group 2. Cognitive therapy in body ego and touch perception (16 weeks): five boys and three girls; age range, 4.3 to 6.7 years; mean age, 5.6 years; mean IQ, 52.

Group 3. Cognitive therapy in body ego (8 weeks) followed by therapy in focal attention and field articulation (8 weeks): five boys and one girl; age range, 4.3 to 8.0 years; mean age, 5.6 years; mean IQ, 47.

THERAPY PROGRAMS

The program in body ego therapy outlined for parents followed the guidelines discussed in Chapter 13 and contained two phases. The first phase consisted of five main sections (Parts I to V, Table 1, Chapter 13), designed to help the child articulate his total body, large and small parts of the body, the body's relation to other objects, and left and right parts of the body. The second phase had 10 major levels. In early levels the child explored individual objects by touch; later he was asked to select by touch, from a number of objects placed in a cloth bag, an object that matched the one placed in his hand.

The program in focal attention and early levels of field articulation was the same as the one used in the first study and followed the guidelines discussed in Chapter 15.

CRITERION TESTS

For the second study we attempted to evaluate the effects of the treatment programs by using tests presenting cognitive tasks to be solved in relation to managing information that was either proximal or distal to the body. Guided by this interest we modified the battery of tests used in the first study. We omitted the Arm Movement Imitation Test because it seemed to be primarily a psychomotor task rather than a cognitive task. We added the Object Discrimination and Matching Test and the Circles and Crosses Test (an early version of the Scattered Scanning Test described in Chapter 10).

The battery of tests ranged from a procedure we conceptualized as requiring cognitive activity most related to proximal body experiences (Maze-Trail Test) to calling for cognitive activity most related to distal body experiences (Object Sort Test I).

1. *Maze-Trail Test* (same as the test used in the first study). In moving a pencil through a maze this cognitive activity is assumed to relate to proximal body experiences in that a representation of body ego (pencil) is negotiated through space (a maze on a sheet of paper).

2. *Object Discrimination and Matching Test; Part A, Buttons Test* (adopted from Schucman, 1960). The child was

asked to place single (later multiple) white, black, and gray buttons in specified containers. *Part B.* Eight geometric plywood cutouts (e.g., diamond, triangle, trapezoid), each mounted in a cardboard container, were arrayed as standards or models. The child was given in mixed order 24 response cutouts, three of each standard; the task was to place each cutout in the container displaying the same cutout. These tests were presumed to assess the ability to discriminate and match information represented in three dimensions and to implicate managing proximal information but less proximal than the body-related information of the Maze-Trail Test.

3. *Picture Discrimination and Matching Test* (same as the test used in the first study). In matching two-dimensional pictures with standards, it was assumed the child was engaged in intellectual activity relating more to managing information distal from the body.

4. *Circles and Crosses Test.* The child was presented with a sheet of paper (8½ x 11) on which were arrayed rows and columns of various printed geometric shapes. The child began with the top row and searched for and marked circles and crosses. Because the task calls for breadth of visual scanning, sampling information visually, and registering particular geometric shapes (vs. pictures of familiar objects), it was assumed to relate to managing information more distal from the body than did the previous test.

5. *Object Sort Test* /(same as the test used in the first study). In requiring that geometric cutouts be grouped and categorized in terms of some principle, therefore that information be managed conceptually, this test was presumed to relate to managing information that was most distal from the body relative to the information of the other tests.

6. *Gain Scores.* As with the first study, gain scores were computed to explore any association that might exist between cognitive therapy and the degree to which the child assimilated guidance offered by the examiner in solving intellectual tasks. With each evaluation (pre- and posttreatment), administration of the criterion tests included coaching trials if a child's first response to a test item fell below a predetermined level of performance. Two gain scores were computed. One represented an index of cognitive plasticity before therapy, the other after 16 weeks of therapy.

RESULTS

Because of the small number of children in each treatment group, test scores were analyzed with the Mann-Whitney *U* test, which requires ranking of the test performance of two groups being compared. The statistic then determines whether an observed difference in the rankings of the two groups could have occurred by chance. The higher the mean ranking of a group, the more successful its performance with the test relative to that of the other group.

First, analyses of rankings of age and IQ showed no significant differences among the three treatment groups (see values reported previously). Moreover, the three groups did not differ before treatment in their performance with three of the tests administered (Table 5). On the Picture Discrimination and Matching Test, however, Group 2 showed significantly better performance than either of the other two groups. On the Object Sort Test I Group 2 posted a better performance than Group 1, but not Group 3. These pretreatment differences were taken into account in interpreting test results obtained after treatment. There were no pretreatment differences among the groups with respect to improving test performances after receiving coaching from the examiner (gain score).

Table 5. Mann-Whitney U Test of Rankings of Test Scores Before and After Cognitive Therapy with Two Programs

		Treatment	Pretherapy			Pre- vs. Posttherapy		
Test		Group	Mean Rank	*U*	*p*	Mean Rank	*U*	*p*
Maze-Trail	1.	Visual	7.6			6.6		
	vs.							
	2.	Body	9.4	25	NS	10.4	17	.06
	1.	Visual	7.4			6.4		
	vs.							
	3.	Body and visual	7.6	23	NS	9.0	15	.14
	2.	Body	8.0			7.9		
	vs.							
	3.	Body and visual	6.8	20	NS	7.0	21	NS
Object Discrimination and matching	1.	Visual	7.4			9.2		
	vs.							
	2.	Body	9.6	23	NS	7.8	26	NS
	1.	Visual	7.1			8.4		
	vs.							
	3.	Body and visual	8.0	21	NS	6.6	16	NS
	2.	Body	7.8			8.1		
	vs.							
	3.	Body and visual	7.1	22	NS	6.8	19	NS
Picture Discrimination and Matching	1.	Visual	6.3			10.2		
	vs.							
	2.	Body	10.8	14	.03	6.7	18	.08
	1.	Visual	7.8			8.6		
	vs.							
	3.	Body and visual	7.1	21	NS	6.0	15	.14
	2.	Body	9.3			7.1		
	vs.							
	3.	Body and visual	5.2	10	.04	7.9	21	NS

Circles and Crosses	1.	Visual	7.4			9.6		
	vs.							
	2.	Body	9.6	24	NS	7.4	23	.15
	1.	Visual	7.4			9.3		
	vs.							
	3.	Body and visual	7.6	24	NS	5.1	9	.03
	2.	Body	8.2			7.9		
	vs.							
	3.	Body and visual	6.6	18	NS	6.9	20	NS
Object Sort I	1.	Visual	6.6			9.6		
	vs.							
	2.	Body	10.4	17	.07	7.4	18	.15
	1.	Visual	7.4			8.8		
	vs.							
	3.	Body and visual	7.7	23	NS	5.8	14	.11
	2.	Body	8.4			8.4		
	vs.							
	3.	Body and visual	7.1	17	NS	6.3	20	NS
Gain score	1.	Visual	7.6			9.4		
	vs.							
	2.	Body	9.4	25	NS	7.6	25	NS
	1.	Visual	8.7			6.9		
	vs.							
	3.	Body and visual	5.9	14	.11	9.1	14	.11
	2.	Body	9.1			6.6		
	vs.							
	3.	Body and visual	5.4	12	.07	8.8	15	.15

To evaluate the effects of therapy, difference scores were computed for each child, with each test, between pre- and posttherapy measures, using the pretherapy test score as the baseline. The difference scores were ranked and examined by Mann-Whitney *U* test (Table 5). Several trends were observed that suggest that body ego cognitive therapy and focal attention-field articulation therapy had different effects on success in handling the various criterion tasks, depending on whether the task involved proximal or distal information. Because we viewed this study as probing the issues raised, we accepted as noteworthy when examining the results differences between groups associated with the 15% level of confidence or higher.

First, body ego therapy resulted in greater improvement with the Maze-Trail Test than did focal attention therapy (Groups 2 vs. 1, p = .06). Even when body ego therapy was combined with focal attention therapy, the result was better maze performance than with focal attention therapy alone (Groups 1 vs. 3 p = .14). Although the difference is small, it is noteworthy that body ego therapy resulted in better test performance than body ego plus focal attention. These trends gave support to the notion that therapy in articulating information provided by the body (both gross and fine) selectively improved managing a cognitive task that represents negotiating body in space (i.e., moving a pencil through a maze).

As noted earlier, the Object Discrimination and Matching Test was conceptualized as presenting the next degree of proximal information to be processed. None of the treatment group comparisons showed differences that were significant at greater than the 15% level, although the group receiving body ego therapy performed best.

With the Picture Discrimination and Matching Test, the children treated with focal attention and field articulation therapy performed better than either the group treated with body ego therapy alone *(p* = .08) or the group treated with body ego plus focal attention therapy (/;> = . 14). The possible significance of this finding is enhanced because before treatment Group 2 (body ego therapy) had performed with the test significantly better than Group 1 (focal attention therapy). Therefore 16 weeks of focal attention therapy enabled Group 1 to overcome an initial significant deficit in test performance and to surpass the test performance of the other children. This finding converged with the difference observed in comparing Groups 2 (body ego therapy) and 3 (body ego plus focal attention therapy). Before treatment, Group 3 performed significantly poorer than Group 2 on the Picture Discrimination and Matching Test. Yet after therapy in both body ego and focal attention, Group 3 overcame this initial deficit and surpassed the performance of Group 2. Although this difference does not approach the 15% level, when viewed in the context of the total findings, it appears that the critical ingredient in improving performance with the Picture Discrimination and Matching Test was 8 weeks of focal attention therapy (following 8 weeks of body ego therapy).

We had conceptualized the Picture Discrimination and Matching Test as the first test in our hierarchical series to require the processing of information more distal from the body than either of the first two. Therapy in focal attention only improved performance with this task much more than did therapy in body ego only and somewhat more than therapy in body ego plus focal attention, providing some support for the notion of differential influence of focal attention therapy in remediating the intellectual functions that process information distal from the body.

With the Circles and Crosses Test, the children treated with focal attention therapy only showed greater improvement than children treated with body ego therapy only, although the change reaches only the 15% level (Groups 1 and 2). In considering this finding, we should notice that before treatment the test performance of Group 1 was appreciably lower than that of Group 2. Again therapy in focal attention seemed to have enabled Group 1 to overcome an initial deficit and surpass the other children. This inference is supported by the results obtained from comparing Group 1 (focal attention therapy only) and Group 3 (body ego therapy followed by 8 weeks of focal attention therapy). These two groups showed nearly identical performance before therapy. After therapy Group 1 (16 weeks of focal attention therapy) handled the Circles and Crosses Test significantly better *(p=* .03).

We believed that the Circles and Crosses Test called for the processing of information that is even more distal from the body. The group differences suggested that therapy in focal attention again had a selective influence in improving performance with this type of task. There was even a hint that focal attention therapy had a slightly greater impact on the handling of tasks that present information more distal than does the Picture Discrimination and Matching Test.

On the Object Sort Test I (requiring the processing of information most distal from the body), the children who received 16 weeks of focal attention therapy showed greater improvement than those who received 16 weeks of body ego therapy (Groups 1 vs. 2, p = .15). Although the difference is of low statistical significance, we must again note that before therapy the children in Group 1 had performed much more poorly with this test than the children of Group 3. Again therapy in focal attention seemed to have enabled Group 1 children to close the gap and surpass the performance of the others. A comparison of 16 weeks of focal attention therapy (Group 1) with 8 weeks of body therapy and 8 weeks of focal attention therapy (Group 3) suggests the same finding. Group 1 children showed more improvement in their performance with the conceptual task (p = .ll).

In terms of the effects of coaching from the examiner, our three comparisons indicate that cognitive therapy in *both* body ego and focal attention enabled Group 3 children to assimilate coaching most and to improve overall test performance. Before therapy, Group 3 showed *less* ability to improve test performance with coaching than either Group 1 or Group 2. Yet after therapy the children in Group 3 displayed a greater ability to improve test performance with coaching than either of the other two groups.

Mothers as Cognitive Therapists

Our impressions and observations of mothers serving as cognitive therapists supported those we made during the first study. Recruiting, training, and supervising mothers as cognitive therapists seemed to be a feasible but by no means simple task. That of the original 33 mothers who had volunteered, one-third dropped out, was a powerful indication that conducting a formal, remedial treatment program with an impaired child arouses many painful feelings in mothers. We learned again that considerable work was needed to keep mothers motivated and to work through various resistances, in spite of their initial eagerness to obtain advice about educating their retarded children. Active participation in conducting cognitive therapy with her child seemed to force each mother into an inescapable confrontation with her guilt, feelings of inadequacy, resentment, and anger surrounding the issue of having a retarded child, and the child's inherent resistance to the request that cognitive habits be changed (see Chapter 12). And again as with the first study, we learned that the structured, stepwise nature of the programs provided each mother with detailed information about aspects of her child's cognitive capacity, thereby challenging her over or underestimations of the child's developmental status.

We also observed that aspects of the mother-child style of interacting were often repeated in the therapy and spotlighted for discussion with the mother. One mother who had had long-standing difficulty in making demands and setting limits complained that the therapy program was asking her to push her child too hard. Another mother who typically was manipulated by her child frequently found herself on the floor performing the body movements prescribed by the therapy program while her child "read" the instructions and watched. As with the first study, some mothers complained that their children were bored with the therapy, that there was not enough time in the day to do the work, and that the materials were inadequate (these complaints surfaced when mothers were facing their own resistance). Anger was frequently directed against the program, at the group leader, and at mothers who for the moment seemed to be coping successfully with the therapy.

As with mothers who participated in the first study, many mothers reported gaining insight into their relationships with their children as therapy progressed. Some realized that they had never spent time alone with their children. Most reported getting to know the child more intimately, especially in terms of level and pace of stimulation that suited him or her.

CRITIQUE

With this study we set out to compare the effects of two cognitive therapy programs, one in body ego and the other in focal attention-field articulation, with each serving as a comparison for the other.

Cognitive therapy in body ego, with its emphasis on articulating information provided by kinesthetic and proprioceptive sensations, is presumed to foster the development of the cognitive functions that manage tasks that present information conceived as being proximal to the body. Therapy in focal attention and field articulation, with its emphasis on articulating and managing information presented by the environment, is presumed to assist in the development of the cognitive functions that manage tasks containing information thought to be more distal to the body (greater self-world differentiation; see Chapters 13 and 14).

To facilitate a comparative study in terms of this conceptualized difference in treatment effect, before and after therapy we administered tests constructed to assess a hierarchy of intellectual functions, from ones that dealt with proximal information to ones that dealt with more distal information or required a higher degree of self-world differentiation. The Maze-Trail Test, which asked the child to move a pencil through a maze, was viewed as a proximal intellectual task and as representing moving the body through space. The Object Sort Test I, in which the child is to group geometric shapes according to some principle, was viewed as a task requiring a high degree of self-world distance and the processing of information in that distant realm of abstraction. Three other tasks were ordered between these: matching three-dimensional objects, matching two-dimensional pictures, and scanning, sampling, and marking printed geometric shapes. When all the changes observed with these tests were considered together, after either body ego therapy or focal attention therapy, some support was obtained for the hypothesized effects of the two types of cognitive therapy. The results showed that body ego therapy improved performance selectively with the maze test. Focal attention therapy had a greater effect in improving performance with the tests of picture matching, circles and crosses, and object sort. Moreover, if the test score changes are examined closely, the results suggest that the effects of body ego therapy and focal attention therapy are hierarchically related to proximal-distal information. Therapy in body ego improved the success with which a child moved a pencil through space defined by a printed pathway (Maze-Trail Test), with focal attention therapy having little or no effect on the functions tapped by this test. Then a gradual shift occurred. Both therapies improved skill in matching three-dimensional objects, with body ego therapy giving evidence of slightly greater influence. Then focal attention therapy had an increasingly and progressively greater effect in improving the success with which a child matched pictures of familiar objects, searched out and marked geometric shapes mixed in with others, and grouped cutouts according to some concept. Body ego therapy, however, had a decreasing influence over the same progression of intellectual tasks. The findings of this study should encourage us to explore further the differential effects of each cognitive therapy program on various intellectual skills.

THE THIRD STUDY: COGNITIVE CONTROL THERAPY WITH CHILDREN ATTENDING PUBLIC SCHOOL KINDERGARTEN: TEACHERS AS THERAPISTS

Several years after the second study I collaborated with Dr. Charles Gunnoe (Gunnoe, 1975) and Dr. Robert Brooks in comparing the effects of group cognitive therapy and academic skill tutoring with public school kindergarten children who were judged to be “at risk” academically. The study grew out of research observations of the cognitive control functioning of children attending a public school system serving a suburban middle-class area located near a large eastern city.

During two successive years, about 20% of the kindergarten population revealed meaningful lags in cognitive control functioning when examined at the end of the school year. Moreover, teacher ratings obtained in subsequent grades suggested that children who lagged in cognitive control functioning during kindergarten tended to show poorer academic performance and learning difficulties. (These studies are described in Chapters 7 and 9.)

When I reviewed these observations with school personnel,[24] we noted that it was during the first grade that the school system typically introduced special services for children who showed evidence of being at risk by the end of the kindergarten year. We wondered about the possibility of introducing remedial assistance for these children during the kindergarten year rather than waiting until the first grade. This meant, of course, that incoming kindergarten children would have to be identified as typical learners or at risk. Our previous work provided us with an approach to this task.

In the summer of 1972 the parents of 50 incoming kindergarten children were contacted and their children were administered the battery of cognitive control tests: Fine Motor Delay, Scattered Scanning, Fruit Distraction, Leveling-Sharpening, and Object Sort. The children tested represented about 40% of the total entering kindergarten population.

To determine whether any of these “freshman” kindergarteners would be at risk academically, their performance with the tests was compared by means of a discriminant function analysis with the test performance of 348 children who had attended the same kindergarten program during the previous two years (see Chapter 9). The results of this analysis identified 18 of the 50 children as performing with the cognitive control tests much like the “suspects” of previous years and below the median of the typical learners of previous years. One reason for the relatively high proportion of at risk children lies in the ages of the subjects: more than half of the 50 were the youngest, chronologically, of the entering class.

After the school year began, the six kindergarten teachers serving the program were asked to designate children who appeared to have difficulty meeting classroom demands during the first 8 weeks of school. They were not aware of the test results of the 50 entering kindergarteners. At the end of this two-month period a conference was held with the teachers to compare test performances and classroom observations. The teachers’ impressions of the 50 children tested during the summer agreed essentially with the test scores. The teachers also referred as possible academic risks about 20 other children who were among the entering class but had not been tested during the summer. Six of these, who suggested the greatest likelihood of learning difficulties, were tested. The cognitive control tests confirmed the teachers’ concerns, showing that these children were well behind in cognitive control functioning when compared with test norms gathered over the previous years.

These six children, plus the initial 18 selected as being at risk from the summer screening program, made up the group to whom remedial help would be offered. Of the original 50 screened, 32 children who were not selected for possible remedial help were viewed as a possible no-treatment comparison group.

To explore further the effects of cognitive control therapy, we decided to provide two forms of remedial help to each group of children: academic skill training would focus on remediating a child’s performance on specific aspects of the regular kindergarten curriculum, and cognitive therapy would offer the therapeutic tasks prescribed by the cognitive therapy program. After the course of therapy was completed, we planned to compare the children receiving one form of treatment with those receiving the other form, and to compare the treatment groups with children who received no treatment.

GENERAL PROCEDURE

A meeting was held with the parents of the 24 children selected for remedial help. We discussed the indications of needing remedial help as shown by the children and conveyed our interest in comparing two forms of remediation.

We said that in our best judgment both skill tutoring and cognitive therapy should be helpful to the children and that knowledge about the relative effects of each approach would assist those who planned remediation and prevention programs for future kindergarten children. The parents were asked to agree to have their children randomly assigned to one or the other treatment group. All parents gave their consent.

Twelve of the 24 children were assigned to cognitive therapy, the others to skill tutoring. Each treatment group in turn was divided into two groups of six children each. Each small group was scheduled to meet one hour a day, four days a week during the school day, in a room located in the school and reserved for the program. The treatment room was down the hall from the other classrooms. It had formerly been used as a kindergarten classroom and was decorated and furnished in the same style as the children's regular classroom.

All the children assigned to the treatment program, and the children who would not receive treatment, were administered selected subtests of the California Test of Mental Maturity (CTMM) to obtain formal assessments of academic skill areas.

Two teachers were recruited specifically to provide remediation to each of the four groups.[25] One teacher served as the senior therapist and the other as an assistant. Given our interest in comparing the effects of skill tutoring with cognitive therapy, we felt that having the same persons run all groups would help control the variable of therapist (style, skill level).

Before the program was begun, Dr. Brooks and I introduced both teachers to cognitive therapy techniques and trained them in administering the programs. The teachers had considerable experience working in the classroom and required no training in tutoring academic skills. Programs of skill tutoring and of cognitive therapy were outlined with the intention that the treatment plan be followed as much as possible with each of the groups of six children assigned to one or the other treatment.

Several months were required to meet with kindergarten teachers and parents, to prepare the therapists, and to work out a schedule for group treatment sessions that would not interfere with the regular kindergarten curriculum. For this reason the treatment program was begun in early February of that school year and continued for 15 weeks until early May. During this time each child left his regular classroom for one hour, four days a week, to attend his group treatment session as scheduled. Also during this time, the two teachers who were conducting the skill tutoring and cognitive therapy were met for weekly supervision. It was necessary to meet with the regular kindergarten teachers on several occasions as well, to discuss in particular concerns that arose when children either refused to attend the treatment sessions or returned to the classroom after a treatment session showing unruly, disruptive behavior.

When the treatment programs concluded and before the school year ended, the 24 children who participated in the treatment program, and the 32 who had not, were reevaluated with the cognitive control tests and the CTMM. All children entered the first grade during the next academic year. To obtain one-year follow-up test scores, the children were again evaluated with the same tests at the end of first grade.

HYPOTHESIS

We wondered whether there would be differences between the test performances of the children who received skill tutoring and those who received cognitive therapy immediately after the treatment program and one year later. We also wondered how the at-risk children who received treatment would compare with children who had not received any form of special remediation.

SUBJECTS

Only children who had complete data from all three evaluations were included in our analyses for this report. Three treatment children and 10 no-treatment children were eliminated. An examination of these 13 children revealed no apparent biases that could affect our comparisons.

The makeup of the final groups was as follows:

Group I, cognitive therapy: 11 children (9 boys and 2 girls); mean IQ, 119.

Group 2, skill tutoring: 10 children (8 boys and 2 girls); mean IQ, 116.

Group 3, no treatment: 22 children (9 boys and 13 girls); mean IQ, 123.

The mean age for the total sample at the start of the program was 64.8 months. One child was black, one was oriental, and 41 were Caucasian. The total mean SES using Duncan's (1961) occupational scale was 75.59 (SD = 14.7), indicating that the children were from middle-class families. The three groups were essentially the same in this characteristic.

After parental consent was obtained, the two therapists and the child's regular teacher explained the program to each child. All children agreed to participate and most showed enthusiasm. Participation in each individual session was left to the child and his regular teacher. If the classroom teacher felt that an important classroom activity would be missed if the child attended a particular session, she could elect not to send him. And if on a given day a child refused to attend a session, he could remain in the regular classroom. Absences, however, occurred infrequently.

Treatment Program

ACADEMIC SKILL TUTORING

The therapists met with each of the regular kindergarten teachers to discuss the readiness skill they felt should be tutored which would supplement the classroom curriculum. From these meetings the following skill areas were outlined, and the tutoring program devoted some time to each.

1. Auditory readiness skills

    a. Identification of rhyming words

    b. Identification of words that have the same and different initial sounds

    c. Identification of vowels in three- and four-letter words

    d. Repetition of simple patterns (clapping)

    e. Repetition of four digit numbers in sequence

    f. Identification of differences in sounds (e.g., high or low, loud or soft)

    g. Demonstration of appropriate response to single oral directions (e.g., put the ball in the box)

    h. Locating the directions from which a sound originated

    i. Demonstration of “next to,” "below,” “in the middle of,” and “above”

    j. Matching Pictures with beginning consonant of the word it represents

    k. Identification of letters by name and sound

2. Visual readiness skills

    a. Identification and matching of geometric shapes (square, rectangle, circle, triangle)

    b. Matching similar pictures

    c. Matching uppercase letters with lowercase letters

    d. Matching and naming pairs of lower- and uppercase letters

    e. Identification of differences in orientation (e.g., which object is going in a different direction from the others)

    f. Demonstration of left to right orientation when naming objects in rows

    g. Recognizing primary colors

3. Geometry, numbers, numerals, and sets

    a. Drawing a triangle, circle, square, rectangle

b. Identification of a sphere and cube

c. Identification and writing numerals 1 to 12

d. Placing numerals in order in a number line, 1 to 12

e. Counting sequentially to 20

f. Describing the position of an object using the ordinals first through sixth

g. Counting the objects in a collection up to 6

h. Identification of a set

i. Naming the numbers of a set

j. Making an equivalent set

k. Recognizing equivalent and unequivalent sets

l. Identifying a penny, a nickel, and a dime and giving their value in cents

COGNITIVE CONTROL THERAPY

Because of the cognitive developmental status of the children in the treatment program, it was decided to provide cognitive therapy first in body ego and tempo regulation (Chapters 13 and 14), then in focal attention (Chapter 15). In general, cognitive therapy consisted of three programs and followed guidelines described in previous chapters.

Body Ego

1. Tracing the outline of the body on large sheets of paper and identifying body parts with the counterpart drawn on the sheet of paper.

2. Articulating large and small parts of the body while assuming various positions and performing various body movements.

3. Articulating left and right parts of the body.

Tempo Regulation

1. Moving the body through free space in regular, slow, and fast tempos and articulating images representing these tempos.

2. Moving the body through increasingly complex pathways (marked on the floor) in regular, fast, and slow

tempos and articulating images representing these tempos.

3. Moving objects over the surface of a table top at regular, slow, and fast tempos and articulating images representing these tempos.

Focal Attention

1. *Passive Scanning.* Visually tracking various targets moved through space by the therapists. Some targets were of high interest value to the children and some of low interest value. The children were allowed to move their bodies and heads when following the targets and then were asked to remain still and follow the targets only with their eyes.

2. *Active Scanning.* Two rods and later other material (e.g., beakers of water, balls of clay) were placed before the children near together and far apart. The children were asked to direct their attention at each and to estimate the dimension designated (e.g., height, volume, mass).

The tasks in focal attention therapy were administered without and later with various auditory, visual, and tactile distractions.

CRITERION TESTS

Before, immediately after, and one year after treatment, the children were administered five tests of cognitive control as described in Chapter 10: Fine Motor Delay, Scattered Scanning, Fruit Distraction, Leveling- Sharpening, and Object Sort. The children were also administered the following subtests of the California Test of Mental Maturity.

Numerical Reasoning. A child's score is the sum of his correct responses on the following tasks:

1. *Numerical Values.* The first group of 15 items requires a child to mark the picture of the object in a row of objects that is, for instance, the highest or the smallest. Other items require a child to point to the incorrect member of a number sequence.

2. *Number Problems.* A child is required to mark the picture that corresponds to the answer to a quantitative problem presented verbally by the examiner.

Verbal Concepts. A child's score is the sum of his correct responses on the following:

1. *Inferences.* A child is required to point to the picture that corresponds to the logical outcome of a statement or statements the examiner has made.

2. *Verbal Comprehension.* A child is required to point to a picture that represents the word the examiner pronounced.

Memory. A child's score is the sum of his correct responses on the following:

1. *Immediate Recall. A* child is required to identify the picture that corresponds to the second member of word pairs the examiner has presented verbally.

2. *Delayed Recall.* A child is required to point to a picture that best represents the answer to a question asked about a story read earlier by the examiner.

RESULTS

The tests administered produced 17 scores. Three of these derived from the CTMM (Numerical Reasoning, Verbal Concepts, Memory) and 14 from the cognitive control tests. Table 6 presents the group means observed with each of these variables during the three evaluations (pretherapy, posttherapy, and one-year follow-up).

Assessments Before Treatment. To explore whether and how the groups differed before treatment, test scores were examined by means of multivariate analysis of covariance with CTMM IQ covaried. In this analysis the combined treatment groups were compared with the nontreatment group, and the tutored group was compared with the cognitive therapy group.

In discussing the comparison between the children who received some form of treatment and those who had not, it should be kept in mind that the two groups were different from the start in terms of test performance. Children were selected for treatment because they attained lower cognitive control test scores not only in comparison to the children who had not been selected for treatment but also relative to the entire kindergarten populations of the previous two years. Accordingly we expected the statistical analysis to reflect this initial difference, and this proved to be the case. Before treatment the overall test performance of the children assigned to tutoring or cognitive therapy was significantly poorer than that of the children not treated (multivariate F ratio = 5.32, $p = .0003$). This finding indicated, following the test scores listed in Table 6, that the treated children *(a)* draw a line over a maze at a slower regular tempo, yet delayed moving a pencil less when asked to do so; (*b*) marked fewer circles and crosses, which covered a smaller distance on the test form; (c) took more time to name the colors on Cards III and IV of the Fruit Distraction Test relative to Card II, showing that they were distracted more; and (*d)* formed more concrete groupings with the Object Sort Test. However the children in the treatment groups did not differ from the children in the nontreatment group in their performance with the Leveling-Sharpening House Test.

Table 6. Cognitive Control and CTMM Scores of Kindergarten Children Who Received Cognitive Therapy, Academic Skill Tutoring, and No Therapy

		Pretherapy		Posttherapy		One-Year Follow-up	
Score	Treatment Group	Mean	SD	Mean	SD	Mean	SD
Fine Motor Delay I: time (seconds)	Cognitive therapy	20.00	12.45	16.27	3.98	12.73	3.38
	Skill tutoring	19.60	6.18	14.30	3.57	13.40	6.24

	No therapy	18.68	6.14	16.36	3.80	10.45	3.67
Fine Motor Delay II-I: time (seconds)	Cognitive therapy	10.73	19.58	32.91	21.50	34.36	27.02
	Skill tutoring	10.40	8.54	19.80	23.00	14.70	14.86
	No therapy	29.18	20.60	38.55	25.90	47.36	37.85
Scattered Scanning: number correct	Cognitive therapy	11.45	1.88	15.18	1.81	17.36	2.06
	Skill tutoring	12.00	3.08	16.70	1.84	17.10	3.06
	No therapy	15.27	2.37	17.82	2.50	19.05	0.98
Scattered Scanning: total distance (cm)	Cognitive therapy	81.00	16.72	106.50	17.56	115.50	25.08
	Skill tutoring	77.80	20.47	115.40	29.06	113.50	18.33
	No therapy	98.45	19.54	118.60	25.22	120.60	24.74
Scattered Scanning: mean distance (cm)	Cognitive therapy	7.07	10.47	6.91	10.38	6.67	13.00
	Skill tutoring	6.66	12.16	6.88	15.80	6.49	5.38
	No therapy	6.37	10.03	6.64	14.10	6.20	8.47
Fruit Distraction II: time (seconds)	Cognitive therapy	127.80	33.63	109.0	33.97	66.64	16.44
	Skill tutoring	149.80	61.02	99.70	31.29	70.20	25.72
	No therapy	90.73	25.52	75.64	21.46	54.95	11.18
Fruit Distraction III-II: time (seconds)	Cognitive therapy	45.45	37.04	-4.36	20.43	7.70	15.87
	Skill tutoring	39.60	35.88	3.80	20.84	7.20	11.72
	No therapy	11.95	20.96	1.18	19.06	3.00	6.6.7
Fruit Distraction IV-II: time (seconds)	Cognitive therapy	71.82	33.85	92.27	43.56	54.09	34.84
	Skill tutoring	95.60	65.64	75.40	40.36	56.40	45.52
	No therapy	70.77	65.66	42.23	24.59	33.41	11.20
Fruit Distraction: Recalls	Cognitive therapy	1.81	1.63	2.00	1.26	1.90	1.56
	Skill tutoring	1.80	1.10	2.00	0.50	1.30	1.26
	No therapy	1.77	1.58	2.36	1.26	1.63	1.61
Leveling-Sharpening: first stop	Cognitive therapy	21.45	14.06	22.27	16.18	14.64	10.36
	Skill tutoring	25.40	17.16	15.40	6.90	12.20	3.50
	No therapy	24.64	13.63	20.95	10.10	12.00	5.96
Leveling-Sharpening: number correct changes	Cognitive therapy	5.00	2.30	4.00	3.08	8.45	2.84
	Skill tutoring	5.40	3.43	7.70	4.57	10.90	2.70
	No therapy	5.31	2.56	6.81	2.94	10.64	3.44
Leveling-Sharpening: ratio	Cognitive therapy	23.60	2.62	24.10	3.78	19.52	4.14
	Skill tutoring	22.14	4.50	18.54	5.60	15.93	3.68
	No therapy	23.21	2.65	21.29	3.74	17.96	7.20
Object Sort: total groups	Cognitive therapy	12.64	4.80	13.64	5.07	11.45	3.69
	Skill tutoring	11.30	7.30	13.70	5.20	12.70	3.98
	No therapy	15.77	5.03	13.45	4.42	12.09	4.53

Object Sort: developmental mean	Cognitive therapy	2.36	0.94	3.87	0.81	3.96	0.64
	Skill tutoring	2.58	1.47	3.99	1.02	4.30	0.60
	No therapy	3.38	0.64	3.97	0.78	4.38	0.72
Object Sort: atypical groups	Cognitive therapy	1.45	1.46	1.09	1.03	1.36	1.39
	Skill tutoring	1.70	1.69	1.40	1.72	0.60	0.89
	No therapy	1.18	1.20	0.90	1.16	0.68	1.10
CTMM, Numerical Reasoning	Cognitive therapy	49.64	7.30	52.18	7.34	49.09	8.68
	Skill tutoring	50.60	6.11	56.10	7.56	57.90	8.46
	No therapy	58.09	6.31	56.32	5.78	62.73	8.48
CTMM, Verbal Concepts	Cognitive therapy	53.18	6.46	57.45	6.70	59.18	7.56
	Skill tutoring	58.10	8.48	61.80	8.32	62.20	5.82
	No therapy	60.32	7.59	61.50	7.74	65.18	6.79
CTMM, Memory	Cognitive therapy	60.09	7.64	57.09	7.68	48.55	8.38
	Skill tutoring	58.50	8.74	61.80	5.82	48.50	7.66
	No therapy	62.36	8.80	63.05	4.72	57.36	8.10
CTMM, Language	Cognitive therapy	49.73	6.36	57.18	7.24	54.00	5.38
	Skill tutoring	53.40	5.67	62.80	7.07	56.70	6.10
	No therapy	57.73	7.94	62.91	6.24	63.41	7.94

Although the children assigned to treatment showed significantly lower test performance than the nontreatment group, the overall test performance of the children assigned to tutoring did not differ from that of the children assigned to cognitive therapy (multivariate *F* ratio =1.28, *p*=*.* 29).

Moreover, an examination of each of the individual analyses of each of the 17 test scores revealed that the two groups performed at essentially the same level, with one exception. Before treatment the CTMM Verbal Concepts score of the children assigned to the tutoring program was significantly better than that of the children assigned to cognitive therapy (univariate *F*= *4.*13, *p* = .05).

Assessments After Therapy. To control for initial differences in test performances, especially between the treated and nontreated children, we decided to use a multivariate analysis of covariance in comparing test performance after therapy. The method of co- variance would take into account a child's initial test scores, as a baseline when examining subsequent scores. Thus the same 17 test scores obtained immediately after therapy were analyzed by means of a multivariate analysis of covariance, where the 17 scores and the CTMM IQ obtained before therapy were covariates (i.e., were taken into account as a baseline). In contrast to our finding before treatment, the combined treatment groups now did not differ significantly in overall test performance when compared with the control group (multivariate *F*= 2.09, *p* = .30). Therefore, after 15 weeks of tutoring or cognitive therapy, both treatment groups closed the pretreatment gap between them and the control group. Before treatment overall test performance of the treated children was at a significantly lower developmental level than that of typical learners who were not treated; now the overall test performance of treated children was more or less at par with that of nontreated children.

Despite the lack of difference between treated and nontreated children when all tests were combined and considered together, when the test scores were analyzed separately, the children showed differences that warrant mention on three of the test variables. The children in the treatment groups marked fewer circles and crosses on the Scattered Scanning Test (i.e., showed more passive scanning: univariate $F= 3.29$, $p = .09$); they took more time, therefore were distracted, when naming the colors on Card IV of the Fruit Distraction Test (univariate $F= 3.22$, $p = .05$); and they constructed more groups (narrow equivalence range) on the Object Sort Test (univariate $F= 4.07$, $p = .06$).

Did cognitive therapy and tutoring in academic skills have different effects as measured by the tests administered? The analysis that compared the two treatment groups immediately after 15 weeks of intervention showed that this was not the case. The combined test performances of each group were virtually the same after treatment (multivariate $F= 0.80$, $p = .68$).

Assessments One Year After Therapy. The test scores obtained one year after treatment were subjected to the same analysis. The two groups who had received treatment still showed that their overall test performance was much like that of the controls (multivariate $F= 1.41$, $p = .44$). The gains in test performance made after treatment, then, sustained one year later. Moreover, the treatment groups no longer showed the moderately poorer test performance they had revealed immediately after treatment on three of the test variables (Scattered Scanning, number correct; Fruit Distraction IV-II; and Object Sort, number of groups).

A comparison of the tutored and cognitive therapy groups one year after treatment also indicated that their overall test performances were virtually the same (multivariate $F= 0.60$, $P = .79$).

Linear and Quadratic Trend Analyses. To examine the rate of change exhibited by each group from pretherapy, to posttherapy, to one year later, the test scores were examined by means of linear and quadratic trend analyses. A linear analysis essentially examines the rate of change from time 1 to time 3—that is, it establishes whether the rate of change over the three assessments follows a linear course. A quadratic trend analysis essentially examines the rate of change from time 1 to time 2 and compares this rate with change observed from time 2 to time 3. A quadratic trend analysis, then, provides the opportunity to explore whether the rate of change is curvilinear (U-shaped).

With the linear trend analysis, the tutored and cognitive therapy groups did not differ, but the combined treatment groups differed significantly from the nontreatment group. The difference between the linear trends of the nontreated and treated groups is consistent with the results of the previous analyses of covariance, which showed that the treated and nontreated children differed at time 1 but not at times 2 and 3. Therefore the linear rate of change for the treated group (from time 1 to time 3) should be greater than that of the nontreated group, and this is reflected in the results of the trend analysis (multivariate *F* ratio = 3.09, p = .01). Moreover the trend analyses of each individual test score showed essentially the same results. No difference was observed in the rate of linear change posted by the tutored and cognitive therapy groups (multivariate *F* ratio = .93, *p* = .36).

When the three evaluations were subjected to a quadratic trend analysis, we again found no difference between the rate of change displayed by the two treatment groups (multivariate *F* ratio = 1.10, *p* — .41), and a difference between the combined treated children and the nontreated children (multivariate *F* ratio = 2.09; *p*=.05). More important, the univariate *F* ratios on 13 of the 17 test scores were significant, unlike the results of the linear trend analysis. This means that the rate of change revealed by all the treated children combined was curvilinear or U-shaped. An examination of the individual mean scores indicated that most of the change or improvement shown by the treated children occurred immediately after treatment, (i.e., from time 1 to time 2) and that a lesser degree of improvement occurred during the succeeding year (from time 2 to time 3). Therefore both tutoring and cognitive therapy had the effect of pushing upward a child's cognitive maturity, a developmental advance that sustained for a year.

What about the rate of change the tutored group showed versus the cognitive therapy group? As we noted earlier the two treatment groups showed no difference when their test scores were combined. However examination of the rate of change they showed in terms of individual test scores brings out several subtle differences that deserve our attention. When considered in relation to group mean scores, they may serve future explorations of the effects of academic tutoring versus cognitive therapy.

Differences Between the Effects of Cognitive Therapy and Skill Tutoring on Selected Test Scores. The quadratic trends of four cognitive control test scores and one academic achievement score revealed noteworthy differences between the children who received

skill tutoring and those who received cognitive therapy, when considered along with the mean scores observed. These scores concern the Fine Motor Delay Test, the Scattered Scanning Test, the Fruit Distraction Test, the Leveling-Sharpening House Test, and the CTMM Verbal Concepts Test. To facilitate discussion the trends are presented in Figures 1 through 5.

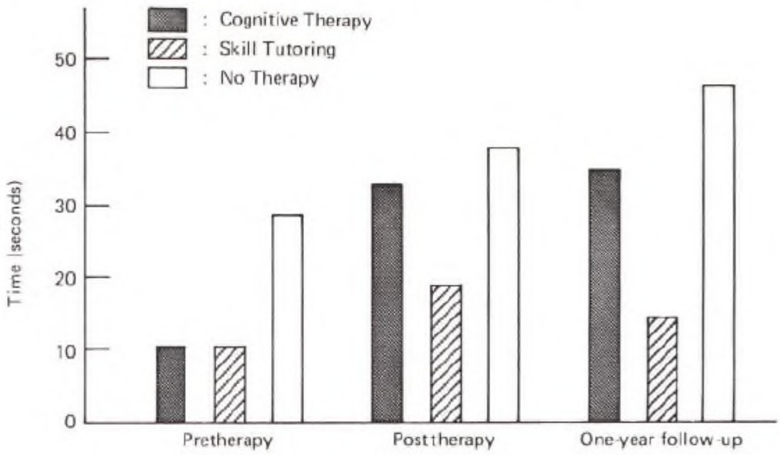

Figure 1. Fine Motor Delay Test, II-I: solid bars, cognitive therapy group; hatched bars, skill tutoring group; open bars, nontreated group.

FINE MOTOR DELAY (Figure 1). Before treatment the tutored and cognitive therapy groups showed the same capacity to delay moving a pencil through a maze. After treatment, the cognitive therapy group showed a sharp increase (although not statistically significant) in the capacity to move a pencil slowly along a pathway relative to their regular tempo. This performance approached that of the nontreated group, whereas the performance of the tutored children improved only slightly. Moreover, one year later the cognitive therapy group had sustained this gain and had increased their capacity to delay fine motor movements. The tutored group, on the other hand, showed a slight decrease in delay. The difference in rate of change between the tutored and cognitive therapy groups is significant (quadratic *F*ratio = 4.61, *p* = .04).

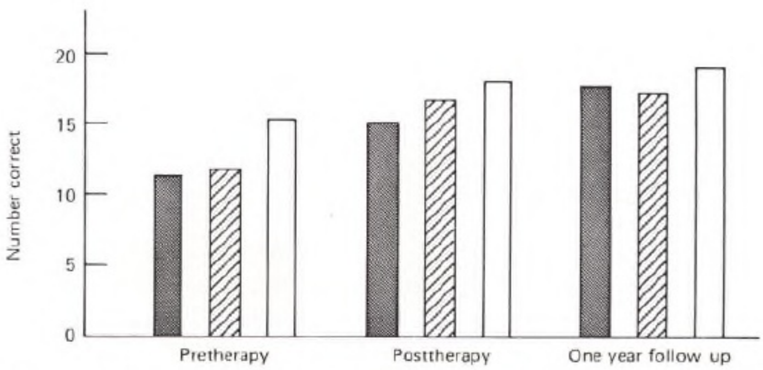

Figure 2. Scattered Scanning Test, number correct; key same as in Figure 1.

SCATTERED SCANNING TEST (Figure 2). Before treatment both treated groups marked about the same number of circles and crosses during the time allowed. After therapy, both the tutored and cognitive therapy groups were able to increase the number of circles and crosses marked (more active scanning), and both groups moved closer to the performance of the nontreatment group. The slightly higher mean number of the tutored group (16.7) versus the cognitive therapy group (15.2) reaches statistical significance *(F*= 4.40, *p* = .05). Although showing a lower mean score immediately after treatment, one year later the cognitive therapy group posted a higher mean score that approaches significance *(p* = . 10). Although the quadratic analysis does not show the trend to be significant, the pattern should be noted. The questions it raises for future study are considered in the critique to follow.

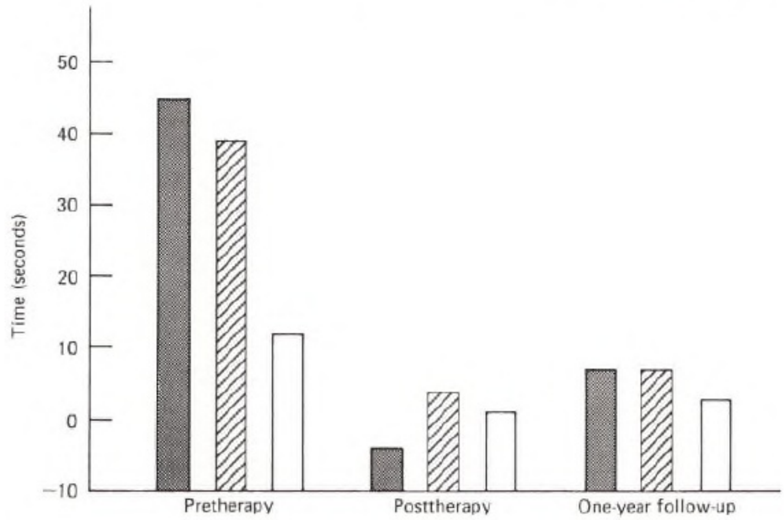

Figure 3. Fruit Distraction Test, time III-II; key same as in Figure 1.

FRUIT DISTRACTION TEST{Figure 3). In the pretreatment phase both groups took considerably more time, to name the colors on Card III versus Card II (indicating difficulty in withholding attention from nonrelevant information), with the cognitive therapy group showing a greater deficit in this cognitive control. Immediately after therapy, the cognitive therapy group took *less* time to name the colors on the distraction card (mean = –4.36 seconds), demonstrating that they were less distracted than the nontreatment children and significantly less distracted than the tutored group (F=4.40, *p* = .05). One year later the three groups clustered closely together. Although the quadratic trend analysis does not reach statistical significance, the improvement shown by the cognitive therapy group immediately after treatment in withholding attention from distractions is noteworthy, and its possible significance is considered below.

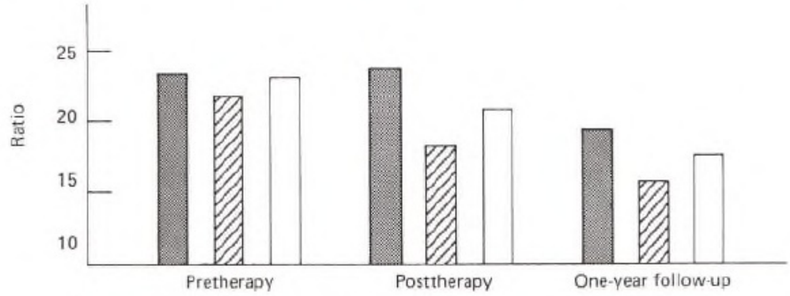

Figure 4. Leveling-sharpening ratio; key same as in Figure 1.

LEVELING-SHARPENING (Figure 4). Recall that the smaller the leveling-sharpening ratio, the more changes in the series of pictures are detected by the individual, who reports them soon after they are introduced (i.e., constructing clear, stable memory images of past information). At the start the three groups showed about the same leveling-sharpening functioning. After therapy the children tutored in academic skills performed better than the cognitive therapy group in constructing differentiated memory images of information (F=4.52, *p* = .05). Moreover, one year later they sustained this difference (although it did not remain statistically significant during that period: F=1.23, *p* = .32). The quadratic trend analysis is significant *(F*= 5.88, *p* = .02), including that the tutored group changed more from time 1 to time 2, and from time 2 to time 3, than did the cognitive therapy group.

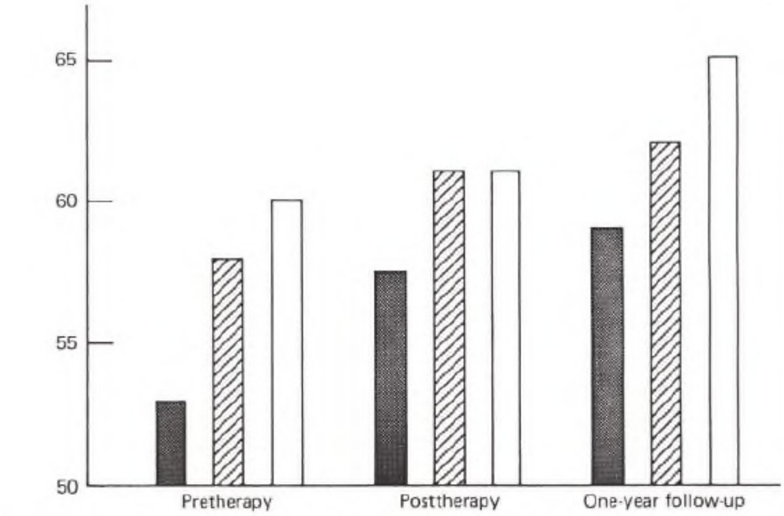

Figure 5. CTMM Verbal Concepts Subtest; key same as in Figure 1

CALIFORNIA TEST OF MENTAL MATURITY VERBAL CONCEPTS SUBTEST (Figure 5). As noted earlier, three subtests of the CTMM were administered to explore the respective effects of tutoring and cognitive therapy on selected academic skills (numerical reasoning, verbal concepts, and memory of verbal material comprehended). Of the three measures, only the trend observed with the Verbal Concept Subtest is noteworthy. Before treatment chance assignment of children to the treatment groups resulted in the tutored group scoring significantly higher on this test than the cognitive therapy group (F=4.13, *p* = .05). Immediately after treatment, although the tutored group still scored higher in Verbal Concepts, the difference between the two groups was not significant, indicating that the cognitive therapy group had improved to a greater degree in the skills tapped by the Verbal Concepts Subtest and therefore had closed some of the initial gap between them and the tutored group (posttherapy F=0.51, /? = .48). One year later it appeared that the gain made by the cognitive therapy group sustained, since the difference between the groups remained nonsignificant (F=0.37, *p* = .55). The quadratic trend analysis indicates that the difference in trend, or rate of change, revealed by tutored and cognitive therapy groups is significant (F=4.74, *p*; = .04). Inspection of Figure 5 indicates the meaning of this significant quadratic trend. The cognitive therapy group improved more on the Verbal

Concepts Subtest than did the tutored group from time 1 to time 2 and again from time 2 to time 3.

Taken together, these findings suggest that the cognitive therapy experiences administered over 15 weeks had a substantial influence in improving or promoting the development of the following cognitive functions and academic skills: delaying fine motor movement, scanning information actively, directing attention selectively in the face of distractions, and drawing inferences from statements and understanding the meanings of spoken words. On the other hand, the tutoring experiences administered seem to have had a noteworthy influence in improving the cognitive control concerned with constructing clear, stable memory images of information. We consider the possible significance of these findings in the critique that follows.

CRITIQUE

This study involved 21 entering kindergarten children who were assessed as lagging significantly in cognitive control development; their teachers, moreover, had judged them as poor learners and at risk academically. Eleven children received 15 weeks of cognitive therapy four sessions per week, and 10 received the same amount of tutoring in kindergarten readiness skills. The performances of the children in each treatment group on tests of cognitive controls and academic skills were compared before, immediately after, and one year after treatment. In addition, test performances of the combined treatment groups were compared with those of 22 kindergarten children who were not lagging significantly in cognitive control development and were judged by teachers to be typical kindergarten learners.

It is interesting to note that the IQ levels of these three groups of children were above average and essentially the same. This observation converges with the numerous findings discussed in Chapters 5 and 6, which indicate that a child's cognitive control functioning (immature or age adequate) is unrelated to the individual's IQ score. A comparison of the effects of cognitive therapy versus tutoring was made in this study, then, with children who were as bright as typical learners but whose cognitive control functioning was immature, placing them at risk academically.

Before treatment, the two treated groups did not differ in any of the criterion tests administered except for the CTMM measure of verbal concepts, where the tutored group, by virtue of chance selection, scored higher than the cognitive therapy group. As expected, the children selected for treatment scored significantly lower on all tests before treatment than the nontreated children who were typical learners.

Evaluations conducted immediately after treatment showed that tutoring and cognitive therapy were equally effective in improving the test performance of the children at risk. When all test scores were combined, we found that both the children tutored and the children who had received cognitive therapy closed the gap that had existed initially: their test scores indicated improvement up to the level of the nontreated children. After treatment the test scores of the children in treatment were no longer significantly lower than those of the typical learners, suggesting that the treated children had undergone considerable development in academic skills and cognitive functioning, very likely because of the tutoring or cognitive therapy they received. Moreover, assessments made one year later showed that the treated children had sustained the gains recorded earlier. They still performed with the criterion tests much like the nontreated typical learners.

What then can we say about the differential effects of the cognitive therapy method versus skill tutoring? Although tutoring and cognitive therapy were equally successful in improving the overall test performance of the children receiving these interventions, an examination of the patterns of change of particular test scores over the three assessments suggests that the two forms of treatment did have different effects, and these differences, although subtle, point the direction for future study. As discussed earlier, cognitive therapy noticeably improved a child's ability to regulate and delay fine motor movements and to focus attention on information designated as relevant to the task at hand while withholding attention from nonrelevant information. These findings fit the content that was emphasized in the cognitive therapy program provided.

Given the developmental status of the children, the first three programs of the cognitive therapy hierarchy were employed as the cognitive therapy (body ego-tempo regulation and focal attention). Moreover, because the children were observed to be very hyperactive and distractible, two therapeutic dimensions within these programs were emphasized: (1) having the children move their bodies, then objects they held, at slower than usual tempos through various pathways marked on the floor and on table tops, and (2) having them engage the several cognitive therapy tasks in the presence of various distracting stimulation. For example, while the children were marching along a pathway, or while they were surveying rods in a height discrimination task, records were played of marching bands, children laughing, children crying, and jet airplanes roaring; materials such as wet spaghetti, sand, ice, and toy animals were handled, and a swinging pendulum and photographs were placed alongside the relevant information (i.e., rods, pathway). Throughout, the therapists brought the children's attention, over and over again, to the task of ignoring the stimulation irrelevant to the activity at hand. Chance happenings were used to serve the same end. For example, during one session a teacher walked into the treatment room unannounced while the children were discriminating two balls of clay. The therapist identified the visitor as a distraction and engaged the children in trying to ignore the visitor in order to remain focused on the balls of clay.

The treatment emphasis on moving the body slowly converges with the finding that the cognitive therapy group improved significantly more than the tutored group with the Fine Motor Delay Test (Figure 1), closely approaching the delay capacity of the typical learners. Moreover, as we saw, the cognitive therapy group sustained this gain while the tutored group seemed to show no growth in the area of motoric delay as measured by the test used.

The emphasis on sustaining attention in the face of distractions converges with the finding that after treatment the cognitive therapy group managed the distraction card of the Fruit Distraction Test better than both the tutored group and the typical learners (Figure3).

These gains in delaying motility and distractibility could be seen as related to the significant improvement shown by the cognitive therapy group with the CTMM Verbal Concepts Subtest (child listens to a statement made by the examiner, surveys a series of pictures, and points to the one that presents the logical outcome of the statement). One possible explanation of the greater improvement shown by the children in cognitive therapy is that their gains in being less impulsive and distractible enabled them after therapy to listen more efficiently, to process the statement made by the examiner, and to point accurately to the correct picture.

Let us now turn to the observation that the tutored group displayed more growth in leveling-sharpening (constructing clear, stable memory images of information). A review of the daily records and supervision notes of the tutoring program provides a clue that might explain this finding. The tasks used in each of the readiness areas seem to have emphasized the cognitive process of forming a memory image of information, and sometimes the process of comparing that image with present information. For example, the children repeated patterns of sounds and series of numbers. They identified spoken words that had similar and different sounds, and they identified sounds that differed in pitch and in intensity. They counted sequentially and drew and matched various geometric shapes. The emphasis given by each of these tasks to the process of constructing a memory image of information could account for the significant result—that is, that these children performed better with the Leveling-Sharpening House Test—after treatment than both the cognitive therapy group and the typical learners, and they sustained the gain to the one-year follow-up.

These several differences lend a certain amount of support to the posited differential effect of cognitive therapy versus tutoring, but some comment is in order about the broad finding that overall test performance was improved equally by both the tutoring and cognitive therapy programs administered. A review by Weikart (1972) of three educational programs is helpful here. He found that a traditional curriculum produced results comparable to those of a “cognitively oriented curriculum” and a “language curriculum.” He suggested that elements common to all three programs had more impact on outcome measures than the theoretical position of each program. The elements he articulated included the following: (1) a clear rationale provided a guide for the selection and operation of activities, (2) teachers planned for each week, (3) teachers’ supervisors kept planning sessions focused, (4) teachers had a high degree of involvement and high expectation for child progress, and (5) home visits were conducted to involve the mothers in the children’s education. In our study each of these elements was very much a part of each treatment program, except for home visits, which we replaced with parent conferences. Following Weikart, then, possible differences in the effects of skill tutoring versus cognitive therapy were reduced by the influence of the above mentioned factors on both programs.

Reflecting on our experience with this study, we would add several other considerations that may serve future investigations. First our therapists recognized that as a result of their training in cognitive therapy, they organized and administered the tutoring activities in carefully graded, stepwise levels. As the previous chapters make clear, the rationale of cognitive therapy emphasizes the importance of presenting information and tasks along a series of developmental steps, each one carefully prescribing an increase of complexity of stimulation, in keeping with the child's cognitive changes and emotional reactions. Our therapists found themselves administering the tutoring tasks with the same developmental guide. More important, they spontaneously recognized that in terms of their previous experience in tutoring and teaching, they would not have been as systematic in organizing tutoring tasks along a developmental hierarchy if it had not been for the influence of cognitive therapy training.

A related issue: the therapists also recognized that as a result of their training in the method of cognitive therapy, they were more alert to managing an episode of resistance expressed by a child in response to some skill tasks presented, and they gave formal attention to such events. Moreover they tended to see the resistant behavior as connected in specific ways to the unique ingredients of the skill task, and they attempted to resolve the resistance in these terms (e.g., by pointing out to a child that he was stressed because he was trying to remember a pattern of four sounds rather than three). Again, as we have seen in previous chapters, the method of cognitive therapy emphasizes the importance for cognitive change of managing and resolving resistance to new complexities of information.

At the same time, when discussing the tutoring program the supervisors (Dr. Brooks and I) tended to influence the shape of tutoring tasks along developmental lines because of their prejudice for the rationale of cognitive therapy. We also brought attention to new forms of resistance emerging and to the need to resolve the resistance.

Although this homogenizing of the techniques of tutoring and cognitive therapy is desirable from the viewpoint of meeting the needs of children, it could obscure our gathering of data that evaluate whether and how the method of cognitive therapy is more effective than other methods and for which forms of learning disabilities. Perhaps there should be a study comparing theoretical positions in which, for example, one group of children would receive skill tutoring with tasks aimed to eliminate skill deficits, but the tasks would not necessarily be presented in a hierarchical order in terms of form and content. The tutors would be supervised by experienced persons who do *not* ascribe to the concept of developmental lines or levels and are vigorously committed to, let us say, some content approach (e.g., language training or some type of remedial reading program). Another group of children would receive a prescribed cognitive therapy program that addressed the underlying cognitive deficit and followed the concept of a stepwise hierarchy. The therapists for this program would be supervised by persons committed to the rationale of cognitive therapy. By attempting to highlight the theoretical differences in this way, perhaps we could learn more about the differential effects on cognitive development of different approaches.

Another consideration we would suggest emerges from the age of the children treated in our program. It may be that tutoring and cognitive therapy had generally the same effect on outcome measures (except those noted) because the children were all relatively young and cognitively immature, the implication being that any systematic enrichment program would promote cognitive growth. A more efficient test of the effect of cognitive therapy may require older children and children having an academic skill deficit that is specific and well organized. For example, one possible group would be composed of fifth grade children who are several grades behind in reading skills. Here one could randomly assign children to an appropriate remedial reading program typically provided by the school system or to a cognitive therapy program that would address the cognitive control functions measured as deficient. Outcome measures could focus on whether the reading skill is improved more by reading tutoring or by cognitive therapy and which approach produces more lasting effects. Since cognitive controls are conceptualized as cognitive structures underlying various academic skills, the method could be tested by determining whether therapy that advances the development of these structures in older children produces more lasting improvement in a specific academic skill than tutoring in that skill.

THE FOURTH STUDY: COGNITIVE CONTROL THERAPY WITH AN AUTISTIC BOY

To this point we have considered only relatively formal studies of cognitive therapy that involve group comparisons. We now present a report of cognitive therapy with an autistic boy who was not attending to, registering, or relating to his environment and its information in his daily living. This brief case report offers an opportunity to explore the effectiveness of cognitive therapy in promoting cognitive restructuring and growth when cognitive controls are not operating, so to speak, or are operating at very early developmental levels. It also illustrates the possibility of resolving resistance when treating even severely handicapped persons.

The clinical case affords a source of comparison with which to consider the effects of cognitive therapy. The boy's behavior after a year of intervention by a day care program (from the age of 5 to 6 years) could be considered to be the outcome of one treatment mode and as a baseline. His behavior after seven months of cognitive therapy from the age of 6 to 6½ could be considered to some extent to be the outcome of cognitive therapy, thus could be compared with observations of the baseline period. Although the boy was about 6 months older when the effects of cognitive therapy were examined, if major behavioral changes were observed, one could argue that they did not result solely from chronological growth and maturation.

Mike's history showed severe atypical and retarded development. It was felt that he had brain damage. At one point he was evaluated for possible blindness because of his vacant, unresponsive stare. Several psychological evaluations failed to produce any usable test responses and data. Institutionalization was considered at various times, but for several reasons a placement was not effected.

At the age of 5 Mike was placed in a day care program for severely retarded children. At the onset of this program evaluations by clinical psychologists and child psychiatrists showed that he had not yet formed any speech patterns (his vocal activity consisted exclusively of high-pitched wailing), that he gave no evidence of awareness of objects, persons, sounds, or events around him, and that his main activity consisted of running along the wall from one end of the room to another, hitting the wall repeatedly and ritualistically with open hands.

After a year in the day care program, Mike showed some progress. At one point he learned to stack two blocks, although this response could not be elicited later, nor did it occur spontaneously. He showed some involvement in picking up an object in each hand and pounding the objects against each other or on the floor. He could on occasion sit among other children for a few seconds or minutes at a time. However he still gave no evidence of awareness of others, of his own body, or of stimulation around him, and he was not making identifiable speech sounds.

Two independent psychological evaluations of Mike, one by a female examiner and the other by a male, were conducted after this year of day-care experience. Both examiners found Mike to be essentially untestable, and each introduced the diagnosis of autism. The examiners found that when test demands were presented to Mike, especially if several were introduced in succession, he would become increasingly agitated and would run about the room. However if the examiner did not persist in requesting that Mike take and handle test materials, he could sit at a table for a few minutes, showing generally less hyperactivity than had been observed the year before.

Mike seemed to behave slightly differently with the two examiners. At times during the evaluation conducted by the male examiner, Mike seemed to take him into account. Moreover, at one point Mike did grasp and release wooden beads into a container when his hand was physically guided to the material. Mike seemed to be completely out of contact with the female examiner. His only self-initiated activity was to bang objects together or put them in his mouth.

The decision was made to continue Mike in the day care program for a second year. In addition, it was decided to provide him with two quarter-hour sessions of focal attention cognitive therapy a day, totaling 10 per week.

The main question asked at the start was, Would training in focal attention break through the autism and cognitive withdrawal inferred by both psychological examiners and result in more rapid developmental change (especially concerning relationships with objects) than had occurred during the previous year in the general day care program?

The therapist[26] began treatment by placing a single white square in the center of the training board. This starting point and the subsequent program followed guidelines outlined in Chapter 12 for severely limited children. Initially the therapist’s energies were directed almost exclusively to helping Mike remain seated before the cutout. During the first weeks the child was able to sit before the cutout for only a few seconds at a time. Once seated, he would pop up from his chair and run the length of the room, back and forth, banging the walls, jabbering loudly, and sometimes wailing. When the therapist returned him to the chair and seated him, firmly but gently, his reactions ranged from passive, “trancelike” states to outbursts of excited, tense, animated movements involving arms and legs. During the “passive” states he sometimes squeezed the square with his fingers, mouthed it, or held it to his nose in a dreamy way. During his moments of excitement he repeatedly banged the square against the table or his other hand. Throughout, the square cutout remained the focus around which Mike and therapist negotiated.

Mike's periods of excitement and agitation increased after the first month of treatment, and he bolted from the chair almost as soon as he was seated there. At this time it was noticed that he was creating more disturbance in the day care classroom. This change in behavior was interpreted as a possible indication that the child was beginning to register with focal attention, to relate to the cutout as a piece of information, and to give some recognition to the therapist and her demands. Apparently he was responding to this intrusion with uncontrolled, diffuse excitement.

It was decided that the therapist would begin a more concentrated effort to keep Mike seated before the board. As soon as he made a move to get up, the therapist put her arms around him and held him down, firmly but gently, saying repeatedly, "Mike, sit." At these times he struck out wildly, scratching, biting, and trying to push the cutout off the table. In a few seconds, his anger would subside, and this was followed by withdrawal into the passive, trancelike state. Then a few minutes later he would again begin his violent struggle to escape from the cutout and its intrusion.

After several days during which these behavioral swings pervaded the sessions, with the therapist attempting to keep Mike before the cutout, Mike began to remain seated for several minutes, showing neither his trancelike state nor his explosive excitement. He seemed to convey a state of inactivity and alertness (see Chapter 11). During these moments of alert inactivity, the therapist repeatedly took the boy's hand, guided it to the square, held it there until he grasped the square, guided his hand to the box, and pried his fingers apart, to let the square fall into the box. Throughout this total behavioral response, Mike did not look at the square or at the therapist.

Another technique was introduced at this time. The therapist held Mike's head between her hands, directing his face toward the square, ensuring that the object fell within his range of vision.

During the latter part of the second month of treatment, a major goal was achieved. Mike grasped the square, removed it, and placed it into the nearby box completely on his own. As he repeated this response, a second square was placed before him. When he failed to respond, as was usually the case, his head would be directed toward the square, or his hand would be guided to it. At the end of the second month Mike met the criterion of removing the square three times in succession without assistance.

Then the therapist placed a white square and a black square before Mike. Using the technique of demonstration and physical guidance, she directed Mike to remove the square that she touched, leaving the other one on the table. With some trials the black square was to be removed and the white square left undisturbed. With others the white square was to be removed and the black square left undisturbed. At the end of the third month of treatment, Mike was able to handle this requirement successfully, without guidance or assistance. By the end of the fifth month he was successively removing designated cutouts from a display consisting of two white and two black squares, then from a display consisting of four white and four black squares.

At this point the program was modified and only white cutouts were placed before him. After two weeks Mike was able to differentiate between and remove either a white square or a white circle. It took him three days to learn to remove either a square or a triangle as designated, and three more days to remove a square, a circle, or a triangle. In the following weeks, in keeping with the program guidelines, the number of cutouts was gradually increased. By the end of the seventh month of therapy he was being presented with a display of up to 25 white cutouts (circles, squares, and triangles) randomly scattered across the table. And he was asked to remove all examples of one or another shape designated by the therapist. The aim here was to help Mike sustain his attention for increasingly long periods of time and to exercise focal attention over and over again in response to the information contained in each display.

During these seven months Mike continued to use various strategies to resist the demands of therapy and to escape from the information of the "outside" world, which was persistently intruding upon and opposing his autistic withdrawal. For example, at one point during the fourth month of training he cried whenever he was seated at the table. During these outbursts the therapist reassured him, but she nevertheless continued with the cognitive tasks. When she guided his hand to one of the cutouts, he would turn and look at her with a "pathetic expression," seeming to make an appeal that therapy be abandoned. At times he put his head on her shoulder and sobbed. That he was attempting to have therapy stopped seemed to be supported by his subsequent behavior: as soon as he was told that he could get up, the tears were gone, and so was the sadness. Suddenly he would begin running about the room, jabbering.

Later Mike used what appeared to be a higher form of resistance. He began to "tease." For example, he frequently removed incorrect cutouts after having clearly shown that he could identify the correct ones. On other occasions he removed cutouts from the board but would not release them into the box, shaking his wrist as if a form were glued to his hand; and at other times he placed his hand over a cutout but would not grasp it. He often accompanied these behaviors with a mischievous laugh, supporting the impression that he was teasing. During this phase Mike began to show laughing and smiling behavior that was purposeful and reciprocated the smiling and laughing of the therapist. This behavior was a noteworthy advance in Mike's emotional development and in the development of his capacity to reciprocate with and relate to another person (see the discussion in Chapter 11 concerning the concept of negotiation in cognitive therapy).

A number of observations made by the therapist, and independently by day care personnel, suggested that Mike's growth in focal attention and his growth in interpersonal transactions were generalizing from geometric shapes and the therapist to objects, persons, and events in his everyday environment. From about the fourth month of therapy, members of the staff noticed that the boy seemed to be "looking at" children, teachers, and goings on in the classroom. Several specific incidents were reported that underscored this increase in awareness. Once when the therapist entered Mike's classroom, for example, one of the other children approached her and hugged her. Mike was standing nearby and was obviously watching this interaction. After looking back and forth from the child to the therapist, he suddenly covered his eyes with his hands, apparently attempting to block out the incident because it was too disrupting and painful for him. When he looked up again and found the child still fussing over the therapist, his face puckered, and tears fell. He then walked over and offered his cheek to the therapist for a kiss.

On other occasions Mike was observed to be “tracking” (i.e., with coordinated movements of his eyes and head, following a child who was riding a bicycle around the room). On still other occasions he showed that he was beginning to recognize objects that belonged to him. For example, during the sixth month of therapy Mike got up from his cot, where he had been resting, walked over to a shelf on which all the children’s shoes were lined in a row, surveyed the row several times, then picked out his shoes and carried them back to his cot. Also, after observing the therapist using a drinking fountain, Mike approached the fountain, operated the foot peddle correctly, and took a drink, performing this act for the first time.

A psychiatric evaluation was conducted after the seventh month of therapy. The findings in general supported the staff’s impression that Mike’s capacity to relate and to cope with information had grown considerably. Mike was accompanied to the psychiatrist’s office by his therapist. He separated from her relatively easily and went along with the psychiatrist, who was a stranger to him (although she had conducted the evaluation of him the year before). In the psychiatrist’s office Mike stood still, head tilted, listening to the sound of a power tool being used by a custodian in the next room. Then he walked in the direction of the noise and permitted the psychiatrist to take his hand and lead him to the custodian, whom he watched “with interest.” At one point, while seated on the floor with Mike, the psychiatrist picked up a piece of metal in each hand and tapped the strips on the floor, singing *The Farmer in the Dell.* When she stopped, Mike sat very still. Then reaching on either side of him, he picked up two metal pieces, which the examiner had placed there, and made a “singing sound” while banging the metal strips on the floor. Mike stacked blocks, imitating the examiner, and performed other similar perceptual motor tasks. The psychiatrist was also impressed because Mike looked at her easily and often, which he had not done during the first evaluation.

Mike did not show any speech at the time of the posttreatment evaluation. The examiner and classroom personnel observed, though, that he made much less use of wailing sounds and he did not run from one end of the room to the other, flapping his hands ritualistically against the walls.

In general, after seven months of focal attention cognitive therapy (two sessions per day, 15 minutes each) Mike showed a wide range of coping behaviors and interactions with individuals, both suggesting that he was now investing cognitive energy actively and selectively, forming mental images of objects, and acknowledging his environment to a much greater degree than he had done during the previous year when he had experienced only the day care program.

Treatment was terminated after seven months because circumstances beyond the control of the day care center required that Mike be removed from the program and taken to a distant facility. We will never know whether further cognitive and emotional gains could have been achieved by Mike if cognitive therapy had been continued over two or three years, for example. To me, the gains Mike made after only seven months of treatment are impressive, given his severe autistic withdrawal and psychological limitations before cognitive therapy was introduced. Cognitive therapy in focal attention and the management of flight and fight behaviors seems to have reorganized Mike's tendency to remain cognitively insulated from the environment, putting him into cognitive contact with persons and information, and unlocking his arrested development.

WORK BY OTHERS RELATED TO PRINCIPLES AND TECHNIQUES OF COGNITIVE CONTROL THERAPY

This section begins with a consideration of studies selected for discussion from many recent publications because they appear to relate in some particular way to cognitive control therapy outlined in this book. Although the research made use of observations of normal children and was conducted to pursue hypotheses that derived from considerations of theory and research, not from those of clinical practice, the investigations make important connections with one or another of the techniques and principles used in cognitive control therapy. In one sense I view these investigations as providing "basic" information about cognitive functioning and development which serves to support or refute the feasibility of a particular technique or principle of cognitive control therapy. More important, I view these studies as roadmaps for clinicians and researchers, suggesting which questions are critical in gathering systematic knowledge to support the treatment method, which experimental methods and methodologies may prove useful in dealing with these questions, and which directions must be followed to support cognitive control therapy as a viable alternative to the many psychotherapies available for the treatment of cognitive disorders.

Following our discussion of selected laboratory studies, we review treatment methods proposed by other workers in which cognitive behavior of patients is the focus. As was the case with cognitive control therapy, these treatment methods emerged when clinical experience indicated the need to modify the technique of psychodynamic psychotherapy to better assist patients exhibiting particular psychological disorders. These methods have been developed primarily to treat emotional symptoms presented by adults, but they relate to the method of cognitive control therapy and serve to elaborate the issue of selecting cognitive activity as the target of psychotherapeutic work. The concluding section raises some implications of cognitive control development and therapy for the practice of education.

The studies I have selected as having particular relevance for cognitive control therapy concern levels of complexity of information, the relation between physical motility and the production of imagery, the effects of demonstration (modeling) and rehearsing (repetition) on cognitive change, intrinsic and extrinsic motivation in cognitive development, and change as viewed in terms of cognitive functioning.

The subsequent discussion is certainly not intended to be a comprehensive review of the literature in the areas touched on. Such a task is outside the scope of this book. Instead, studies are discussed more to represent each area, to point the interested reader toward references that in turn will suggest others, and to stimulate clinicians and researchers to conduct related studies in the treatment room, laboratory, or school.

Levels of Complexity of Information and Cognitive Functioning

All the cognitive therapy programs systematically vary the complexity of the tasks presented, but the therapy programs in field articulation and leveling-sharpening, in particular, make use of the technique of presenting configurations of geometric cutouts (then of pictures of meaningful objects) that vary systematically from simple patterns (a few cutouts representing few stimulus dimensions) to complex patterns (many cutouts representing many stimulus dimensions). With each stepwise increase in complexity of the displayed task, it is assumed that a more highly differentiated level of cognitive control functioning is required and that structural growth of the control will take place. Therefore investigations of levels of complexity of information are quite relevant and useful in evaluating this technique and in considering possible modifications.

Perhaps the greatest number of studies of visual complexity has been done with infants. Ever since the pioneering observations of Berlyne (1958) and Fantz (1958) showing that infants are selectively responsive to patterns of stimulation that vary in complexity, the issue has been studied from many technical-methodological angles and conceptualized in various ways. In broadest terms, with an increase in age throughout infancy, there is a preference for more complex patterns of stimulation. The reader is encouraged to examine reviews of literature available, since this board finding has many tangents and tributaries: Salapatek (1975), Fantz and Fagan (1975), Cohen and Gelber (1975).

Let us look in some detail at a study that illustrates the work being done and pursues and elaborates one issue. Greenberg and Blue (1975) noted that past work did not segregate the effects of contour of stimuli versus number of stimuli in exploring this progression of the infant's preference for more complex stimulation. They recorded the amount of time that 2- and 4-month-old infants looked over one of three types of stimulus presentation: *(a)* patterns that increased in terms of contours but had an equal number of elements, (h) patterns that increased in number of elements but had an equal number of contours, and (c) patterns that increased in complexity in terms of both the number of elements and contours. They found that numerosity and contours acting in tandem are responsible for the shift toward complexity with age observed in previous studies.

What about older children? Do they find complex patterns more interesting and pleasing? Do they approach more complex patterns of information with age? From the results of several studies, this seems to be the case. Aitken (1974) asked groups of children from the ages of 3 to 10 years to rank polygons varying in complexity from 4 to 40 sides in terms of whether the individuals experienced the shapes as interesting and pleasing. The results revealed a shift at the age of 7 to 8 years toward a preference for more complex patterns. The 3 to 4 year olds ranked the polygons unreliably, the 5 to 6 year olds preferred *less* complex patterns, the 7 to 8 year olds preferred slightly more complex patterns, and the 9 to 10 year olds showed the clearest trend, with interest and pleasure increasing linearly with complexity.

This trend was also observed when 2 and 4 years old children (Switsky, Haywood, and Isett, 1974) and children in grades one through 6 (Wohlwill, 1975b) were asked to manipulate physically wooden polygons varying systematically in complexity. In these studies the age functions defined an inverted U, indicating the need to determine more precisely at what stages in cognitive-emotional development, *and in terms of what particular dimension of complexity,* children show low, middle, and high preferences for complexity and avoidance of complexity. A U-shaped relationship between complexity and preference was also reported by Boykin and Arkes (1974), who presented preschoolers with jigsaw puzzles consisting of 1, 3, 6, 10, and 16 pieces.

When children were presented with patterns of stimulation more meaningful (in terms of daily experiences) than polygon cutouts, they also showed a preference with age for more complex patterns. Wohlwill (1975a) asked children (grades one through eight) to look over (a) displays of postage stamps systematically increasing in complexity from one in which all the stamps were identical to one in which all the stamps were different, and (*b*) a series of scenes of the physical environment, scaled in diversity. Again an inverted U-shaped function was reported, with looking time increasing to about the midpoint of diversity, then falling off. Kreitler, Zigler, and Kreitler (1974) have discussed the definition of complexity in light of their findings.

From the viewpoint of our interest in cognitive control processes, the study by Mandler (1975) relates both to the complexity of information and to the leveling-sharpening cognitive control. Age differences in memory of spatial orientation of information varying in terms of meaningfulness and complexity were observed in subjects ranging from kindergarten age to adulthood. The study by Christie and Schumacher (1975) concerned with the recall of relevant and nonrelevant information relates leveling-sharpening and field articulation to complexity, the study by Lehman (1972) addressed strategies of field articulation, and there have been a number of studies relating complexity to the process of focal attention (Hagen and Hale, 1973; Egeth, 1967; Hale and Taweel, 1974; Hagen and Kail, 1975).

A fair degree of support is available, then, for, the rationale that with cognitive development, increasingly more complex information is preferred, and to promote cognitive growth, information should be presented in terms of levels of complexity hierarchically ordered.

Delaying Motility, Constructing Imagery, and the Role of Physical Activity and Demonstration (Modeling).

The cognitive control therapy programs designed to promote development in body ego and tempo regulation (the first cognitive control of the hierarchy) make major use of the technique of imposing delay on a child’s gross and fine body movements through space. These programs also rely heavily on the technique that encourages the child to construct images (of persons, animals, or objects) that represent body postures, kinesthetic perceptions, and tempos.

Earlier we discussed at some length how in cognitive control therapy delaying motility and differentiating schemata of gross and fine body movements and body perceptions are prerequisites for growth at higher levels of cognitive control functioning concerned with visual scanning, selectively deploying attention, holding information in memory, and categorizing information. These prerequisites stem from the proposition, supported by considerable research from the camps of Piagetian, Wernerian, and ego psychology investigators, that cognitive development proceeds from sensorimotor to perceptual to conceptual activity. Although this progression has been proposed by several schools, psychoanalytic theory has been explicit in specifying that delaying motility is the critical ingredient in the unfolding of cognition from dominance of sensorimotor activity to dominance of thought without motor activity.

Early in his writings Freud (1900, 1911) outlined the two-stage theory of thinking which he labeled primary and secondary process. Primary process thinking follows rules of the pleasure principle. Here thinking is dominated by the pressures of drives and the need for satisfaction in immediate discharge and in action. Qualities of thinking in this stage include prelogical formations, condensations, and displacements without spatial, temporal, causal, or reality constraints. Secondary process thinking is governed by the requirements of adaptive efficiency (reality principle). It takes into account the consequences of actions, it remains in tune with temporal, causal, and reality expectations, prohibitions, and opportunities, and it makes use of available information in logical terms shared by the environment. According to Freud, a shift from primary to secondary process thinking requires that the individual develop structures that inhibit, delay, and postpone the discharge of drives, needs, and motives in actions. In delaying action, in postponing physical manipulation of some object, a “hallucinatory” (mental) image is constructed of the need-satisfying object or event. This hallucinatory image is the archetype of thought.

Freud’s theory, especially the concept of delay, has since been discussed and elaborated in light of advances in ego-cognitive psychology (Rapaport, 1951; Klein, 1970). These writers and others (e.g., Wolff, 1960) have considered the relation between the psychoanalytic conception of activity versus thought and Piaget’s parallel view of “internalized imitation” (Piaget and Inhelder, 1967). For Piaget, an image is “internalized imitation” of activity that manipulates objects and information. But as we noted, according to psychoanalytic theory, the critical ingredient for the construction of this image as a substitute for action is inhibition and delaying action. The importance of delay and inhibition to cognitive functioning has received considerable support from research findings obtained since Freud’s first formulations. A review of this literature (White, 1965) indicates that tendencies to respond are organized in a temporal hierarchy so that inhibition and delay of the first available response are preconditions for a slower, cognitively more mature response.

Of the many studies conducted recently in this area, those examining the relation between motor activity and imagery production seem to be especially relevant to the treatment technique formulated in cognitive control therapy with body ego and tempo regulation. Let us take one of these as a stimulus for our discussion. Wolff and Levin (1972) were interested in exploring the age range over which constructing dynamic images depends on concomitant input from activity with information. They also wanted to identify the age range over which the child’s ability to form dynamic images undergoes its most accelerated development. In one experiment they presented kindergarten and third grade children with 16 pairs of common toys (e.g., metal airplane, plastic truck, toy bear), one pair at a time. With each pair, children were asked to remember "which toys go together." To explore the relation between action and imagery production, the children were assigned to one of four treatment conditions: (1) *control group,* the children simply received the instructions to remember which toys go together; (2) imagery group, the children were asked "to think in their minds" a prescribed image of the two toys playing together, (3) *experimenter manipulates group,* the experimenter manipulated each pair of toys in a prescribed interaction (e.g., the bear was placed in the truck), (4) *child manipulates group,* the child was instructed to manipulate each pair of toys in the same interactions prescribed for the third group.

After the experimental conditions, 16 toys (one from each pair) were lined up and the others were presented one at a time. As each toy appeared the child was to point to one in the line that initially belonged with it. The kindergarten children who had manipulated the toys or watched the experimenter manipulate them remembered which toys belonged together significantly better than the children who were asked only to "think of a picture in your mind," and better than the controls (the performance of the latter two groups was the same). On the other hand, the third grade children who manipulated the objects, those who watched the experimenter manipulate them, and those who were asked to "imagine" the toys interacting but did not handle them, all recalled the pairs equally well, and better than the controls.

Because the children who manipulated the toys also looked at them, the authors conducted a second study with kindergarteners and first graders to control for visual input versus sensorimotor input. At each age the "imagery" group placed each pair of toys in a box and imagined the toys interacting. The "child manipulates" group placed each pair in a box and manipulated them in a prescribed interaction, without being able to see the interaction. At both ages the children who manipulated the toys recalled the pairs of toys significantly better. Of particular importance is the finding that in the first study the recall performance of the kindergarten children who both manipulated and looked at their manipulation of toys was 58% better than that of the children who were asked to "imagine" the toys interacting. In the second study the recall performance of the children who did not look at the toys during the interacting but only handled them was 55% better than that of the children in the imagery group. Therefore the critical ingredient in remembering the toys for kindergarteners seemed to be the sensorimotor experience.

In a third study the same authors found that children from 4 to 7 years old who voluntarily traced two-dimensional nonsense forms with their hands, while looking at the forms, later recognized the forms better than children who did not touch them. Moreover, the degree of facilitation from overt activity and touching decreased with age. From these findings Wolff and Levin concluded that to the age of about 5 years, constructing a dynamic image of information depends on motor input that duplicates the form of the perceptual response. Beyond the age of 5 years these perceptual processes rely less and less on overt motor activity.

This developmental relation between motor activity and image production received support from another study with 4 and 7 year olds (Levin, McCabe, and Bender, 1975). The developmental relation of motor activity as one of several modes was also extended to language (Wolff and Wolff, 1972). Teachers were asked to rate 4- and-5-year-old students on verbal output (amount child talks), verbal skill (level of sophistication of speech), gross motor behavior (jumping, running), fine motor behavior (puzzles, art work), and manual dexterity (coordination in manipulating objects). Verbal skill correlated significantly with fine motor movements and manual dexterity, whereas verbal output correlated with gross motor movements. When related to the work with imagery, this finding converges with the biodevelopmental principle given in Chapter 2—namely, as actions are delayed and refined, images emerge and language becomes sophisticated as an instrument in dealing with the environment.

These studies by Wolff and his colleagues bring our attention not only to the role of motor activity in facilitating imagery production, but also to the role of imagery in promoting cognitive efficiency (e.g., a child's remembering which two toys belong together).

On the basis of his research findings, Hollenberg (1970) proposed that visual imagery facilitates rote learning but interferes with conceptual learning. He believed this to be consistent with Galtan's view that visualization tends to focus the individual's attention on concrete aspects of the environment and to distract him from more abstract features necessary for conceptual behavior. Saltz and Finkelstein (1974) challenged Hollenberg's proposal and demonstrated that with second graders conceptual learning (e.g., the concept of roundness) occurred significantly faster for high-imagery materials than for low. These investigators made an important contribution in discussing methodological considerations in the study of imagery. Whether an individual tends to produce little or a great deal of imagery when learning or dealing with a task is an aspect that is no less important than the capacities of some materials (e.g., real objects) to evoke more images than others (pictures of objects) and these more than others (e.g., words labeling objects).

Does "visually rehearsing" an image improve cognitive efficiency? This question has special relevance for us because in many cognitive control therapy programs outlined in earlier chapters the technique of repeating encounters with patterns of information (rehearsing) is used heavily. Millar (1972) asked children 3 to 5 years old to examine nonsense shapes for 2 seconds. Then during a 5-second delay she told the children, "Many people can see pictures in their heads. Close your eyes and try to see the shapes in your head." The children who received this condition did significantly better subsequently in matching the nonsense forms with alternatives.

Two studies that approach the issue of motor activity and imagery in learning from another direction deserve our attention because they spotlight other techniques used in cognitive therapy and because they also frame questions for future study. Koenigsberg's (1973) observations connect with those by Wolff discussed earlier (i.e., demonstration by an adult model is a form of sensorimotor input). Children 4 to 6 years old were matched for initial difficulty in discriminating the orientation of letters and were assigned to one of several training conditions that involved matching the orientation of shapes with a standard: (1) one group received no demonstration and was asked which of two shapes was the same as a standard, (2) one group touched both the standard and the response shapes before making a judgment, (3) one group traced the perimeter of the standard and comparison shapes with fingers before making a judgment, (4) one group watched the experimenter physically demonstrate how the standard and comparison shapes were not the same by rotating one and aligning it with the other, and (5) one group themselves manipulated one shape, aligning it to determine its orientation relative to comparison shapes. Koenigsberg found that demonstration by the experimenter improved performance most, with sensorimotor activity adding relatively little additional benefit. In the studies by Wolff, although manipulation of the toys by the examiner (i.e., demonstration) and manipulation of the toys by the child did not result in a significant difference in the number of pairs of toys remembered, manipulation of the toys by the examiner produced the greatest degree of recall for each grade (kindergarten, first, and third). Relating this finding to Koenigsberg's, we are left with a provocative question: why does physical demonstration by an adult (authority figure) promote the greatest degree of imagery production that facilitates recalling pairs of toys or the spatial relations of shapes? Koenigsberg's answer would be that sensorimotor activity, whether performed by the child or by an adult observed by the child, served to channel the child's attention to relevant information.

Miller and Morris (1974) offer another hypothesis. They found that 3- to-6-year-old children tended to drop marbles in holes into which the experimenter had dropped his marbles. (Initially the experimenter dropped his marbles into holes first used by the child.) These writers suggest the possibility that after being imitated by the experimenter, the child in turn imitated the examiner. They also proposed that being imitated creates a sense of control over the environment. This hypothesis and Koenigsberg's notion that demonstration serves to channel attention seem to be reasonable, but they do not address directly the issue of why sensorimotor information provided by an adult is more powerful in promoting imagery production than sensorimotor information obtained directly by the child. Here psychodynamic workers would ask questions about ego ideal and identification, and learning theorists would inquire about modeling. Would a child's production of imagery be the same if he observed another child perform the same actions on objects rather than an adult? Would there be a difference if he observed an adult resembling his father's authority versus another adult who minimized the representation of authority? And would a child who shows evidence of holding authority figures in awe (strong ego ideals) produce more imagery when watching an adult demonstrate than a child who shows little awe of ego ideals?

Demonstration by the therapist in dealing with tasks is one key technique in cognitive control therapy. Information about these and other questions would be very helpful in establishing when, in what way, and with what children demonstration will promote cognitive growth or further flight and fight behavior in response to cognitive demands. Although much research has been done with the concept of modeling (Bandura, 1971), there is still much to be learned in this area that would benefit psychodynamically oriented cognitive approaches to treatment.

Before leaving the issue of the relation between motor activity and imagery and the role of imagery in cognitive development, we should acknowledge that imagery techniques have received considerable attention in recent years as applied in various psychotherapies: transactional analysis, Gestalt therapy, psychodrama and behavior modification (Singer, 1974; Sheehan, 1972) and psychoanalytic therapy (Arieti, 1970). Given our interest here, however, it is interesting to note that Singer, whose creative writings in the field of imagery and daydreaming are major statements in this area, does not give formal attention in his recent text (Singer, 1974) to the relation between action and imagery nor to the roles of delay and inhibition. Studies do support delaying motility, demonstration, rehearsing, and constructing images as techniques useful in promoting cognitive development. These studies also suggest for future study many possible topics that involve clinical technique. If one goal is to facilitate a child's using images as a substitute for action, for example, it would be interesting to try to learn at what age the image of a turtle is more effective than the image of a horse in substituting for and delaying motility. And if an impulsive child represents moving slowly with the image of a panther (see Chapter 12), what is the optimum number of transformations of this image if delay is to be achieved (e.g., from panther to horse, to dog, to cat, to turtle)?

Motivation in Cognition

INTRINSIC VERSUS EXTRINSIC

It is clear from discussions in previous chapters that the method of cognitive control therapy does not advocate or agree with the use of extrinsic rewards (e.g., candy, tokens) as a means of initiating or sustaining a child's involvement with a cognitive task. Nor does the method ascribe to the assumption that extrinsic rewards reinforce and promote a child's perseverance, efficiency, interest, and investment in coping with information. Rather, cognitive control therapy takes the organismic view of man and accordingly assumes that interest, pleasure, and satisfaction in selectively approaching, rearranging, relating, assimilating, and using information are associated with the cognitive activity itself—that is, derive from within the organism (see Chapter 11). Differences between models of extrinsic motivation (especially social learning theory) and models of intrinsic motivation (especially psychoanalytic theory) are heatedly debated and are important, but they fall outside our focus. Here we mention briefly three models of intrinsic motivation, one by D. E. Berlyne, one by George Klein, and one by Robert Holt, which in my opinion have particular relevance for cognitive psychology in general and cognitive control therapy in particular. I believe that these models hold the most promise for stimulating operationally definable concepts that should help us in our struggle to understand the perplexing and complex relations among cognition, affects, and motivation. Moreover these models are all the more appreciated when we consider that the relation between cognition and motivation is typically ignored within the vast literature of cognition. Notice, for example, that two volumes devoted exclusively to cognitive studies do not include one presentation, among the 33, on the topic of cognition and affects (Hellmuth, 1971). Because our sketch cannot do justice to the detailed models developed by Berlyne and Klein and the extensive empirical work on which they rely, the interested reader is encouraged to turn to the original sources.

Berlyne’s model of intrinsic motivation has been summarized in terms of its relevance for cognitive psychology and educational practice (Day and Berlyne, 1971), and other presentations are available (Berlyne, 1960, 1963). Berlyne posits an arousal model of curiosity and exploration, which in turn relies on the neurophysiological concept of a reticular activating system initially proposed by Moruzzi and Magoun. In Berlyne’s model intrinsic motivation derives from the interaction of child, task, and information. Berlyne distinguishes three groups of properties that enable stimulation to arouse us and attract our attention: (1) psychophysical properties (e.g., color, size, ambiguity, intensity) and changes in these, (2) ecological properties (i.e., stimuli that are highly emotionally charged), and (3) collative properties or characteristics of stimuli that depend on the individual’s previous experiences and expectations.

Berlyne considers collative properties to be especially powerful in inducing a state of heightened arousal, which in turn activates a state of curiosity and initiates exploration. The state of tension and heightened arousal is alleviated by exploration and search for information. The model includes other concepts such as “diversive curiosity”—a state of heightened arousal induced by an environment lacking in interesting stimulation, which in turn leads to “diversive exploration.”

Berlyne’s model opens a number of windows through which to view the issues of cognition, affect, and motivation, but we are left with several questions. When conducting cognitive therapy how do we understand the child who actively avoids more complex or ambiguous patterns of information—the child who consistently becomes angry (complains of being tired, accidentally “spills” water on the floor, and tosses the training materials across the room) each time there is an increase in complexity in the task presented.

Now let us consider Klein’s (1970) model, derived from psychoanalytic theory and from his extensive research with cognitive controls. Klein places cognition and wish in the center of motivation and drive, and drive theory in the center of cognition. He tells us there is no such state of affairs as cognition and motivation; rather, cognition *is* motivation. From the view of pre-1940 psychoanalytic theory this proposal may appear to be ridiculous or at best daring. From the view of cognitive psychology it may be puzzling or at best of no special importance.

In the following quotation Klein makes his position quite clear. I believe anyone who is unfamiliar with Klein’s work yet interested in the topic of motivation and cognition should read this selected material several times because it requires that a new construct be formed as a lens through which to examine the issue of cognition and motivation. For the cognitive psychologist, who does not usually attend to motivational issues and is interested in trying on Klein’s model, it may be helpful to “perceive” a set of intersecting rectangles as forming the galloping horse of motivation. For the psychodynamic clinician, who is not accustomed to working with cognitive issues, it may be helpful to “perceive” the galloping horse as a set of intersecting triangles. But each person must always keep in mind that for Klein, while the horse and rectangles *both* exist, they are the same.

> I propose to discuss motivation in terms of properties of the behavioral unit of ideation, affect, and action, and not in terms "drive." To discuss drive as if it were a distinctive entity that "interacts" with thought creates all sorts of mischief. It is only as structured affective-cognitive-motor events that drives are knowable as motivations and definable at all. Inasmuch as motivation involves knowledge, it is cognitive. It lends significance and meaning to what we see and do (assimilation, in Piaget's terms), or it causes us to revise what we think we know (accommodation). Conversely, insofar as cognition has direction, it is motivated. A motive has consequences, and consequences involve ideational residues of actions, of affects, and of thoughts—all cognitive matters. Therefore, what is motivating about behavior and what is knowledgeful about motivation are one and the same. Motives in cognition are not motives "interacting" with cognition; to the extent that a thought records a directed relation of knower to object, to event, to self, and to other, it **is** a unit of motivation. Although we must be sure not to forget the insights into motivation that psychoanalytic theory has given us, it seems timely to talk more about the ideational units in which drives are represented and less about purely energic or quantitative considerations that are by now customary in discussions of drives . . . (p. 360).

> Motivation implies directions and intensity of activity. They are its core attributes. Motivation is not a matter of external stimulation or internal stimulation alone. To motivate behavior, rather than to simply arouse the organism, external stimuli must first become meaningful; the same is true of internal stimuli, or "drive." If drive is indeed unoriented, internal stimulation, it too becomes motivational only when it is cognitively represented, as in a wish,. . . memories.... Without such a mediating process, external and internal stimulation have activating but not directional effects (p. 364).

Klein brings the concept of the representation of motivation in wishes and memories closer to the center of cognition by proposing that the locus of motivation is within the structure of "a train of thought" (Klein's "cognitive unit of motivation"). A train of thought defines a closed feedback loop beginning with the initial wish or desire and ending with the final experience of gratification—from thought to action, back to thought. The entire train of thought or cognitive unit of motivation includes "a temporally extended series linked to stimulation by exteroceptors and visceroceptors, to motor activity by affective and effector processes, and to one another by facilitative and inhibitive signals in a patterned sequence" (p. 364). A cognitive unit of motivation begins in what Klein calls a "primary region of imbalance" (PRI), a concept he formulated relying on the writings of Donald O. Hebb and Floyd Allport. The PRI is conceptualized as existing in one brain region where excitation initiates the sequence of thoughts, affects, and action, the components of each forming a train of thoughts that are interconnected and organized over time. As this train of thoughts, affects, and actions rolls out, it remains oriented toward the initial imbalance and excitation; thus its course follows a loop, starting from and returning to the imbalance of excitation. Eventually some set of thoughts, affects, and actions provides sufficient feedback to the area of imbalance and cancels or switches it off, completing that cognitive unit of motivation. The quality of "intention" is defined by the fact that the many components of thought, affect, and action remain oriented toward the region of imbalance and interconnected as a loop around it. The quality of "direction" is defined by the resulting behavior occurring in a self-closing loop until experience and cognitive feedback turn off the imbalance. The quality of "intensity" is given by the number, persistence, and repetition of thoughts, affects, and actions that do not bring relief to the region of imbalance.

Klein stresses that the final actions, affects, and thoughts of a unit of cognitive motivation are seen as *balancing* rather than as reducing tension and this major difference between this model and Berlyne's has implications for cognition-motivation. By conceptualizing behaviors as achieving a balance in tension rather than a reduction, Klein believes that he provides for an important property of motivation usually overlooked in tension-reduction models, namely, the "aesthetic" component of drive. Klein gives several examples. When we are hungry for ice cream, we do not simply want ice cream. We may want a particular flavor, or ice cream in a soda or in a sundae. Similarly, wanting to eat may include wanting a particular food or wanting to eat in a particular restaurant. Klein feels strongly that these qualitative aspects of the cognitive requirements of balance should not be ignored.

Klein's examples rely on instances involving consummating drives (those just given, and the example of a man who feels the imbalance of sexual attraction but who wants, and is lonely for, a particular girl; not any girl will do). Although these serve to illustrate the model, it may also be useful to remind ourselves of examples that do not involve consummating behavior as such and are more closely tied to the "consummation of nutriment" provided by patterns and tempos of information. (See Chapter 11 for a discussion of stimulus nutriment from the Piagetian and psychoanalytical perspectives.) For example, one child we treated wanted to assemble something, but not any puzzle would do, and the child pushed away a puzzle of 10 pieces. In his motivational state of imbalance for a particular stimulus nutriment, he was simultaneously angry and agitated and excited in anticipation. He searched through many materials in the classroom until he found a puzzle of five pieces, which he assembled with pleasure Motivational balance achieved for the moment, he then went on to another activity. Another child, who wanted to look at a picture book of trains, refused a book distinguished by one feature—the pictures of train engines and boxcars were arranged on the pages at various angles and without attention to proportion and perspective. The child insisted on a book he preferred, which contained pictures of train engines and boxcars located in rows and drawn in proportion and in proper perspective. When the book was located, the child sat by his nursery school teacher and looked at each picture, with obvious interest, involvement, and pleasure. When each picture had been examined, he got up and soon pursued another activity.

From Klein's model we would say that these two children experienced tension from a PRI which activated a series of actions, affects, and thoughts, all interrelated over time and oriented toward the intention of engaging a particular stimulus (with its unique tempo, intensity, complexity, etc). When the stimulus was finally engaged, the initial state of tension imbalance was brought to some level of balance sufficient to switch off the intention for particular cognitive-affective experiences and to permit another region of imbalance and intention to be experienced, as well as another train of actions, affects, and thoughts.

Holt (1976) has provided a careful and creative critique, elaboration, and extension of Klein's model, calling for a reconsideration of the psychoanalytic theory of motivation. We deal here with only a few of Holt's points that relate especially to our interest in the reorganization of cognitive controls by behavioral means. Holt notes that Klein's concept of a primary region of imbalance is "an unfortunately vague metaphor implying something very much like the old drive—a notion of need-generated excitations and tensions that must be discharged" (p. 182). Holt proposes that the concept "imbalance" be replaced by the concept of "perceptive-evaluative mismatch." This concept relates to Piaget's "*decalage*" and parallels Rubinstein's (1975)model. Holt acknowledges that his concept "hardly [provides] a gain in euphony," but he hopes that it offers a gain in explicitness.

The concept of “mismatch” concerns a process that compares and determines whether three sources of information fit together or lack fittedness to some degree: (1) the perception (input) of some information, event, person, (2) a memory (centrally generated pattern) of related information and experiences, and (3) value judgments attached to both the perception and the memory.

In terms of behavior, this concept means that an individual evaluates and compares existing and potential stimulation and determines the extent of their coincidence, as well as the degree to which they differ in value. If a large discrepancy exists between potential and existing information, and between the value of each, a mismatch exists that motivates. If present stimulation is less valued than what might be, a wish for the more valued develops in fantasy. If present stimulation is more valued than what might be, it is experienced as a threat, and a fear of the potential stimulation develops in fantasy. In both cases the mismatch can be corrected by changing reality. In the first case the individual obtains the valued stimulation so that what he now engages is what he wanted. In the second case the individual avoids the potential stimulation that is threatening, thus he continues to engage and value the existing stimulation. In both instances the degree of mismatch is resolved, a fittedness is achieved, and the motivational unit is no longer influential in directing behavior. The process of comparing and matching existing with potential information can take place consciously, preconsciously, or unconsciously. Rather than viewing a cognitively represented wish as initiated by some unspecified kind of imbalance that in turn motivates behavior, Holt views a wish as initiated by “a cognitive-affective state something like dissatisfaction which arouses anticipation of pleasure and/or unpleasure.”

In addition to freeing Klein’s model from a vague anatomical concept of imbalance, Holt’s conceptual elaborations fit the concept of a mismatch between cognitive controls and information in psychopathology (see Chapter 11) and stimulate operational definitions of variables that weave cognitive controls, affects, and adaptation as fibres of the same fabric. Let us reconsider the two vignettes of children presented earlier, keeping in mind both Holt’s formulation and the model of pathological cognitive controls. The first child actively and aggressively avoided the 10-piece puzzle and behaved purposefully (was motivated) until a puzzle containing fewer pieces was located. We would propose that the level of complexity of stimulation preferred by this child, represented by a puzzle of five pieces, was a function of the developmental status of his cognitive controls. Accordingly the existing stimulation (a 10-piece puzzle) was valued *less* than the wished for (potential) information (containing five pieces). A state of mismatch existed, associated with threat and unpleasure. The existing stimulation was avoided while the potential was sought after and located. At this point the mismatch was resolved and the motivational unit was no longer influential. But our model adds that in continuing to engage less complex information that matches his cognitive controls (smaller puzzle) and in avoiding more complex information, this child does not have the opportunity to differentiate and develop his cognitive controls. Instead, they remain fixated. This example characterizes the child in cognitive control therapy who struggles to avoid potentially more complex information. The same analysis could be imposed on the behavior of the second child, who preferred stimulation that was less diverse and more orderly.

From these examples, then, we can imagine a child characterizing a more normal state of affairs. This child's cognitive controls would result in his perceiving a 10-piece puzzle as *less* valued, and he would become motivated to find and engage more complex stimulation (e.g., a 15-piece puzzle), which would be valued more. When the latter had been engaged, the child's cognitive controls would assimilate the information and experience and in turn would differentiate and become preadapted to valuing and pursuing even more complex information. We have reviewed several studies of normal children demonstrating this progressive preference for and pursuit of more complex stimulation with age.

Earlier chapters have made it clear that the goal of cognitive therapy is to locate the course of cognitive control development on a new track, to allow the child who is handicapped by cognitive deficits to value and pursue increasingly complex forms of stimulation and to derive pleasure in learning, exploring, and knowing. How does the normal child obtain these attitudes, which place high value on seeking and engaging increasingly complex stimuli and on approaching and processing such information? Holt's model includes a concept that helps us address this question and makes contact with the rationale of cognitive control therapy. Holt proposes that an individual conceptualizes his affects and responses in terms of values displayed by others, especially by adults who are important to the person. That is, the ego ideals the child has internalized influence his attitudes toward information and learning. Applied to our interest in cognitive therapy, Holt suggests an exciting approach to the study of the process by which a cognitively disabled child develops pleasure in learning and engaging information for the sake of the activity itself. Throughout the process of cognitive therapy, the therapist displays love of learning, perseverance in the face of information, and excitement when confronted with increased complexity. The child at first imitates the therapist as an ego ideal; then as the child's resistances are resolved, he identifies with the therapist, and internalizes a representation of the therapist. This representation now serves as a concept of value that is employed by the child in comparing when and whether a perception of existing information matches or is mismatched with a memory of what is potentially available. Thus we hypothesize that the child who has internalized an ego ideal that represents excitement in the face of complex information and pleasure in learning begins to perceive as less valued existing information that is less complex than existing cognitive controls, or has the same degree of complexity. Accordingly the child would change the environment and seek more complex information. If the child has internalized an ego ideal that does not represent pleasure in learning, or if he has not internalized an ego ideal, the perception of existing information that is more complex than current cognitive controls would be evaluated as dangerous and more threatening than less complex information. Such a child would flee from or fight against the information. The studies of cognitive therapy with retarded children discussed at the start of this chapter, which assessed the effect of coaching on the child's efficiency with a criterion test, could be seen as related to the child's having internalized an ego ideal (the parent as therapist) that represents pleasure in complexity.

Finally Holt suggests other important modifications in Klein's model. Klein's model is limited to a negative feedback system. Yet much behavior in everyday life does not have an episodic character. Individuals spend much time engaged in long-term activity with no logical stopping points. Holt says, “We have to add the conception of *positive* feedback systems which do not involve any ‘discharge’ or even ‘switching off.’ Rather our theory must recognize that as long as a pattern of behavior yields a balance of gratification over negative affect, it will continue (in the face of intrusions and interruptions)” (p. 184). Of special importance to me is Holt’s suggestion that we also need to conceptualize Klein’s model in developmental terms. “Klein’s model presupposes a mature person; of course, we must eventually be able to model motivation at all levels of personal development and account for the ways in which growth takes place” (p. 185).

This need for developmental considerations is met in part by Fowler’s (1971) concept of developmental competence and cognitive baselines. Fowler’s model contains some elements similar to the models we have reviewed and offers new provocative considerations, as well. Fowler defines competence as the total set of perceptual-motor-cognitive rule systems an individual has developed at any given phase of his life. Three dimensions are critical in the development of competence: (1) acquisition of general and language rule systems, (2) rule strategies and tactics of problem solving (i.e., cognitive styles and cognitive controls), and (3) affective hierarchies and motivational systems (i.e., the role of affective strategies in the differential attachment children develop to areas of information). When Fowler considers the first years of development through the lens of his competence concept, he articulates issues such as the rate, tempo, and intensity of stimulation with which the child copes and around which the child organizes competence strategies, and he establishes a developmental view of cognitive deficit.

> . . .If the beginning years are passed under conditions of low level or disorganized stimulation, the developmental outcome is not simply low competence, although this may be evident—but *ineffective means* for tackling new experiences profitably. The most salient differences between high and low level children in the first two or three years, then, is found as much in the forms of problem solving they employ as in the level of complexity at which they operate. . . . Failure to early establish a high level cognitive baseline is thus to generate *alternative*, poor modes of functioning, *not* simply to fail to generate high level forms. These alternative modes become preferred but poorly adaptive systems, leaving a child to meet each new encounter with the same old, less effective ways. They are preferred and self-perpetuating because they are the only modes known and because they do not lead to types of problem solving which generate new learning, (p. 255)

Fowler’s detailed discussion of the cognitive and affective differences between low and high competence children should stimulate much research, and he reminds us that deficit is not absolute but is relative to time (developmental sequencing), place (environmental context), and function (organismic state at the moment).

STUDIES OF MOTIVATION AND REWARD IN COGNITION

From this discussion of models of motivation in cognition, let us turn to a review of several studies selected to illustrate connections between motivation and each of the topics we have considered to this point. This research, therefore, points to promising directions for future study: intrinsic versus extrinsic motivation, modeling and demonstration by an adult (ego ideal) as a reward, and the role of delay and imagery in motivation and reward.

The first two studies delimit the camps of extrinsic and intrinsic motivation. On the basis of their findings, Jefrey, Hartmann, and Gelfand (1972) placed themselves in the center of the social learning theory camp with the opinion that extrinsic rewards and motivation are the most important. “Love is not enough,” they contend. “When attempting to establish . . . any behavior, one should dispense reinforcers contingent on desired behaviors ...” (p. 1058). Boys were introduced to a model (a young adult male) and asked to indicate which drawings they preferred in each of several pairs, to help with a study of picture preferences of adults and children. During the first phase the model always made his choice, in view of the child, before the child made his choice. The children were divided among three reinforcement conditions: (1) no reinforcement offered when the child made the same choice as the model, (2) nurturance (before the pictures were shown the model interacted with the child in a “nurturant” way for 7 minutes), and (3) contingent reinforcement under which the child was rewarded by the model with candy and social approval each time he matched the model’s choice. In the second phase the child and the model chose among another set of pictures but while sitting in different rooms “under the pretext of an equipment breakdown.” Now the model did not know the child’s choices, but the child was told the model’s choices. In phase one children reinforced with a “nurturant” interaction matched the model’s choices at chance levels, whereas children reinforced with candy matched the choices of the model at significant levels. The results were essentially the same in the second phase.

A study by Greene and Lepper (1974) provides a provocative comparison. They first reviewed research that reflects a growing concern over the possible adverse affects of extrinsic rewards on children’s subsequent intrinsic interest in the activity for which rewards were provided. In individual sessions they asked preschool children to draw a picture under one of three experimental conditions :

(1) *No Reward.* The child was simply asked to make a drawing.

(2) *High Reward.* The child was shown a copy of a “good player award” (a certificate), was told that a very few of these would be given to the children who drew the best pictures. The child was given an award and had his name printed on an “honor roll” when he finished his drawing.

(3) *Low Reward* The child was shown a copy of a “good player award” and told that many of them would be given to all the children who drew for the examiner.

In addition to these conditions, the examiner gave a reward (certificate) to preselected children after they completed their drawings. This group constituted a condition of “unexpected reward” in contrast to Groups 2 and 3, who were introduced to the rewards before drawing and therefore expected one.

Two weeks later, for the first hour of three consecutive classroom days, the child’s preschool teacher placed a wide variety of materials on tables (including drawing material), and the children were asked to engage in any activity they chose. Two observers, located behind a one-way mirror, recorded the amount and type of activity in which the child engaged. Children who had received an expected reward showed significantly less subsequent interest and involvement in drawing activity than children who had received no reward or had been unexpectedly rewarded.

Furthermore, the drawings of the rewarded children were of poorer quality. No difference was observed in the follow-up drawing activity and interest between the high and low reward groups. On this basis the authors concluded that expectation of a reward (more than the size of it) has a deleterious affect on intrinsic interest in the activity rewarded.

This work, when considered along with that by Jefrey, Hartmann, and Gelfand, brings our attention to several important methodological issues in the study of motivation in cognition. Greene and Lepper chose an activity (drawing) that combines cognitive functioning and interest for the age group in question (preschoolers). Is the task of examining 46 pairs of pictures a good fit for second graders? The question is raised to bring attention to the need to consider closely the nature of the task chosen in studies that compare intrinsic and extrinsic motivation. Furthermore, Greene and Lepper used a naturalistic setting, a stage-appropriate activity period, and a free choice situation, to assess the influence of extrinsic reward and reward expectancy. The children chose what they wanted to do from among many activities in their classroom. This technique appears to have considerable value for research in this area.

In a previous section we considered demonstration (modeling) as a form of sensorimotor input in managing and using information. Does demonstration serve as a form of reward, and how does it compare with extrinsic rewards? A study by Zimmerman (1974) gives us a clue. Children 3, 4, and 5 years old were given the task of grouping pictures of animals that go together. The examiner demonstrated grouping strategies to some of the children and in other cases the examiner rewarded the child with candy. Demonstration facilitated the children's learning to categorize, but incentives failed to improve performance. The results also suggest that the 3 and 4 year olds were influenced more by the model than were the 5 year olds, raising questions for future study about the relation between developmental status of a child (both cognitively and in terms of issues such as ego ideals and identifications) and the power of demonstration to arouse intrinsic motivation and to serve as an agent of cognitive change.

The work of Jacobson and Greeson (1972) is cogent here and relates directly to the use of demonstrations in cognitive therapy. Preschool children from poverty backgrounds participated in a 20-hour conceptual learning program in one of three experimental conditions: (1) the child was rewarded with frosted cereal, (2) *before* the child responded to the training tasks the therapist demonstrated how the tasks could be approached, and the child was also rewarded with frosted cereal, (3) *after* the child responded to the training tasks, the therapist demonstrated how the task could be approached; the child was also rewarded with frosted cereal. After training the children in Group 2 (demonstration beforehand plus cereal) showed an increase of 21 IQ points, whereas the children in Groups 1 and 3 showed increases of 10 and 8 points, respectively. Most important, the significantly greater gain by Group 2 sustained to a follow-up evaluation conducted 14 months later. Since all children received frosted cereal (an extrinsic reward), the results give support to demonstration by a therapist (ego ideal) as an agent in promoting cognitive growth.

A study by Crandall and Laccy (1972) suggests another approach to the study of the role of ego ideals and intrinsic motivation in cognition. It seems reasonable to assume that children who accept responsibility for their own academic successes and failures, rather than projecting the responsibility and seeing others as culpable, have developed internalized ego ideals that include commitment, investment, and pleasure in the pursuit of knowledge and learning. Using the Intellectual Achievement Responsibility Scale, these investigators selected children who saw themselves or others as responsible for their academic successes and failures (internal and external categories, respectively.) They administered the Embedded Figures Test, with a time limit, which they felt aroused motivation within a cognitive task because it requires close scanning, sorting out relevant from nonrelevant information, and retaining and producing the information to select a correct response. Their results, supported by other work they cited, indicated that "internals" search more actively for information and better retain, process, and produce information when required.

The issue of demonstration has been joined in several studies with the issue of delay. The voluntary delay of 9 year olds in receiving a reward (Yates, 1974) was assessed four weeks before, immediately after, and four weeks after exposure to one of four conditions: (1) a model in a televised film demonstrated high delay behavior, (2) a model discussed good reasons for waiting, (3) a model demonstrated delay behavior and discussed reasons for waiting, and (4) no film was viewed. All three treatment conditions resulted in more delay behavior with this age group, with the greatest delay following the films in which delay behavior was demonstrated and reasons were discussed. If a group situation represents a form of demonstration or modeling, it is interesting that children in groups decided more often to wait for a larger reward than children deciding alone (Nisan, 1976).

Wellman, Ritler, and Flavell (1975) found that when 2 and 3 year olds were asked to recall a particular location of a stimulation after a period of delay, the children engaged in motoric behaviors that seemed to be designed to increase their recall. Indeed, the more of such behavior during the delay, the greater the recall. This situation could be seen as one in which children provide themselves with "selfdemonstration," as sensorimotor input, which facilitated recall. Another related study showed that when children delayed gratification for longer periods of time, they demonstrated faster learning (Newman and Kanfer, 1976).

These investigations lead us to the issue of delay and gratification. Nisan (1974b) explored possible developmental trends in delay of gratification and the effect of imposing inhibition. Kindergarteners and first, second, and third graders answered questions about arithmetic which all were able to handle successfully. Then each child was thanked and given the choice of receiving a box of six crayons immediately, or a box of a dozen crayons in two days. Within each age group, half the children were asked not to decide immediately, but to think about the matter until the examiner gave a signal (in 45 seconds).

A significant age trend was observed. No kindergarten children waited, but nearly all the third graders did. This finding replicated those of others who have shown that a shift toward increased delay of gratification occurs from the ages of 6 to 9 years. Moreover, the condition of asking children to wait and think it over before choosing had the effect of increasing slightly the number of second graders who chose to wait two days for the crayons, but it had no effect on third graders.

Nisan discussed why he believed the age trend observed and the effect of imposed inhibition are explained better by psychoanalytic concepts of delay and secondary process thinking and by the Piagetian concept of decentration, than by the social learning concept of modeling.

If children from the ages of 6 to 9 years are asked to choose between receiving a reward immediately and receiving a larger reward later, and if some children are exposed to the reward and some not, there is an increase in delay with age when the reward is exposed (Nisan, 1974a). Yet children from the ages of 9 to 12 years showed an increase in delay when the reward was absent (Toner, 1974).

That waiting for a larger reward is associated with age and with whether the reward is visible suggests several questions. What do children think about while they are waiting? Do they think about the reward? Do the images and fantasies children have about rewards play a role in delay of gratification and in the intrinsic value of rewards? Mischel, Ebbesen, and Zeiss (1972) showed that asking children to engage in simple internal activity during a period of delay (e.g., "think about having fun") had an effect on delay behavior. When children were given instructions to evoke positive, negative, or neutral moods, then were given a choice of an immediate, lesser reward or a delayed, greater reward, those who experienced a positive mood chose the delayed reward and those who experienced the negative mood the immediate one (Moore and Clyburn, 1976).

The foregoing studies relate to our questions of the role of fantasy in delay of gratification, but a creative, provocative study by Mischel and Baker (1975) approaches the questions directly. These investigators stressed that given the importance of the "reinforcement" concept in contemporary psychology, it is surprising that so little is known about how the mental representation of rewards affects a person's pursuit of them. In addressing the representation given by a child to a reward and attempting to determine how this representation influences a child's motivation, Mischell and Baker stepped into the center of intrinsic motivation. To explore this issue, they gave children 3 and 4 years old the choice of receiving marshmallows or pretzels as rewards. After the child had expressed his preference, he was given another choice. He could wait until the experimenter returned to receive two pieces of the preferred reward, or he could choose not to wait any longer and signal for the experimenter (by ringing a bell), but if he did this he would receive only one piece of the reward. The rewards (two pieces on one side of a dish and one piece on the other) remained before the child throughout the delay period. Before the start of the delay period, the children were assigned to one of four experimental conditions, each of which instructed the child to engage in fantasy about the reward while waiting.

(1) *Consume Relevant Group.* Members were asked to imagine the consummatory qualities of the food selected (e.g., "When you look at the marshmallows, think how chewy, sweet, and fun they are to eat," or "When you look at the pretzels, think how crunchy they are and about the toasty taste in your mouth").

(2) *Consume Irrelevant Group.* Children were asked to imagine the same qualities, but with respect to the food for

which they were *not* waiting (i.e., the children who wanted a pretzel thought about tasting delicious marshmallows).

(3) *Transform Relevant Group.* Children were asked to imagine and think about non-consummatory qualities of the food they wanted and associations to it (e.g., “When you look at the marshmallows, think how white and puffy they are, like clouds. Think about clouds.” Or, “When you look at the pretzels, think how long and brown they are, like logs and trees. Think about logs and trees.”)

(4) *Transform Irrelevant Group.* Children were asked to imagine and think about the same nonconsummatory qualities and associations, but in response to the food for which they were *not* waiting.

A fifth control group was given no instruction on what to think about while waiting. All groups were trained in fantasizing and were given an opportunity to practice.

What is the effect on delay of gratification if a child imagines the consummatory qualities of objects? Mischel and Baker found that children who fantasied how tasty pretzels were while they were waiting for marshmallows (or vice versa) delayed the longest (consume irrelevant group), whereas children who fantasied about the tastiness of the food for which they were waiting (consume relevant group) delayed the least. What is the effect on delay of gratification if a child thinks about the nonconsummatory qualities of objects? Children who thought about fluffy clouds and white moons while they were waiting for marshmallows (or about logs and tree trunks while waiting for pretzels—the transform relevant group) delayed much longer than children who engaged in the same associations but about an object for which they were *not* waiting. Therefore thinking about the delicious qualities of some object while you are waiting to eat a different one, and thinking about associations to an object you are waiting to eat, both are powerful intrinsic rewards associated with a high degree of delay. Thinking about the delicious qualities of the object you are waiting to eat and thinking about associations to an object you are not waiting to eat are intrinsic forces associated with little delay and quick discharge in action.

Mischel and Baker have provided findings that in themselves are valuable, but their contribution is outstanding, I believe, because it opens a new window into the study of the influence of mental representation of rewards on a person’s behavior—namely, into intrinsic motivation. From Klein’s model discussed earlier, a child in each of the experimental conditions of this study experienced a different “train of thought” or cognitive-motivational units beginning with the instructions to fantasize about the reward and ending with the child’s ringing a bell to call in the examiner and receive something to eat. These results beckon us to probe deeper into each of these four units or trains to learn more about affect and motivation in cognition.

Change and Development in Cognitive Structures

Considerations of therapy and intervention necessarily bring up the issue of conceptualizing change and rendering it operational. As we discussed in Chapter 11, the views of change in mechanistic theories and in organismic theories are quite different. Mechanistic theories see change as stimulated by a modification of the environment. In social learning theory the concepts of operant conditioning and imitation are most often employed to understand change. The extensive research and theory building with these concepts fall outside our scope. What of the view of change in organismic theories, to which cognitive therapy ascribes?

Although behavioral structures and change in structures were nodal issues around which David Rapaport's (Gill, 1967) many writings orbited from a psychoanalytic perspective, and Holt's recent concept of "perceptive- evaluative mismatch" gives us a way of thinking about cognitive change which includes affects, to date Piaget's writings have stimulated the most articulation and the most studies of change as applied explicitly to cognitive structures. To explain how cognitive structures change or become restructured, Piaget (1967) has proposed the hypothesis of equilibration. Briefly, the results of an individual's actions (physical, perceptual, or conceptual) on stimuli are seen as feedback to the psychological structure (organization) that gave rise to the actions. A discrepancy between the actions and the existing cognitive structure induces a state of disequilibrium, and the existing structure reorganizes in a way to restore equilibrium. This process of action-feedback- disequilibrium organismic change-equilibrium-action-feedback-disequilibrium, and so on, is a continuous one and leads to progressive restructuring, resulting in a hierarchy of successively more highly differentiated, elaborated, and integrated structures.

When translating this hypothesis into operational terms, it becomes clear that a cognitive structure cannot be changed by reinforcing some desired transformation or by reorganizing it. Rather, several interrelated elements and conditions in the individual and in the environmental task are necessary to produce cognitive change: (1) The cognitive structure must be actively involved (engaged in imposing actions on information). (2) There must be a state of conflict (mismatch) between the existing structure and informational demands. That is, the cognitive actions the existing structure can impose on information are not appropriate to the complexity of the current informational demands. (3) The complexity of the demands of the existing information is just above the complexity of the child's cognitive structure which is meeting the demand. (4) Cognitive restructuring cannot be produced by presenting information whose demands and complexity are at a much lower or higher level than that of the cognitive structure involved: in both these instances no conflict takes place, hence no restructuring. Some empirical support for this model of cognitive restructuring has been reported (Steiner, 1974; Gyr and Willey, 1971; Kuhn, 1972).

This model of cognitive restructuring relates directly to the principles and techniques employed in cognitive control therapy. Treatment begins with tasks or levels of complexity that are just below the stage of the child's cognitive control organization. As treatment proceeds, the complexity of the task is increased bit by bit and step by step. As we have seen, cognitive control therapy leans heavily on the concept of mismatch or conflict between cognitive structure and information. One main goal of the therapist is to carefully increase the complexity of the task until a state of cognitive conflict or structural imbalance occurs, then the child is helped to learn effective ways of managing the new level of complexity (i.e., to restructure the cognitive control). However our applications of the concepts of cognitive mismatch and disequilibration with cognitively disabled children suggest that the model needs elaboration and investigation benefiting from the recent cognitive-motivational models of Klein, Holt, and Fowler. As I have emphasized in earlier chapters, in clinical situations we have repeatedly observed children tenaciously clinging to their old strategies of processing and avoiding information. Their cognitive motivational units contain a train of thoughts and behaviors that feed back unpleasure when processing information, that avoid dealing with more complex information, and that avoid maintaining some level of cognitive tension or imbalance that *is valued positively.* There seem to be no ego ideals operating within these children that say, "To pursue, grapple with, learn from, and use information is a stress that is most pleasurable and rewarding." The cognitive motivational concepts of Klein, Holt, and Fowler, when joined with concepts of structural change in cognition, suggest a new horizon for research that should contribute much to technology as well as to basic understanding of change and motivation in cognition.

Cognitive Therapy Approaches with Children and Adults

I have been able to locate only a few reports of therapy approaches with children that emphasize some aspect of cognitive functioning explicitly in the treatment methods. Modaressi (1975) reported the results of a group cognitive control therapy program modeled after the method of cognitive control therapy outlined here, although Modaressi's source was an earlier report by me of the method (Santostefano, 1969a and 1969b). Fifteen children, ages 4 to 5 years, attending a program designed to help socially disadvantaged children prepare for the demands of school, were selected by their teachers as high risks (academically) and exceptionally vulnerable. With a teacher serving as therapist, these children received cognitive control therapy in the classroom following the hierarchical model of cognitive controls. Therapy in focal attention was provided first, followed by therapy in field articulation and leveling-sharpening. Instead of beginning the treatment using geometric shapes (as outlined in this book), Modaressi elected to use material "with high motivational value in order to deepen the child's involvement." Therefore the treatment consisted of the higher stimulus levels of each program, as outlined in earlier chapters. For example, in therapy with field articulation, pictures of multicolored fruit were used to form displays, and the children were asked to pick up all the apples, regardless of color. Moreover, whenever a child showed excessive impulsivity and motility, the therapy program emphasized delay. The goal of the therapy program also followed our model. Modaressi was interested in exploring whether the promotion or the differentiation and growth of cognitive controls resulted in improved learning ability and adaptational skills.

Comprehensive clinical observations were made to evaluate the effects of treatment. Modaressi reported that 11 of the treated children performed as well as the nonvulnerable group after therapy, and three showed moderate improvement. To illustrate the types of problem his vulnerable children presented and the way in which therapy helped them overcome their handicaps, he described one child in some detail. Tony, aged 4, seemed to be "in a daze in the classroom," and his communication and relating skills consisted only of imitating, echoing, and touching other children. He could not label concrete objects. Following treatment Tony's teacher reported, "We have seen remarkable results. Tony interacts with children and adults and can be understood most of the time. He very seldom echoes, and this is when he does not understand what has been said to him. He can label and discriminate many concrete objects and pictures. He no longer carries a blank expression. He follows directions well and often gives directions to other children."

One therapist (Kimball, 1969) used the therapy program in focal attention to treat a blind child. The child was asked to examine by touch each display of cutouts presented, then to remove the cutouts designated by the therapist. The displays were systematically varied in terms of size and number of cutouts. When appropriate, the child was asked to remove the cutouts as quickly as possible within gradually decreasing periods of time. After six months of treatment (twice a week), the therapist felt that treatment had generalized and transferred to other situations. For example, the child now showed that he could discriminate sizes and shapes of various everyday materials, and he understood number concepts. His language had improved noticeably, too, although the degree of blind mannerisms did not change.

Siegal (1973) has described a treatment technique she calls "movement therapy." Although proposed for children with emotional disturbances, the technique relates in certain respects to the concepts and techniques described here for the therapy programs in body ego and tempo regulation. It is interesting to note that discussions by psychoanalysts (Solnit, 1973; Kestenberg, 1973) of Siegal's movement therapy do not show appreciation for the large body of developmental data indicating that fantasy and thought emerge from actions. These psychoanalysts appropriately remind us that therapies that make use of body movements run the risk of sexually exciting and seducing a child, noting that such emotions could be countertherapeutic. The same issue has also been discussed by clinical psychologists in a debate over touching in therapy (Prescott, 1973; Livington, 1973).

The method of "kinetic psychotherapy" has been proposed by Schacter (1974) for group treatment of emotionally disturbed children, and it bears more resemblance to Siegal's approach. Schacter uses prescribed physical activities "to bring an individual in touch with his body and feelings." However in presenting his method, he does not address action as a stage in cognitive development.

Although not proposed as a clinical treatment method, the work of Patterson and Mischel (1975) may be useful in suggesting new techniques in cognitive therapy. They asked nursery school children to remain focused in completing a cognitive task (copying X's and O's) in the face of distractions (a mechanically animated "clown box" periodically made sounds and the clown's display windows were lighted, allowing the child to glimpse at attractive toys). One group of children was given strategies to resist the distraction. For example, the children were asked to try to say, "No, I can't. I'm working," each time a recorder in the clown box said "Look!" Children to whom strategies were suggested worked more with the cognitive task when the experimenter was absent. Blank and Solomon (1968) have reported a language treatment program to develop conceptual thinking in socially disadvantaged children.

Now we turn our attention to the emphasis given cognition in behavior modification treatment methods with adults and children (e.g., American Psychological Association, 1967; Franks, 1969). In Chapter 12 we discussed in some detail the similarities and differences between concepts and techniques of behavior modification and the method of cognitive control therapy presented here. We stated the arguments and rebuttals that have been exchanged between adherents of behavior therapy and psychodynamic psychotherapy and various attempts to relate the two positions (e.g., Wachtel, 1973; Beck, 1976; Sloane, 1975). In considering this body of work from our vantage point, we should note that although cognition is emphasized, behavior therapy has been directed largely toward emotional disturbances and neurotic systems presented by patients, not toward restructuring cognitive organization or approaches to information as such (i.e., cognitive controls and styles, strategies of problem solving).

Only the variants of behavior therapy that establish particular connections with the method of cognitive control therapy are briefly sketched here. Perhaps because the variant proposed by Ben Feather derives from "an application of psychoanalytic theory to the practice of behavior therapy," it connects most with cognitive control therapy (Feather and Rhoads, 1972a, 1972b; Rhoads and Feather, 1974). Feather begins by setting a task before the patient. The patient is asked to think about "the worst possible thing you can imagine happening," in whatever situation he fears. In a very general sense this technique is like that used by the cognitive control therapist who sets a configuration of cutouts before the child, who is anxious about, runs from, or fights against holding information in memory, and asks the child to look the material over so that he can remember it. Next in Feather's method, on the basis of the fantasies the patient produces, a hierarchy of graded fantasies is constructed involving enacting the relevant impulses. (Again this parallels the cognitive control therapist who formulates a hierarchy of displays to be remembered based on the child's handling of the first presentations.) Feather then has the patient imagine each fantasy scene in the hierarchy, beginning with those which elicit the least anxiety and gradually moving up to the most threatening imaginary scenes. (The cognitive control therapist asks the child to engage each display, beginning with the one eliciting the least stress—representing the least mismatch between cognitive control and complexity of information—and moving up to the display eliciting the most stress.)

Feather's approach, which to this point is much like most behavior therapies, now takes a sharp turn. Feather observed that patients sooner or later showed resistance to the treatment task. Desensitization proceeded quickly when used to treat what Feather calls a "ghost symptom" (i.e., a symptom that once served as a solution to a conflict). When the symptom was the vehicle of expressing or solving a current conflict, the patient resisted the task. To solve this problem of resistance, Feather devised modifications in his approach that distinguish it from other behavior therapies. The original hierarchy is abandoned temporarily and a new one is constructed *containing elements of the conflict underlying the symptoms.* The patient now works on the new hierarchy to resolve the resistance. Here again, Feather's approach connects with cognitive control therapy. In Chapter 12 we discussed how the therapist sets the original hierarchy of tasks aside and forms a new one that recruits and integrates the child's resistant behavior into the requirements of the cognitive tasks presented. The resistant behavior, stemming from the underlying conflict between cognition and information, is resolved in this way.

Last, like the cognitive control therapist, Feather formally works on helping the patient recognize (with interpretation if necessary) the resistant behavior, its source and self-defeating qualities. When resistance is resolved, the patient can move into the next most stressful encounter. Although the focus of Feather's method is neurotic symptoms, and the content of treatment involves induced fantasies, there is a parallel between his method and the method of cognitive control therapy.

Beck (1976) has devoted a book to what he has called "cognitive therapy" in the treatment of emotional disorders with adults. Beck's main rationale agrees with the model proposed by George Klein in which motivation is embedded in thoughts and ideas as well as actions.

> . . . emotional reactions, motivations, and overt behaviors are guided by thinking. A person may not be fully aware of the automatic thoughts that influence to a large extent how he acts, what he feels, and how much he enjoys his experiences ... (Beck, 1976, p. 235).
>
> Since the central psychological problem and the psychological remedy are both concerned with the patient's thinking (or cognitions), we call this form of help cognitive therapy. . . [and it] consists of correcting faulty conceptions and self-signals .. . [and] by correcting erroneous beliefs we can clamp down or alter excessive, inappropriate emotional reactions . . . (Beck, 1976, p. 214).

The targets of Beck's cognitive therapy are tangible distortions of reality, illogical thinking (inappropriate inferences), establishing credibility (working alliance between therapist and patient), problem reduction (grouping problems with similar causes), and learning to learn (developing new ways of learning from experiences and to solve problems).

Beck outlines several specific techniques that make up his method of cognitive therapy. In reviewing these, I relate each one to the concepts and techniques of cognitive control therapy whenever such a comparison is appropriate.

1. *Filling in the Blanks.* The patient is trained to observed more and more pieces (i.e., thoughts, words, actions) that contributed to a sequence of external events and his reactions to them. From the viewpoint of cognitive controls, this technique suggests to me a combination of focal attention, field articulation, and leveling-sharpening processes in that the patient is trained to scan his experiences more actively and broadly, to register more information relevant to the issue, and thereby fill in the blanks, and to hold this information in memory, making it possible for the entire sequence to be considered.

2. *Recognizing Maladaptive Ideation.* The patient is trained to "perceive a thought, focus on it, and evaluate it just as one can identify and reflect on a sensation (such as pain) or an external stimulus (a verbal statement)" (p. 235). Again from the view of cognitive control theory, this process suggests to me aspects of the field articulation control—for example, selectively deploying attention on one thought while ignoring others.

3. *Distancing and Decentering.* "Here the patient is trained to consider thoughts 'objectively,' to distinguish between 'I believe' (an opinion that is subject to validation) and 'I know' (an irrefutable fact)" (p. 243), and to hold influencing feelings at a distance. I do not see this process as relating to one of the cognitive control functions per se, but it could be related to the issue in cognitive control therapy of helping a child see information as information and not, for example, as bombs about to explode.

4. *Authenticating Conclusions and Changing Rules.* The processes Beck describes here seem to me to be related to that of the equivalence range control, linking different properties of different objects or situations so that they belong together in terms of some reason or concept. In Beck's therapy the conclusions, concepts, and rules a patient has constructed to unify various aspects in his thoughts, life situations, and experiences are challenged and reorganized whenever they result in excessive anxiety.

Beck discusses similarities and differences between his cognitive therapy and behavior therapy. For example, the cognitive therapist trains a patient to examine his spontaneous thoughts and fantasies and formulates change in terms of modifying the patient's conceptual systems. The behavior therapist desensitizes the patient with induced, predetermined images and formulates change in terms of counterconditioning.

In my opinion Beck makes a creative contribution in giving sharper focus to the patient's cognitive behavior as the therapeutic target and in specifying cognitive techniques. However his model is lacking significantly in several important respects. He makes no mention of the phenomenon of resistance and its management. Nor does he address the issue of patients who may come to treatment with inadequate cognitive equipment, thus being limited at the start in the ability to scan their experiences and thoughts, focus on and examine one, articulate the concepts that guide their conduct, and reorganize these. It seems to me that a prerequisite for Beck's cognitive therapy would be a fairly well-developed set of cognitive controls. Many adult patients considered to be neurotic and borderline, in my experience, bring severe deficits in scanning, remembering, or conceptualizing. With these adult patients, I have explored first conducting a formal course of cognitive control therapy to help them rehabilitate and reorganize their cognitive control strategies. From this growth some of these patients have been better able to engage in the process of cognitively examining thoughts, feelings, concepts, and behaviors, as outlined by Beck.

The techniques of symbolic modeling as used in behavior therapies are related to the work of both Feather and Beck. A review of these techniques and pertinent studies is available in Singer's (1974) superb text on imagery and daydream methods in psychotherapy and behavior modification.

Cognitive Control Therapy: Implications for Educational Practice

As research with cognitive controls has grown, several writers have brought attention to the implications of this work for educational practice (e.g., Kogan, 1971; Fowler, 1971; Slaughter, 1971; Cruickshank and Hallahan, 1975).

Several issues seem to be repeated in these reports. One concerns the definition of cognition as it relates to educational practice. For many years educators have tended to consider cognition in relatively unidimensional terms, something like a "g" factor in intelligence. Cognitive controls and style offer educators one way of viewing cognition as a configuration of functions, each with its own operational process, and each tied to particular informational demands. Moreover, we need to learn more in the school setting about cognitive controls as structures underlying a wide range of intellectual activities, and the intellectual areas that are interfered with differentially by deficits in one or another control. A number of writers believe that even with our current conceptual understanding of cognitive styles and our current technology for assessing them, educators should consider identifying children who lag in cognitive style development and prescribing specific interventions to remediate the lag. Chapter 9 discusses my attempts to use cognitive control tests to identify children at risk academically; and this chapter reviews my efforts to make available cognitive control therapy as part of the daily school experience of kindergarten children. The project by Sapir (1971) is another example of prescribed, deficit-focused remediation provided within the school for children lagging in cognitive development.

The concept of cognitive control in adaption discussed earlier and Fowler's treatment of cognitive baselines should aid educators in elaborating their view of cognitive deficits and learning disabilities. Too often educators view a child as having a "perceptual," "attentional," or "spatial" deficit with the attitude "once a deficit, always a deficit." But cognitive style research is beginning to teach us that deficits are not absolute but relative to time, task demands, environmental context, and cognitive-emotional variables. What may be a deficit for one classroom task may be an adaptive asset for another. Reconsidering the global notion of cognitive deficits in terms of underlying functions relative to the environment pertains to the suggestion by Critchley (1971) that the concept of "dyslexia" may be global and might benefit from a consideration of the specific underlying cognitive deficits revealed by children who qualify for the label.

In addition to the suggestion that cognitive style concepts be used in diagnosing and treating cognitive lags in children with special needs, the suggestion has also been made (Kogan, 1971) that educators consider teaching children cognitive strategies that have adaptive value for learning and problem solving both inside and outside the classroom. The content of school subjects may be learned and forgotten, but the approaches a child uses to process information persist. Should schools include in their curricula activities that teach children to learn how to learn? On the basis of my experience in assessing the cognitive control functioning of public school children, observing the relationships between cognitive controls and learning difficulties, and observing how maladaptive cognitive controls persist over several years, I have developed the conviction that school systems should consider introducing in kindergarten a curriculum that systematically promotes the delay of motility, as well as encouraging broad and active scanning, selective attention deployment, holding increasingly complex configurations in memory, and categorizing information. I also believe that the curricula introduced should bring to the awareness of children various forms of cognitive control functioning and the situations in which one or the other is adaptive or maladaptive. Should curricula include a “course” at each grade level, from kindergarten through secondary grades, in “Strategies in Dealing with Information”?

Writers have also wondered about the cognitive styles of teachers and the match or mismatch between teacher’s style, course content, and the style of children. Does this match or mismatch have consequences for learning? Here and in other areas considered in this section, exciting research opportunities are available in which cognitive developmentalists and educators can join hands.

CONCLUDING REMARKS

This chapter considered three formal studies of the method of cognitive control therapy. In two cases parents served as therapists with their retarded children, and in one teachers acted as therapists in a public school setting. These studies suggested that the contents of the various therapy programs presented in this book promote the growth of different cognitive functions. The work also supports the utility of the cognitive control therapy programs in institutional settings as well as in the clinician’s office. In addition we reviewed the application of cognitive control therapy with an autistic boy. Mike, an accident of nature, provided an opportunity to explore whether this treatment method is effective in organizing, as it were, the origin of one cognitive control—namely, focal attention.

We also reviewed a number of investigations conducted by others, which provide information about several concepts and techniques embraced by the method of cognitive control therapy: levels of complexity of information; delaying motility, constructing imagery, and the role of physical activity and demonstration in cognitive functioning; models and studies of intrinsic motivation in cognition; organismic change in cognitive structures; and cognitive therapy methods proposed by others in treating emotional symptoms presented by children and adults.

Taken together, these studies provide encouraging support for the rationale and method of cognitive control therapy outlined here. Moreover, this research indicates that since Frank’s (1962) early work, much attention has been given to the role of cognition in psychological illness and healing, and stimulating us further to explore this exciting new field.

NOTES

[21] This report is taken from an earlier publication (Santostefano and Stayton, 1967). The study was selected by the 1969 Research Awards Committee of the American Rehabilitation Counseling Association as one of the “Top Twenty Research Reports.”

[22] The original report of this work presented the cognitive deficiency as one in focal attention. However at this stage in our work we were combining active- passive, narrow-broad scanning (focal attention) with selective attention deployment (field articulation). Later studies led us to differentiation of these two cognitive processes in our assessments and in therapeutic techniques.

[23] This study, conducted in collaboration with Dr. Kalman Heller and Ms. Marilyn Weissman, was reported at the annual meeting of the American Association of Psychiatric Clinics for Children, November 9, 1968.

[24] I am grateful to Dr. Donald Pierson, who was principal of the school the kindergarteners attended, for permitting and supporting this study, and to Dr. Charles Gunnoe, who was assistant to the superintendent of schools, for obtaining funds to support the teachers conducting the therapy and for collaborating in the study.

[25] I am grateful to Donna Lee Manley and Ann Santa for their dedicated efforts throughout the project.

[26] I am grateful to Marilyn Weissman for her dedicated efforts in helping this child.

CONCLUDING REMARKS TO CLINICAL CHILD PSYCHOLOGISTS AND CHILD DEVELOPMENT RESEARCHERS

My interest in cognitive controls, their assessment and treatment, grew out of my first formal clinical experiences. This interest was nourished in the years that followed both by further clinical experiences and various research observations.

In 1957, while a postdoctoral fellow in clinical child psychology at the University of Colorado Medical Center, I was assigned as one of my "treatment cases" a 7-year-old boy who had been referred for psychotherapy because "he was learning virtually nothing" in his second attempt at first grade, in spite of at least average intelligence. In addition, he alternated between fits of hyperactive and aggressive outbursts that brought him into confrontation with his family and teacher, and episodes of passive, wistful withdrawal that disengaged him from classroom stimulation, adding to the frustration of an already frustrated teacher.

I began twice-weekly psychotherapy sessions with "Teddy," to whom I am indebted because he taught me a great deal. I conducted this program of psychotherapy in the best way I knew at the time, and within a psychoanalytic tradition to which I already had made a commitment. I entered each session sustained by the conviction that if I could help the child successfully work through and resolve his inner conflicts, the nature of which had been indicated by the psychological evaluation, he would begin to perform better in the classroom and at home. As the treatment proceeded I began noticing aspects of Teddy's behavior in the playroom that gradually impressed on me that whatever else troubled this boy, he simply did not seem to be registering information around him—information that *I* took for granted *he* was taking for granted. Relative to the other children I had been assigned to treat in psychotherapy, Teddy showed some fragment of behavior in each session that suggested to me that he was approaching information in ways very different from those the other children used. For example, when he touched surfaces of different textures, he did not spontaneously show any signs that he was "aware" of the differences I had been assuming any child must notice, and when he entered the playroom he seemed to look only at a limited section. Once when we had a deck of cards scattered over the floor, he seemed to look over only a small segment of the spread as we searched about and picked up cards of the same suit; and on several occasions he did not seem to notice or register the fact that the play material had been completely changed around on the shelves by housekeeping since our last session.

At first I shoved these observations aside when they impressed themselves on me. I believe I did this because I was engaging Teddy primarily from my psychoanalytic commitment to his inner motivational dynamics. Therefore each time I noticed some aspect of Teddy's cognition or perception, I tended to shift my attention away from these behaviors and focus on or watch for some fragment of play that might eventually elaborate, for example, his guilt over aggressive ambitions, or the deeper level conflict (which existed, according to the projective data) over the unavoidable loss he had experienced when his mother was hospitalized for six months shortly after he reached his second birthday.

After a while I found that I could not ignore my observations of Teddy's unique cognitive behavior. In looking back, I think I had to account for them in part because of the interest I had maintained throughout graduate school in both clinical psychology and research in perception and personality. Another reason, I am fairly certain, is related to my experiences at the time with three particular "clinician-researchers" then in the departments of psychiatry and psychology of that institution.

John D. Benjamin, a psychoanalyst and brilliant developmental researcher who was and is virtually unknown in the fields of clinical and developmental psychology, invited me and others to join in a multidisciplined study of twins. In the discussions that took place formally and informally around this project, Benjamin frequently brought to my attention the importance of cognition, primarily through the work of Heinz Werner. Benjamin often lamented that cognition was a stepchild in clinical psychology and psychiatry, probably because it was "undynamic," and urged that cognition be made central in personality research and clinical practice. He eventually published this view (Benjamin, 1961), which was echoed nearly 10 years later by Arieti (1970), who commented, "Cognition is or has been up to now the Cinderella of psychoanalysis and psychiatry. No other field of the psyche has been so consistently neglected by clinicians." Arieti also proposed that cognitive psychology had no place in clinical practice probably because behaviorism has maintained its emphasis on overt behavior and classical psychoanalysis on libido theory and psychic conflict.

The second "clinician-researcher" was Gaston Blum, also a psychoanalyst and child psychiatrist and another participant in the twin study, who was beginning to approach cognition through his interest in the reading process and reading disabilities in children. The third "clinician-researcher" who influenced me at that time was John J. Conger. He was chairman of the Department of Psychology then, busy completing his text on child development with Paul Mussen and Jerome Kagan (a text that was to become a classic in the field of undergraduate education in child development) and also conducting developmental research, practicing clinical child psychology, and teaching—a role model I was to internalize in the following years.

Influenced by these various factors and having the implicit permission of a tolerant and free-thinking psychoanalytically oriented therapy supervisor, I found myself asking Teddy to join me in activities that were not part of the usual fare of play therapy. For example, because I had questions about the state of development of his tactile perception, I had him feel the texture of the grass on the lawn outside the clinic, the bricks that formed the building, the sidewalk leading to it, and so on. I tried to notice his spontaneous body movements and affects with each tactile encounter as well as whether and how he articulated the differences he perceived in texture. And because I had noticed that he seemed to register information located only in small areas (just under his nose), I placed a display of lettered blocks before him, each block about 1 inch from the next, and asked him to look the display over and pick out the letter “T.” Then I asked him to locate other letters in turn. When he seemed to be surveying the whole display, I began gradually to spread the display of blocks over a wider area on the floor so that, for example, each block was 6 inches from any other. Again I asked him to find particular letters. Gradually, after observing him handle many displays. I learned that when he looked around he was looking from between a pair of horse blinders. Information outside a relatively short gaze went unnoticed.

Observations such as these began to raise questions in my mind, which fortunately I could discuss in my supervision. If this boy tends to be lazy and passive when looking around at information, and if he wears blinders, would this affect what he notices and does not notice on the shelves in the playroom and, therefore, what he does or does not do with the materials in the room? That is, in addition to motivational or psychodynamic concepts being introduced to account for why he chose in one session to pick up the fire engine or the ambulance, should we not also introduce the fact that he wears “blinders”? Indeed, would not his way of looking around influence what he notices or does not notice in the classroom.

We puzzled about the possible dynamics underlying the passivity and “tunnel vision” that characterized Teddy’s scanning, but we were not convinced by the formulations we forced on these behaviors. I also returned to examine the psychological tests. I noticed that although Teddy had attained an IQ of 109, he sometimes showed “narrow attention” and “peculiar forgetting” of a stimulus in handling one or another WISC item. These peculiarities in “ego functioning” were not given special attention in the case conference where, as I remember, the emphasis was on the possible motivational and dynamic factors underlying the child’s difficulties.

As I gathered observations over a two-year period and presented Teddy with various cognitive tasks to manage (most of the time constructed intuitively), and as I reexamined his test protocols, I wondered about these peculiarities in his ways of perceiving. I wondered what they meant especially for the process of traditional psychotherapy, which requires that the child direct attention at a wide array of information and remember (or transport) information from one session to the next. I wondered how I could understand Teddy’s peculiar ways of looking and remembering in terms other than “ego functions of perception.” As I look back, I believe that somewhere in the back of my mind was Klein’s (1951) paper “The personal world through perception,” which had been assigned in a graduate course on perception. In that course we had spent a couple of classroom meetings discussing the “new look in perceptual research” (i.e., efforts to relate perception and personality) which began to emerge in the early 1950s. But if Klein’s article was in my mind, I must admit that it was buried under the many readings and discussions that occupied me and other postdoctoral trainees at the time: readings on technique and theory in psychoanalytic play therapy, on psychodiagnostic testing as developed by David Rapaport and Roy Schafer, and on child psychopathology from the viewpoint of psychoanalysis.

In 1959, two years after I had started therapy with Teddy, the monograph by the Menninger group on cognitive controls was released (Gardner et al., 1959). I was at once impressed by the promise the concept of cognitive controls held for clinical practice. Here, it seemed to me, was a conceptual guide I could use to organize my observations of the cognitive functioning Teddy (and other children) showed in the playroom. Here was a way to relate cognitive activity to psychodynamics, adaptation, and defenses. Here was a way to approach the need articulated by John Benjamin in our research meetings, namely, to bring cognition to the center of personality research and clinical practice. I went back to read Klein's earlier paper on the personal world through perception, which forecast the concept of cognitive control. Now his paper made sense, and my excitement grew.

Noticing that Klein and his colleagues conducted their observations exclusively with adults, and already committed to a career in child clinical psychology, I immediately became caught up with the question whether the same cognitive control principles characterize the strategies children use to approach, select, avoid, and process information. Accordingly, I set out to try to assess cognitive behavior with children using the methods described in the Gardner monograph, though I soon found that the methods that proved adequate with adults were not suited for children, especially children coming to the clinic. For example, I found that although most school age children could certainly read the words "red, yellow, blue, green" of the Stroop Word Interference Test, listed by the Menninger group as a measure of the constricted-flexible cognitive control, some children could not. Others who could read seemed to be anxious more because the task required processing printed words. Therefore I was never sure whether I was measuring a child's upset related to a reading task or a child's unique way of processing relevant and irrelevant information. By way of another example, I found that the Schematizing Squares Test used by the Menninger group to assess the leveling-sharpening cognitive control, which requires the child to judge the sizes of 150 squares, was too tedious for many children with emotional problems.

Because of these experiences, I began constructing tests that seemed to satisfy the operational definitions of each cognitive control as presented in the 1959 monograph and at the same time seemed to be more suited for children. I administered these tests to children in the clinic and in public schools, revised the tests, administered the revisions, revised again, and so on. My first publication in this area of cognitive controls (Santostefano, 1963) reported a study, which used the Size Estimation Task described by the Menninger group, to explore whether the task distinguishes broad and active scanners from narrow-passive scanners, and whether such scanning activity showed age and sex differences. One year later (Santostefano, 1964) another study was published reporting the Fruit Distraction Test, a procedure I had developed as a substitute for the Stroop test to assess the manner in which children manage relevant and irrelevant information. In the second study the Fruit Distraction Test as well as the Size Estimation Test had been administered to brain-damaged, orphaned, and public school children. I wondered whether differences observed in the two cognitive controls assessed related to the unique "life experiences" each group seemed to represent. These early reports revealed the several interests I have attempted to maintain in my work with cognitive controls; development, psychopathology, and adaptation.

From these first studies I continued pursuing one major question that, as Wachtel (1972a) pointed out, has consumed most of the work in the area of cognitive controls since the 1959 monograph. Others were occupied with whether one could identify and characterize the cognitive functioning of adults in terms of cognitive controls. I wanted to explore whether it was in fact possible to characterize children in terms of the same controls—by such features as whether they scan the environment broadly or confine themselves to limited segments of information, whether they attend to both relevant and nonrelevant information when the task accentuates both or direct their attention selectively, whether they construct global images of information and fuse present with past information or they construct articulated images and differentiate present from past information, and so on. In short, the first step I needed to take, I believed, was to explore whether cognitive control principles, already identified as characterizing the cognitive functioning of adults, also characterize the functioning of children in a meaningful way.

Shortly after reading the 1959 monograph by Gardner and others in George Klein's group, I also came upon the report by Herman Witkin (1959) concerning the concept of field dependence-independence. In that report Witkin presented observations of children and adults (ages 8 to 21 years) dealing with the tilting-room, rod-and-frame, and embedded-figures procedures. Witkin and his followers gathered observations of children as well as adults early in their work. Although I found Witkin's report of individual differences in perception of the upright exciting, to my mind his work was embarked on a unidimensional approach to cognitive strategies. Klein's multidimensional approach attracted me most: perhaps because it was explicitly connected with psychoanalytic theory, perhaps because it seemed to fit better with the many different unique "peculiarities" I had observed in the cognitive functioning of children, and perhaps because it seemed to conceive more clearly how cognitive controls served adaptation and how they might relate to mechanisms of defense, since early in my clinical experience I had become convinced that these concepts and the behaviors they framed had much to offer clinical practice. Therefore I decided to use Klein's model and methods of cognitive controls consistently, that is, to stick with multidimensional approach of cognitive controls with its psychoanalytic context.

From the start then, I have attempted to pursue the goal of characterizing the cognitive functioning of children in terms of cognitive controls from a developmental perspective, always wondering about differences revealed by age groups and by psychopathological populations believed to represent different developmental levels. Also from the start, whenever opportunities presented themselves, I studied cognitive control functioning in psychopathology and in adaptation. For example, once I was called by the pediatrics department of a medical center where I held a position and was told that young boys with a history of intoxication by glue sniffing were being studied. Did I want to give some perceptual tests? I immediately wondered whether, if instead of giving a Bender Visual Retention Test, Wechsler Block Design Test, or whatever, I were to organize my testing in terms of cognitive controls, would I be able to capture the effects glue sniffing exerts on cognitive functioning and organization in children. This study is reported in Part III. On another occasion, I was called by a neurosurgeon, who knew of my interest in cognition and invited me to administer perceptual-cognitive tests before and after brain surgery, which was being planned to alleviate a patient's epilepsy.

Again I wondered whether organizing my assessments in terms of cognitive controls would enable us to identify changes after surgery (whether improvements or decrements) in the way in which this patient processed information. Tragically, the patient could not respond to testing after the surgery, and even several months later was too confused clinically to cope with the simplest test demands. This study is not reported here.

At the same time, while pursuing the question of identifying cognitive control functioning in children, I maintained my interest in another question, which had grown out of my work with Teddy. If cognitive controls define the cognitive strategies of children, and if these strategies are lagging or deviant in some way, does traditional psychotherapy sufficiently modify these deficient cognitive structures? And if not, could cognitive controls be restructured in some way, or redirected on a more appropriate developmental course, with therapeutic experiences other than traditional play therapy, which put more emphasis on cognitive activity and deal with affects and motivation within this emphasis?

From the first intuitively formed “cognitive games” I administered to Teddy, I gradually tried, discarded, and modified a range of cognitive tasks and clinical techniques that came to form a treatment approach, over the course of 10 years, which I called “cognitive control therapy.” The first formal presentation of my ideas and experiences with this technique took place in 1967 at the annual meeting of the American Orthopsychiatric Association in Chicago. The conceptualizations developed to date, and the rationale, technique, and formal studies, make up Parts IV to VI.

The question of whether and how psychotherapy could be modified for children with major ego dysfunctions and cognitive disabilities still commands much of my attention and energy, and I am very interested in any information that bears on the issues. Whenever I have the opportunity, I evaluate the cognitive control functioning of children before and after therapy, especially before and after child analysis, and before and after a course of cognitive therapy. I am especially interested in clinical situations in which intensive psychotherapy does not result in cognitive reorganization in, say, a major learning disability and in which the child’s need permits us to make available cognitive control therapy. Here we have one opportunity to study the relative effects of the two approaches. In these ways and with formal studies I hope to learn more about when and whether a cognitive emphasis in therapy, as outlined in Parts IV to VI, is and is not the treatment of choice for children whose problems include major cognitive disabilities.

The work described in this book should reflect my continuous effort to maintain and interrelate my interest in and commitment to developmental principles, psychoanalytic theory, and clinical psychological practice. As Sears (1975) noted, psychoanalysis has been isolated from developmental research since the 1950s. One of my main theses is that although this seems to be the case, it is also true that developmental research has been isolated from the practice of clinical child psychology. Diagnostic studies presented in Part III and the treatment technique presented subsequently represent my attempts to find an expression for psychoanalysis, developmental psychology, and clinical child psychology, as fibers of the same fabric.

POSTSCRIPT TO PARTS I-III

In 1949 George Klein and his colleague Herbert Schlesinger (Klein and Schlesinger, 1949) suggested that personality and cognition be joined. They proposed that the study of cognition and personality approach the individual as a self-regulative system that is dynamic, continuous, and, at the same time, quasi-stable; a system that ". . . continually brings into harmony needs, impulses, and wishes and buffers these turbulences from within against limitations from without. . ." (p. 36). With this publication, cogently titled "Where is the perceiver in perceptual theory?" Klein and Schlesinger ushered in the field that gave rise to the concept of cognitive controls; and I believe this field still has much fruit to bear for clinical technology and theory. Because the early publication had a seminal influence and represents part of the historical underpinning of Parts I to III, it would serve us to pause and consider Klein's thinking at that time.

Surveying the growing number of studies that emerged in the 1940s on the role of motivation in perception, Klein pointed out that their main concern had been with:

> . . . part-relationships rather than entireties, with generalized states rather than diversities. We learn how hunger affects perception, hunger defined by so many hours of food deprivation, and we seem to inherit a push-button system of generalized part-relationships. Press the button "hunger" and out comes a perceptual effect. The person becomes a passive medium of his drives whose course bears nothing of his personal stamp ... (p. 34).

Klein went on to say that his studies indicated that perceptual processes were not as stable as presented in the literature but were influenced by the "kind of person" in which they are studied. For example, he had observed marked individual differences in a study that asked subjects to estimate the size of disks containing various symbols, including a swastika. To those who had been interested in general laws of perception and personality, these individual differences were, it seemed to Klein, "embarrassing bacteria to the pure atmosphere of precise measurement." To those who had become newly interested in individual differences, the same differences were accepted as evidence of how motivation affects perception (in this case, values and needs aroused by the symbols). But, Klein argued, in the latter view the locus of study was still the situation, not the person. To account for the individual differences he had observed, Klein took a creative conceptual step and proposed the differences suggested "how a person is organized to cope with his values and needs." In taking this step, he located motivation in cognition and cognition in adaptation.

To begin answering the question raised in the title of his paper, Klein attempted to formulate laws of perceivers rather than of perception by suggesting that individual differences in perceptual activity represent "functional attributes" of perception that have "adaptive properties" by which a person selects, fends off, and organizes information; that individual differences or functional attributes are classifiable into a limited number of categories or "modes of response," and these modes of response are the various ways a person puts these functional attributes "to work." Klein gave as an example an individual who puts to work the "mode" of tending to notice a change in stimuli or of tending to overestimate the size of a disk.

Klein continued attempting to locate the perceiver in perceptual theory in his classic paper published two years later (Klein, 1951). There he elaborated the concept of "functional attributes" with the concept of "perceptual attitude," to account for the "special ways, distinctive for the person for coming to grips with reality." A perceptual attitude (1) is a solution to an adaptive task and (2) therefore responds to particular adaptive properties in a situation, (3) is a style or cognitive organization, and (4) expresses a purpose that is part of the ego-controlling system. Klein illustrated by describing three perceptual attitudes his observations suggested: leveling or sharpening of information, tolerance of or resistance to unstable information, and physiognomic versus literal attitude toward information. Klein wondered how many of these attitudes could be identified if a person were observed in many different situations and with various tasks. He wondered what the origins of these attitudes were, and how they related to each other and to mechanisms of defense. Although these perceptual attitudes appeared to him to be stable, Klein also wondered whether they could be shown to change within a person.

Three years later Klein (1954) replaced the term "perceptual attitudes" with "cognitive controls" in a creative project designed to study changes in perceptual attitudes as persons functioned in an experimentally induced thirst situation. The changes in perceptual attitudes he observed gave him insight into attitudes as "ego-cognitive controls" of information, affects, and motivation and led him to formulate one such control, namely, "constricted-flexible. "

In these three seminal writings, published more than 20 years ago, Klein raised a number of questions about cognitive controls. If we now address these questions, along with the issues noted in Chapters 4 and 5 in the light of the work reported there, we should be able to obtain a good picture of the progress made since Klein's first studies and formulations and of the directions future work should take if clinical practice and cognitive-personality theory are to derive optimum benefit from the frontiers provided by the field of cognitive controls.

Is It Possible to Conceptualize Cognitive Functioning in Normal and Pathological Groups of Children with the Same Control Principles that Conceptualize Functioning in Adults?

Yes. The various studies reported in Part III, especially the factor analytic studies in Chapter 5, provide convincing evidence that when populations of children, normal and clinical, deal with a wide variety of cognitive tasks, their functioning represents a small number of principles that satisfy the operational definitions of cognitive controls provided by Klein and his colleagues in their work with adults: focal attention, field articulation, leveling-sharpening, and equivalence range. According to our findings, it is possible and meaningful to characterize children, for example, by such features as whether they scan the environment broadly or confine themselves to scanning only a limited segment, and whether they direct attention indiscriminately or selectively at relevant and nonrelevant information.

THE NEED FOR A COGNITIVE CONTROL THAT INVOLVES BODY PERCEPTS AND MOTILITY

Our work with children also suggests the need to formulate a cognitive control—we have tentatively termed it “body ego-tempo regulation”—to account for the regulation and control of information that comes from body images and percepts related to body boundaries and to experiencing the body in motion. The addition of this control permits us to conceptualize the cognitive control of information ranging from the regulation of motility involving relatively little thought to the regulation of thought involving relatively little motility.

In considering the five cognitive control principles, which seem to define the basic strategies of children, we should note that Gardner and Moriarty’s (1968) factor analysis of cognitive control functioning in 60 latency aged boys and girls did not isolate a leveling-sharpening principle. However this principle was isolated in seven different factor analytic studies reported in Chapter 5 (five of these each involved over 100 children). Therefore I believe we can conclude with confidence that the construct leveling-sharpening has validity as one organizing principle in the cognitive functioning of children. Perhaps the leveling-sharpening principle failed to appear in the results of Gardner and Moriatry because they employed the Schematizing Squares Test, a procedure that children apparently find tedious. Therefore Gardner and Moriarty may have assessed processes other than the way in which a child holds information in memory over time. In our factor analytic studies the leveling-sharpening principle was revealed not only by tests designed to elicit this cognitive control process but also by other tests (e.g., Benton Visual Retention Test; memory for spatial orientation of designs).

THE PROCESS OF EACH CONTROL

In his earliest writing, Klein emphasized the need to clarify and specify the process unique to each cognitive control principle and to distinguish among the principles in terms of process. In my own work not only was support obtained for cognitive control principles as valid constructs, but the process of each principle was specified—in some instances supporting descriptions in the literature, and in other instances elaborating existing definitions.

1. *Focal Attention Cognitive Control.* This process appears to consist of two part-processes: the degree of vigor or activity of visual scanning and the breadth of a single visual sweep. Although in our studies active scanning usually went along with broad scanning, and passive with narrow, the opposite relation was observed as well, giving us a topic that deserves further study. For example, what is the developmental and adaptive significance for the emergence in a child of a scanning control that is active and narrow or passive and broad?

2. *Field Articulation Cognitive Control.* In general, our results support the definition of this control process as involving the management of relevant and nonrelevant information. However data obtained with the test method I have developed to assess this principle suggest that it is meaningful to determine, also, how a person manages information that is irrelevant in terms of its spatial (geographic) location versus information that is irrelevant in terms of the context. We observed, for example, that orphaned children were particularly disrupted by irrelevant information that was physically peripheral to the relevant information. It seemed as if the orphaned children were sensitive to, reached out for or pursued, information surrounding relevant stimuli. In contrast, brain-damaged

children were particularly disrupted by contextually irrelevant information (i.e., information embedded within the relevant stimulus). These observations suggest that it would be useful to study these part-processes of field articulation further.

Parenthetically, the two types of nonrelevant information specified here could also be found in measures of field dependence-independence, the cognitive style (proposed by Witkin) that appears to conceptualize the same process as the field articulation cognitive control (see Chapter 4). The Rod and Frame Test seems to me to involve more the management of information (the frame) that is irrelevant in terms of its geographic location relative to the main stimulus (the rod). The Embedded Figures Test seems to involve more the management of information (geometric shapes) that is irrelevant and embedded within the main stimulus (the geometric shape to be articulated).

3. *Leveling-Sharpening Cognitive Control.* Our results suggest this control process consists of two part-processes. Again the findings may be a function of the makeup of the particular test devised (House Test). Other methods need to be studied to explore whether additional part-processes are involved. One that our work defines concerns the degree of differentiation imposed on the organization of information framed in memory ; the other concerns the degree of stability or fluidity that characterizes the image of information over time. By using a display of information that contains several elements (e.g., cloud, tree, fence, house) that must be remembered, one has the opportunity to observe whether those elements change in memory (e.g., the cloud shifts location) or are stable.

4. *Equivalence Range Cognitive Control.* We are reminded in the literature (Wolitzky and Wachtel, 1973) that it is not clear whether this process is unidimensional or multidimensional. Our results suggest that three part-processes are involved when an individual manages information in terms of categories: *(a)* the number of categories (domains) imposed that are realistic with respect to the properties of the information at hand, (b) the level of abstraction represented by these realistic categories, and (c) the number of categories imposed that are unrealistic or illogical given the properties of information at hand.

A PLEA FOR COMPARABILITY AND GENERALIZABILITY IN COGNITIVE CONTROL ASSESSMENTS

In the studies reported in Part III, all cognitive control principles except one (equivalence range) were assessed with newly devised methods differing in appearance, and sometimes in procedure, from those used by Klein in his earlier work and by others in subsequent research. Because the test methods used by me are different, some have asked whether the tests I devised in fact measure the cognitive control principles as defined by Klein. For example, Gardner and Moriarty (1968, p. 40) noted that the relevance of the Leveling-Sharpening House Test as reported in an early publication (Santostefano, 1964b) for the concept of leveling-sharpening as defined by Holzman and Klein, needs yet to be determined, since the House Test was not correlated with measures of the Schematizing Squares Test. (Klein and Holzman based their formulation of the principle on results obtained using the Squares Test.) The House Test has been correlated with a procedure that closely approximates the Schematizing Squares Test in content and method (see

Chapter 6).

However the issue should not be debated at this level. I believe that the more important question is how the process elicited by a newly constructed measure of some cognitive control fits the operational definition of that control. Since a "new" test may fit the definition better than an "old" test, low correlation between the two does not necessarily mean that the former is an inadequate measure. Here we must turn to correlational, and even better, factor analytic studies to determine whether the response process elicited by a new test qualifies as a measure of a particular control. The many factor analytic studies and studies of criterion-related validity contained in Part III provide convincing support for the contention that Leveling-Sharpening House Test measures the process of leveling-sharpening, the Fruit Distraction Test assesses field articulation, the Scattered Scanning Test evaluates focal attention, and so on. I have not found particular procedures traditionally used in cognitive control research with adults (e.g., Stroop test, Size Estimation Test, Schematizing Squares Test) to be effective with children. When taken together, however, the results of the many studies conducted with the tests I devised as alternatives for children make clear that the methods are valid and reliable measures of the cognitive control principles as defined.

A personal communication from George Klein to me may be of interest at this point. At a research symposium I had reviewed the effectiveness of the House Test in assessing meaningful and reliable changes in the leveling-sharpening control in response to imminent surgery and parachute jumping (Chapter 9), and I discussed my reasons for constructing a new test of this control. In commenting on the research findings, Klein noted that in his own early work he may have formulated a meaningful construct in leveling-sharpening, but the Schematizing Squares Test may not have been the most effective method to assess it.

I would encourage interested workers to relate "traditional" cognitive control methods with the methods described here and with new methods they devise to improve technology. We should not become caught up in proving whether, for example, the House Test is "better" than the Schematizing Squares Test. Rather, we should become interested in attaining comparability and generalizability in cognitive control research, a need recently underscored by Bell and Hertz (1976) in the field of child development research as a whole.

If we are to make advances in using assessments of cognitive controls in clinical practice, and in furthering our knowledge of cognitive functioning in development and psychopathology, workers must be clear in defining the cognitive control process they are assessing and in choosing a method that elicits a process very close to the definition. I believe the work offered in Parts I to III can provide considerable assistance to clinicians interested in definitions of each cognitive control and in the methodology necessary for assessment. Our knowledge has reached a point at which tests such as the Matching Familiar Figures Test, the Embedded Figures Test, or the Stroop (as well as the tests described in this book) should not be used interchangeably but rather with a clear understanding of the processes tapped and not tapped. For example, given our earlier discussions, since the Embedded Figures Test presents information that is contextually nonrelevant and the Rod and Frame Test presents information that is spatially nonrelevant, would we expect to find a correlation between these procedures when administered to orphaned children? If we do not take into account the type of irrelevancy contained in the task, we may miss the opportunity to construct new insights into cognition, personality, and psychopathology.

ONE VOTE FOR A MULTIDIMENSIONAL APPROACH TO UNDERSTANDING THE COGNITIVE STRATEGIES OF CHILDREN

In concluding my discussion of whether the same cognitive control principles characterize both adult and child functioning, I cast a vote in favor of a multidimensional approach, as opposed to a unidimensional approach, to the meaning of individual differences in managing information. Klein wondered how many different "modes of response" might characterize persons when dealing with various cognitive tasks, and the cognitive control camp has identified six or seven modes, though five appear to cut across ages. In contrast, Witkin has pursued a single mode or style (global-articulated), as has Kagan (impulsive- reflective). First, the results of the factor analytic studies reported here offer convincing support of the value of a multidimensional model of cognitive strategies. When other cognitive tasks are included in the factor space (e.g., Piagetian tasks, intelligence tests, word fluency tests), the measures of cognitive controls consistently assume dominance in defining the basic or common principles that account for most of the variability in test performance observed. Moreover, a number of studies discussed in Chapters 6 and 9 illustrate the utility of assessing multiple controls. We have observed that first one control correlates meaningfully and predictably with a particular population, situation, or test, and then another control with another population, situation, or test. By avoiding the approach of Witkin and Kagan in which one searches for correlation between all possible populations, situations, and tests in terms of a single cognitive dimension, we have been able to begin understanding in finer detail the differential relations between several cognitive strategies and aspects of psychopathology and adaptation in children.

What Is the Origin of Cognitive Controls?

In one of his early papers Klein (1951) speculated that cognitive controls originated in psychosexual trauma: that in dealing with psychic conflict, cognitive functions are organized and fixed and persist later in development, long after the trauma has ceased to exist.

> Our examples have suggested to you that perceptual attitudes share certain of the properties usually assigned to defenses. With defenses, they are coping mechanisms at the disposal of the ego; they are means of "resolving" tensions and of bringing about stability . . . . In fact we might suggest the defenses observed at the clinical level are counterparts of the controls we are looking for in perception . . . . For all we know, of course, perceptual attitudes may, like defense mechanisms, begin in psychosexual fixations or traumata . . . (Klein, 1951, p. 349).

Since cognitive controls are viewed as ego organizations, and since other ego organizations such as mechanisms of defense have been conceptualized as originating in the management of psychic conflict, especially psychosexual trauma, we can understand why Klein invoked the same origin for cognitive controls. He was applying the psychoanalytic model of psychic conflict to account for the origins of cognitive controls as well as of mechanisms of defense. This proposal has set the tone for studies of cognitive controls and mechanisms of defense. Workers have tended to search for relations between them and have noted in adults, for example, that extreme repression is related to leveling and that projection and isolation are related to extensive scanning. It is noteworthy that in a careful study of a group of latency aged children (Gardner and Moriarty, 1968), almost no significant correlations were observed between defense mechanisms and general characteristics of ego organizations and cognitive controls.[27]

Although my work has not yet included studies of the relation between cognitive controls and mechanisms of defense, I hold the view that cognitive controls originate in the first year of life and are shaped in the interaction between the infant's innately given perceptual tendencies and the match or mismatch between these tendencies and the tempo, complexity, and timing of information in the environment. My present view of the origins of cognitive controls derives from the many observations made of infant perception and cognition, some of which we considered in Chapters 2 and 18. These observations suggest that in the first year of life infants show organizations of cognitive activity, and changes in these organizations over time, which bear a strong resemblance to cognitive control processes as conceptualized. Infants appear to progress from scanning narrow segments of the environment to scanning broad segments, toward attending progressively more to articulated, "relevant" segments of information, and toward holding more information in memory and for longer periods of time. Moreover, infants show wide individual differences in these response tendencies and behaviors, suggesting that cognition serves adaptation (e.g., closing eyelids in the face of an imminent collision). Observations such as these indicate to me that perhaps cognitive controls, as we observe them in 3 and 4 year olds are present at birth in some rudimentary form and gradually become organized over the first year of life.

Chapter 2 discussed the possible advantages of organizing observations of infant cognitive activity in terms of cognitive control theory. I suggested that one area of potentially fruitful research would be to relate individual differences in scanning, memory, and the like, observed in the first year of life, with differences observed in the second to the fourth years. From such studies we could gain insight into the origins of cognitive controls. Does the infant who is an excessively narrow scanner in the sixth month of life show excessively narrow scanning in the second year of life, and the third? If there is a major change in the organization of a cognitive response tendency before the age of 3 years, can we identify this change as related to the timing of some critical experience with information?

My view of the origins of cognitive controls also derives from retrospective studies in clinical practice of a large number of children who presented major cognitive control dysfunction, yet did not show significant neurotic or character conflicts. In an effort to understand the origin of the cognitive dysfunction, I turned to the children's early histories, which in many cases revealed experiences (caretaker-infant mismatches) that could be related to the compromising of cognitive control tendencies. These children suggested to me Type I cognitive control pathology discussed in Chapter 9 ("incomplete ladder").

I have also seen children who would fit Klein's formulation—that is, that cognitive controls are fixed or organized in the process of the formation of a childhood neurosis. The histories of these children indicated that major neurotic conflicts emerged after the fourth or fifth year of life. Upon examination at age 8 or 9 years, the children showed significant derailment of a particular cognitive control and clear evidence of a major childhood neurosis. I have characterized these children in Chapter 9 as representing Type II cognitive control pathology ("broken rung").

We have much more to learn about the organizing and derailing of cognitive controls in the first two years of life and about significant derailments that occur after the fifth year in connection with the emergence of neurotic and other emotional disturbances.

Do the Tests of Cognitive Controls Presented Here Measure What Tests of Intelligence and Academic Skills Measure?

No. In several age groups representing normal and clinical populations of children (Chapter 6), no meaningful correlations were observed between measures of cognitive controls and measures of intelligence and academic abilities. This finding concurs with that of Gardner and Moriarty (1968), who also reported no relation between cognitive controls and intelligence test scores in a study of latency aged children. Reviews of the literature (e.g., Wachtel, 1972b) have pointed to the positive correlations observed between measures of intelligence and measures of cognitive style, usually field dependence-independence. Because of this correlation, there is a tendency to criticize all tests of "cognitive style," and investigators are reminded of the need to distinguish between differences in ability and differences in adaptive-cognitive strategies. Since the methods presented here have not correlated with ability and intelligence tests in several studies, this criticism does not appear to be applicable.

In addition to being relatively unrelated to intelligence and ability tests, the tests of cognitive controls for children proposed here also seem to be unrelated to various response dispositions such as need for achievement, test anxiety, and the tendency to respond quickly versus slowly. Although these initial findings are encouraging, there is a need to study further, at all age levels from preschool through adolescence, whether performance with the cognitive control tests devised is relatively free of variables such as achievement motivation, text anxiety, and need to conform to what is perceived as socially preferred. If observation continues to support the position that performance with the cognitive control tests devised is relatively unrelated to these various factors, nor to intelligence and academic test performance, then we have continued assurance that the procedures assess cognitive strategies and adaptive preferences.

The Question of Intellectual Ability Versus Cognitive Controls in Infancy

One particularly intriguing question for further study concerns the age at which variables we call "academic and intellectual skills" begin to differentiate from cognitive controls and strategies. Infant observation permits us to theorize that during the first 18 months of life many aspects of an infant's responsivity may be viewed in terms of individual differences in cognitive strategies with respect to unique ways of approaching, avoiding, and selecting information. During the same period of development, infant intelligence scales attempt to measure one or another response taken as an “intellectual ability.” If we look at the first 18 months of life through the twin lenses of cognitive controls and intellectual abilities, several questions emerge that should lead to new knowledge and insights into the issue of intelligence versus cognitive styles. What is “an intellectual ability” during the first year of life? What is a cognitive strategy or control in the first year of life? How are intellectual abilities and cognitive control strategies related during the first year of life? Would it be useful to view intellectual abilities as emerging from and relying on cognitive controls during the first year of life?

If we relate these questions to recent essays on infant intelligence testing, we obtain a glimpse, I believe, of the value of introducing the issue of cognitive controls versus intellectual abilities all the way down to the first year of life. In this set of essays (Lewis, 1976b) we are told that an examination of results provided by infant testing over the past 40 years indicates that the construct of intelligence is very “frail” when applied to infancy (Lewis, 1976b), that infant intelligence scales produce very unreliable scores, and that the value of infant intelligence testing is highly questionable (Honzik, 1976). Why should this be the case? Several reasons are offered (Honzik, 1976; Brooks and Weinraub, 1976). For example, we are told that development occurs too rapidly during the first year of life, and behavior sampled to measure “intelligence” at one stage in infancy differs from behavior sampled at another stage. I would add that the lack of stability of infant intelligence scores may also be due to individual differences in cognitive control strategies during infancy. This proposal is illustrated by one area of infant testing, namely, the lack of item consistency, which plagues infant testing. Brooks and Weinraub (1976) noted there is a surprising lack of agreement among infant intelligence scales as to when a particular response is expected to occur, even though the tests have been standardized on large populations of infants. For example, the response “regarding one’s image in a mirror” is located in one scale at age 5 months and in another at 8 months, and the response “searching behind a mirror” is placed in one scale at 10 months and in another at 18 to 20 months.

If we consider both these responses from the viewpoint of individual differences in cognitive controls, we come upon a clue that may help future investigations clarify why infant scales are so inconsistent in locating the age of behaviors. Whatever else is involved in the response of regarding one’s image in a mirror, it seems to me that the manner in which an infant scans a field (narrow vs. broad; passive vs. active) would influence whether, how, and when he registers his image in a mirror. We have discussed research findings indicating that in the first weeks of life infants already show marked differences in scanning broadly or looking at a limited segment of the field. If these individual “controls” or “strategies” persist, we could speculate that the infant who scans broadly probably scans around and beyond a mirror. Would this infant show at a later age (8 months) behaviors indicating that he is regarding his image? Similarly the infant who scans narrowly may be “looking” at the small area of a mirror at an earlier age (5 months). And what about the test material used? A small mirror is less likely than a large mirror to elicit the response from a “broad scanner.”

Considerations such as these indicate that much would be gained if cognitive control strategies were assessed along with intellectual abilities during the first two years of life. If the two domains are related, we may be able to clarify further what we mean, in terms of process, by an intellectual skill versus a strategy or preference in managing information.

What Is the Relation Among the Cognitive Controls Studied? Does the Organization of Each Cognitive Control Change In the Course of Development?

Klein wondered about these questions when he elaborated the concept "perceptual attitudes," the forerunner of cognitive controls. "We can say as yet practically nothing about the relationships among attitudes. ... I have spoken of perceptual attitudes as 'stabilized' modes of control, thus encasing in a static term what is really a dynamically shifting process . . . it tells us nothing of how attitudes are changed within the person . . ." (Klein, 1951, pp. 351, 353). Except for one study (Gardner and Moriarty, 1968), it seems that little investigative attention has been paid to the question of developmental changes in cognitive controls and the relations among them.

The longitudinal and cross-sectional age studies reported in Chapter 7 strongly support the proposition that each cognitive control follows a developmental course that ranges in broadest terms, from stages in which the cognitive control process is global to stages in which the process becomes differentiated into component processes and integrated. In my studies the changes observed in each control through development defined increasing monotonic functions for the most part.

1. *Focal Attention.* From narrow, passive scanning to broad active scanning.

2. *Field Articulation.* From attending to both relevant and nonrelevant information to withholding attention from nonrelevant information while sustaining attention on relevant information.

3. *Leveling-Sharpening.* From constructing global, unstable images of past information that are fused with present information to constructing more articulate, stable images of past information. Throughout this course there is also a decrease in the tendency to introduce invented (fabulated) information into the memory image.

4. *Equivalence Range.* The number of groupings used to conceptualize information increases monotonically from few to many, as does the level of abstraction expressed by the category (from concrete to symbolic). However throughout this course the number of groups that reveal incomplete but realistic conceptual thinking, and the number of groups that reveal unrealistic, illogical conceptual thinking, follow S-shaped inversely related courses.[28]

5. *Body Ego Tempo Regulation.* Only the component process of fine motor delay has been investigated in our longitudinal studies at this time. The progression observed is a sharp increase in delay of motility to the age of 8 years; the level reached is maintained to early adolescence, where a slight decrease in fine motor delay is observed.

HYPOTHESIS DEFINING THE RELATIONS BETWEEN CHANGES IN COGNITIVE CONTROLS AND EMOTIONAL DEVELOPMENT IN LATENCY

In addition to defining general courses of development for each cognitive control, our age studies uncovered several other issues pertaining to change in cognitive controls and to the relations among them. First, when we examined more closely the developmental functions defined by the component processes of each cognitive control, we noted points of inflection, asymptotes, and nonmonotonic features. When we stepped back and asked how these many points of inflection, generated by all the controls, could be interrelated, we discovered a hypothesis to define the patterning or "style" of multiple cognitive controls which should be useful in suggesting future research.[29]

In broadest terms, the hypothesis defines a fit between the two-stage concept of personality development during latency proposed by psychoanalytic theory and the several inflection points observed in the various cognitive control developmental functions. In the first half of latency (from ages 5 to 8 or 9 years) cognitive controls are "outer oriented," relatively speaking. That is, cognitive controls are more connected with, and do more work on, information contained in the external environment. In this position cognitive controls maintain an affective-cognitive balance by providing *distance* and *insulation* from *internal* information (representations of affects and drives; emotionally laden fantasies), preventing such internal information from disrupting cognitive efficiency with managing and assimilating cognitive tasks and information in the outer environment. By emphasizing work on external information, cognitive controls are viewed as facilitating the growth of other ego functions during the first half of latency (5 to 8 years) concerned with gradually renouncing the egocentric position of the oedipal phase and its dominating drives and tensions, and constructing regulatory structures, defense mechanisms, and differentiated capacities to flexibly adapt to environmental dictates and opportunities. From the age of 9 years to early adolescence, cognitive controls shift to a position that is both outer and inner oriented. In this position cognitive controls maintain a cognitive-affective balance by providing contact with, and performing work on, information both in the external environment and in the internal environment of feelings, drives, and fantasies, as represented in cognitive symbols. This change in the orientation of cognitive controls fits Klein's (1954) early formulation of the "steering" effect exerted by cognitive controls on presses from within and without. The next section elaborates the adaptive significance of the particular "steering effect" proposed here.

We also observed points of inflection, asymptotes, and nonmonotonic features in the developmental functions generated by clinical populations. When we compared these characteristics with those of normal groups, we obtained further support for the heuristic value of the hypothesis defining the inner versus outer orientation of cognitive controls. We found that in children with mild clinical difficulties (e.g., learning disability) and among children hospitalized because of emotional disturbances, the orientation of cognitive controls was opposite to that of normals during the first half of latency. Cognitive controls in these children were more inner oriented before the age of 9 years. This difference between clinical and normal populations enabled us to propose that the "system" of cognitive control development is in reciprocal balance with other developing personality systems. During the first half of latency the focus on outside information, with distance from inside drive tensions, is seen as assisting the processes involved in renouncing the egocentric, drive-dominated position of the oedipal phase, increasing identification with the standards of parents and teachers, and elaborating defenses. During the second half of latency, once impulses have been mastered and external ego ideals and standards registered and internalized as stable concepts, cognitive controls turn to the inner world of feelings and flexibly construct a balance of information coming from the inner environment as well as outer environment, which serves ever changing motivational conditions and environmental circumstances and demands. Our initial data with clinical groups, then, suggest that the cognitive work of these children is occupied before the age of 9 with inner drive tensions, egocentric demands, and the like. Therefore other ego functions are not developing with the benefit of encounters with information and standards of behaving contained in the outer environment. Our data further suggest that when these children reach the second half of latency (8 to 12 years), cognitive controls maintain an asynchronous cognitive-affect balance, with cognitive controls either excessively outer oriented or excessively inner oriented and failing to flexibly shift the orientation in keeping with adaptive opportunities.[30]

HYPOTHESIS DEFINING THE RELATIONS AMONG COGNITIVE CONTROLS

My studies have also suggested a hypothesis that may serve future studies concerning the relations among cognitive controls. I have proposed a hierarchical ordering of cognitive controls (Chapters 2 and 8). From a dominance of the regulation of information located "proximally," in body percepts and body motility, the controls that regulate information located more "distally" become predominant. That is, focal attention emerges next as dominant, integrating body definitions and motoric delay. Then field articulation emerges as dominant, assimilating broad-active scanning in its process and emphasizing selective deployment of attention. From this stage, leveling-sharpening emerges, subordinating and integrating all previous control processes, as images of information registered are held in memory. In the last stage equivalence range emerges, incorporating all previous processes, as information is scanned, articulated, held in memory, and related in terms of categories and concepts. I have also proposed that in ideal development the mature individual has all these controls available, shifting progressively or regressively from one control to another, or from one level within a control to another, to achieve adaptation. Both developmentally *immature and mature* levels of a control can be adaptive in one context and maladaptive in another.

In using this scheme to consider children who present major cognitive dysfunctions and learning disabilities, I concluded from my observations that these children represent two broad profiles or types of deviation in cognitive control development. One I have termed the "incomplete ladder." Such children show cognitive controls that have developed to a particular level or stage in the proposed hierarchy, but development has been severely arrested at this point. Or they show that all cognitive controls lag significantly. I have hypothesized that in these children cognitive controls were compromised in the first two years of life because a significant mismatch existed between innately given cognitive strategies and the tempo, complexity, and timing of information displayed by the environment. The second hierarchical deviation is termed the “broken rung.” Representative children show adequate cognitive control functioning, but one of the cognitive controls is significantly lagging or derailed. In these children the deviant control is seen as having been compromised by the formation of a major neurosis after the third year of life.

Much research needs to be done exploring the heuristic value of the proposed hierarchy and the two types of pathological profiles proposed.

What Is the Role of Cognitive Controls in Adaptation and Motivation? What Else Could We Say About Cognitive Controls and Psychopathology?

The sketch of Klein’s early writings presented at the start of this chapter and the extensive discussions in Chapters 2 and 4 should make clear that the hallmark of the cognitive control concept is adaptation—more precisely, the role played by cognitive controls in adaptation. Klein’s initial concepts of “perceptual attitudes” with their “adaptive properties” are surrounded by many statements about the role these attitudes play in “how the person is organized to cope with both inner and outer environments.” He ended his early essay on “the personal world through perception” with a number of questions concerning the role of cognitive controls in adaptation.

> . . . we know nothing yet of special mechanisms directed to particular contents or trauma, of personal “resources” which become available in the fright of battle or in the heightened emotion of any sharp break with everyday living. Would these bring out other “solutions”? . . . could it also be that the consistencies (cognitive controls) of the person would still call the turn to some degree? . . (1951, p. 353).

And in the classic “thirst” study, while discussing the role of a particular control in adapting to and managing need tensions, Klein pointed out that to investigate adaptation directly, one should observe changes within the same individual, for example, from sated to thirst conditions (Klein, 1954). The centrality of adaptation in cognitive control theory is stated explicitly in the important monograph by Klein and his colleagues: “The essential question we have posed concerns the individual’s style of adaptation in his mode of coming to terms with the world . . .’’(Gardner et al., 1959).

In spite of the centrality of adaptation in cognitive control theory, very little research has been done in this area, as remarked by Wachtel (1972a) in his essay on cognitive style and style of adaptation. One of the reasons for the paucity of research, Wachtel proposed, is that the empirical strategy typically used by investigators thus far views a cognitive control as an end in itself rather than as part of a sequence of adaptations to changing environments. This empirical strategy was necessary to identify the various cognitive controls and their unique characteristics, but now we can and should study cognitive controls in adaptation directly. It was because of my interest in observing cognitive controls responding to changing environments that I conducted the studies reported in Chapter 9, in which the modes of cognitive control functioning of children and adults were compared in at least two environments: home, hospital, dentist’s office, airport, and final exam classroom.

In his essay Wachtel (1972a) asked the question, “Adaptation to what?” My response relies on these studies of cognitive controls in changing environments and on the developmental studies that led to the hypothesis expressed earlier of the inner versus outer orientation of cognitive controls. Although I hope to modify and specify my response with further investigation, at this time I would say, “Adaptation to maintaining cognitive-affective balance.” It seems to me cognitive controls serve to maintain a balance between the intake of information from the “inside” and the “outside,” a balance that is relevant and necessary, given the individual’s adaptive intentions and developmental status, and given the environment’s circumstances, expectations, constraints, and opportunities.

The elaborations that follow rely on my earlier comment about the inner versus outer orientation hypothesis and the studies detailed in Chapter 9. We observed, for example, that when compared to their performance at home, children regressed towards increased leveling of information when in the hospital before surgery. Moreover, we observed that the children who regressed the most toward leveling tended more to engage in fantasies concerning castration, fantasies that were primitive and literal rather than attenuated and indirect. Introducing our developmental data at this point, we might propose that if an 8-year-old child regresses to a stage of increased leveling, this regression also signals a shift by the leveling-sharpening control toward an inner orientation. That is, our data tell us that in normal development and in average environments, the leveling-sharpening control in an 8 year old is outer oriented. There is a heightened tendency to sharpen—that is, to register *external* information and to construct articulate images of this information. Thus a shift toward increased leveling when the environment changes from home to hospital also brings a shift from an outer to an inner orientation.

This conceptual formulation fits the observations made. The children who regressed most toward leveling also turned inward away from external information and engaged in vivid, primitive fantasies about castration and bodily harm. One way to look at this change in orientation is to view such a child as leveling information in the external environment, while at the same time sharpening information in the internal environment.[31] If we rely on the subjects’ mothers’ reports about how well these boys adjusted at home after surgery, we see that the boys who shifted toward increased leveling and toward an inner orientation made the postoperative adjustment with less immature, unreasonable behavior. Using clinical-psychoanalytic theory and experience, I propose that this adaptive success was facilitated by the individual’s being able to turn inward and work through the personal interpretations of castration, given the surgical experience, by rehearsing these interpretations in fantasy. As a result, the unconscious distorted interpretations and anxieties did not interfere with postoperative adjustment.

More than offering a finding, this study suggests a speculation that deserves further study: the shift toward the developmentally earlier stage of leveling information, along with the shift of cognitive controls toward an inner orientation, constructs a cognitive-affective balance that is *adaptive for the context and the psychological requirements of that stage of personality development*—& balance between information in the outer environment (the hospital setting, the reality of a hernia repair) and information in the inner environment (the personal interpretation given the surgery in terms of guilt, need for punishment, etc.). In considering this speculation we should recall the issue discussed in Chapter 9 that in this environmental context (surgery), the person is required to be more or less passive in the face of experiences. And inner orientation of cognitive controls serves best the adaptation to environments requiring passivity. I would formulate the adaptive role of cognitive controls in similar terms with respect to the study of young adult parachutists, but here the opposite holds. In shifting toward a stage of increased sharpening in a situation in which the individual can be an active participant (at the airport before jumping), cognitive controls move toward an *outer* orientation. In this way, potentially disrupting information from inner fantasies and feelings is distanced and cognitive controls connect with and work on information in the outer environment—information that serves the immediate reality need of recalling where the rip cord is, when to pull it, and so on.

At this point I could elaborate my thinking still further by connecting cognitive controls and adaptation to motivation. To do this I must ask the reader to recall the Klein-Holt model of cognition and motivation (Chapters 2 and 18) and the exciting research by Mischel (1975) on the role of fantasy in delay, both of which we have discussed in detail. I would speculate, borrowing from Mischel's findings, that before the age of 9 years, if a child is hungry and is waiting for marshmallows, cognitive controls are likely to work on information in the external environment that is some distance from the consummatory properties of marshmallows. That is, cognitive controls would fix on the properties of "white" and "fluffy" as represented by "clouds." Where does the Klein-Holt model fit in? In the cognitive train of thought of these children, cognitive controls maintain a state of balance, a state of adaptiveness, by registering a series of elements *related* to the wanted object (marshmallows) but also some distance from the *consummatory* properties. In so doing, cognitive controls serve to delay behavior and need gratification. After the age of 9 years, the child's cognitive train of motivation is likely to register and fix on both "distant-outer" representations, such as fluffy white clouds, and "inner representations," such as family picnics at which marshmallows were toasted and parents asked everyone to stand in line and wait his turn. By engaging both outer and inner information at this stage of development, cognitive activity serves to control and regulate motivation and delay and postpone action.

Our observations of the clinical populations discussed in Part III suggest that emotionally disturbed children represent a derailment of this cognitive-affective balancing. Clinical children before the age of 9 years tend to fix on inner information of urge and tension, and the delay of action is impaired. Children older than 9 years tend to fix on outer information, probably the consummatory properties of the wanted object, and delay of action is similarly impaired.

The pattern of cognitive controls revealed by the clinical groups studied (Chapter 5) suggested further insights into the relations among cognitive controls, adaptation, motivation, and pathology. We observed that one cognitive control was compromised (derailed) in terms of ideal development, when combining with another to form a cognitive style. For example, brain-damaged children showed a preference for narrow scanning combined with the tendency to ignore irrelevant information embedded in the context. Orphaned children showed a preference for narrow scanning combined with the tendency to ignore irrelevant information contained in the periphery of the field. Both these patterns contrasted with that exhibited by normal children, in whom broad scanning combined with the tendency to ignore both peripheral and contextual irrelevancies. Preadolescents hospitalized because of emotional disturbances showed a preference for narrow scanning in combination with a tendency to maintain stable memory images. Adolescents hospitalized because of emotional disturbances tended to delay motility excessively and to scan narrow segments of information in combination with ignoring contextually irrelevant information, especially information connected with inner affects.

When I examined these patterns of controls, each unique to a different clinical group, I speculated that the compromised cognitive control in each case represents an attempt to construct a cognitive style (pattern of cognitive controls) that accommodates to and is adaptive for the vulnerability to informational demands unique to the pathological state in question. The brain-damaged children would be viewed as vulnerable to and stressed by the demands of the context or background of information, and this cognitive imbalance is served by narrow scanning. Orphaned children, stressed by peripheral irrelevant information, maintain cognitive-motivational balance by narrow scanning, which serves to ignore such information. If we assume that our hospitalized preadolescents were vulnerable with respect to maintaining constant, stable contact with external objects, we could say that the cognitive style that accommodates to and serves this vulnerability calls for a compromise of focal attention (narrow scanning). We could also assume that our hospitalized adolescents were vulnerable in the regulation and binding of impulses and affects. If this is true, a style that compromises the delay of motility (excessive delay) and focal attention (excessive narrow scanning), and combines these with excessive ignoring of irrelevant (inner) information, accommodates to and serves this vulnerability in maintaining the required cognitive-motivational balance. These observations suggest that the concept of a configuration of cognitive controls is of value in understanding cognition in psychopathology. Moreover a cognitive style approach to questions of cognition and psychopathology may ultimately point to innovations in treatment. For example, if a severely disturbed latency child shows broad scanning, perhaps the therapist's effort should be aimed at promoting *narrow* scanning. Would such training facilitate the construction of stable memory images and object constancy, thus serving adaptive transactions with the environment free of fabulated and distorted information?

From these discussions of cognitive controls and adaptation, motivation, and psychopathology, I would like to return to the question of the origin of cognitive controls, both normal and pathological. If we now include our earlier discussion of the long-range and short-term adaptation (Chapter 2), several potentially useful speculations come to mind. To convey these, I shall use as metaphors the research done by me and my colleagues with presurgical patients and orphaned children. If a child's experiences during the first two years of life are "like surgery," it seems to me this would set the stage for an inner orientation of cognitive strategies. Accordingly from the start this child would miss out on new encounters with external information and new assimilations of information. The subsequent growth of cognitive controls and other ego functions would be characterized more by cognitive control immaturity (e.g., excessive leveling of external information; narrow scanning). If the child's experiences during the first two years of life are "like being orphaned," it seems that this would set the stage for an "outer-orientation" of cognitive controls. Subsequent development may show, for example, excessive attention to external irrelevant information, or excessive sharpening and retention of external information in its exact detail.

I really mean these speculations to be questions. Speculations such as these may stimulate the clinician to look more closely at the histories of his learning-disabled child patients and to explore the unique features of the environment during infancy. The researcher may pursue these questions in predictive longitudinal studies. One study, for example, might follow the cognitive control development of children who experienced three of four hospitalizations and or surgical procedures during the first years of life and the development of comparison groups, one that had no surgery and one that underwent multiple surgical procedures after the fifth year of life. Such investigations could shed light on the relation between the developmental timing of experiences and the subsequent structuring of an inner versus outer cognitive orientation that is more or less inflexible in the face of various environments.

In normal development, one could speculate that predominantly inner orientation of cognitive controls dominates from the age of 2 to 4 years, that an outer orientation begins to emerge about the fifth year, and that after the ninth year the two orientations begin to be integrated and the capacity to flexibly and adaptively shift from one to the other gradually improves. During the first two years of life which precede this hypothetical normal course of development, I would speculate that the child's long-range environment is average and expectable in terms of the individual's unique psychological givens and that this environment is punctuated by short-term unusual or not-average environments that deviate only in "moderate" degrees from the average. During these short-term, moderate changes, cognitive controls have the opportunity to differentiate and develop flexibly. It is when the changes severely depart from the average and expectable that cognitive structures become fixed at a premature advanced stage or at a regressed level.

The role of cognitive controls in adaptation, motivation, and psychopathology is indeed a complex one. I hope the research reported here and the issues I raise clarify the complexity somewhat and help to point the way to future study.

If You Impose Little Delay on Motility, Scan Narrowly, Attend to Irrelevant Information, and Level Information, Are You "Bad"?

Definitely not. Because so much is still being made in the literature about the value of one or another end of a cognitive control continuum, I feel it is important to stress again that the developmental-adaptional approach to cognitive controls erases the issue of value. The preceding comments and the discussions and data in Parts I to III should make it clear that a particular cognitive control stage is both "good" and "bad" depending on its fittedness with the demands and opportunities of the outer environment, with the demands and opportunities of the inner environment, and with the cognitive-affective balance that would ensure the most successful adaptation to the situation at hand.

Concluding Remarks to the First Postscript

I have emphasized the importance, in assessing cognitive strategies, of the task requirements, the requirements of developmental stages, the requirements of the situation, and the requirements of the affective-motivational balance the individual is attempting to maintain. This emphasis relates to increasing criticism in the literature of situationism—that is, the prevailing view in American psychology that the situation alone shapes the response of the individual—and to the plea that observations focus on how an individual shapes his environment (Parke, 1976; Bennett, 1976; Bowers, 1973; Mischel, 1973; Gillis, 1971).

If the emphasis I have taken is applied to practice, it should remind the clinician that when assessing “cognitive dysfunction” he should not think in absolute terms. Rather, cognitive dysfunction is defined here in terms of the developmental stage of the person, the environment in which he is functioning, and the task he is managing, as well as the inner states, needs, and tensions he is balancing (see also Fowler, 1971). Perhaps belaboring my point a bit, my observations suggest that at a certain stage in development a cognitive strategy such as leveling information is adaptive before surgery, whereas the strategy of sharpening information is adaptive before taking a final exam in school. At another stage in development, sharpening may be more adaptive before surgery and leveling before taking an exam in school.

Taking the child’s developmental stage, environment, adaptations, and motivational balance into account suggests that significant changes should be introduced into clinical technique. For example, you are presented with a child who shows a very short attention span or forgets details from one moment to the next, according to his teacher. As you plan a diagnostic evaluation, several questions relating to adaptation should immediately come to mind. That is, what is the cognitive control functioning of the child *when in the classroom*? Do the teacher’s observations relate to a dysfunction in focal attention (narrow-passive scanner) or in leveling-sharpening (a severe leveler)? How does the child’s cognitive control functioning in the classroom relate to his functioning at home? Does the difference observed suggest that the child enters the classroom as if he is about to undergo surgery? That is, does he show adequate leveling-sharpening or focal attention functioning at home, but regressed stages in each control when in school?

I realize that it is not always feasible to evaluate a child at home and again at school. But if we are to make use of the research findings reported here and of the importance of ecology and adaptation for clinical planning, we must find ways of evaluating a child’s cognitive control functioning in different environments.

Over the years I have had the opportunity in my clinical practice to evaluate learning-disabled children in their homes and again in the classroom. I justified this procedure to the parents in part by the research findings reported here. Although the series of children is small, I have learned a great deal from this experience and believe I provided a better service to the children in question. Some children showed, for example, excessively narrow scanning or leveling *both* at home and at school. Others showed adequate focal attention or leveling-sharpening at home but in school revealed marked regressive shifts toward scanning narrowly and leveling information in memory. The treatment plans I formed for each type of case were very much influenced by these results. The first type of child needed cognitive restructuring, since cognitive controls seemed to be lagging in both environments. The second type of child needed psychotherapy or counseling more, since cognitive controls were regressing as part of an emotional response to the school environment.

Fowler (1971) has cautioned us against labeling cognitive functioning as deficient on the basis of "middle-class" instruments. The cognitive control tests described here have proved effective with several socioeconomic levels, ethnic groups, and races, and with populations representing severe and mild psychological disorders. Related to this issue are the studies I have conducted (Chapter 9) that identified about 20% of the entire kindergarten population of a middle-class school system as lagging significantly in cognitive control functioning. Since these children grew up in "advantaged" homes, we become challenged by the observations that being middle class does not spare one from developing cognitive disabilities. It is findings such as these, and the observations I have made of the development of cognitive controls, changes in cognitive controls to changing environments, and cognitive controls in child psychopathology, as well as the concepts and hypotheses I have proposed concerning normal and pathological origins of cognitive controls and cognitive controls in adaptation and motivation, that I hope will stimulate clinicians to include these methods and concepts in their practice and will spur investigators to join in the exploration of the still fertile frontier of cognitive controls.

POSTSCRIPT TO PARTS IV-VI

The rapid growth of cognitive psychology during the past three decades has brought with it a number of therapies offered as ways of helping children suffering from cognitive and learning disabilities (see, e.g., Cruickshank and Hallahan, 1975a, 1975b; Sherman and Bushell, 1975; Hellmuth, 1970, 1971; Franks, 1969). These proposals, and many others we considered in Parts IV to VI, have come primarily from workers who ascribe to behavior theory and therapies of behavior modification. Other proposals have also been set forth by workers who ascribe to Piagetian theory and to the cognitive style approach of Kagan and Witkin (e.g., McKinney and Banerjee, 1975; Inhelder et al., 1974). To my knowledge, workers who have followed the multidimensional model of cognitive controls, originally formulated by George Klein, have not offered clinical techniques based on this framework to assist children with cognitive disabilities.

The rationale and method of cognitive control therapy described in Parts IV to VI represents my attempt to do just that. As I noted at the start of this chapter, beginning with my first efforts to provide Teddy with "cognitive games" during a course of psychoanalytically oriented psychotherapy, I have been developing the method of cognitive control therapy. I have been intentionally shaping and sculpturing its techniques with several tools: the theory of cognitive controls, propositions from the biodevelopmental framework outlined in Part II, and hypotheses from psychodynamic psychotherapy. As a result, the method of cognitive control therapy attempts to emphasize in the treatment process innate, cognitive givens, stages of cognitive control development, negotiations between the child and the therapist that relate to their mutual adaptations, the existing conflict between the child's unique ego-cognitive organizations and the organization of information from which he flees or against which he fights, the interface between cognitive control activity and the management of affects ; the cognitive-affective balance the child attempts to maintain, and whether this cognitive-affective balance results in flight or fight behaviors that severely restrict the child's engaging and growing from information.

As we have seen, the goal of cognitive control therapy is to enable the child to reorganize or restructure inefficient, growth-restricting strategies used to control and manage information and to work through and master feelings and behaviors that accompany the processing of information. Cognitive control therapy is aimed at helping the child evolve developmentally higher cognitive controls : affective-cognitive strategies that could be used by the individual to process information and to learn with a sense of pleasure. Finally, it is important to recall that the cognitive control therapy program prescribed for a child is guided by a diagnostic study of the child's cognitive controls, the patterning of these controls, and the balance they maintain between internal and external information, including affects, tensions, impulses, and needs.

The Criticisms of Mann and Goodman

Before asking the clinician to consider including in his or her practice cognitive control therapy as a piece of technology, I cite a relatively recent review of "perceptual training" programs by Mann and Goodman (1976). These writers concluded that such training programs are essentially "irrelevant" and "useless." The criticisms they raised caught my attention and stimulated me to apply them to cognitive control therapy. If I could meet their criticisms, in taking stock of the method I have evolved, I could further convince myself and others of the potential value of cognitive control therapy. Therefore, I pick up the gauntlet tossed by Mann and Goodman onto the sacred ground that defines the field of cognitive psychology. Is the method of cognitive control therapy capable of jumping over the hurdles they have set up?

THE FIRST AND SECOND HURDLES

The first issue raised by Mann and Goodman is that perception (cognition) is an "abstraction" and "abstractions cannot be trained." This issue is connected with the second matter they emphasized, namely, that it is not clear what perceptual-cognitive assessments measure. They noted,

> The perceptual training movement by and large depends on the utilization of poorly validated and unreliable instruments such as the Frostig, the Winterhaven, and the Purdue rating scales to determine *their* parameters of perception and to assess children's strengths and weaknesses in this or that perceptual process.
>
> The perceptual assessment proponents confuse test names with the actual behaviors and processes these tests elicit. The names they have assigned to various perceptual tests are in fact arbitrary and established largely on the basis of intuitive logic, commonsense conceptualizations, and unsubstantiated borrowed concepts from experimental psychology . . . they are usually face valid and no more. Perceptual assessors in fact have not in any way definitely demonstrated the ways their perceptual assessment instruments are related to the latent behavioral domains they presume to measure. Yet they proceed to recommend training for their perceptual "its" and "thems" on the basis of their tests (Mann and Goodman, 1976, pp. 272-273).

In substantiating this criticism, Mann and Goodman noted a number of factorial studies that have not supported the claim of the Frostig Development Test that it taps five domains of perceptual-cognitive functioning. They also pointed out that even if several of the perceptual functions assessed by the Frostig tests are valid, perhaps other important areas of perception-cognition are being ignored. Then they say, "Assuming for the moment that indeed [tests] can delineate specific [domains], it would not follow that such subareas are the areas of major relevance to the child's [academic] achievements."

With this set of issues, Mann and Goodman are bringing attention to *(a)* the validity of a cognitive-perceptual construct, *(b)* the extent to which the process elicited by a cognitive test matches the definition of the construct,

the extent to which the cognitive tests samples a fundamental cognitive principle or organization versus the extent to which it samples a conceptually higher level cognitive skill that relies on more basic functions for its operating, (*d)* the extent to which a set of tests delineates most if not all the domains of cognitive functioning, (*e*) the extent to which these domains are relevant for a child's academic performance.

This set of hurdles or issues relates to the cognitive control tests for children, which are used to determine the need for cognitive control therapy and to prescribe the content and direction of the therapy, should it be indicated. It seems to me the work reported in Part III clears these hurdles reasonably well, for the most part. Considerable validating support for the construct of cognitive controls has been gathered. Therefore, although the concept of cognitive control is certainly "an abstraction," in the words of Mann and Goodman, this particular abstraction happens to connect with definable and observable, specific cognitive behaviors that can be measured reliably and validly. The domains of cognitive behaviors, the cognitive strategies conceptualized by cognitive control concepts, are "real." They change in identifiable and predictable ways with age and in response to changing environments. They can be observed serving adaptations and implicated in systematic ways in child psychopathology.

And what about the relevance of cognitive controls for a child's academic performance? The connection between cognitive controls and academic performance is not a myth. Several longitudinal and cross-sectional studies reported in Part III provide convincing support for the contention that lagging or derailed cognitive controls are associated with academic failure, and stage-adequate cognitive controls are associated with academic success and pleasure in learning. Though much more needs to be learned about the specific relations between patterns of cognitive controls and success or failure with a particular academic subject, cognitive controls clearly appear to be fundamental strategies that underline academic skill functioning of many types (reading, mathematics, science, language, etc.). We also have some confidence that cognitive control tests appear to measure cognitive strategies and preferences, which are not what tests of intelligence and academic abilities, Piagetian tasks, and scales of achievement motivation, test anxiety, and personal attitudes measure.

That cognitive control tests clearly measure basic domains or principles brings me to the issue of whether the five domains measured by the tests described in Part III represent all possible domains of cognitive functioning. Certainly not. Even when many and various tests of cognitive functioning in the *visual* mode are factor analyzed along with tests of cognitive controls, the five cognitive controls reported here continue to define separate domains. However more work needs to be done to clarify whether other domains defining cognitive strategies (e.g., tolerance for unstable information) are major factors in a *child's* cognitive functioning and in a *child's* academic performance.

There is of course the auditory mode, which is not assessed at all in the approach reported here. I have long wondered whether multiple cognitive control strategies could be identified in the auditory functioning of children and, if so, whether they could be shown to define the same domains and processes (e.g., narrow-passive vs. broad-active auditory scanning; global vs. differentiated and stable memory images of sounds). But the work needed to understand cognitive controls in the visual mode has given me more than enough to keep busy. I would strongly urge that future research explore the auditory mode through the lens of cognitive control theory.

To close this portion of my evaluation of cognitive control therapy and the criticisms of Mann and Goodman, I conclude that cognitive control behaviors are real; they appear to have relevance for the academic performance of children, and they can be identified reliably as stage -adequate or derailed. If cognitive controls are implicated as basic cognitive structures in a child's academic success, and if cognitive controls are observed to be derailed or to show dysfunctions, would it not make sense to treat them? I have taken the position that they can be treated, restructured, and placed on a growth-fostering line of development. But when cognitive controls are treated, what happens? What is the relevance of such treatment? These questions take us to the last set of hurdles imposed by Mann and Goodman.

THE THIRD AND FOURTH HURDLES

Mann and Goodman pointed out that perceptual-cognitive training programs assume that training in some developmentally lower or more "fundamental" function benefits more advanced spheres of functioning (e.g., reading, arithmetic). They ridiculed the "bead stringing, parquet-block assembly, and jigsaw puzzles" forced on children and concluded, "We do not believe that much can be gained in such developmental regression." From this criticism the writers then pointed out that the "narrow focus" of perceptual tests prescribing the treatment results in narrow therapeutic activities, possibly overlooking other essential perceptual functions.

First of all, this issue relates to the concept of epigenesis to which the biodevelopmental framework proposed in these volumes ascribes; namely, that an early form of functioning is never replaced by a higher form. Rather, the higher function that emerges subordinates and integrates the earlier form. Moreover, the early form remains active, codetermining all future functioning. It would not make much sense to point out to Mann and Goodman that this principle is proposed by theories of Piaget, Werner, and psychoanalysis and is supported by considerable evidence. Either one includes this principle into one's "theoretical religion" or one does not. If the principle is accepted, one is obligated to jump the hurdle set up by Mann and Goodman and demonstrate how training in a more fundamental cognitive structure influences the efficiency, or promotes the growth of, a higher cognitive skill that relies on the first for its operating.

Chapter 18 describes studies that attempted to evaluate the effects of cognitive control therapy on the functioning of retarded and public school children. In addition I described the results obtained with an autistic boy treated with cognitive therapy in focal attention. These initial findings, based on comparison groups and formal evaluations, are encouraging. It appears that when a cognitive control strategy is specifically treated, reorganized, and restructured to meet stage expectations, the efficiency of many other higher level cognitive skills improves. That is, if a child tends to scan passively and at narrow segments of his environment, or if a child tends to form global, fluid images of information in memory, promoting active, broad scanning in the first child and the construction of stable, articulate memory images in the second child does seem to improve the efficiency of higher level intellectual skills. Certainly much more formal and informal study is needed to explore whether and how therapy in cognitive control functioning improves efficiency in learning and promotes pleasure in learning. However I feel that sufficient formal and clinical evidence is available to enable us to jump over the last two hurdles placed before us by Mann and Goodman in their critique.

It is clear in Parts IV to VI that I have not entered the battle of "psychoanalysis versus behavior therapy." Rather, I have tried to point out the technical advantages and limitations each brings to the task of diagnosing and treating ego-cognitive dysfunctions. Elements of the method of cognitive control therapy are virtually the same as ones found in approaches used in behavior therapy (e.g., administering a graded series of tasks, starting with a level that creates the least stress). As detailed in Chapters 11 and 12, however, the method of cognitive control therapy includes in its core of techniques one issue that distinguishes it from behavior therapy: namely, the management and resolution of transference and resistance.

In my previous discussion of the issue of the cognitive-affective balance maintained by cognitive controls, I pointed out that cognitive controls should flexibly shift between an outer orientation and an inner orientation to balance the intake of information from the external environment and from the internal environment of feelings, impulses, and fantasies. I have also dealt with the role of the child's ego ideals (internalized concepts of persons who are admired and held as models) in the individual's shifting from learning for love to developing a love of learning. The transference and resistance displayed by a cognitively disabled child when faced with cognitive tasks during cognitive control therapy, presents *in vivo* the child's unique cognitive orientation. These transference and resistance behaviors repeat in the office the child's fight against and flight from information ; they are the same behaviors he uses in school to avoid the stress created by task requirements that violate his cognitive orientation. I have proposed, then, that a critical aspect of cognitive control therapy involves working through these resistances with the child. While the child is provided with therapeutic cognitive experiences that restructure his cognitive-affective balance, he is also helped to become aware of his self-defeating cognitive strategies, the stress they create, and how the behaviors used to manage the stress are maladaptive (insight).

At this stage in the development of the technique of cognitive control therapy, the emphasis is on promoting developmental advance in one or another cognitive control (e.g., from narrow scanning to broad scanning). I have maintained this emphasis because most of the children who present cognitive disabilities show developmentally immature cognitive controls and inflexible cognitive strategies. There is a need to develop techniques that promote dedifferentiation of cognitive controls. Some children show excessively broad and active scanning. Or they tend to be excessive sharpeners of external information, insulating themselves from internal feelings, fantasies, and images. We need to learn how to promote in these children a strategy of narrow scanning, for example, when such a strategy would seem to be more adaptive within the child's total cognitive style.

At the base of the cognitive therapy method is the position that the symptom of the cognitively disabled child (e.g., his poor reading, daydreaming, short attention span, or hyperactivity) is not treated. Rather, we treat the deficient cognitive control strategy or strategies underlying the symptom or symptoms. Cognitive control therapy attempts to provide the child with cognitive coping systems that are flexible in managing and learning from changing environments, a goal that agrees with recommendations of Fowler (1971) and Kogan (1971).

Reichler and Schopler (1976) have cautioned that when a particular type of dysfunction is emphasized, professional specializing often emerges and leads to professional narrowing. I agree, and I hope that the work reported here does not lead to a narrowing in the form of specialities such as "cognitive therapy" and "cognitive diagnosis." My goal is to provide clinicians with technology that if added to existing skills, would enable them to treat a broader range of childhood disorders with a greater degree of specificity. If not psychotherapy or behavior modification for a given child, would cognitive control therapy better meet the need at hand ? Along with tests of intelligence and personality, would cognitive control tests help in evaluating and planning the assistance required by a learning-disabled child?

Concluding Remarks to the Second Postscript

As with all treatment methods, the method of cognitive control therapy has been undergoing continuous change over the past 10 years, shaped by therapeutic necessity and new experiences and insights, as well as by theory. Even as I write this concluding remark, techniques described in Parts IV to VI have been elaborated. Moreover, variations of the method have been employed in the past three years with adults who present major cognitive disabilities as well as various psychopathologies. But these elaborations and extensions cannot be presented until they have survived the test of application and study. It seems to me that the basic rationale and technique of cognitive control therapy have reached a stage in development, and have resulted in sufficient positive clinical experiences, to justify asking clinical child psychologists and other mental health professionals to consider using the method in their efforts to help cognitively disabled children. Certainly no claims of superiority of cognitive control therapy over other therapeutic techniques are made. I am making a plea, though, for clinicians to explore whether and when and why any particular method selected is the treatment of choice.

CONCLUDING REMARKS TO CLINICAL CHILD PSYCHOLOGISTS AND CHILD DEVELOPMENT RESEARCHERS

I am aware that the image of the clinical psychologist with his kit of diagnostic tests has been fading in some areas of psychology in the United States. I am also aware that new psychological therapies are appearing in American psychology almost as frequently as new motion pictures are released. Yet this book is devoted to a set of test procedures designed to assess cognitive controls in children, and to still another therapy method. If this work deserves attention, it is because I have taken a problem area, cognitive functioning and cognitive disabilities, and approached it systematically and consistently, using a single conceptual framework, so that clinical experiences and questions guide research, on the one hand, and research findings guide clinical technology, on the other. Part I describes the segregation of child clinical practice and child development research, proposes a biodevelopmental framework as the conceptual framework holding most promise for practitioners, and elaborates diagnosis and treatment in one area, cognition, with this framework as a guide. I leave it to the reader who is a practitioner to evaluate whether the work described illustrates that the biodevelopmental framework has something to offer to those in search of new technology. I also invite the reader who is primarily a researcher to evaluate whether the same framework has something to offer to those in search of new knowledge.

A basic thesis of mine has been that the searches for new technology and for new knowledge through research are two sides of the same coin. George Klein (1970), who launched the concept of cognitive controls to which this book is devoted, pointed out that what he called “the clinical attitude” should pervade clinical and research activity equally. The clinical attitude “consists of an automatic inclination to give priority in the observations of behavior to questions of Why? and What is it for?. . . It favors attention to an individual’s purposive trends, directions, and meanings, conscious and unconscious.” Let us now add that the clinical attitude also gives priority to several questions: What is its origin and process? How does it develop and change? What is the adaptive significance of these changes? In so doing we have essentially the biodevelopmental framework described in Chapter 2.

Ideally then we should encourage the growth of more “two-headed monsters”— individuals who apply the clinical attitude, now in practice and now in research. Actually, I believe the two heads should be integrated as one whenever possible. A clinician should do research *and* practice, and a researcher should practice *and* conduct investigations. But I recognize that specialization is required, given the vast body of knowledge and technology that is contained in any one of the areas of clinical psychology. If specialization is required, then practitioners and researchers, as specialists, should work on the same team, dealing with the same patients. Clinicians should be cautious of the tendency to dismiss formal study as interfering with patient care and to feel complacency with old technology. Researchers should give major attention to questions suggested by clinical problems that arise from patient care. Researchers should be alert to the possibility that retreating into a research tower to study pure, esoteric questions could be a defense that protects them from the pain and anxiety of struggling with the suffering of mentally ill patients. Research can be an emotional battle against ignorance or an exercise in isolation and intellectualization as a defense against anxieties.

Forty years ago Norman Cameron (1937, p. 440) pointedly reminded psychology of the anxious world of clinical practice: “The fears ... [the clinician] deals with are very real, the sorrows are deep and lasting sorrows, and the defeats are often final and irrevocable. They are not the consequences of put-up jobs which can be accurately timed and prearranged, as laboratory situations are.”

But Cameron speaks here only to the whirl of presses that characterizes clinical practice. What I wish to emphasize is that this whirl of presses, the forces of need, should blow through the researcher’s laboratory as well as the clinician’s office. I believe that the more this happens, the more research will develop the practical relevance we spoke about in Chapter 1 and for which Leon Yarrow (1973) made a plea, and the more clinical practice will develop the technological rigor it so sorely needs. But this takes me back to the point from which I started: that ideally the laboratory and the clinical office should be one and the same, as often as is possible and realistic.

G. Stanley Hall, who was awarded the first doctorate in American psychology, a child development researcher, and a “clinician” when there was yet no clinical psychology, made a statement 80 years ago that seems to capture and condense, as would a dream, what I am proposing here. All we need to do is substitute in Hall’s remark the words “clinician’s office” for “hospital,” and “clinical psychologist” for “physician.”

> It is a trite saying that a great hospital for mental and nervous diseases is nature’s own laboratory in which she makes her tragic experiments. That these have been made before with no adequate observations and apparatus to record the lessons she is so ready to teach, has only made the tragedy darker. It is a matter of congratulation that the old prejudice that such studies sacrificed the interests of patients to those of science, is now giving way to the higher, truer view that the best service is rendered to those cases most carefully studied. These methods focus the attention of physicians concerned upon each case studied, and stimulate them to utilize all available literature. For the patient it is a careful diagnosis. For the psychologist its contributions are added knowledge of the great science of man, and for the practical physician, increased courage, zest, and ability to cope with man’s great enemy—disease (Hall, 1895, p. 7).

NOTES

[27] The interested reader is encouraged to examine the original report by Gardner and Moriarty (1968) because it provides an excellent example of methodology required in assessing mechanisms of defense and in studying their relation to cognitive controls.

[28] These general courses of cognitive control development agree with age differences observed by Gardner and Moriarty (1968) in a cross-sectional study of children from 9 to 13 years old, with two exceptions. They did not observe differences in extensiveness of scanning and in the number of groups constructed with the Object Sort Test. In my opinion the first omission was probably due to the method used (i.e., Size Estimation Test), and the second was inevitable because the youngest children studied were 9 years old. In my longitudinal investigations, we observed a sharp increase in the number of groups formed to the age of 8 years This level was then maintained to adolescence.

[29] The reader is reminded that the term “style” is used here in keeping with Klein’s usage, to designate the interrelations or unique patterning of multiple cognitive controls.

[30] In terms of the pivotal changes that were observed in the organization of cognitive controls at the age of about 8 years, Kagan and Kogan (1970) noted, after a review of several studies, that a number of qualitative changes have been observed at around this age in the performance of children on various mental tasks.

[31] I am devising test methods that attempt to assess cognitive controls as they *work on* information from the inner environment of feelings, impulses, and fantasies. My aim is to relate measures of cognitive controls when managing “inner information” to measures of controls when managing “outer information.”

APPENDIX A

LIST OF DIAGNOSTIC AND TREATMENT STUDIES

The studies conducted by my colleagues and me and discussed in the body of this book are outlined here for the reader's reference and convenience. The tabulation includes only studies that used the tests of cognitive controls and scoring systems devised by me and described in Chapter 10. Studies of cognitive controls that were conducted by other workers and using other test methods, are described in Chapters 2 and 18. To aid the reader, the studies are clustered into six categories.

Investigations conducted to assess the reliability of each test and those relating the tests to socioeconomic variables are not summarized here and can be found in Chapter 6.

I. Age Differences

Age Levels	Population and Analysis	Tests; Cognitive Controls Assessed	N	Sex	Race	IQ	SES	Chapter
4½, 5½, 6½	Public school youngest and oldest prekindergarten ; longitudinal	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	44	Girls, boys	White	Not known	Middle	7
5, 6, 7	Public school learning disabled; cross-sectional	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening	96	Girls, boys	White, black	64-121 $\bar{X}$ =95	Lower	7
6, 9, 11, 13, 15	Hospitalized for emotional disturbance; cross-sectional	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	164	Girls, boys	White	61-125 $\bar{X}$ =98	Lower-middle	7
6, 7, 8, 9, 10	Public school; adequate and at-risk learners; longitudinal	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	46	Girls, boys	White	Not known	Middle-class	7
6, 8, or 9	Public school; adequate and at-risk learners; longitudinal	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	34	Girls, boys	White	Not known	Middle-class	7
6, 9, 12	Public school; crosssectional	Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	60	Girls, boys	White	Average	Lower-class	7
6-13	Brain-damaged; correlations, factor	Fine Motor Delay, Focal Attention, Field Articulation	44	Girls, boys	White	46-108 $\bar{X}$ =72	Lower-middle	7
6-13	Orphaned; correlations, factor	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	38	Girls, boys	White	80-122 $\bar{X}$ = 104	Lower-middle	7
7-12	Public school; correlations, factor	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	44	Girls, boys	White	70-124 $\bar{X}$ =110	Lower-middle	7
14-16	Public school	Field Articulation	50	Girls, boys	White	Not known	Lower-middle	7

II. Clinical Studies and Population Differences

Age Levels	Population and Analysis	Tests; Cognitive Controls Assessed	N	Sex	Race	IQ	SES	Chapter
3½–8, X̄ =5½	Compare retarded children receiving one of two forms of cognitive therapy	Maze Test, Object Matching, Picture Discrimination, Circles and Crosses, Object Sort I, Gain Score	22	Girls, boys	White	51	Lower-middle	18
3½–7½, X̄ =5½	Compare retarded children receiving cognitive therapy with children not treated	Maze Test, Picture Discrimination, Buttons Test, Object Sort I, Arm Imitation Test, Gain Score	63	Girls, boys	White	55	Lower-middle	18
5½	Compare public school children receiving cognitive therapy vs. skill tutoring; with one-year follow-up	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening ,Object Sort, Achievement Test	43	Girls, boys	White	120	Middle	18
6, 7, 8, 9, 10	Discriminate adequate and disabled learners; predict academic performance to fifth grade from kindergarten assessment of cognitive controls; longitudinal	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	41	Girls, boys	White	Not known	Middle	9
6, 7, 8, 9	Discriminate adequate and disabled learners; predict academic performance to fourth grade from kindergarten assessment of cognitive controls; longitudinal	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	184	Girls, boys	White	Not known	Middle	9
6, 7, 8	Discriminate adequate and disabled learners; predict academic performance to third grade from kindergarten assessment of cognitive controls; longitudinal	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	164	Girls, boys	White	Not known	Middle	9
6, 8 or 9	Discriminate adequate and disabled learners; compare predictive success of teacher ratings vs. cognitive control assessment; longitudinal	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	33	Girls, boys	White	Not known	Middle	9
7-11, X̄ = 9	Observe changes in cognitive controls in stress (hospital; dental office)	Leveling-Sharpening, Fable Test of Anxiety, Projective Tests of Aggression and Body Boundaries, Behavioral rating	45	Boys	White	95	Lower-middle	9
6	Public school kindergarten; compare adequate and at-risk learners	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	52	Girls, boys	White	Not known	Middle	6
6	Public school kindergarten; compare adequate and at-risk learners	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	184	Girls, boys	White	Not known	Middle	6
6	Public school kindergarten; compare adequate and at-risk learners	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	164	Girls, boys	White	Not known	Middle	6

6, 9	Public school; compare bilingual and monolingual	Field Articulation	25	Girls, boys	White	Not known	Middle	2
8	Public school; compare poor and adequate readers	Field Articulation	34	Girls, boys	White	96	Lower-middle	6
6-13	Compare public school, orphaned and brain damaged children	Focal Attention, Field Articulation, Leveling-Sharpening	44, 38, 44	Girls, boys	White	110, 104, 72	Lower-middle	6
8-10	Public school; compare cognitive controls and impulsive-reflectives	Focal Attention, Field Articulation, Leveling-Sharpening, Matching Familiar Figures	60	Girls, boys	White	75-140 $\bar{X}$ = 110	Lower-middle	6
8-13, $\bar{X}$ = 11	Compare adequate and poor readers	Focal Attention, Field Articulation, Leveling-Sharpening	47	Girls, boys	White	93-98	Lower-middle	6
12-15	Observe changes in cognitive control in glue intoxication	Leveling-Sharpening	33	Boys	Spanish-American	Not known	Lower	9
19	Observe changes in cognitive control in stress (parachute jumping; hospital)	Leveling-Sharpening	44, 46	Boys	White	College	Middle	9
19-24	College; relate cognitive controls and masculinity-femininity	Leveling-Sharpening, Gough scale of Masculinity-Femininity	45	Girls, boys	White	Not known	Middle	6
21	Observe changes in cognitive controls under stress of final exam	Leveling-Sharpening, Edwards Personal Preference Schedule	44	Girls, boys	White	College	Middle	9

III. Factor Analytic Studies

Age Levels	Population and Analysis	Tests; Cognitive Controls Assessed	N	Sex	Race	IQ	SES	Chapter
6	Public school kindergarteners	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort, Personality tests, Teacher ratings	184	Girls, boys	White	Not assessed	Middle	5
6	Public school kindergartners	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort, Personality tests, Teacher ratings	164	Girls, boys	White	Not assessed	Middle	5
7	Public school first graders	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort, Piagetian tasks, Neurological tasks, CTMM subtests	43	Girls, boys	White	Not assessed	Middle	5
7-12 $\bar{X}$ = 10	Public school	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Other cognitive tests	44	Girls, boys	White	70-124 $\bar{X}$ = 110	Lower-middle	5
6-13, $\bar{X}$ = 9	Orphaned; public school	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Other cognitive tests	38	Girls, boys	White	80-122 $\bar{X}$ = 104	Lower-middle	5
6-13, $\bar{X}$ = 11	Brain-damaged (residential center)	Fine Motor Delay, Focal Attention, Field Articulation, Other cognitive tests	44	Girls, boys	White	46-108 $\bar{X}$ = 72	Lower-middle	5
5-17, $\bar{X}$ = 12	Hospitalized for emotional disturbance	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort, WISC subtests	164	Girls, boys	White	61-125 $\bar{X}$ = 98	Lower to middle	5

IV. Correlational Studies

Age Levels	Population and Analysis	Tests; Cognitive Controls Assessed	N	Sex	Race	IQ	SES	Chapter
6	Public school kindergarteners; teacher ratings of cognitive controls	Motor delay with body activity , Focal attention and field articulation with paying attention leveling-sharpening and knowledge of classroom routine	121	Girls, boys	White	Average	Middle	6
6, 9, 12	Public school; correlation	Three test forms of leveling sharpening	60	Girls, boys	White	Average	Lower-middle	6
8	Public school poor and adequate reads; Fruit Distraction Test x Test of Attention	Field Articulation, Continuous Performance Test of Focal Attention	34	Girls, boys	White	96	Lower-middle	6
7-12	Public school; cognitive controls x cognitive tests	Focal Attention, Field Articulation, Leveling-Sharpening, Benton Visual Retention, Marble Board, Incomplete Figures	44	Girls, boys	White	70-124 $\bar{X}$ = 110	Lower-middle	6
10	Public school; cognitive controls x anxiety, achievement, intellectual responsibility	Focal Attention, Field Articulation, Leveling-Sharpening, Test Anxiety Scale, Achievement Motivation Scale, Intellectual Responsibility Scale	120	Boys	White	90-110	Lower-middle	6
14-16, $\bar{X}$ = 15	Public school; Fruit Distraction x Rod and Frame	Field Articulation, Rod and Frame	50	Girls, boys	White	Not known	Middle	6
19-24	College; leveling-sharpening x personal preference	Leveling-Sharpening, Edwards Personal Preference Schedule	45	Girls, boys	White	College	Middle	6
19	Novice parachutists; multiple test forms	Two forms Leveling-Sharpening Test	44	Boys	White	College	Middle	6

V. Sex Differences and Cognitive Controls

Age Levels	Population and Analysis	Tests; Cognitive Controls Assessed	N	Sex	Race	IQ	SES	Chapter
6	Public school kindergarten; adequate learners	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort	348	Girls, boys	White	Not assessed	Middle	6
5, 6, 7	Public school; poor learners; behavior problems	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening	96	Girls, boys	White, black	64-121 $\bar{X}$ = 95	Lower	6
6, 9, 12	Public school	Focal Attention, Field Articulation, Leveling-Sharpening	60	Girls, boys	White	Average	Lower-middle	6
8-10 $\bar{X}$ = 9	Public school	Focal Attention, Leveling-Sharpening, Field Articulation	44	Girls, boys	White	75-140 $\bar{X}$ = 110	Lower-middle	6
14-16 $\bar{X}$ = 15	Public school	Field Articulation	50	Girls, boys	White	Not known	Middle	6
19-24	College	Leveling-Sharpening	45	Girls, boys	White	Not known	Middle	6

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VI. Intelligence, Academic Achievement and Cognitive Controls

Age Levels	Populations and Analysis	Tests; Cognitive Controls Assessed	N	Sex	Race	IQ	SES	Chapter
5-9	Public school; poor learners; behavior problems; correlations	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, WISC subtests	96	Girls, boys	Black, white	64-121 $\bar{X}$ = 95	Lower-middle	6
6	Public school kindergarten ; factor analysis; with third and fourth grade achievement tests	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort, Otis-Lennon IQ Test ,Iowa Tests of Basic Skills	184	Girls, boys	White	Average	Middle	6
7	Public school; achievement factor	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort, CTMM subtests	43	Girls, boys	White	Average	Middle	6
6-13 $\bar{X}$ = 11	Brain-damaged (residential center); IQ factor	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, WISC subtests, Other cognitive tests	44	Girls, boys	White	46-108 $\bar{X}$ = 72	Lower-Middle	6
6-13, $\bar{X}$ = 9	Orphaned; public school; IQ factor	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, WISC subtests, Other cognitive tests	38	Girls, boys	White	80-122 $\bar{X}$ = 104	Lower-middle	6
6-17, $\bar{X}$ = 12	Hospitalized for emotional disturbances; IQ factor	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, Object Sort, WISC subtests	164	Girls, boys	White	61-125 $\bar{X}$ = 98	Lower-Middle	6
7-13; $\bar{X}$ = 9	Public school; IQ factor	Fine Motor Delay, Focal Attention, Field Articulation, Leveling-Sharpening, WISC subtests, Other cognitive tests	44	Girls, boys	White	70-124 $\bar{X}$ = 110	Lower-Middle	6
8-10	Public school; correlation	Focal Attention, Field Articulation, Leveling-Sharpening, WISC subtests	44	Girls, boys	White	75-140 $\bar{X}$ = 110	Lower-Middle	6
8-13	Public school; poor and adequate readers; correlation	Focal Attention, Field Articulation, Leveling-Sharpening, IPTA IQ	47	Boys	White	65-126 $\bar{X}$ = 98	Lower-Middle	6
10	Public school; correlation	Focal Attention, Field Articulation, Leveling-Sharpening, Stanford Achievement Tests	120	Boys	Black, white	90-110	Lower-Middle	6

APPENDIX B
DIAGNOSTIC TESTS FOR CLINICAL PRACTICE AND RESEARCH

This appendix describes material, procedures, and scoring of test methods used in a number of studies discussed earlier, especially in Chapters 5, 6, and 7. Unless otherwise indicated, test materials and record blanks are available from the author.

CIRCLES TEST OF FOCAL ATTENTION
Adopted from Piaget; see Santostefano (1963)

MATERIALS

Thirty-three cards, each containing a pair of circles drawn in black ink. On 22 cards one of the circles is surrounded by a larger (context) circle. Each pair consists of a standard circle and a variable circle. There are three sets of 11 cards, each set being defined by the standard circle used.

1. *No-Illusion Condition.* A standard circle with a diameter of 9 mm is paired with each of 11 variable circles ranging from 7 to 12 mm in diameter, in half-millimeter increments.

2. *Positive Illusion Condition.* A standard circle, 9 mm in diameter, surrounded by a circle 12 mm in diameter, is paired with each of the same 11 variables as in condition 1; the 12 mm circle that surrounds the standard typically creates an illusion causing the standard to appear larger than its actual size.

3. *Negative Illusion Condition.* A standard circle 9 mm in diameter, surrounded by a 45 mm circle, is paired with each of the same 11 variables as in condition 1; the 45 mm circle that surrounds the standard typically creates an illusion causing the standard to appear smaller than its actual size.

The 33 standard-variable pairs of circles are randomized for presentation; the left-right positions of the standard and variable circles are also randomized.

ADMINISTRATION

E places the notebook containing the cards before *S,* presents Card 1, and says, *With this test I am going to show you circles like these* (pointing), *and I want you to pick which one of the circles is the larger (bigger) one. Sometimes the circles may be the same size. If the two circles look the same size, tell me. Now look at these two;point to the bigger circle or tell me if they look the same. E* records the response and then turns to Card 2 and says, *Sometimes one of the circles will have another circle around it like this one.* (pointing) *When this is the case, you should compare the size of the inside circle with the size of the other circle and then point to the bigger one. Look at this circle and this one inside here. Which one is bigger, or do they look the same size?* Record the response. Continue presenting the remaining cards following the same procedure. If for any display it seems necessary to ensure that the child is making the correct comparison (especially with 5 to 8 year olds), say, *Look at this circle in here and this one. Which is bigger, or are they the same ?*

SCORING

Condition 1 (9 mm standard circle; no illusion). If the correct (larger) circle of any pair is selected, the score for that pair is zero. If the incorrect circle is selected, the following points are assigned for each error according to the size of the variable paired with the standard for that presentation.

Points for Incorrect Judgments	Variable (mm)
5	7
4	7.5
3	8
2	8.5
1	9
2	9.5
3	10
4	10.5
5	11

In this scoring system, the more different in size the two circles, the larger the score assigned, if the child chooses the smaller circle as the larger. If one of the pair of 9 mm circles is chosen as larger, an error score of 1 is assigned. Therefore a high score indicates "poor" performance in size estimation.

Condition 2 (9 mm standard circle surrounded by 12 mm context circle; positive illusion). If the larger circle is selected, the score is zero for that pair. If an error is made and the smaller circle is selected as larger, the error receives a positive or negative score according to the variable size paired with the standard. Since the context circle is expected to cause the standard circle to appear larger than its actual size, whenever the standard is selected as larger than the variables, from 9 to 11 mm, a positive score is assigned (from +1 to + 5). Whenever the standard is selected as smaller than the variables, from 9 to 7 mm, a negative score is assigned (from –1 to –5). The positive score indicates that the error (illusion) in size estimation occurred in the expected direction; the negative score indicates that the subject has erred in the direction opposite to that expected. Note again with the 9 mm variable that the score is + 1 if the standard is judged *larger* than the variable and –1 if the standard is judged *smaller.*

Points for Incorrect Judgments	Variable (mm)
-5	7
-4	7.5
-3	8

-2	8.5
± 1	9
+ 2	9.5
+ 3	10
+ 4	10.5
+ 5	11

The higher the positive score, the stronger the positive illusion experienced. A negative score indicates that the illusion was experienced in a direction opposite from the expected.

Condition 3 (9 mm standard circle surrounded by 45 mm context circle; negative illusion.) If the larger circle is selected, the score is zero for that pair. If an error is made (the smaller circle is selected as larger), the error receives a negative or positive score according to the variable size paired with the standard. Since the 45 mm context circle is expected to cause the standard circle to appear smaller than its actual size, whenever the standard is selected as smaller than the variable circles, from 9 to 7 mm a positive score is assigned (from +1 to + 5). Whenever the standard is selected as larger than the variable from 9 to 11 mm, a negative score is assigned (— 1 to — 5). A positive score indicates that the error in size estimation occurred in the expected direction; a negative score indicates an error (illusion) that is opposite to the expected direction.

Points for Incorrect Judgments	Variable (mm)
+ 5	7
+ 4	7.5
+ 3	8
+ 2	8.5
± 1	9
-2	9.5
-3	10
-4	10.5
-5	11

Once more, with the 9 mm variable the score is + 1 if the standard is judged *smaller* than the variable, and — 1 if the standard is judged *larger.*

The higher the positive score, the stronger the negative illusion experienced. A negative score indicates that the illusion was experienced in a direction opposite from the one expected.

RATIONALE

This test is assumed to assess the cognitive principle of focal attention. Broad and active scanners tend to show better performance in judging the relative size of circles because they deploy attention systematically and actively from one circle to the other in making comparisons between the two; narrow and passive scanners show relatively poor performance because they do not systematically deploy attention from one circle to the other, thereby maximizing the error of the standard (see Gardner, 1961, Santostefano, 1963, 1964a).

LEVELING-SHARPENING CIRCLE AND WAGON TESTS

MATERIALS

Memory drum with a viewer, 2x6 inches. Two metal spools, one containing the stimulus tape and the other collecting the stimulus tape, permit a continuous display of stimuli at fixed exposure times.

The Circles Test consists of 98 circles printed in a column on a tape and ranging in diameter from 7 to 20 mm, presented in 1 mm increments. Beginning with the 7 mm circle, each circle size is given four 3 second presentations in the memory drum before the next larger circle is presented.

The Wagon Test consists of a tape on which is printed a series of 24 pictures of a child's wagon (two-dimensional, line drawing). The wagon in its entirely is presented three times in succession. Following this, the wagon, with one detail omitted, is presented three times in succession. In the next three displays the same detail is omitted, plus another. In this way the following eight details are omitted accumulatively throughout the series: front wheel, which is partially obscured because of the perspective of the drawing; a line forming the back corner of the wagon; a line forming the front corner of the wagon; two lines forming the floor of the wagon; one half of the handle; two hubcaps; the other half of the handle; two circles forming the inside of the wheels.

ADMINISTRATION

With the Circles Test each circle is displayed for 3 seconds. The child is asked to view each presentation and to press a button whenever the circle displayed appears to be larger than the previous one. Similarly, each picture of the wagon is displayed for 3 seconds and the child is asked to press a button whenever the wagon displayed "looks different" from any of the previous pictures. When the button is pressed, the memory drum is stopped automatically. The examiner asks the child in what way the picture has changed. The response is recorded, and the memory drum is reactivated. With both tests, the child is presented all stimuli.

SCORING

Three scores are computed following the same procedure described in Chapter 10 for the Leveling-Sharpening House Test: the number of the display at which the child first perceives a correct change, the number of correct changes perceived, and the lag in detecting a change (the number of times a change is displayed before the child detects it).

RATIONALE

The child who perceives the first change early in the series, perceives many correct changes, and calls them out soon after they first appear, is viewed as characterized by the cognitive control process of sharpening; that is, articulate images of information are held in memory over time and are differentiated from existing information. The child who perceives the first change late in the series, perceives few changes, and notes these many displays after they first appear, is viewed as characterized by the process of leveling; that is, global images of information are held in memory over time and are fused with existing information.

STROMBERG DEXTERITY TEST (MODIFIED)

MATERIALS

Fifty-four circular wooden blocks (18 red, 18 yellow, 18 blue); form board (Figure 1) containing 54 circular recesses—18 colored red (left-hand third), 18 colored yellow (middle third), and 18 colored blue (right-hand third). The Stromberg Dexterity Test materials are available from The Psychological Corporation.

ADMINISTRATION

The test consists of three parts. In the first two the child takes the blocks one at a time, in a specified sequence, and places each block into a recess that is the same color as the block. In the third Part the child takes the blocks one at a time, in a specified sequence, and places each into a recess of a color different from the color of the block.

The left-hand matrices in Figure 1, show, the location of the blocks for each part of the test, the color of each, and the sequence in which they are taken. The right-hand matrices show the colors of the form board recesses and the specific recess into which a cutout is to be placed. Following Figure 1, in part 1 the child removes the cutouts by columns, from the bottom cutout to the top (alternating from red to yellow to blue cutouts) and from the right-hand column to the left. In part 2 the child removes the blocks by rows, alternating from blue to yellow to red, from right to left, and from the bottom row to the top. In part 3 the child again removes the blocks by columns, from the bottom cutout to the top, and from right to left, but as indicated, each cutout is now placed in a recess of a color different from that of the cutout.

Part 1. The blocks are arrayed in rows and columns to the left of the child, and the form board is to the right. As viewed by the child, the blocks are in the following order. The row of nine blocks nearest the child is red, and the remaining five rows moving from the child to the top row are yellow, blue, red, yellow, blue (Figure 1). Have *S* stand in front of the material and say, *This is a game to see how fast you can put all these colored blocks* (pointing) *into these* *colored holes,* (pointing) *Put only red blocks into red holes* (pointing), *yellow blocks into yellow holes here* (pointing), *and blue blocks here,* (pointing) *Pick up only one block at a time, starting with this red block. (E* picks up block 1 from the lower right-hand corner of the array and places it in recess 1, in the lower right-hand corner of the red area in the form board.) *And put it in here. Then you take the yellow block and put it in here. (E* picks up block 2 and places it in recess 2.) *Then take this blue block and put it in here. Then the red block in here. (E* places blocks 1 through 4 as indicated in Figure 1.) *E* then says, pointing to block 5 (blue), *Where would this one go* ? *You put it where it should go.* The child is then asked to place blocks 6 through 9. Additional explanations and clarifications are given as needed.

When the child places block 6, *E* says, *You see, we finished this column (stack) now we start down here,* (pointing to block 7). When 5 has placed blocks 7,8, and 9, *E* says, *That's fine. You know how the game goes. Now we'll put all these circles back and start the game. E* returns the blocks to their appropriate places and again reminds *S* to work as quickly as possible, saying, *Now remember, begin with this red block* (1) *and pick up all these blocks in this column. Then when you've put them in their holes, take the blocks from this column* (point to blocks 7 to 12) *and then from this column* (point to blocks 13 to 18), *and so on. Work as fast as you can, and pick up only one block at a time. Ready ... go!* For some children it may be necessary to substitute the words "row" or "stack" for column.

Record total time taken to complete this task. If the child makes an error either by picking up the wrong block or by placing a block in an incorrect recess, call his attention to the error and help him correct it at once, saying, *Look at this, do you think it's right?* Allow *S* to make corrections. The stopwatch continues running. These errors are recorded by *E* on the score sheet provided, as follows. If, the child picks up block 8 instead of block 7, draw an arrow from block 8 to block 7. If the child places block 7 in recess 11 rather than in recess 7, write the number "7" in recess 11. Record in a similar manner errors the child makes and spontaneously corrects. An error is said to occur when the child touches an incorrect block or touches an incorrect recess with a block.

Part 2. When the child has finished part 1, arrange the cutouts for part 2 as shown in Figure 1—that is, in columns alternating from blue to yellow to red from right to left. Say, *Let's do the game again. Put all the blocks into the holes, the blue blocks in the blue holes, the red blocks in the red holes, and the yellow blocks in the yellow holes. But this time we will take the blocks across the bottom row, then across the next row, and so on. Let me show you. E* takes block 1 and places it in recess 1 in the lower right-hand corner of the blue area; then block 2 into recess 2, and so on, until block 5 is located. *E* then picks up block 6 and says, *Where would this one go ?* The child is allowed to respond, and instructions are repeated or elaborated, as needed. The child then practices by locating blocks 6 through 10. Return the blocks and say, *Do you understand what you are to do this time? Take the blocks from the rows going across here* (pointing) *and put them in the holes, going up this way.* (pointing) *Ready . . . begin!* Scoring is the same as part 1.

Part 3. When the child has finished part 2, arrange the cutouts for part 3 as shown in Figure 1. The arrangement is the same as for part 1, with the cutouts alternating from red to yellow to blue by rows from the bottom row to the top. Say, *I'd like you to do this game once more. But this time we will put the blocks back into the holes in a different way.*

Put all the red blocks here in the blue holes (pointing), *all the yellow blocks here in the red holes* (pointing), *and all the blue blocks here in the yellow holes,* (pointing) *I'll show you what I mean. E* places blocks 1 through 4, commenting as needed. The child is asked to place blocks 5 through 9 for practice. Again *E* gives further guidance as needed to ensure that the child understands the task. The blocks are then returned to their respective columns. *Ready . . . begin!* Scoring is the same as for part 1.

Blocks:
Numbers indicate sequence
in which blocks are taken

B	54	48	42	36	30	24	18	12	6
Y	53	47	41	35	29	23	17	11	5
R	52	46	40	34	28	22	16	10	4
B	51	45	39	33	27	21	15	9	3
Y	50	44	38	32	26	20	14	8	2
R	49	43	37	31	25	19	13	7	1

Form-board recesses:
Numbers indicate location of each block

Red			Yellow			Blue		
52	34	16	53	35	17	54	36	18
49	31	13	50	32	14	51	33	15
46	28	10	47	29	11	48	30	12
43	25	7	44	26	8	45	27	9
40	22	4	41	23	5	42	24	6
37	19	1	38	20	2	39	21	3

Part 1

R	Y	B	R	Y	B	R	Y	B
54	53	52	51	50	49	48	47	46
45	44	43	42	41	40	39	38	37
36	35	34	33	32	31	30	29	28
27	26	25	24	23	22	21	20	19
18	17	16	15	14	13	12	11	10
9	8	7	6	5	4	3	2	1

Red			Yellow			Blue		
54	36	18	53	35	17	52	34	16
51	33	15	50	32	14	49	31	13
48	30	12	47	29	11	46	28	10
45	27	9	44	26	8	43	25	7
42	24	6	41	23	5	40	22	4
39	21	3	38	20	2	37	19	1

Part 2

B	54	48	42	36	30	24	18	12	6
Y	53	47	41	35	29	23	17	11	5
R	52	46	40	34	28	22	16	10	4
B	51	45	39	33	27	21	15	9	3
Y	50	44	38	32	26	20	14	8	2
R	49	43	37	31	25	19	13	7	1

Location of cutouts:
sequence in which cutouts are taken

Red			Yellow			Blue		
53	35	17	54	36	18	52	34	16
50	32	14	51	33	15	49	31	13
47	29	11	48	30	12	46	28	10
44	26	8	45	27	9	43	25	7
41	23	5	42	24	6	40	22	4
38	20	2	39	21	3	37	19	1

Location of recesses:
sequence in which cutouts are replaced

Part 3

Figure 1. Stromberg Dexterity Test (modified).

SCORING

E records total time taken by the child to complete each of the three parts. *E* also records on the record blank errors the child makes and spontaneously corrects, as well as errors that require correcting by *E.* An error occurs when *S* touches an incorrect block or touches an incorrect recess with a block. If *S* picks up an incorrect block and places it in an incorrect recess and does not correct the error spontaneously, *E* corrects *S* immediately, but the stopwatch continues running.

RATIONALE

In addition to involving motor coordination and dexterity, this test is viewed as involving the process of scanning a broad array of information. In parts 1 and 2 the field of information is divided into orderly, narrow segments by the sequence in which the cutouts are removed and the recesses in which they are located. The sequence used in part 3 divides the field into larger, less ordered segments, thus requires broader and more active scanning. In addition, the mismatch between the color of the block and the recess presents an element of distraction to be managed while locating the cutouts.

CONTINUOUS PERFORMANCE TEST OF ATTENTION

MATERIAL

Stimuli are displayed in a 1 x 5 inch viewer of a memory drum equipped with a button that rings a bell and activates electrical counters when it is depressed. Two stimulus strips are used to administer three different parts. The first strip contains six geometric shapes (circle, cross, star, square, diamond, X) in block figures 1 inch square. The shapes are randomized in 15 rows, four shapes in each row. The second strip contains letters of the alphabet printed in black, randomized over 15 rows, four letters in each row. The first strip is used for parts A and B. The strip containing letters of the alphabet is used for part C.

ADMINISTRATION

Part A. *E* seats *S* before the memory drum, places a sample strip on the viewer and says, *With this game you will see rows of designs like these in this window. Can you tell me what they are ? (S* labels each design.) *That's right. This row has a diamond, a circle, an X, and a square. I want you to press this button and ring this bell every time you see both a square and an X in the window with the other designs. (E* points and demonstrates.) *Would you ring the bell for this row? . . . That's right, you would, because a square and an X are in the row. (E* sets the next sample card on the viewer.) *Would you ring the bell when you see this row of designs? . . . That's right, you wouldn't, because there is a square but no X. Do you understand? As you watch the window, rows of designs will go by pretty fast, so watch closely. Keep your finger near the bell and ring it when you see an X and a square. You just need to touch the button to ring the bell. Let's try that for practice.* Allow the child to ring the bell several times. When he understands the task, remove the cover from the memory drum, exposing the viewer. Adjust the counters and set exposure time at 4 seconds. The stimulus is presented three times, resulting in 45 displays of rows of geometric shapes. Of the 45 displays, 9 contain both a square and an X and 27 contain either a square or an X. Record the child's responses to each row displayed on the record blank.

Part B. The same procedure and stimulus strip are used. The child is to ring the bell each time the row displayed contains a circle and a star. Of the 45 displays, 9 contain both a circle and a star among the four shapes, and 30 contain either a circle or a star among the four shapes.

Part C. The stimulus strip containing the letters of the alphabet is inserted into the memory drum. Using a sample card, the child is asked to name each of the letters; then he is instructed to ring the bell each time the row of letters displayed contains the letter "b." The stimulus strip is presented three times, resulting in 45 displays of rows of letters. Of the 45 displays, 12 contain the letter "b" and 12 contain either a "d" or a "p," which are most likely to result in incorrect responses. Each row is displayed for 4 seconds.

SCORING

E records the number of correct and incorrect responses for each part. The electrical counter determines whether the response occurred within the 4 second period.

RATIONALE

This procedure is purported to provide a measure of continuous attention. In addition, the requirement that rows of stimuli be surveyed in a short period of time is viewed as implicating the degree of activity and breadth of visual scanning.

AUTOKINETIC TEST

MATERIALS

A light-tight box, 7x9 inches, containing a bulb of low wattage, is placed 8 feet from a table at which the child is seated. An aperture of 1 mm at one end of the box emits a pinpoint of light when the bulb is turned on. On the table is a sheet of graph paper 22 x 28 inches held in place by tape. The paper is divided by markings 1 inch square. An automatic timer activated by *E* turns on the pinpoint of light while simultaneously extinguishing the lights in the testing room. During the procedure, the room is totally dark except for the pinpoint of light. *S* is provided with a pencil.

ADMINISTRATION

E seats the child comfortably at the desk. *This game is like watching a star in the sky at night. When we play the game the lights will be out like this.* (*E* turns out the lights for a few seconds.) *I'll be in the room with you, and there's nothing to be afraid of. When the lights go out, you will see in front of you a spot of light like this.* (*E* turns out the lights again and displays the spot of light for a few seconds.) For children 5 to 8 years old say, *Let's make believe the light is a* *star in the sky.* (and substitute "star" for "light" in the remaining instructions) *When this spot of light is shining, I want you to watch it. Try to keep looking at it. After a while the spot of light may begin to move. If it moves, I want you to draw a line on that paper, showing me where the light goes. Now let's practice a little, so you'll know what I mean. E* gives the child a pencil and a sheet of practice paper and asks the child to place the pencil point on the X in the center of the paper. *E* stands by the apparatus, holding up a dime.

Now let's make believe this dime is the spot of light and that X under your pencil is the place where this light is in the sky. Suppose it moves here. (E lowers the dime approximately 6 inches.) *What would you do? (E* notes whether the child draws a line from the X toward the lower edge of the paper.) If the child does not understand, *E* guides the child's hand, explaining, *Since the light moved down, we show where it goes by drawing a line down. . . . That's fine. Now suppose the spot of light moves over here. (E* moves the coin approximately 6 inches to the right of the previous location.) *What would you do?* Again *E* ensures that the child performs appropriately, explaining or demonstrating when necessary.

That's fine. Now I'd like to explain one more thing. Suppose the spot of light moves and then stops. If the light stops, I want you to make a dot for me on the paper. Let's try it again, so you'll see what I mean. See, the spot of light is moving from here to here. (E moves the coin from right to left.) *Now it stops here. What would you do? (E* ensures that the child has made a dot with his pencil.) *Now what if it moves to here?* After holding the coin still for a moment, *E* moves it upward. *What would you do? . . . That's right. From the dot you just made, you would make another line that moves up showing me where the light goes. E* supplies demonstration and allows practice as needed.

That's fine. Do you understand what I'd like you to do ? Now I'm going to turn the lights off. You will see that spot of light I told you about. Keep watching the light. If it moves, draw a line showing me where it goes. If it stops, make a dot showing me where it stopped.

E activates the timer and stands near the child. Approximately 1 minute after the timer is activated *E* says, *Try very hard to keep watching the light. Try not to take your eyes away from it.* This is the only comment *E* makes during the 5 minute test trial, except on occasions when the child becomes especially frightened or so confused that it does not seem appropriate to continue with the test. However if the child requires support, *E* should make whatever comments seem necessary to enable the child to complete the task.

SCORING

Three measures are taken: the length of the line drawn, the number or stops marked (dots), and the number of 1 inch squares transversed.

RATIONALE

This test is assumed to provide a measure of the cognitive principle of tolerance for unrealistic experiences

(Gardner et al., 1959).

MEMORY FOR SPATIAL ORIENTATION OF DESIGNS

MATERIALS

Projector and screen; 48 slides arranged in pairs. The first slide of each pair presents the standard, a geometric shape; the second slide contains four presentations of the stimulus; three have been rotated either 45°, 90°, or 180°, and one replicates the position of the standard. The standard and the responses are projected for 5 seconds each.

ADMINISTRATION

The child is seated approximately 8 feet from the screen. *I'm going to show you some designs on the screen. First I'll show you one design like this. (E* holds sample standard against screen.) *Then I'll show you a row of designs like this. (E* holds sample responses against screen.) *Do you see, all these designs are just like the one you saw a little while ago, but some of them have been turned around. Can you tell me which one is just like the one I showed you before ? (E* provides additional instructions as needed to ensure that the child understands the task.) *Fine. Now I'll show you a lot of designs. First the one you need to remember, and then four of them. And you point to the one that is just like the first one you saw. The designs will be on the screen for only a little while, so you should try to look at them quickly and decide.* After each presentation, record the child's response on the record blank.

SCORING

The score is the number of correct responses. Types of error are also evaluated (e.g., consistently choosing a response that is rotated 180°).

RATIONALE

This test is assumed to assess the accuracy with which information is held in memory.

BENTON VISUAL RETENTION TEST
By Arthur L. Benton (1955)

MATERIALS

Ten geometric designs (Form C of the Benton Visual Retention Test); printed on 5 x 8 inch cards. Each design except the first two consists of two central major figures and a peripheral minor figure that is smaller than either of the central figures. The child is provided with sheets of 5 x 8 inch paper and a pencil. Each design is displayed for 5 seconds, then removed. After a delay of 15 seconds, the child draws the design from memory on the sheet of paper provided. Only one design is drawn on a sheet of paper.

ADMINISTRATION

Seat the child comfortably at a table. *With this game, I'm going to show you a design. I want you to study it while I hold it in front of you. Then I will take it away. Try to remember the design that you looked at. After a few seconds I will give you a sheet of paper and a pencil and ask you to draw the design. Let's try one for practice.* Present the child with the practice card containing a rectangle and say, *Now here's a design. Study it as long as I'm holding it in front of you.* Remove the card after 5 seconds and say, *Now we 're going to wait before I ask you to draw it.* After a 15 second delay, present the child with a sheet of paper and a pencil and say, *Now draw the design I showed you. Make it exactly the way you saw it.* After *S* has finished the drawing say, *Do you understand? I'll show you a design, you study it, then I'll ask you to draw it from memory.*

After this practice trial, each card is presented without comment with one exception. Before introducing Card 3, which is the first to include two major figures and peripheral minor figure, say, *Draw everything you see.* If the child omits the peripheral minor figure in drawing Card 3, *E* should make the same comment before introducing Card 4. After Card 4, no further comments are made. It is usually effective not to present the child with the pencil and sheet of paper until the end of the 15 second delay. Some children, who find it difficult to wait, will begin to draw before the end of the delay if given the paper sooner. Sometimes a child attempts to converse with *E* during the delay period. *E* should tactfully discourage this by asking the child to concentrate on the design in mind.

SCORING

The child's drawings are scored following the system described by Benton in the test manual. In general, there are two scoring categories. The first is the number of correct reproductions. The second system (error score) evaluates the types of errors made; omissions and additions, distortions, perseverations, rotations, misplacements, changes in size.

RATIONALE

The test is assumed to provide a measure of the accuracy with which information is held in memory.

EXPLODED BLOCK DESIGN TEST

MATERIALS

Form board containing nine square recesses arrayed in three columns and three rows, 3 inches apart; Goldstein-Scheerer Colored Cubes (Psychological Corporation). The designs to be constructed, by placing cubes into the form board, are taken from the Goldstein-Scheerer Cube Test (1941) and from the Block Design Test of the WISC. Two forms are used. Form A consists of 10 designs printed without lines demarking the individual blocks that make up the design. Form B consists of the same designs as Form A, but lines demark the individual blocks, showing the separate parts that make up the total design. The designs increase in difficulty from the first to the tenth. Figure 2 shows the number of blocks and colors used to form each design.

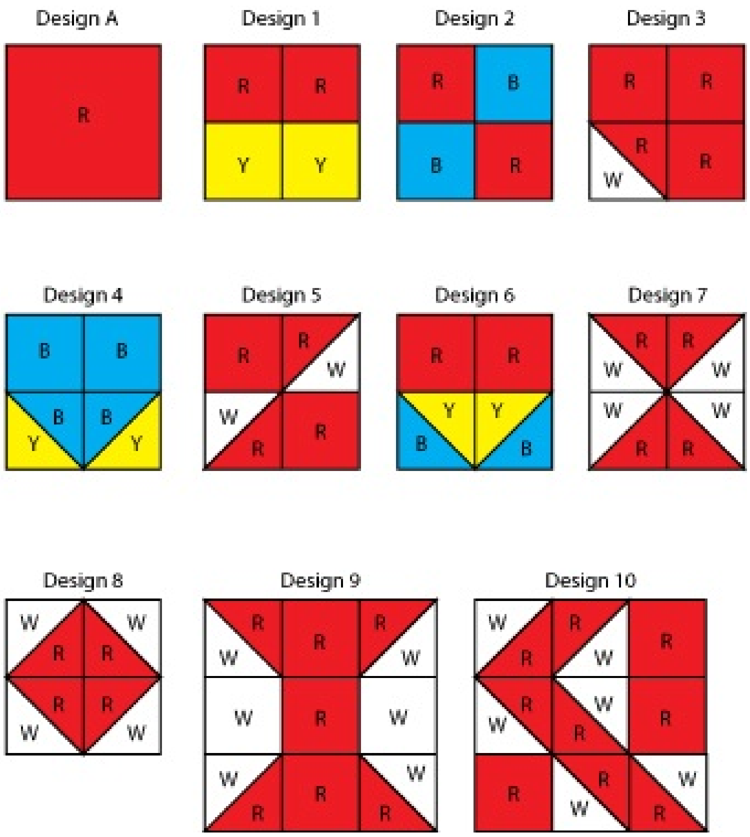

Figure 2. Exploded Block Design Test: R, red block; Y, yellow block; B, blue block; W, white block.

In general the child is asked to copy the designs by setting four blocks into the board (designs 1 through 7) or nine blocks (designs 8 through 10) so that if they were juxtaposed, they would form the design displayed on the card.

This test was developed in collaboration with Dr. Graham Sterritt.

ADMINISTRATION

Form A. Place the form board, four of the Goldstein-Scheerer cubes, and practice design A before the child. Be sure an L-shaped cardboard lid covers the form board, making only four of the recesses available to the child. Do *you see these blocks? We're going to put them in these four holes, so if we push them together they will look just like this design on the card. I'll show you how.* (*E* places the four blocks so that the top surface is red.) *See the top of these blocks? They're all red, and if we pushed the blocks together, do you think it would look like this design? S* should be allowed to respond; whether *S* indicates that he does or does not understand, *E* removes the four blocks from the recesses and pushes them together, demonstrating. *Does the top of these blocks look like this design ? . . . Fine.* Be sure not to mention during the demonstration the analysis that is required (i.e., do not say, "The corner of the design here would be this block over here.").

If *S* appears to understand, give him the four blocks asking him to make practice design A. If he succeeds, administer design 1. If S fails practice design A, demonstrate again using practice design B and ask *S* to try a second time. Whether *S* passes or fails practice design B, continue with design 1.

Present *S* with design 1 of Form A and mix the blocks. *Here's another one. We're going to put the blocks in these four holes, so if we push the blocks together, they would look like the design on this card. I'll show you how first, and then I'll ask you to try it. E* assembles the blocks, again being careful not to mention the analytic process required—not pointing out, for example, that the yellow block placed in the lower, left-hand recess corresponds to the yellow section of the lower left quadrant of the design. Say, *Do you see ? If we push these four blocks together, do you think they would look like this card?* After the child responds, *E* pushes the four blocks together to demonstrate. *E* then shuffles the blocks and says, *Now you try it. Pick up one block at a time and put them in these holes so if they're pushed together they will make this design.* Record the time the child takes to complete the design and the design that is constructed.

E does not demonstrate after this point in the test. When *S* has finished working with design 1, *E* presents each of the remaining designs, saying only, *Here's another one. Put the blocks in these holes, so that if they're pushed together, they will look like this design.* The latter part of this instruction may be omitted if the child appears to understand the concept that if the blocks are juxtaposed, they will form the design. *E* continues with Form A until *S* has failed three successive designs. If designs 8 to 10 are administered, *E* removes the lid, exposing all nine recesses, and provides the child with the remaining five blocks saying, *Now with this next design, you need all these blocks. There are nine of them. See if you can put them in all these holes so that if they're pushed together, they will look like the design on this card.*

Form B. The designs of Form B are the same as Form A, but they are divided by lines into squares corresponding to the blocks required for the construction of the design. After the child has completed the designs of Form A, the designs of Form B are given only when the corresponding design of Form A has been failed. For example, if a child failed designs 1, 3, 4, 5, causing the test to be discontinued because of the three successive failures, *E* administers designs 1, 3, 4, 5 of Form B (omitting design 2, since this was passed successfully on Form A). With this child *E* continues with Form B beyond design 6 until 5 fails three successive designs. By way of another example, if *S* failed designs 5, 6, and 7 but passed all the preceding designs, *E* would begin From B with design 5 and continue until the child had failed three successive designs. With Form B, *E* gives no demonstrations or help of any kind. With Form B, *E* says, *I'd like you to try some of these designs again for me.* (presenting the first design for that particular *S) Notice that this time the design has lines that divide it up* (or *cut it up,* if the child is younger) *into blocks. See if you can put the blocks in these holes, so if they're pushed together they look like that design.*

SCORING

Record *S's* performance on the appropriate form, noting any changes *S* may make after starting his production. Time taken to complete each design is also recorded.

RATIONALE

This test is assumed to yield measures of the cognitive principle of field articulation.

INCOMPLETE FIGURES TEST

MATERIALS

Six geometric designs are made up of two overlapping figures, each presented on a sheet of paper 7 x 8 inches. Each figure is partially drawn by discontinuous lines. See Figure 3 for samples of two designs. In general, the child is asked to complete the design by connecting the partial lines with a pencil.

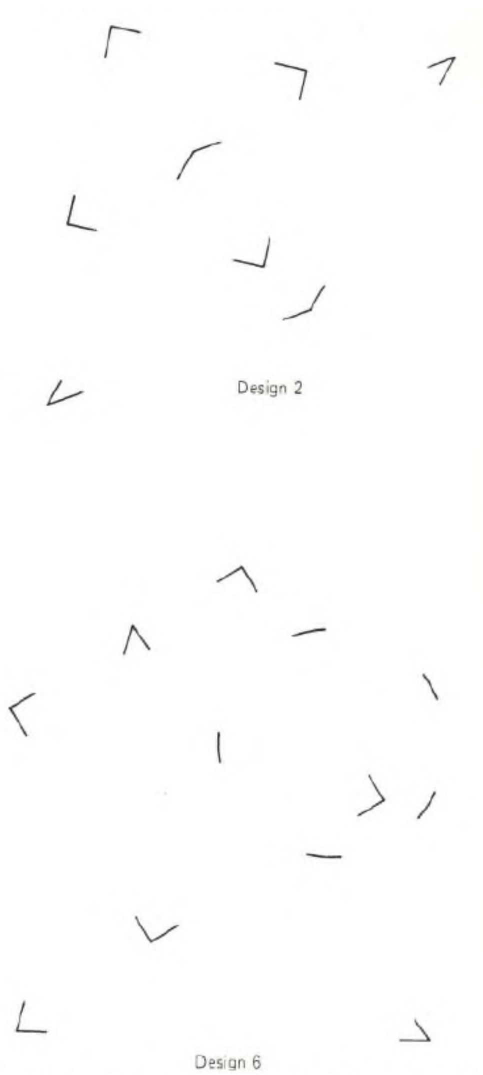

Figure 3. Two of the six designs from the Incomplete Figures Test.

ADMINISTRATION

E places the test booklet and a pencil before *S* and turns to design 1 saying, *See this design? It isn't finished. It isn't all there. You finish it with this pencil; make it the way it should be.* These instructions are given with each design, if necessary. If a child asks for more direction, *E* limits comments to, *Just make it the way you think it should be. You finish it the way you think it ought to look.*

SCORING

During the administration, *E* records time taken to complete each design. In addition, the following criteria are used to assign values to each of the designs produced:

Accuracy Score	Criteria
5	Total reproduction is accurate in all respects.
4	One of the subforms is correct in all respects, but parts of the other subform have been omitted; there are no inappropriate connections. An inappropriate connection is defined by a line drawn from one line-segment to an incorrect line segment, given the actual configuration of the subforms.
3	One of the subforms is correct in all respects, the other subform is not marked; one subform is correct, but in addition there are one or more inappropriate connections.
2	One or more connections between line segments have been made correctly, but neither subform has been completed; there are no inappropriate connections.
1	The design shows one or more appropriate connections. In addition, it contains one or more inappropriate connections. There must be at least one appropriate connection indicating that S perceives the directional properties of a line segment. Moreover, S must make an appropriate connection that does not constitute an element of the periphery of either the total form or one of the subforms. Therefore connecting all the peripheral line segments is not scored a 1 unless at least one appropriate connection is made between two line segments that generate a line not in the periphery of the figure.
0	Any one of the following: (a) only peripheral line segments are connected, (b) line segments are circled; no lines are generated, (c) all lines generated constitute inappropriate connections, (d) in general, no comprehension is demonstrated that lines connecting the segments are necessary to construct the Gestalts.

RATIONALE

This test is assumed to yield measures related to the principle of field articulation. Unrelated and surrounding line segments represent distracting cues that interfere with generating a line from one line segment to the next appropriate line segment. As seem to be "drawn or pulled," when generating a line toward nearby but inappropriate line segments. In addition, the line segments and their interrelationships must be articulated and integrated cognitively for the subforms to be "seen" or for the directional properties of line segments to be appreciated and comprehended.

MARBLE BOARD TEST

MATERIALS

The Marble Board Test is described in Volume I of the *Psychopathology and Education of the Brain- Injured Child*

(Strauss and Lehtinen, 1947). The form board is made of plywood, painted gray; it is f inch thick and 11 inches along each side. There are 10 rows of 10 holes, the center of each hole is 1 inch from the adjacent hole, and each hole is f inch in diameter. *S* is given a container filled with black marbles. The stimuli consist of eight configurations, each constructed on a marble board identical to the one used by the child (see Figure 4). In general *S* is asked to examine the stimulus configuration presented and to construct the configuration with the marbles and the marble board provided. The stimulus is present throughout *S'*s performance.

ADMINISTRATION

Place the marble board and container of marbles before *S.* As you place Marble Board 1, containing design 1, before *S,* say, *I made something on this board with some marbles just like yours. Do you see this design? You make a design on this board with these marbles so it's just like mine,* If *S* does not appear to understand, say, *You just take your marbles and put them in your board so they look just like mine.* Testing is stopped after three successive failures.

SCORING

E keeps a continuous record of S's performance by writing numbers consecutively in the squares of the record form (Figure 4) to indicate the sequence in which marbles are placed and their locations. Two scoring procedures are used. The first (number of correct reproductions) provides a measure of overall accuracy. A score of 0 or 1 is assigned to each performance, according to whether the production by *S* replicates exactly the stimulus design. The second scoring system is adapted from one reported by S. Goldenberg (*Some Aspects of Cerebral Damage in Children*, doctoral dissertation, University of Washington, 1955) in which the method used by *S* to construct a design is evaluated. The method *S* employs to construct each design is rated as *continuous, segmental,* or *incoherent* as follows.

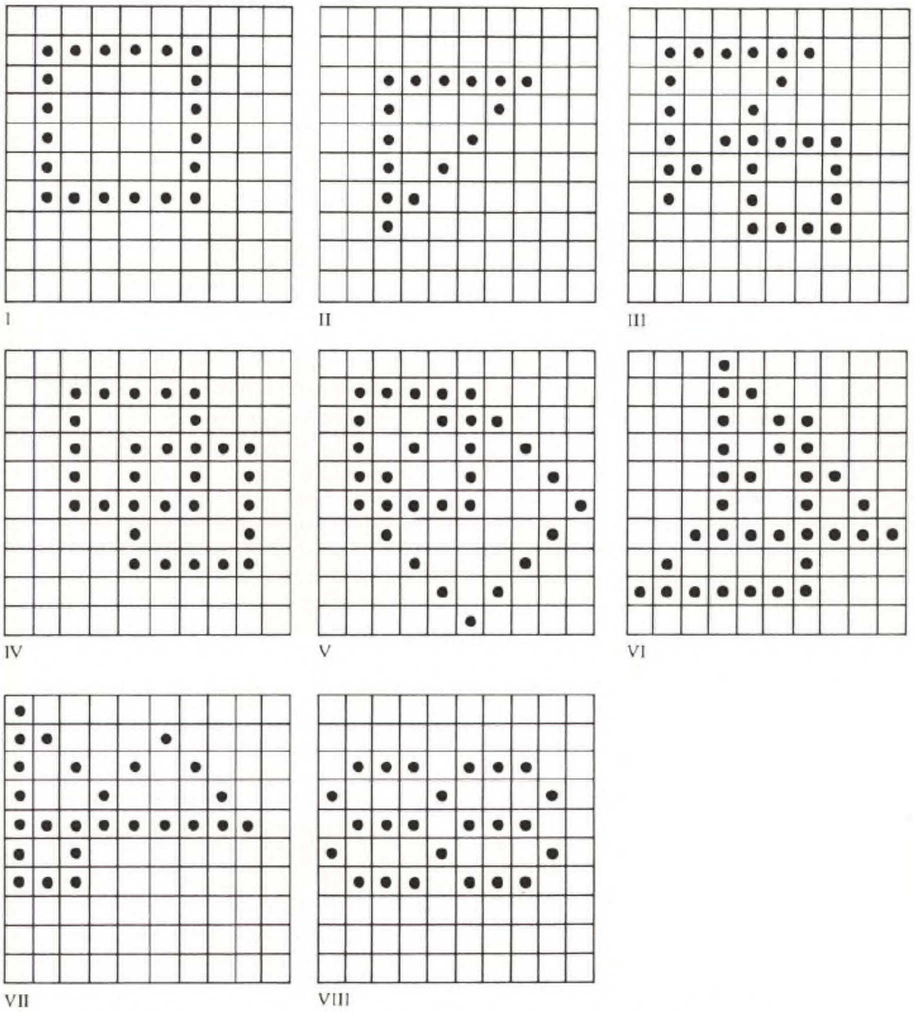

Figure 4. Standards presented to be copied on the Marble Board Test.

Scoring Rules: Method of Construction; Goldenberg Version

CONTINUOUS. Consecutive placement of adjacent marbles proceeding in a single direction of movement (a) along the configuration outline (composed of one or more component subforms) to completion of configuration; (b) along outlines of primary subforms, each completed with a single direction of movement.

SEGMENTAL. Two or more series of consecutive placements of adjacent marbles (a) along one or more sides of a subform; (b) each series, in relation to marbles already placed, must terminate at an angle of the subform or configuration and must be composed of units of sides; (c) successive series may be on the same or different primary subforms; *(d)* where a series corresponds to a side of a *secondary* subform (a subform not composed of complete sides of primary subforms), that subform must be completed in successive steps. One or more of these consecutive steps may form a side or sides of a primary subform as well; *(e)* a single series may include sides of different subforms.

INCOHERENT, (a) Not qualifying as one of the foregoing methods; *(b)* one or more series of placements not composed of complete sides of figures, or ending at other than an angle of the pattern, excepting the series that complete a side by terminating at other than the end of the side; (c) isolated placement of single marbles, except (i) where the isolated placement completes a figure or subform or (ii) as parts of several “balancing” placements, these confined to only the first subform attempted and constituting less than 50% of the placements in that subform; (**d)** when used as corner reference points in the first three or four placements of a triangle or square, respectively.

NOTE, (a) Where nonadjacent *but consecutive* placements are in the same direction of movement, they are to be considered as parts of a consecutive placement of *adjacent* marbles. This is intended to apply to situations (i) where consecutive placements cannot be adjacent because of previously placed intervening marbles, (ii) where the consecutive placements inaccurately represent a side of a figure composed of adjacent marbles, (iii) in scoring-design 8. (**b**) When one subform is continuous and the other is segmental, the performance with that design is scored segmental, (c) Balancing refers to the alternate placement of single marbles along two sides away from their point of intersection, *(d)* Reference points are, for example, the placement of the first three marbles at the angles of a triangle.

RATIONALE

The test is assumed to provide measures relating to the cognitive control principle of field articulation.

SANTOSTEFANO TESTS FOR ASSESSING MOTIVES IN CHILDREN

Three tests were devised to assess motives in children in each of three behavioral modalities: action, fantasy, and language. The rationale and evidence supporting the validity and reliability of the methods are presented elsewhere (Santostefano, 1977, 1970, 1965, 1962; Santostefano and Wilson, 1968; Blaisdell, 1972; Eichler, 1971; Stoops, 1974). The procedures are also discussed in Chapter 2. In general the items constructed for each test and the scoring system are designed to provide measures of the developmental level or degree of delay, of directness, and social appropriateness characterizing expressions of a motive in behaviors involving action, fantasy, and language. It is recommended that the tests be used as a single procedure, although only one test of course can be used to assess a single modality.

Introductory instructions for all three tests are followed by instructions specific to each test, including descriptions of materials. If the three tests are being considered for a research study, the investigator may wish to counterbalance the sequence of administration (e.g., giving the action test, the fantasy test, and the language test to half the group, and the language test, the fantasy test, and the action test to the other half). Meaningful order efforts have been observed (Eichler, 1971).

GENERAL COMMENTS

These instructions are spoken by *E* after sufficient rapport has been established with the child.

I'm going to give you different games to play. Each game has more than one part. With each game, you will always play all the parts, but I want you to play first the part you feel like playing most of all. Try to keep in mind that all the parts of a game are right. There are no right answers or wrong answers with these games. I am interested in which games you feel like playing first then second, and so on. I will explain each of the games to you as we go along.

The introduction serves to construct a test attitude in the child necessary for these procedures. The language of the introduction should be modified to suit the child, but *E* should ensure that each of the main points is covered: *(a)* each game has more than one part, (b) the child will always play all the parts, (e) the child is to play first the part he prefers to do most, *(d)* there are no right or wrong answers, (e) the examiner is interested in which games the child feels like playing first, second, and third.

Similarly, the instructions for each of the three tests should be modified to suit the child's age, language style, and so on. The aim is to ensure that the child understands what the games are about and what he is expected to do.

The sequence of instructions given here for each battery or the sequence of items within a test may not suit the sequence to be employed in a particular study or clinical evaluation. Moreover, if the test is being used in a research project, the examiner may wish to systematically control the left-right location of the materials placed before the child, as well as the order in which the items are administered. The latter is important for research studies because order effects have been observed (Eichler, 1971).

Miniature Situations Test of Action Aggression (MST)

INSTRUCTIONS

Seat the child at a table and say, *With the next game you are going to play, each game has three parts. You will play all three parts, but I want you to play first the part you feel like playing most of all. After you play that game, there will be two parts left, so you would go ahead and play whichever one of the two parts you want to play next. And then you will play the last game that is left. This first game will give you an idea.*

Item 1. *E* places three sheets of paper (8½ x 11 inches) and a pair of scissors before the child and says, *With this game* (pointing) *you can rip up this sheet of paper. With this game* (pointing) *you can crumple up this sheet of paper. And with this game* (pointing) *you can cut this piece of paper in half along the line. Go ahead and do the one you want to do most of all.* After the child has performed one of the games, *E* removes the material and says, *Now there are two games left. Go ahead and do the one you feel like doing next.* When the child has completed his response, *E* removes the material and says, *Now go ahead and do the last game.*

E then says, *All the games will be like the one we just played, there will be three parts, and you do first the one you feel like doing the most.*

INQUIRY. After each item has been completed, an inquiry is conducted designed to obtain the child's reasons for the sequence of actions performed and to gather fantasies and associations that occur to the child after having performed the actions. The purpose of the last phase of the inquiry is to evaluate the child's view of the reactions and standards of authority in response to aggression. There are three steps to the inquiry:

1. *Can you tell me why you felt like playing that one most of all?* This question frequently leads to verbalizations that relate to the second part of the inquiry.

2. To obtain the child's associations, *E* says, *What does this game remind you of? What ideas do you want to tell me about this game* **?** In this way the child is allowed to select any one of the parts as the source of his associations. For example, if the child comments that cutting the paper reminded him of school, the examiner may bring the child's attention to the other parts and ask what crumpling paper reminded him of, then ripping paper.

The goal is to obtain a brief association to each of the items. In addition to evaluating the content of the child's associations, these responses help the investigator to determine the degree to which the child includes language and representational elements in his primarily action responses. One child has little or nothing to say following his actions and does not produce fantasies; another child constructs elaborate fantasies following his action aggressions. For this reason, then, one needs to keep relatively constant the amount of time and encouragement given each child during the inquiry. If a child seems to have little or nothing to say, this should be accepted with a comment such as, *That's fine. This game just doesn't remind you of anything.*

3. With the third step of the inquiry, the examiner says, I *want you to take a guess. Which game do you think I wanted you to play first?*

After the inquiry has been completed, each of the remaining four items is administered and an inquiry is conducted in a similar manner. The materials used in each item are apparent from the instructions.

Item 2. *Now with this game, one part is you can hit the enemy soldier with this stick,* (pointing) *The other is you can stab the enemy soldier in the back with this dagger,* (pointing) *The other part is you can tie the enemy soldier with this rope. Do the one you feel like doing most of all first.*

Item 3. *With the next game, one part is you can cut this playdough in half with the knife,* (pointing) *Another part is you can open this envelope with the knife,* (pointing) *Another part is you can cut the top of this drum with the knife* (pointing). *Do the one you feel like doing most of all first.*

Item 4. *With the next game, one part is you can stick a pin in the map where* (*Boston*) *is.* (E points to the star on map) *Another part is you can break this balloon with the pin* (pointing). *Another part is you can throw the dart at the target and try to stick the bull's eye.* (pointing) *Do the one you feel like doing most first.*

Item 5. *With this next game, one part is you can take the screwdriver and turn the screw into the wood.* (pointing) *Another part is you can hammer the nail into the wood,* (pointing) *Another part is you can break this lightbulb.* (pointing) *Do the one you feel like doing most of all first.*

SCORING (SEE FIGURE 5)

Each item receives a score from 1 to 6 as determined by the sequence in which the actions were performed. For example, if a child first cuts the paper, crumples the second sheet, and tears the third, a score of 6 is assigned, indicating that a high degree of delay, indirectness, and social appropriateness characterized the actions performed to express aggression. If the child first tears, then crumples, then cuts, a score of 1 is assigned, indicating that little delay and indirectness characterized the actions. The five scores assigned are summed and averaged, providing a mean action-aggression score. In addition, a weighting system has been developed (Figure 5) to distinguish between, for example, stabbing a soldier doll and tearing a sheet of paper. The former is viewed as a more direct and impulsive action expression of aggression than the latter. In this scoring system "the combined item score," the sequence of actions performed with each item, again receives a score. However the score assigned to each item is influenced by the extent to which the actions are judged to be more primitive or sublimated relative to the other actions. Again a low score indicates impulsivity and directness (developmental immaturity), and a high score directness and delay (developmental maturity).

Item	Combined Item Score	Single Item Score	Order of Choices		
			First	Second	Third
Soldier	1	1	Stab	Hit	Tie
	2	2	Stab	Tie	Hit
	9	3	Hit	Stab	Tie
	10	4	Hit	Tie	Stab
	17	5	Tie	Stab	Hit
	18	6	Tie	Hit	Stab
Drum	3	1	Drum	Dough	Envelope
	4	2	Drum	Envelope	Dough
	11	3	Dough	Drum	Envelope
	12	4	Dough	Envelope	Drum
	19	5	Envelope	Drum	Dough
	20	6	Envelope	Dough	Drum
Bulb	5	1	Bulb	Nail	Screw
	6	2	Bulb	Screw	Nail
	13	3	Nail	Bulb	Screw
	14	4	Nail	Screw	Bulb

	21	5	Screw	Bulb	Nail
	22	6	Screw	Nail	Bulb
Balloon	7	1	Balloon	Dart	Map
	8	2	Balloon	Map	Dart
	15	3	Dart	Balloon	Map
	16	4	Dart	Map	Balloon
	23	5	Map	Balloon	Dart
	24	6	Map	Dart	Balloon
Paper	—	1	Rip	Crumple	Cut
	—	2	Rip	Cut	Crumple
	—	3	Crumple	Rip	Cut
	—	4	Crumple	Cut	Rip
	—	5	Cut	Rip	Crumple
	—	6	Cut	Crumple	Rip

Figure 5. Scoring system for the Miniature Situations Test of Action Aggression.

Structured Fantasy Test of Aggression (SFT)

INSTRUCTIONS

The child is seated at a table. Each test item consists of a stimulus picture and three response pictures. *Now, with the next game I will show you four pictures at a time that tell a story. Each story will have a beginning like this.* (*E* places the stimulus picture item A before *S) You see, this picture shows a boat tied to a dock and a storm is coming,* (pointing) *Now, I want you to pick one picture from these (E* places the three response pictures before the child) *that you feel tells the rest of the story best. You see, in this picture lightning smashes the mast of the boat* (pointing). *With this picture a big wave comes and tips the boat over,* (pointing) *And with this picture the wind knocks the boat against the dock,* (pointing) *Pick which one of these you imagine tells the rest of the story best. Remember, there are no right or wrong answers. All these are right. I want you to pick the one you imagine tells best what happens. Put the picture here, next to the first one.* After the child has responded, *E* removes that picture and says, *Fine, now there are two pictures left. Which one of these two do you think tells next best what happens after the storm comes. . . . Fine. Now, you have one more left. Put that next to the first picture. E* should have the child place the last picture by the stimulus picture, to convey that he has available and will make use of all three alternatives.

INQUIRY. E replaces all the pictures before the child and says, *What other ideas do you have about this story ? What else do you want to tell me about it?* If a child remains silent or says “OK,” “I don’t know,” and so on, this is accepted. If a child is very verbal, *E* should limit the discussion to about a minute or two.

In administering each of the following items, *E* also places the stimulus picture before the child first, while giving the brief theme of the story. Following this, the three response pictures are placed before the child in the sequence indicated by the protocol. The procedure outlined with training item A is followed. The child makes his three choices and is asked for fantasies and elaborations. Any spontaneous comment by the child during the item should be recorded.

Item 1. (place card) *This is a story about two cowboys facing each other. How does the rest of the story go? Does one cowboy punch the other one?* (pointing) *Do the cowboys race to see who is faster ?* (pointing) *Or, does one cowboy shoot the other one ?* (pointing)

Item 2. (place card) *This is a story about a boy who is lying on the sidewalk, and this man finds him. What do you think tells best what happened? Did the wind knock him down ?* (pointing) *Did a bigger boy hit him on the head?* (pointing) *Did a bigger boy trip him?* (pointing)

Item 3. (place card) *This is a story about a man in the woods who sees a wolf. Which picture do you think tells best what happens? Does he yell at the wolf to chase it away?* (pointing) *Does he throw a stick at the wolf to chase it away ?* (pointing) *Does he shoot the wolf?* (pointing)

Item 4. (place card). *This is a story about a boy who's coming home from a baseball game and his team lost. Which picture do you think tells best what happens. Does he put a dent in the fender of the car with his baseball bat?* (pointing) *Does he smash the windshield of the car with his bat ?* (pointing) *Does he let the air out of the tires?* (pointing)

Item 5. (place card) *This is a story about a dog who hurt his paw and this boy found him. Which picture do you think tells best what happened? Did another dog bite his paw ?* (pointing) *Did a porcupine stick his paw?* (pointing) *Did he step on a sharp rock?* (pointing)

SCORING (FIGURE 6)

Each item receives a score from 1 to 6 in the single item score and a score from 1 to 30 in the combined item score. Each score is then divided by the number of items (5) to obtain an average score. The rationale of scoring is the same as the one used with the MST, assessing the action mode. A score of 1 is assigned when the child selects first, for example, the version in which one cowboy shoots the other; then that one punches the other, and last that they are riding their horses in a race. The sequence of fantasies is taken as characterizing impulsivity, directness, and social inappropriateness. The opposite sequence receives a score of 6. Therefore a low score is interpreted as indicating developmental immaturity in delay and sublimation within the fantasy mode, a high score developmental maturity in delay and sublimation.

Item	Combined Item Score	Single Item Score	Order of Pictures Selected		
			First	Second	Third

Cowboy	1	1	Shoot	Punch	Race
	2	2	Shoot	Race	Punch
	11	3	Punch	Shoot	Race
	12	4	Punch	Race	Shoot
	21	5	Race	Shoot	Punch
	22	6	Race	Punch	Shoot
Boy	3	1	Blackjack	Trip	Wind
	4	2	Blackjack	Wind	Trip
	13	3	Trip	Blackjack	Wind
	14	4	Trip	Wind	Blackjack
	23	5	Wind	Blackjack	Trip
	24	6	Wind	Trip	Blackjack
Wolf	5	1	Shoot	Stick	Yell
	6	2	Shoot	Yell	Stick
	15	3	Stick	Shoot	Yell
	16	4	Stick	Yell	Shoot
	25	5	Yell	Shoot	Stick
	26	6	Yell	Stick	Shoot
Dog	7	1	Bite	Porcupine	Rock
	8	2	Bite	Rock	Porcupine
	17	3	Porcupine	Bite	Rock
	18	4	Porcupine	Rock	Bite
	27	5	Rock	Bite	Porcupine
	28	6	Rock	Porcupine	Bite
Car	9	1	Smash	Dent	Tires
	10	2	Smash	Tires	Dent
	19	3	Dent	Smash	Tires
	20	4	Dent	Tires	Smash
	29	5	Tires	Smash	Dent
	30	6	Tires	Dent	Smash

Figure 6. Scoring System for the Structured Fantasy Test of Aggression

Continuous Word Association Test of Language Aggression (CWAT)

E speaks a stimulus word and the child is asked to say aloud, without stopping, every word that comes to mind until the time limit is up (60 seconds). Two stimulus words are used, and these make up two parts of the test. The stimulus word “knife” is presumed to arouse the aggressive drive, and words spoken in association are presumed to represent expressions of aggression in the language mode. The second stimulus word, “tree,” is taken as a control, since in pilot studies this word tends to elicit significantly fewer aggressive words and associations. If this test is used in a research study, the order in which the two stimulus words are administered should be counterbalanced.

Have the child comfortably seated. *Now we are going to play a word game. I am going to say a word, and after I say the word, you say every word that comes to your mind. Let’s practice. Like if I say “chair,” you could say “sit, wood, table, boat. ” Do you see ? You say every word you can think of, one after the other. The words can be about anything. Now I’ll say “chair" again and you say the words that come to you.* Wait for the child to give an association. If he does, say, *Good, think of another word.* Coach the child until he has given at least *Score* three word associations. Reassure the child if necessary that the words may be about anything.

Do you understand? I’ll say a word and then you say every word that you can think of until I say stop. Ready? The word is “knife.” If the child does not respond after 10 seconds, say, *What words come to your mind?* No other assistance is given. If a child seems to be “finished” after giving three or four words, say, *What else?* E records the child’s reaction time (time taken to speak the first word association) and not each association. After 60 seconds *E* asks *S* to stop, saying, *That’s fine.*

After the child has completed the task, *E* says, *Now I would like you to do this game once more. I am going to say another word, and after you hear that word, you say aloud every word that comes to your mind. Ready? The word is “tree.” E* again records the child’s reaction time (time taken to speak the first word) and each word or phrase spoken by the child. After 60 seconds, *E* says, *Stop, that's fine.*

SCORING

The associations are recorded as single word associations (e.g., butter, fork, stab, cut) or as phrases (e.g., butter your bread, stab a crook). These association units are determined by *E,* who makes the judgment on the basis of the way in which the child verbalized the associations as well as by the context. However rapid, slow, or uneven the child’s associations, it is usually relatively easy to determine what constitutes a word-association unit.

Each unit is labeled aggressive and non-aggressive in terms of the scoring criteria described below, and the units designated as expressing some form of aggression are assigned a score. The same weighting system used to evaluate MST and SFT responses is used here. A low numerical score is assigned to association units that depict impulsive, direct language expressions of aggressions, and a high numerical score is assigned to association units depicting delayed, indirect expressions. When a score has been assigned to each association unit, the scores are summed and divided by the number of association units judged to express aggression, yielding an average aggressive score (or developmental ranking) in the language mode. In addition, the total number of association units expressed is divided into the total number of association units judged to express aggression, to obtain the percentage of associations characterized by expressions of aggression.

Score	Category	Category Description
1	A	Words or phrases that indicate: 1. Literal, direct, forceful, hostile contact between persons, animals, or objects or the result of such contact (e.g., kill, stab, hit, hurt, wound, blood, smash, bury). 2. Intense emotional states of fear, pain, and flight (states typically associated with violence and injury: e.g., agony, pain, scream, cry).
2	B	Words or phrases that describe: 1. Imminent physical harm to persons, animals, or objects, or a situation that clearly connotes but does not literally depict inflicting harm (e.g., combat, war, prison, capital punishment, savage, gas chamber, fighting, victim, bullets, weapon—when it is qualified as dangerous). 2. Emotional states or conditions that are associated with possible but not actual destruction to persons, animals, or objects or convey hostile aggressive affect (e.g., danger, hate, mean, evil). 3. States that could represent outcomes of direct, forceful, hostile contact (e.g., paralyzed, unconscious). 4. Literal, direct, hostile contact between persons, animals, and objects but not as forceful as associations scored 1-A (e.g., injury, harm).
3	C	Words or phrases that describe: 1. Weapons typically associated with physically harming persons or animals (e.g., gun, weapon, stiletto, hunting knife, switchblade; also butcher knife and club). 2. Inflicting physical harm typically viewed as beneficial to persons or animals (e.g., incision, operation; also sore). 3. Crude parts of the body (e.g., intestine, liver, flesh, heart). 4. Emotional states that convey tension, concern, or alarm about injury and are associated with possible but not actual destruction to persons, animals, or objects (e.g., worry, terrible, forbidden, retreat). 5. Miscellaneous (e.g., hunt, fish).
4	D	Words or phrases that describe: 1. Activities that reflect possible aggression to persons, animals, or objects but may also reflect nonaggressive activity (e.g., plunge, stick, cut, chop, bite, butchering, clean fish, crack, fire). 2. Ethnic groups and occupations typically viewed as symbols of aggression and violence and intense emotional expression (e.g., Puerto Rican, Indian, Sicilian, Negro, hood, detective, policeman, spy, crime, criminal). 3. Emotional states that could be associated with pleasure as well as pain, but convey intensity (e.g., yell, tease). 4. Animals, real and fictitious, associated with aggression (e.g., rat, bear, tiger, bee, lion, Gargantua, porcupine).
5	E	Words or phrases describing aggression that has been attenuated considerably and indicates differentiation of the expression of aggression in terms of means and ends: 1. Properties of objects (e.g., point, sharp, sharp branches). 2. Parts of objects (e.g., blade, sheath, jet, hooks, knife handle). 3. Physical manipulations and alternations of objects and materials or the products of such (e.g., chip, drop, peel, slice, pare, skinning, skin, grind, shaving, erosion, dig, sew, stump of tree). 4. Objects not used solely to inflict injury to animals or persons but typically used to injure plants, and objects used to prepare other objects to inflict injury (e.g., hatchet, cutting board, pocket knife, knife sharpener, hammer, scissors, butcher knife).

		5. States of feelings or actions that convey some degree of tension or aggressiveness (e.g., rough, beat, involuntary, dark night, mask, fast, throw, action, strength, fall, run, trip).
		6. Unprepared foods (e.g., meat, side of beef).
		7. Miscellaneous (e.g., bone, teeth, mouse).
6	F	Words or phrases that describe the inversion of aggression:
		1. Socially acceptable occupations or activities that inflict harm on persons or animals for commercial, medical, or entertainment reasons; also occupations in the entertainment field that operate in situations containing possibly injury (e.g., doctor, surgeon, butcher, knife thrower in circus, hero, fire ranger).
		2. Equipment that inflicts pain but is used medically to help individuals (e.g., syringe, needle, scalpel, anesthesia; also crutch).
		3. Properties of objects, manipulations of people or objects, and states of emotion that convey the inversion of hostility and destruction (e.g., dull, quiet down, life, joy, help, useful, lovable, protection, guard, defense).
		4. Miscellaneous objects connoting very attenuated aggression but used as aides (e.g., nail clipper, spindle, letter opener).
7	G	Words or phrases that are primarily concerned with nurturance and construction:
		1. Prepared foods, raw and prepared fruits and vegetables, food utensils, equipment, persons and locations typically associated with preparing food (e.g., chicken, turkey, milk, water, orange juice, kitchen, pots, fork, spoon, bread, fish, apple, cook, mother, chef, percolator, salt).
		2. Miscellaneous (e.g., stomach, conservation, gardening).
8	H	Words or phrases that seem to have no apparent relationship to aggression, either expressing directly some degree of aggression, whether very attenuated, or the inversion of aggression (e.g., cube, well, animal, steel, edge, wood, handle, Romeo and Juliet, operate, table, pride). These examples illustrate border-line associations scored zero.

Miscellaneous Categories. In addition to the eight categories just given to designate an association unit as depicting a level of aggression or its inversion or as depicting no aggression, the categories that follow have proved meaningful in several studies. In each case the number of instances is determined and percentages in terms of total number of associations are computed.

Echo (Ech)	*S* repeats the stimulus word immediately after it is spoken by *E,* or repeats an association he has just produced. *Note*: Associations repeated or echoed are also assigned numerical scores with the system just described.
Repetition (Rep)	*S* produces an association he has already produced; however the first production of the association was followed by one or more new associations. Repetitions are also given numerical scores.
Stall (Sta)	After the stimulus word has been given or after an association has been produced, *S* makes statements that are not associations, but bids for more structure; these are taken as efforts to forestall responding to and experiencing the affect and imagery triggered by the stimulus or as efforts to recover equilibrium before continuing. For example: "Start Out?" "You want me to begin?" "Shall I keep going?" "Did I mention that one before?" "Did the lights just get dim?"

Continuous Word Association Test II (CWAT II): Succorance Motive

The procedure for CWAT II is the same as CWAT

I. *E* speaks the stimulus word "mouth" and the child is to say aloud every word that comes to mind for 60 seconds. *E* notes the reaction time and records each association.

If the child has already handled CWAT I, no other training is necessary. *E* says, *Let's do that word game again.*

Now I'll say another word and then you say every word that comes to your mind until I say stop. Ready? The word is "mouth."

If the child has not already handled CWAT I, *E* trains the child in the continuous word association technique using the stimulus word "chair" as described in the instructions for CWAT I.

With the CWAT II, it is assumed the stimulus word "mouth" activates associations representing feelings and impulses related to orality and succorance. Observations guided by psychoanalytic theory typically indicate that representations of orality fall into two broad groups. One concerns behavioral content emphasizing the receptive, erotic, nourishing, supportive, comforting aspects of oral experience and activity; the other concerns content emphasizing the demanding, hostile, attacking, destructive, devouring aspects of oral activity. The scoring system discussed below deals only with the former category. The CWAT I scoring system is used to evaluate the hostile aggressive aspects of oral behavior.

SCORING

Each association (word or phrase) is assigned a score from 1 to 8 in terms of the applicable category. A score of 1 denotes a developmental low level of oral expression in the language mode (e.g., sucking, **in utero).** That is, the language verbalized to express oral issues coveys a high degree of directness, An 8 denotes a developmentally high level of oral expression in the language mode. That is, the language verbalized to express oral issues conveys a high degree of indirectness and sublimation. The high level score is also assigned to expressions that express an inversion of succorance. The scores are averaged to obtain a mean developmental level, and percentage of associations conveying orality is computed.

Score	Category	Category Description
1	A	Words or phrases that describe activity, objects, parts of the body, or states of being, typically viewed as representing the earliest forms of nourishment, support, and comfort, received by human infants (e.g., suck, sucking, nipple, mother's milk, breast, umbilical cord, *in utero,* baby's bottle, formula, born).
2	B	Words or phrases that describe:
		1. Activity associated with literal intake of nourishment by humans, but these activities do not connote the infantile quality described in category A (e.g., chew, swallow, eat, digest, drink, taste).
		2. People, objects, or states of being depicting humans in need of care or associated with the care of humans but not conveying the quality described in category A (e.g., mother, milk, child, crib, baby, sleep, hungry).
		3. Actions expressing the comforting and erotic aspects of orality and suggesting a high degree of directness, literalness, and/or eroticism (e.g., hug, kiss, cuddle, caress, feel, love making).
		4. Miscellaneous (e.g., mouth-to-mouth resuscitation). *Note*: Mother's milk is scored in category A; either mother or milk is scored here; "Bite" is scored according to CWAT I.
3	C	1.Words or phrases generally viewed in our culture as stereotypes associated with infantile-regressive oral needs: (a) animals, activities or events associated with care or nurture of young animals (e.g., cow, baby, kangaroo, chick, hatch, puppy); (b) food, objects, or parts of plants [e.g., sugar bowl, cake, ice cream, sweet, candy, egg, party, doll, Barbie (the commercial doll), toys, roots].
		2. Parts of the oral cavity or digestive system involved directly with the intake of nourishment (e.g., lips, tastebuds, tongue, stomach, digestive tract).

3. Activity of the mouth that involves ingesting but other than food (e.g., smoking, puff, anything you might put in your mouth).

4. Miscellaneous: if "cavity" is preceded by "teeth," score according to CWAT I; if not, score here.

4	D	Words or phrases that describe: 1. Prepared foods (e.g., roast, chicken, food, dessert). 2. Unprepared foods usually seen as immediately eatable (e.g., apples, pears, strawberries). 3. Persons associated with the commercial preparation or dispensing of food; persons and material associated with healing and care of the ill (e.g., cook, waiter, baker, doctor, nurse). 4. Physiological processes associated with the intake of food and with routine survival (e.g., salivate, saliva, salivary glands, digestive juices, breathing, inhale, exhale). 5. Affective states, sensations, actions, and objects associated with orality combined with erotic qualities that are less direct and more differentiated than those scored in category B (e.g., touch, wide open, warm, soft, security, lipstick, dancing).
5	E	Words or phrases that describe 1. Times designated for eating (e.g., dinner, lunch, breakfast, picnic). 2. Equipment used to prepare or contain food, or as implements in eating (e.g., fork, knife, dish, can, jar, cupboard, refrigerator, bottle). 3. Parts of the body related to the oral cavity or the digestive system or involved with the intake of nourishment, but less direct than those described in category C (e.g., Adam's apple, cheek, throat, chin, jaw, soft and hard palate, mucous membrane). 4. Articles of clothing, objects, or persons representing symbols of care and support (e.g., mittens, pocketbook, bed, pillow, rocking chair, fur, friend). 5. Affects and actions associated with nurture and comfort combined with erotic qualities that are less direct than those scored in category D (e.g., smile, happy, laugh, singing, comfort, relax, enjoy, very good).
6	F	Words or phrases that describe: 1. Labels used to designate children (e.g., boy, girl, children, kids). 2. Affiliation represented in actions and in a highly differentiated form (e.g., each of us, together, side-by-side, gregarious). 3. The outcome of care, nurture, and support (e.g., living, fat, grow, healthy). 4. The care or repair of objects (e.g., patch, sew, fix). 5. Affective states, sensations, and actions suggesting further differentiation of comfort, nurture, and support (e.g., opening, entrance, intake, passageway, gate). 6. Miscellaneous: sink.
7	G	Words or phrases that describe: 1. Articles of clothing associated with the necessities of daily care and comfort (e.g., dress, suit, shirt, shoes, socks, coat). 2. Abbreviations or designations associated with persons who nurture and support (e.g., Mrs. lady, woman, connoisseur). 3. Objects, expressions of mass or quantity, or states of being that connote nurture and support in a highly differentiated form (e.g., house, money, more, many, big, weight, 25 pounds, bank, scale, paper clip). 4. Affiliation depicted in verbal behavior (e.g., talk, together, conversation, dialogue). 5. Miscellaneous: plant, table, verbose, talkative.
8	H	Words or phrases that describe: 1. Diminution or inversion of nurture and support (e.g., little, thin, alone, cold, close, empty).

		2. Small animals typically associated as preoccupied with procuring food (e.g., mouse, bird, fly).
0	I	Words or phrases that appear to have no association to the expression of supportive, nurturing, comforting aspects of orality (e.g., people, land, legs, arms, toes, chair, brush, hair, eyelids, eyes, right, left).

UNSTRUCTURED FANTASY TEST OF AGGRESSION (UFT)

MATERIAL

TAT Card 18 GF.

ADMINISTRATION

Following traditional TAT procedure, the child is asked to tell a story about the picture: *what is going on, what led up to it, and how the story ends.*

SCORING

Two scales are used to evaluate a child's story. One assesses the degree of directness and social appropriateness characterizing the aggression depicted in the story; the second assesses the degree to which the expression of aggression is delayed in the story that is constructed. Each scale is constructed to provide a developmental ordering from little to much directness of aggression, and from little to much delay.

Scale I: Degree of Directness and Social Appropriateness. This scale has scores ranging from 1 to 18. In general, low numbers are assigned to stories that depict direct, violent aggression and high numbers to stories depicting indirect, attenuated aggression or aggression that is denied or inverted into its opposite (i.e., construction). When examining a story for scoring according to this scale, it is helpful to determine first (a) the form of the aggressive behavior depicted in the story, followed by (b) the cognitive and affective reactions assigned to the characters in the story, (c) whether the two persons depicted in the picture are seen as the agent and recipient of the aggression or whether the agent and/or recipient of aggression are viewed as characters depicted outside the scene in the stimulus picture, and (d) the outcome of the aggressive happening.

Score	Category	Category Description
1	A	One character depicted in the picture is described as inflicting (or having inflicted) relatively violent, physical, direct harm to the other character in the picture. No justification for the aggression is given. *Example*: "This lady is strangling the other one—that's all I can make out of it." "This person just shot that one, that's all."
2	B	One of the characters depicted in the picture is described as inflicting (or having inflicted) relatively direct, violent, physical injury to the other character in the picture. Some justification is given for the aggressive act, but the justification is incongruous with the act or not appropriate to account for it. *Example*: "This girl said something that set her mother in a rage and she hit her."
3	C	One of the characters depicted in the picture is inflicting (or has inflicted) relatively direct, violent, physical injury to the other character in the picture. Some justification is given for the act, and the justification is relatively congruous with the act and appropriate to account for it.

Example: "This women is insane or drunk and she doesn't know what she's doing and she's choking this other girl."

4 D One of the characters depicted in the picture is described as incurring (or having incurred) relatively direct, violent, physical injury from a person described as *outside* the picture.

Example: "This girl was shot by her boyfriend and her mother just found her and is picking her up."

5 E One of the characters depicted in the picture is described as inflicting (or having inflicted):

a. Relatively direct, violent, physical injury to the other character depicted, but the aggressor is described as subsequently exercising strong control over the aggressive act, bringing it to a stop.

Example: "This woman is strangling this other woman but then realizes she is losing control and she stops."

b. Relatively direct and physical injury to the other character depicted, but the aggressive act is described as performed in the service of punishment rather than in the service of harming the other individual.

Example: "This mother is strangling this girl, trying to force her to tell her something because she's been bad."

c. Attenuated aggressive behavior (more attenuated than behavior described in levels 1 through 4) which, however, still represents aggressive physical contact between persons.

Example: "This mother grabs her daughter in a brief loss of control and then lets her go."

6 F One character depicted in the picture is described as being injured directly and relatively violently by an impersonal force or by a nonspecific aggregate of people.

Example: "This is during the war and a bomb from an airplane hit this building and a piece of the ceiling fell on this girl and killed her." "This girl was hurt by a mob."

7 G a. A person introduced by the subject and described as outside the scene depicted by the picture is described as being injured physically relatively directly and violently by a person also introduced by the subject and described as located *outside* the scene depicted in the picture. The aggressive act and its consequences may be described as affecting one of the characters in the picture.

Example: "This girl just fainted because she learned that her husband was shot by another man."

b. The story proposes two alternative themes as equally likely. One theme involves one character being aggressed upon violently and directly; the other theme involves one character being injured by some impersonal force.

Example: "This person has just been shot, or he just had a heart attack."

8 H a. A character introduced by the subject and described as located *outside* the scene represented by the card is described as being injured directly and relatively violently by an impersonal force or nonspecific aggregate of people. The consequences of this aggressive act and injury could be described as affecting one of the characters located in the picture.

Example: "This woman is crying because her husband was hurt badly in a car wreck."

b. The story proposes two alternative themes as equally likely. One theme involves one character in the picture inflicting relatively direct, physical, violent injury on the second character; the other theme involves one of the characters in the picture assisting the other, who is in some way incapacitated.

Example: "This woman is strangling this other woman, or it could be that she's helping her up because she fell. I can't tell which one it is, it could be either."

c. The story depicts ongoing violent harm to one of the characters but no agent of aggression is specified.

Example: "This lady is dying, she's hurt bad from something."

d. The story depicts major injury to one of the characters that is possible but not conclusive.

Example: "Is he dead?" "That lady, I'm not sure if she's hurt or not."

9 I One of the characters depicted in the picture is described as incurring a very attenuated aggressive act; this act as presented in the story is outside the control of or does not involve the participation of the other character. However there is a clear association (usually a temporal one) 12 between the other character and the aggressive act, the association making the character the possible agent of the aggressive act.

Example: "This mother called her daughter and she came to the top of the stairs and she slipped and fell."

10 J One of the characters depicted in the picture is described as incurring a very attenuated aggressive act from a

person located *outside* the picture. As with category I, the aggressor outside the picture is represented as not participating in or responsible for the aggressive act, but a connection is implied. The second character *in* the picture is usually depicted as helping the injured character.

Example: “A boy left roller skates at the top of the steps and this girl slipped on them and tumbled down the stairs; her mother is helping her up.”

11	K	a. One of the characters depicted in the picture is described as incurring aggressive behavior from an impersonal force or nonspecific aggregate of people located *outside* the picture, and the aggressive act is highly attenuated. *Example*: “This girl isn’t liked by other people; she doesn’t have many friends.” “This girl just faints; she just saw something that she has seen before. I don’t know what it was that she saw, but something that made her faint.” b. One of the characters depicted in the picture is described as aggressing (in a highly attenuated way) toward some object outside the picture. *Example*: “This girl stole something from a store.”
12	L	a. One of the characters depicted in the picture is described as incurring an injury that is highly attenuated; however no force or person is specified as the agent of the aggressive act. *Example*: “This girl is ill and her mother is helping her.” “This girl just fell and her mother is helping her.” b. The subject depicts a character located *outside* the picture and describes that character as being injured, but no force or person is specified as the agent of the aggression. The consequences of this injury could affect one of the characters depicted in the picture. *Example*: “This woman’s husband died because of illness and she is sad.”
13	M	a. One of the characters depicted in the picture is described as directing verbal aggression toward the other character in the picture. *Example*: “Her mother is mad and scolding the girl.” b. The characters in the picture are described as engaged in some form of physical contact that, however, represents attenuated aggression. Aggressive affect is ascribed to one of the characters. *Example*: “Her mother is holding her and her mother is mad.”
14	N	a. One of the characters depicted in the picture is described as incurring verbal aggression from a specific person located *outside* the picture. *Example*: “This girl is sad because her best friend told her off, and she’s telling her mother about it.” b. The characters in the picture are described as engaged in some form of physical contact that is nevertheless more attenuated than that described in category M. Aggressive affect is ascribed to one of the characters. *Example*: “She has her hands on this kid and she is mad.”
15	O	a. One of the characters depicted in the picture is described as incurring verbal aggression from a nonspecified force. *Example*: “This girl was yelled at and she’s telling her mother.” b. The story depicts physical conditions that suggest very attenuated aggression. *Example*: “She is looking at cavities in her teeth.” “She is looking at her rash.”
16	P	The story as a whole represents denial of and/or repression of aggression. *Example*: “I don’t know what’s going on there; it’s a house, old house; two people standing there.” “She’s looking at her; the two persons are deciding to go upstairs.”
17	Q	The story as a whole represents denial of and/or repression of aggression combined with some degree of inversion of aggression (i.e., reaction formation). *Example*: “The mother is helping her gargle and her mother is going to walk upstairs with the clothes.” “The man crossed a desert and the lady is giving him water.”
18	R	The story as a whole represents predominantly the inversion of aggression (i.e., reaction formation). Although denial and repression of aggression are operating, they are not major features of the *manifest* story.

Example: "The mother is hugging (kissing, feeding) her daughter."

Scale II. Degree of Delay. The degree of delay is assessed by comparing the words used to tell the total story to the number of words used from the start of the story to the point in the story at which the aggressive impulse is characterized. These steps are followed:

1. Count the total number of words used to tell the story; this number is the denominator of the ratio to be computed.

2. Determine the point in the story at which the aggressive impulse is discharged (in whatever form and at whatever developmental level). Count the number of words from the start of the story to the point of aggressive discharge; this number is the numerator of the ratio.

3. Compute the ratio. Example a: "This lady is strangling that kid. The kid knocked over her best lamp. Boy! Is the mother mad!" Three words precede the word "strangling," the point at which aggression is expressed in this story. There are 18 words in the total story. The ratio of 3 over 18 yields a value of .16. Example b: "It's an old house; a long set of stairs there; it's a long time ago, you can tell by their clothes; she's grabbing her." Twenty-two words precede the word "grabbing," the point at which aggression is expressed in this story. There are 24 words in the total story. The ratio of 22 over 24 yields a value of .90.

The smaller the value of the ratio, the less the degree of delay. The higher the value, the greater the degree of delay.

If the story contains two points at which aggression is expressed, the ratio is computed using the point at which the more primitive form of aggression was expressed.

RATIONALE

Evaluations of stories told to TAT Card 18 GF in terms of scales I and II are viewed as assessing in developmental terms the degree of directness and delay of aggression expressed in the fantasy mode. Direct and immediate aggression is conceptualized as defining a developmentally immature stage; indirectness and delayed aggression is conceptualized as defining a developmentally mature stage.

FABLES TEST OF CASTRATION ANXIETY
Adopted from Friedman (1952)

The fables used in this test are adopted from Friedman (1952). I developed the scoring system described here, which assigns a developmental level to the child's response, on the basis of completions given by large numbers of children.

MATERIAL

Two fables.

Fable I. “Once there was a little monkey named Frank (Mary). He had a long curly tail. He liked his tail so much that he looked at it every day, and he had all sorts of fun with it. One day, Frank woke up and saw that something was different. What do you think happened?”

Fable II. “Jim (Janey) was a little boy (girl). His finger always itched and he scratched and rubbed it all the time. The more it itched, the more he scratched. His parents told him not to scratch the finger, but still he rubbed it and scratched it whenever it itched. What do you think happened?”

ADMINISTRATION

Say, *I am going to read a story to you. Listen, and when I finish, I want you to tell me what you think happens*. Read the first fable. After the child has responded to the question, *What do you think happens?* conduct an inquiry as needed to clarify (1) the agent of the aggression (i.e., who performed the aggressive act described), (2) the nature of the aggression (“how” the event happened), and (3) the outcome (“what” happens after that).

Of course it is not possible in all cases to obtain information about each of these categories. However every effort should be made within reasonable clinical practice to obtain the information from the child. The child’s spontaneous completion may seem to leave out the possibility of an agent of the aggression. This might be the case if the child replies to Fable II, for example, that the boy is sick. **E** could ask what made him that way (did some one or something make him sick?), to obtain data about the agent of the aggression.

SCORING

A score ranging from 1 to 16 is assigned to the main action or happening described by the child in response to the question “What do you think happened?” The lower values are assigned to imagined events that depict literal, direct castration or bodily harm; the higher values are assigned to imagined events depicting attenuated or indirect expressions of castration or bodily harm. The same categories are applied to the completions of both fables.

Score	Category Description
1	The whole character is destroyed (e.g., he is killed, a truck came and smashed him flat).
2	The whole character is severely threatened, injured, or modified but not destroyed (e.g., he fell out of a tree, he was hit by a car, he was attacked by a dog, he got into a bad fight, he got spanked).
3	The body part is completely severed by a forceful, direct, aggressive act (e.g., tail was chopped off, his hand was sawed off).
4	The body part is removed but not in an aggressive way (e.g., the tail fell off, the tail is gone, his fingers disappeared).
5	a. The body part is injured in a relatively direct, painful way but not severed (e.g., tail got cut, tail is bleeding).
	b. The body part is described as diminished in size (e.g., his tail got shorter, his finger shrunk, it’s littler).

6 A feature of the body part is severed (e.g., the skin of his tail was peeled off, hair on his tail cut off, fingernail was cut off).

7 The whole character is acted on, threatened, or modified in appearance by an action more attenuated than those in category 1 (e.g., bucket of paint spilled all over him, he tripped over a rock, he fell in mud, a storm is coming, a wolf is coming).

8 a. The body part is injured or modified in ways more attenuated and benign than those in categories 3 to 6 (e.g., he got a mosquito bite, a bump got on the tail, the tail hit something, the finger got swollen, the tail was shedding hair, his finger got all irritated).

b. The whole character is threatened by imminent danger, but less severe than that described in category 7 (e.g., a dog comes, a rat comes).

9 a. The whole character or body part is affected but not by a direct act of aggression (e.g., it got infected, it got poison ivy, he's sick; also score here, it never stops itching).

b. The whole character is threatened by imminent danger, but less severe than that described in category 8 (e.g., a mosquito flies on him, a mouse comes).

10 The body part changes in physical appearance by an event or act symbolic of aggression (e.g., it got muddy, it got paint on it).

11 The main action depicted defines a form of restitution or assistance for an injury implied as severe [e.g., he was taken to the doctor (hospital) he had an operation to fix it].

12 The main action depicted defines a form of restitution or assistance for an injury implied as benign (e.g., they put Bengay on it, it stopped itching and got better; they put a Band-aid on his tail).

13 The body part changes in physical appearance but no agent or event is designated. The change is benign (e.g., his tail changed in color, the tail is different, his finger got blue).

14 The response conveys that injury to the body part is denied and/or repressed (e.g., another monkey came and he's got a tail, Frank swings by his tail, nothing happens, I don't know).

15 The response conveys that injury to the body part is denied and/or repressed, and in addition there is evidence of some inversion (reaction formation) of the injury (e.g., the spots got washed off, his finger was clean, his tail uncurled).

16 The response conveys that injury to the body part has been inverted primarily (reaction formation). Although denial and repression are operating, they are not major aspects of the manifest response (e.g., his tail grows, his tail got twice as big, his finger got real big and strong).

Note that a child may substitute a body part (e.g., toe, nose, hand, paw) for the one depicted in the fable. The actions on these body parts are treated in the same way as the fingers and tail described in the fables.

TEACHER RATING SCALE OF STUDENT PERFORMANCE

MATERIALS

The rating form appears in Figure 7. If a teacher is evaluating the entire class, the names of the children in the class are written on 3 x 5 cards, one name per card. Five small boxes or trays numbered 1 through 5.

ADMINISTRATION

The rating scale may be administered individually to a teacher or to groups of teachers. If a single child is being rated, the rating form illustrated in Figure 7 is used. If the entire class is being rated, the teacher is given a deck of cards; on each card is the name of a child in the class. The teacher is asked to sort the cards into five groups. The six children (or 20% of the class) who represent the developmentally lowest level of the variable in question are placed in category 1, the six representing the developmentally highest level in category 5, the six representing the average in category 3, and the children below and above the average in categories 2 and 4, respectively.

With each variable the teacher is asked to use his or her experience with the grade level under consideration to determine what is “average,” the lowest one-fifth of the class, and so on. The teacher is urged not to use the present group of children as the frame of reference, if possible, but rather the many children of that age with whom the teacher has worked previously. In this way it is possible for a teacher to convey that the current second grade class, which is being rated, does not contain children she would rate as “seldom restless” (scale III-A, Figure 7). She may conclude that relative to other second grade classes in her experience, the present class contains children who belong in the average category or below, because most of them move about excessively in the classroom.

Pupil's name:__________ Teacher's name:__________ Grade:__________ Date:__________

I.	*Academic Skills*	Rating				
		1	2	3	4	5
		Bottom 6 of Class	Below Average but not Bottom 6	Average in Class	Above Average but not Top 6	Top 6 of Class
A.	Reading	___	___	___	___	___
B.	Mathematics	___	___	___	___	___
C.	Written language	___	___	___	___	___
D.	Verbal language	___	___	___	___	___
II.	*Cognitive-Coping Skills*					
A.	Paying attention	Many things catch his/her attention; she/he is lost in thought or fantasy; teacher works to get child's attention		Sometimes		Attention is self-directed and focused; teacher does little work to get child’s attention
B.	Knowledge of class routine	Disorganized and unclear about routine: little knowledge of routine		Sometimes		Well organized; knows routine; clear on elements of routine
C.	Perceptual-motor coordination	Poor coordination with lettering, scissors, manipulation of small objects		Sometimes		Good coordination with lettering, scissors, manipulation of small objects
D.	Use of free time	Needs much prodding and direction: perseverates with games of low cognitive stimulation		Sometimes		Self-directed; flexibly shifts to various games of high cognitive stimulation
E.	Academic perseverance	Quickly gives up working with academic projects; short work span		Sometimes		Sustains involvement with academic projects: long work span
III.	*Regulation of aggression and tensions*					
A.	Body activity	Usually restless; in constant motion		Sometimes		Body usually still

B.	Physical aggression	Usually pushing, shoving, punching	Sometimes	Almost never pushing, shoving, punching
C.	Verbal aggression	Usually calling children names, teasing, swearing	Sometimes	Almost never calling children names, teasing, or swearing

In locating a child at a level, the teacher is also encouraged to be guided by the child's usual behavior. On occasion the teacher may need to qualify the rating assigned. For example, a child may usually sit still while handling academic work but display restlessness during the minutes just before gym class.

The teacher should be encouraged to rate each variable independently to minimize the "halo effect." Children low in some academic skill may not be the most restless or aggressive. Moreover, the variables "restless" and "aggressive" are frequently blurred. Teachers could be reminded that the former concerns "body in motion" and the latter acting on persons and objects to injure or damage them.

The following is a brief discussion of each variable.

I. Academic Skills. Because these variables are quite familiar to teachers, only a few comments are made here.

a. *Reading*. Ask the teacher to consider, for example, visual discrimination, auditory discrimination, visual memory, comprehension, and word attack strategies.

b. *Mathematics*. Ask the teacher to consider, for example, concepts of numerosity, mass, and quantity; greater and less than; measurement; and for higher elementary grades, skills such as adding, subtracting, dividing, multiplying, and doing number problems.

c, d. *Written and Verbal Language*. Ask the teacher to consider in each mode: vocabulary level, clarity and completeness in communicating concepts and ideas, and originality.

II. Cognitive-Coping Skills

a. *Paying Attention*. This variable concerns the way in which a child deploys his attention on the average while functioning in the classroom. Category 1 defines a child who either seems to "dream a lot" and is "tuned out" or is easily distracted by a variety of objects and events, therefore gives a little bit of attention to many things. The factor that links both these types is the necessity for the teacher to expend considerable effort to "get the child's attention." Category 5 defines a child who seems to direct and focus his attention on academic material being presented and maintains his focus throughout the classroom activity. The teacher needs to do little work to get the child's attention. The child directs his attention on the academic task at hand more or less on his own, once the teacher calls for his attention.

A teacher may feel that a given child's attention deployment varies appreciably in terms of the activity going on in the classroom or in terms of the materials being presented. The teacher should be encouraged to take a stand and assign the child an overall rating. The general rating may then be supplemented by secondary ratings and qualified in terms of subject matter, time of day, and so on.

b. *Class Routine*. This variable concerns the knowledge a child shows of classroom routine. Category 1 defines the child who seems confused about classroom routine, is frequently disorganized about classroom routine, is usually assisted by another child to follow the routine, and needs frequent reminders about coming events and material that has to be prepared. Children in category 5 know the classroom routine intimately, are clear about its elements, and remain organized with respect to it. It is assumed the child being rated has had the same opportunities as other children in the classroom to learn classroom routine. Obviously, if the child being rated has been in the classroom for only a month or two while the rest of the class has been managing the classroom for five or six months, this discrepancy should be taken into consideration.

c. *Perceptual Motor Coordination*. In the primary grades this variable relates to a child's coordination when using crayons and scissors, assembling puzzles, painting, and performing other related activities involving fine motor dexterity. In later grades the manipulation of equipment such as is used in science as well as in lettering and numbering is considered. A rating of 1 defines a child who seems to be all thumbs, exhibiting fine motor coordination that is clumsy and ineffective. A rating of 5 defines a child who for his age handles small material with a high degree of smooth fine motor dexterity.

d. *Use of Free Time*. This variable is rated only if the classroom program includes a period of time during which the children are free to select from a number of available materials and activities. Several issues are considered here. First, does a child initiate selecting some activity during free time, or does he typically require directions and reminders to "find something to do." When a child does select materials and activities, do they represent complex or simple displays of information? And does a child tend to return many times to the same activity or does he seem to pursue variety and change? A rating of 1 defines a child who must be prodded to engage academically enriching material during free time, usually selects some low-level stimulation, perseverates with the same activity, or wanders about the room. A rating of 5 defines the child who easily initiates engaging material during free time and seeks out games that enrich cognition.

e. *Academic Perseverance*. When a child begins an academic project (whether a number worksheet or language paper), does he stick with it until it is completed, except for expectable interruptions? Or does the child frequently interrupt his involvement, contriving reasons to turn to something else, go to the bathroom, sharpen a pencil, and so on? Does a child need frequent reminders to return to a project ? Category 1 defines a child who typically interrupts himself many times while engaging an academic task. Category 5 defines the child whose perseverance with academic tasks is above average for his age.

III. Regulation of Aggression and Tension

a. *Body Activity*. In general this variable asks the teacher to consider whether a child seems to be more "at home" in action or in thought. A rating of 1 defines a child who is very active and restless in class. While this child is in his seat his body is constantly moving about; he drums his fingers, scratches his head, and twists and turns. He seems to prefer movement and action, and his feelings are more positive when he is able to move around. When a child becomes irritable, angry, or sullen if his physical activity is restricted, he presents a clue that helps us determine whether he is "at home" in action. A rating of 5 defines a child who tends to remain physically still and seems to prefer to be engrossed in thought. This child sits relatively still when listening to directions and walks about the classroom very little.

b. *Physical Aggression*. This variable concerns action behaviors that appear to intend to hurt, threaten, or insult another person or his property. Effort should be made to consider aggressive behavior independently of body activity and restlessness. A very restless child may not show much aggression at all, whereas a child who keeps his body generally still may show much aggression. It is a common error to equate body restlessness and hyperactivity with aggressivity. A rating of 1 defines a child who pushes other children, roughhouses aggressively, trips his peers, abuses their books and papers, and so on. A rating of 5 defines a child who shows little or no behavior that seems to be intended to hurt others or their things.

c. *Verbal Aggression*. This variable concerns aggressive verbal behavior. Again, care should be taken to differentiate a child's verbal and physical aggressivity. Examples of verbal aggression are talking back, disagreeing in a hostile tone, teasing and provoking with words, name calling, and swearing. Attention should also be paid to whether and how often a child's tendency to play the "comedian" crosses the boundary from humor to verbal hostility.

BIBLIOGRAPHY

Abies, B. The three wishes of latency aged children. *Developmental Psychology,* 1972, 6, 186-192.

Achenbach, T. *Developmental psychopathology.* New York: Ronald Press, 1974.

Ainsworth, M. Reversible and irreversible effects of maternal deprivation on intellectual development. *Child Welfare League of America*, 1962, 42-52.

Aitken, P. P. Do children find complex patterns interesting or pleasing? *Child Development,* 1974, 45, 425-431.

Albert, J. A. Modification of impulsive conceptual style. *Dissertation Abstracts International*, 1970, 30 (7-B), 3377.

Alexander, F. The dynamics of psychotherapy in the light of learning theory. *American Journal of Psychiatry,* 1963, 120, 440-448.

Allison, J., Blatt, S. J., and Zimet, C. N. *The interpretation of psychological tests.* New York: Harper & Row, 1968.

Alpert, A. The latency period. *American Journal of Orthopsychiatry,* 1941, 11, 126-133.

Alpert, A., Neubauer, P. B., and Weil, A. P. Usual variations in drive endowment. *The Psychoanalytic Study of the Child*, 1956, 11, 125-153.

Als, H., and Lewis, M. The contribution of the infant to the interaction with his mother. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Denver, Colorado, 1975.

American Psychological Association. *Research in Psychotherapy*, Vol. 3, Washington, D.C.: APA, 1967.

American Psychological Association. *Standards for educational and psychological tests.* Washington, DC.: APA, 1974.

Appell, M. J., Williams, C. M., and Fishell, K. M. Changes in attitudes of parents of retarded children effected through group counseling. *American Journal of Mental Deficiency*, 1964, 68, 807-812.

Arieti, S. Conceptual and cognitive psychiatry. *American Journal of Psychiatry,* 1965, 122, 361-367.

Arieti, S. The role of cognition in the development of inner reality. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 1. New York: Brunner/Mazel, 1970.

Ashton, R. Aspects of timing in child development. *Child Development,* 1976, 47, 622-626.

Ausubel, D. P. *Ego development and the personality disorders: A developmental approach to psychopathology.* New York: Grune & Stratton, 1952.

Baker, A. H., Rierdan, J., and Wapner, S. Age changes in size value phenomena. *Child Development,* 1974, 45, 257-268.

Baldwin, A. L. The study of child behavior. In P. Mussen (Ed.), *Handbook of research methods in child development.* New York: Wiley, 1960.

Baldwin, A. L. *Theories of child development.* New York: Wiley, 1967.

Baltes, P. B., and Schaie, K. W. (Eds.). *Life-span developmental psychology: Personality and socialization.* New York: Academic Press, 1973.

Bandura, A. *Psychological modeling.* New York: Atherton, 1971.

Bandura, A., and Walters, R. H. Aggression. In H. W. Stevenson, J. Kagan, and C. Spiker (Eds.), *Child Psychology: The sixty-second yearbook of the National Society for the Study of Education.* Chicago: University of Chicago Press, 1963.

Barsch, R. H. The processing mode hierarchy as a potential deterrent to cognitive efficiency. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 2. New York: Brunner/Mazel, 1971.

Beck, A. T. *Cognitive therapy and the emotional disorders.* New York: International Universities Press, 1976.

Becker, W. C. The process-reactive distinction: A key to the problem of schizophrenia. *Journal of Nervous and Mental Disorders,* 1959, 129, 442-449.

Becker, W. C. Consequences of different kinds of parental discipline. In M. L. Hoffman and L. W. Hoffman (Eds.), *Review of child development and research.* New York: Russell Sage Foundation, 1964.

Beckwith, L., Cohen, S., Kopp, C., Parmalee, A., and Marcy, T. Caregiver-infant interaction and early cognitive development in preterm infants. *Child Development,* 1976, 47, 579-587.

Bell, R. Q. A reinterpretation of the direction of effects in studies of socialization. *Psychological Review,* 1968, 75, 81-95.

Bell, R. Q., and Hertz, T. W. Toward more comparability and generalizability of developmental research. *Child Development,* 1976, 47, 6-13.

Bender, L., and Keeler, W. R. The body image of schizophrenic children following electroshock treatment. *American Journal of Orthopsychiatry,* 1952, 22, 335-355.

Benjamin, J. D. The innate and experiential in development. In H. W. Brosin (Ed.), *Lectures in experimental psychiatry.* Pittsburgh: University of Pittsburgh Press, 1961.

Bennett, J. W. Anticipation, adaptation and the concept of culture in anthropology. *Science,* 1976, 192, 847-852.

Benton, A. L. *The revised visual retention test: Clinical and experimental application.* New York: Psychological Corporation, 1955.

Berger, J., and Israel, N. Leveling-sharpening and discrepancy in self-report and psychological indices of stress. Paper presented at Eastern Psychological Association Meeting, Atlantic City, New Jersey, April, 1970.

Berger, L., and McGough, J. L. Critique and reformulation of “learning theory” approaches to psychotherapy and neurosis. *Psychological Bulletin,* 1965, 63, 338-358.

Bergman, P., and Escalona, S. K. Unusual sensitivities in very young children. *The Psychoanalytic Study of the Child,* 1949, 3/4, 333-352.

Berkowitz, B., and Graziano, A. Training parents as behavior therapists: A review. *Behavioral Research and Therapy,* 1972, 10, 297-317.

Berlyne, D. E. The influence of albedo and complexity of stimuli in visual fixation in the human infant. *British Journal of Psychology,* 1958, 49, 315-318.

Berlyne, D. E. *Conflict, arousal, and curiosity.* New York: McGraw-Hill, 1960.

Berlyne, D. E. Motivational problems raised by exploratory and epistemic behavior. In S. Koch (Ed.), *Psychology: A study of science,* Vol. 5. New York: McGraw-Hill, 1963.

Bibace, R., and Gruen, G. *A comparative developmental analysis of cognitive processes in populations representing various sequences of development.* Unpublished manuscript, Clark University, Worcester, Mass, 1968.

Bignier, J. J. A Wernerian developmental analysis of children’s descriptions of siblings. *Child Development,* 1974, 45, 317-323.

Birdwhistell, R. L. *Kinetics and content.* Philadelphia: University of Pennsylvania Press, 1970.

Bissel, J., White, S., and Zivin, G. Sensory modalities in children’s learning. In G. S. Lesser (Ed.), *Psychology and educational practice.* Glenview, 111.: Scott, Foresman, 1971.

Blaisdell, O. *Developmental changes in action aggression and in fantasy aggression*. Doctoral dissertation, Boston University, 1972.

Blake, R. R., and Ramsey, G. V. (Eds.) *Perception: An approach to personality.* New York: Ronald Press, 1951.

Blanck, G., and Blanck, R. *Ego psychology'.Theory and practice.* New York: Columbia University Press, 1974.

Blank, M., and Solomon, F. A tutorial language program to develop abstract thinking in socially disadvantaged preschool children. *Child Development,* 1968, 39, 379-389.

Block, J. Ego identity, role variability, and adjustment. *Journal of Consulting Psychology,* 1961,25, 392-397.

Block, J., Block, J. H., and Harrington, D. M. Some misgivings about the Matching Familiar Figures Test as a measure of reflection-impulsivity. *Developmental Psychology,* 1974, 10, 611-632.

Borgatta, E. F., and Lambert, W. W. (Eds.). *Handbook of personality theory and research.* Skokie, 111.: Rand McNally, 1968.

Bornstein, B. On latency. In *Psychoanalytic study of the child.* New York: International Universities Press, 1951.

Borowitz, G. H., and Hirsch, J. G. A developmental typology of disadvantaged four year olds. *American Journal of Orthopsychiatry,* 1968, 38, 213-214. (Abstract)

Botel, M. *Guide to the Botel reading inventory.* Chicago: Follett, 1961.

Bowers, K. S. Situationism in psychology: An analysis and critique. *Psychological Review,* 1973, 80, 307-336.

Boyd, R. D. Analysis of ego-stage development of school- age children. *Journal of Experimental Education,* 32, 249-253.

Boykin, W. A., and Arkes, H. F. Processing time and complexity preference in preschool children. *Psychological Record,* 1974, 24, 259-265.

Brazelton, T. B. Observations of the neonate. *Journal of the American Academy of Child Psychiatry,* 1962, 1, 38-58.

Breger, L., and McGaugh, J. L. Critique and reformulation of "learning theory" approaches to psychotherapy and neurosis. *Psychological Bulletin,* 63, 338-358.

Brennen, W., Ames, E. W., and Moore, R. W. Age differences in infants' attention to patterns of different complexities. *Science,* 1966, 51, 354-356.

Bronfenbrenner, U. Toward an integrated theory of personality. In R. R. Blake and G. V. Ramsey (Eds.), *Perception: An approach to personality.* New York: Ronald Press, 1951.

Bronfenbrenner, U. Developmental theory in transition. In H. W. Stevenson (Ed.), *Child Psychology.* Chicago: University of Chicago Press, 1963.

Brooks, J., and Lewis, M. Infants' responses to strangers: Midget, adult and child. *Child Development,* 1976, 47, 323-332.

Brooks, J., and Weinraub, M. A History of infant intelligence testing. In M. Lewis (Ed.), *Origins of intelligence: Infancy and early childhood.* New York: Plenum, 1976.

Bruner, J. S., Brunswik, E., Festinger, L., Heider, F., Muenzinger, K. F., Osgood, C. E., and Rapaport, D. *Contemporary approaches to cognition.* Cambridge, Mass.: Harvard University Press, 1957.

Bruner, J., and Postman, L. An approach to social perception. In W. Dennis (Ed.), *Current trends in social psychology.* Pittsburgh: University of Pittsburgh Press, 1948.

Budoff, M., and Friedman, M. Learning potential as an assessment approach to the adolescent mentally retarded. *Journal of Consulting Psychology,* 1964,28, 434-439.

Burns, P., Sander, L. W., Stechler, G., and Julia, H. Distress in feeding: Short-term effects of caretaker environment of the first 10 days. *Journal of the American Academy of Child Psychiatry*, 1972, 11, 427-439.

Bush, E. S., and Dweck, C. S. Reflections on conceptual tempo: Relationship between cognitive style and performance as a function of task characteristics. *Developmental Psychology,* 1975, 11, 567-574.

Buss, A. H., and Lang, P. J. Psychological deficit in schizophrenia: I. Affect, reinforcement, and concept attainment. *Journal of Abnormal Psychology,* 1965, 70, 2-24.

Caldwell, B. M., and Ricciuti, H. N. (Eds.). *Review of child development research: Child development and social policy,* Vol. 3. Chicago: University of Chicago Press, 1973.

Cameron, N. Experimental psychology and medicine. *Psychological Records,* 1937, 1, 437^145.

Campbell, J. D. Illness is a point of view: The development of children's concepts of illness. *Child Development,* 1975, 46, 92-100.

Campbell, S. B., Douglas, V. I., and Morgenstein, G. Cognitive styles in hyperactive children and the effect of methylphenidate. *Journal of Child Psychology and Psychiatry,* 1971, 12, 55-67.

Charles, D. C. Historical antecedents of life-span developmental psychology. In L. R. Goulet and P. B. Baltes (Eds.), *Life span developmental psychology'.Research and theory.* New York: Academic Press, 1970.

Chess, S., Rutter, M., Thomas, A., and Birch, H. G. Interaction of temperament and the environment in the production of behavioral disturbances in children. *American Journal of Psychiatry,* 1963, 120, 142-147.

Chess, S., Thomas, A., and Birch, H. G. Behavior problems revisited: Findings of an anterospective study. *Journal of the American Academy of Child Psychiatry,* 1967, 6, 321-331.

Chodoff, P., Friedman, S. B., and Hamburg, D. A. Stress, defenses and coping behavior: Observations in parents of children with malignant disease. *American Journal of Psychiatry,* 1964, 120, 743-749.

Christie, D., and Schumacher, G. M. Developmental trends in the abstraction and recall of relevant versus irrelevant theoretic information from connected verbal materials. *Child Development,* 1975,46, 598-602.

Cicchetti, D., and Sroufe, T. The relationship between affective and cognitive development in Down's syndrome infants. *Child Development,* 1976, 47, 920-929.

Coates, S. Sex differences in field independence among preschool children. In R. C. Friedman, R. M. Richart, and R. L. Van de Wiele (Eds.), *Sex differences in behavior.* New York: Wiley, 1974.

Coelho, G. V., Hamburg, D. A., and Murphy, E. B. Coping strategies in a new learning environment. *Archives of General Psychiatry,* 1963, 9, 433-443.

Cohen, L. B., and Gelber, E. R. Infant visual memory. In L. B. Cohen and P. Salapatek (Eds.), *Infant perception: From sensation to cognition,* Vol. 1. New York: Academic Press, 1975.

Cohen, L. B., and Salapatek, P. (Eds.). *Infant perception: From sensation to perception, 2* Vols. New York: Academic Press, 1975.

Cohen, N. J., Weiss, G., and Minde, K. Cognitive styles in adolescents previously diagnosed as hyperactive. *Journal of Child Psychology and Psychiatry,* 1972,13, 203-209.

Cohen, S. E. Developmental differences in infants' attentional responses to face-voice incongruity of mother and stranger. *Child Development,* 1974, 45, 1155-1158.

Cohler, B. Psychoanalysis, adaptation, and education: I. Reality and its appraisal. *Psychological Reports,* 1972a, 30, 695-718.

Cohler, B. Psychoanalysis, adaptation and education: II. Development of thinking. *Psychological Reports,* 1972b, 30, 719-740.

Comalli, P. E. Changes in visual perception. In L. R. Goulet and P. B. Baltes (Eds.), *Life-span developmental psychology: Research and theory.* New York: Academic Press, 1970.

Condon, W. S. *Multiple response to sound in dysfuctional children.* Unpublished manuscript, 1977.

Condon, W. S., and Brosin, H. W. Microlinguistic kinesic events in schizophrenic behavior. In D. V. Sankar (Ed.), *Schizophrenia: Current concepts and* *research.* Hicksville, N.Y.: PJD Publications, 1971.

Condon, W. S., Ogston, W. D., and Pacoe, L. V. Three faces of Eve revisited: A study of transient microstrabismus. *Journal of Abnormal Psychology,* 1969, 74, 618-620.

Condon, W. S., and Sander, L. W. Synchronization of neonate movement with adult speech: Interactional participation and language acquisition. *Science,* 1974, 183, 99-101.

Condon, W. S., and Sander, L. W. Synchrony demonstrated between movements of the neonate and adult speech. *Child Development,* 1974,45,456-462.

Copel, S. L. *Psychodiagnostic study of children and adolescents.* Springfield, 111.: Thomas, 1967.

Copel, S. L. *Behavior pathology of childhood and adolescence.* New York: Basic Books, 1973.

Cornell, E. H., and Gottfried, A. W. Intervention with premature human infants. *Child Development,* 1976, 47, 32-39.

Cortes, J. B., and Gattie, F. M. Physique and selfdescription of temperament. *Journal of Consulting Psychology,* 1965, 29, 432^139.

Cortes, J. B., and Gattie, F. M. Physique and motivation. *Journal of Consulting Psychology,* 1967, 30, 408—414.

Crandall, V., Katkovsky, W., and Crandall, V. J. Children’s beliefs in their own control of reinforcement in intellectual academic achievement situations. *Child Development,* 1962, 36, 91-109.

Crandall, V. C., and Lacey, B. W. Children’s perceptions of internal-external control in intellectual-academic situations and their embedded figures test performance. *Child Development,* 1972, 43, 1123-1134.

Crandall, V. J. Achievement. In H. W. Stevenson, J. Kagan, and C. Spiker (Eds.), *Child psychology. The sixty-second yearbook of the National Society for the Study of Education.* Chicago: University of Chicago Press, 1963.

Crisp, A. H. Transference, symptom emergence, and social repercussion in behavior therapy. *British Journal of Medical Psychology,* 1966, 39, 179-196.

Critchley, M. Developmental dyslexia as a specific cognitive disorder. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 2, *Deficits in cognition.* New York: Brunner/Mazel, 1971.

Cronbach, L. J., and Meehl, P. E. Construct validity in psychological tests. *Psychological Bulletin,* 1955, 60, 281.

Crosby, K. G. Attention and directability in mentally retarded and intellectually average children. *American Journal of Mental Deficiency,* 1972, 77, 46-53.

Cruickshank, W. M., and Hallahan, D. P. (Eds.). *Perceptual and learning disabilities in children,* 2 vols. Syracuse, N.Y.: Syracuse University Press, 1975.

Davids, A. Effects of aggressive and nonaggressive male and female models on the behavior of emotionally disturbed boys. *Child Development,* 1972, 43, 1443-1448.

Davidson, M., McGinnis, R., and Parnell, R. Distribution of personality traits in seven year old children: A combined psychological, psychiatric, and somatotype study. *British Journal of Educational Psychology,* 1957, 27, 48-61.

Davis, D. R. Family processes in mental retardation. *American Journal of Psychiatry,* 1967,124, 340-351.

Davison, G. C., and Stuart R. B. Behavior therapy and civil liberties. *American Psychologist,* 1975, 30, 755-763.

Day, H. I., and Berlyne, D. E. Intrinsic motivation. In G. S. Lesser (Ed.), *Psychology and educational practice.* Glenview, 111.: Scott, Foresman, 1971.

Decarie, T. G. *Intelligence and affectivity in early childhood: An experimental study of Jean Piaget’s object concept and object relation.* New York:

International Universities Press, 1965.

Dennis, W. Historical beginnings of child psychology. *Psychological Bulletin,* 1949, 46, 224-235.

Denny, D. R. Relationship of three cognitive style dimensions to elementary reading abilities. *Journal of Educational Psychology,* 1974, 66, 702-709.

Deutsch, C. Environment and perception. In M. Deutsch, Katz, and A. R. Jensen (Eds.), *Social class, race, and psychological development.* New York: Holt, Rinehart, & Winston, 1968.

Deutsch, M. The role of social class in language development and cognition. *American Journal of Orthopsychiatry,* 1965, 35, 78-88.

Dodds, J., and Santostefano, S. A comparison of the cognitive functioning of glue-sniffers and non-glue-sniffers. *Journal of Pediatrics,* 1964, 64, 565-570.

Dolch, E. W. *A manual for remedial reading*. Champaign, 111.: Gerrard Press, 1945.

Dreyer, A. S., Hulac, V., and Rigler, D. Differential adjustment to pubescence and cognitive style patterns. *Developmental Psychology,* 1971, 4, 456-462.

Duncan, O. A socioeconomic index for all occupations. In A. Reiss (Ed.), *Occupations and social status.* New York: Free Press, 1961.

Dyk, R. B., and Witkin, H. A. Family experiences related to the development of differentiation in children. *Child Development,* 1965, 36, 21-55.

Egeland, B. Training impulsive children in the use of more efficient scanning techniques. *Child Development,* 1974, 45, 165-171.

Egeth, H. Selective attention. *Psychological Bulletin,* 1967, 67, 41-57.

Eichler, J. *A developmental study of action, fantasy, and language aggression in latency aged boys*. Doctoral dissertation, Boston University, 1971.

Ekstein, R., and Motto, R. L. *From learning for love to love of learning.* New York: Brunner/Mazel, 1969.

Elkind, D. Egocentrism in adolescents. *Child Development,* 1967a, 38, 1023-1034.

Elkind, D. Middle class delinquency. *Mental Hygiene,* 1967b, 51, 80-84.

Elkind, D. Developmental and experimental approaches to child study. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 1. New York: Brunner/Mazel, 1970.

Elkind, D. Cognitive development and psychopathology: Observations on egocentrism and ego defense. In E. Schopler; and R. J. Reichler (Eds.), *Psychopathology and child development.* New York: Plenum, 1976.

Elliott, R., and McMichael, R. E. Effects of specific training in frame dependence. *Perceptual and Motor Skills,* 1963, 17, 363-367.

Erikson, E. H. *Childhood and society.* New York: Norton, 1950.

Erikson, E. H. Identity and the life cycle. *Psychological Issues,* 1959, 1, (1, Whole No. 1).

Escalona, S., and Heider, G. M. *Prediction and outcome:A study in child development.* New York: Basic Books, 1959.

Eysenck, H. J. *Behavior therapy and the neuroses.* Oxford, England: Pergamon Press, 1960.

Fagan, J. F., III. Infants’ recognition of invariant features of faces. *Child Development,* 1976, 47, 627-638.

Fantz, R. L. Pattern vision in young infants. *Psychological Record,* 1958, 8, 43-49.

Fantz, R. L., and Fagan, I. F., III. Visual attention to size and number of pattern details by term and preterm infants during the first six months. *Child*

Development, 1975, 46, 3-18.

Fantz, R. L., Fagan, J. F., and Miranda, S. B. Early visual selectivity. In L. B. Cohen and P. Salapatek (Eds.), *Infant perception: From sensation to cognition,* Vol. 1, *Basic visual processes.* New York: Academic Press, 1975.

Farnham-Diggory, S. Self, future and time: A developmental study of the concepts of psychotic, brain-damaged and normal children. *Monographs of the Society for Research in Child Development,* 1966, 31 (1, Whole No. 103).

Faterson, H. S. Articulateness of experience: an extension of the field-dependence-independence concept. In S. Messick and J. Ross (Eds.), *Measurement in personality and cognition.* New York: Wiley, 1962.

Feather, B. W., and Rhoads, J. M. Psychodynamic behavior therapy: II. Clinical aspects. *Archives of General Psychiatry,* 1972a, 26, 503-511.

Feather, B. W., and Rhoads, J. M. Psychodynamic behavior therapy: I. Theoretical aspects. *Archives of General Psychiatry,* 1972b, 26, 496-502.

Feffer, M. H. The cognitive implications of role taking behavior. *Journal of Personality,* 1959, 27, 152-168.

Fenichel, O. *The psychoanalytic theory of neurosis.* New York: Norton, 1945.

Ferenczi, S. The further development of an active therapy in psychoanalysis (1919). In J. Rickman (Ed.), *Further contributions to the theory and technique of psycho-analysis.* New York: Basic Books, 2 vols., 1952a.

Ferenczi, S. On the technique of psychoanalysis (1919). In J. Rickman (Ed.), *Further contributions to the theory and technique of psycho-analysis.* New York: Basic Books, 2 vols., 1952b.

Ferlemann, M. Coping. *Menninger Perspective,* 1972, 3, 17-22.

Festinger, L. *A theory of cognitive dissonance.* Stanford, Calif.: Stanford University Press, 1957.

Fish, B., and Shapiro, T. A typology of children's psychiatric disorders. *Journal of the American Academy of Child Psychiatry,* 1965, 4, 32-52.

Fisher, R. L. Failure of the conceptual styles test to discriminate normal and highly impulsive children. *Journal of Abnormal Psychology,* 1966, 71, 429-431.

Fisher, S., and Cleveland, S. E. *Body image and personality.* New York: Van Nostrand, 1958.

Fisher, S., and Cleveland, S. E. *Body image and personality.* New York: Dover, 1968.

Fisher, S., and Fisher, R. L. A developmental analysis of some body image and body reactivity dimensions. *Child Development,* 1959, 30, 389-402.

Flavell, J. FI. *The developmental psychology of Jean Piaget.* New York: Van Nostrand, 1963.

Fontana, A. F. Familial etiology of schizophrenia: Is a scientific methodology possible? *Psychological Bulletin,* 1966, 66, 214-227.

Fowler, W. Cognitive baselines in early childhood: Developmental learning and differentiation of competence rule systems. In J. Hellmuth (Ed.), *Cognitive studies,* vol. 2. New York: Brunner/Mazel, 1971.

Frank, G. H. The role of the family in the development of psychopathology. *Psychological Bulletin,* 1965, 64, 191-205.

Frank, J. D. The role of cognition in illness and healing. In H. H. Strupp and L. Luborsky (Eds.), *Research in Psychotherapy,* Vol. 2. Washington, D. C.: American Psychological Association, 1962.

Franks, C. M. (Ed.). *Behavior therapy : Appraisal and status.* New York: McGraw-Hill, 1969.

Freedman, D. G. Smiling in blind infants and the issue of innate vs. acquired. *Journal of Child Psychology and Psychiatry,* 1964, 5, 171-184.

Freedman, D. G., Loring, C. B., and Martin, R. M. Emotional behavior and personality development. In Y. Brackbill (Ed.), *Infancy and early childhood: A handbook and guide to human development.* New York: Free Press, 1967.

Freeman, N. H., and Janikoun, R. Intellectual realism in children's drawings of familiar objects with distinctive features. *Child Development,* 1972, 43, 1116-1121.

French, T. M. Interrelation between psychoanalysis and the experimental work of Pavlov. *American Journal of Psychiatry,* 1933, 12, 1165-1203.

Freud, A. *The ego and mechanisms of defense.* New York: International Universities Press, 1946.

Freud, A. *Normality and pathology in childhood: Assessments of development.* New York: International Universities Press, 1965.

Freud, S. *The interpretation of dreams,* 1900. In *Standard edition of complete works,* Vols. 4 and 5. London: Hogarth, 1953.

Freud, S. *Freud's psycho-analytic procedure,* 1904. In *Standard edition of complete works,* Vol. 7. London: Hogarth, 1958.

Freud, S. *On psychotherapy,* 1905. In *Standard edition of complete works,* Vol. 7. London: Hogarth, 1958.

Freud, S. *Formulations regarding the two principles in mental functioning,* 1911. In *Standard edition of complete works,* Vol. 12. London: Hogarth, 1958.

Freud, S. *Recommendations to physicians practicing psycho-analysis,* 1912. In *Standard edition of complete works,* Vol. 12. London: Hogarth, 1958.

Freud, S. *On beginning the treatment* (further recommendations on the technique of psychoanalysis: I), 1913. In *Standard edition of complete works,* Vol. 12. London: Hogarth, 1958.

Freud, S. *Remembering, repeating and working-through* (further recommendations on the technique of psychoanalysis: II), 1914. In *Standard edition of complete works,* Vol. 12. London: Hogarth, 1958.

Freud, S. *Instincts and their vicissitudes,* 1915. In *Standard edition of complete works,* Vol. 14. London: Hogarth, 1957.

Freud, S. *The ego and the id,* 1923. In *Standard edition of complete works,* Vol. 19. London: Hogarth, 1961.

Freud, S. *Inhibition, symptoms, and anxiety,* 1926. In *Standard edition of complete works,* Vol. 20. London: Hogarth, 1961.

Friedman, S. M. An empirical study of the castration and oedipus complexes. *Genetic Psychology Monographs,* 1952, 46, 61-130.

Fries, M. E. Review of the literature on latency period. In M. Levitt (Ed.), *Readings in psychoanalytic psychology.* New York: Appleton, Century, Crofts, 1959.

Fries, M. E., and Woolf, P. J. Some hypotheses on the role of the congenital activity type in personality development. *Psychoanalytic Study of the Child,* 1953, 8, 48-52.

From, F. Perception of human action. In H. P. David and J. C. Brengelmann (Eds.), *Perspectives in personality research.* New York: Springer, 1960.

Fugua, R. W., Bartsch, T. W., and Phye, G. D. An investigation of the relationship between cognitive tempo and creativity in preschool children. *Child Development,* 1975, 46, 779-782.

Furth, H., and Wacks, H. *Thinking goes to school: Piaget's theory in practice.* New York: Oxford University Press, 1974.

Gardner, R. W. Cognitive styles in categorizing behavior. *Journal of Personality,* 1953, 22, 214-233.

Gardner, R. W. Cognitive Controls of attention deployment as determinants of visual illusions. *Journal of abnormal and social psychology,* 1961, 62, 120-127.

Gardner, R. W. The development of cognitive structures. In C. Scheerer (Ed.), *Cognition: Theory, research, promise.*New York: Harper & Row, 1964.

Gardner, R. W., Holzman, P. S., Klein, G. S., Linton, H. B., and Spence, D. P. Cognitive control: A study of individual consistencies in cognitive behavior. *Psychological Issues,* 1959, 1 (4, Whole No. 4).

Gardner, R. W., Jackson, D. N., and Messick, S. J. Personality organization in cognitive controls and intellectual ability. *Psychological Issues,* 1960, 2 (4, Whole No. 8).

Gardner, R. W., and Moriarty, A. *Personality development at preadolescence.* Seattle: University of Washington Press, 1969.

Gardner, R. W., and Schoen, R. A. Differentiation and abstraction in concept formation. *Psychological Monographs,* 1962, 76 (41, Whole No. 460).

Garrity, C. *Academic success of children from different social class and cultural groups.* Doctoral dissertation, University of Denver, 1972.

Geva, E. *The cognitive control-field articulation and phonetic-semantic preference in bilingual children.* Unpublished manuscript, 1976.

Gill, M. The present state of psychoanalytic theory. *Journal of Abnormal and Social Psychology,* 1959,58, 1-8.

Gill, M. (Ed.). *The collected papers of David Rapaport.* New York: Basic Books, 1967.

Gillis, J. S. Ecological relevance and the study of cognitive disorders. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 2. New York: Brunner/Mazel, 1971.

Giora, Z. *Psychopathology: A cognitive view.* New York: Gardner, 1975.

Glaser, H., and Massengale, O. Glue-sniffing in children. *Journal of the American Medical Association,* 1962, 181, 300-310.

Glover, E. *The technique of psycho-analysis.* New York: International Universities Press, 1958.

Goldman, A. E. A comparative-developmental approach to schizophrenia. *Psychological Bulletin,* 1962, 59, 57-69.

Goldstein, K., and Scheerer, M. Abstract and concrete behavior. *Psychological Monograph* No. 239, 1941.

Gollin, E. S. A developmental analysis of learning. In J. Hellmuth (Ed.), *Cognitive Studies,* Vol. 1. New York: Brunner/Mazel, 1970.

Gomberg, E. S. Etiology of alcoholism. *Journal of Consulting and Clinical Psychology,* 1968, 32, 18-20.

Goslin, D. A. (Ed.). *Handbook of socialization theory and research.* Skokie, 111.: Rand McNally, 1969.

Gough, H. G. Identifying psychological femininity *Educational Psychological Measurement,* 1952, 12, 427-439.

Goulet, L. R. Training, transfer and development of complex behavior. *Human Development,* 1970, 13, 213-240.

Goulet, L. R., and Baltes, P. B. (Eds.). *Life-span developmental psychology: Research and theory.* New York: Academic Press, 1970.

Gourevitch, V., and Feffer, M. H. A study of motivational development. *Journal of Genetic Psychology,* 1962, 100, 361-375.

Greenberg, D. J., and Blue, S. Z. Visual complexity in infancy: Contour or numerosity? *Child Development,* 1975, 46, 357-363.

Greene, D., and Lepper, M. R. Effects of extrinsic records on children's subsequent intrinsic interest. *Child Development,* 1974, 45, 1141-1145.

Greenspan, S. I. A consideration of some learning variables in the context of psychoanalytic theory. *Psychological Issues,* 1975 (1, Whole No. 33).

Grinker, R. R., Nunnaly, J. C. The phenomena of depressions. In J. O. Cole, M. Katz, and W. E. Barton (Eds.), *The role and methodology of classification in psychiatry and psychopathology.* Chevy Chase, Md.: U. S. Department of Health, Education and Welfare, 1965.

Group for the Advancement of Psychiatry. Committee on Psychiatry. *Psychopathological disorders in childhood: Theoretical considerations and a proposed classification* (GAP Report No. 62). New York: GAP, June 1966.

Gruen, W. Rejection of false information about oneself as an indication of ego identity. *Journal of Consulting Psychology,* 1960, 24, 231-233.

Gruenbaum, H., Weiss, J. L., Cohler, B. J., Hartman, C. R., and Gallant, D. H. *Mentally ill mothers and their children.* Chicago: University of Chicago Press, 1975.

Gunnoe, C. *The evaluation of a structure based and a skilled based intervention program for at risk four and five year old children.* Doctoral dissertation, Harvard University, Cambridge, Mass., 1975.

Guthrie, G. D. *Changes in cognitive functioning under stress: A study of plasticity in cognitive controls.* Doctoral dissertation, Clark University, Worcester, Mass., 1967.

Guyette, A. M. *A developmental analysis of cognitive functioning in mental retardates.* Doctoral dissertation, Clark University, Worcester, Mass., 1965.

Gyr, J. W., and Willey, R. L. The constructive nature of perceptual and cognitive processes and its implications for cognitive change. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 2. New York: Brunner/Mazel, 1971.

Hagen, J. W., and Hale, G. H. The development of attention in children. *Minnesota Symposia on Child Psychology,* 1973, 7, 117-140.

Hagen, J. W., and Kail, R. V. The role of attention in perceptual and cognitive development. In W. M. Cruickshank and D. P. Hallahan (Eds.), *Perceptual and learning disabilities in children,* Vol. 2, *Research and theory.* Syracuse, N.Y.: Syracuse University Press, 1975.

Hale, G. A., and Taweel, S. S. Children's component selection with varying degrees of training. *Journal of Experimental Child Psychology,* 1974, 17, 229-241.

Hall, G. S Laboratory of the McLean Hospital, Somerville, Massachusetts. *American Journal of Insanity,* 1895, 51, 1-7.

Hamilton, M. Perspectives on the conference. In M. Katz, J. O. Cole and W. E. Barton (Eds.), *The role of methodology of classification in psychiatry and psychopathology.* Chevy Chase, Md.: U. S. Department of Health, Education and Welfare, 1965.

Hanf, C., and Kling, J. *Facilitating parent child intervention: A two-state training model.* Unpublished manuscript, 1974.

Haronian, F., and Sugarman, A. Fixed and mobile field independence: Review of studies relevant to Werner's dimension. *Psychological Reports,* 1967, 21, 41-57.

Harris, Dj B. Problems in formulating a scientific concept of development. In D. B. Harris (Ed.), *The concept of development: An issue in the study of human behavior.* Minneapolis: University of Minnesota Press, 1957.

Hartmann, H. (1939). *Ego psychology and the problem of adaptation,* 1st English ed. New York: International Universities Press, 1958.

Havighurst, R, J. History of developmental psychology: Socialization and personality development through the life span. In P. B. Baltes and K. W. Schaie (Eds.), *Life-span developmental psychology .Personality and socialization.* New York: Academic Press, 1973.

Hawkins, R. P. Learning of peripheral content in films,: A developmental study. *Child Development,* 1973, 44, 214-217.

Heilbum, A. B. Style of adaptation to experienced aversive maternal control and interpersonal distance following failure. *Journal of Nervous and Mental Disease,* 1972, 155, 177-182.

Hellmuth, J. (Ed.). *Cognitive studies,* 2 vols. New York : Brunner/Mazel, 1970, 1971.

Hemmendinger, L. Developmental theory and Rorschach method. In M. A. Rickers-Ovsiankina (Ed.), *Rorschach psychology.* New York: Wiley, 1960.

Hertzig, M. E., Birch, H. G., Thomas, A., and Mendez, O. A. Class and ethnic differences in the responsiveness of preschool children to cognitive demands. *Monographs of the Society for Research in Child Development,* 1968, 33 (1, Whole No. 117).

Hess, E. H. Imprinting. *Science,* 1959, 130, 133-141.

Hetherington, E. M. (Ed.). *Review of child development research,* Vol. 5. Chicago: University of Chicago Press, 1975.

Hill, K. T., and Zigler, E. The action-thought dimensions and performance in an action versus thought conflict situation. *Journal of Personality,* 1964, 32, 666-681.

Hill, S. D., McCullum, A. H., and Scheau, A. G. Relation of training and motor activity to development of right-left directionality in mentally retarded children: Exploratory study. *Perceptual and Motor Skills,* 1967, 24, 363-366.

Hobbs, N. *The futures of children.* San Francisco: Jossey-Bass, 1975.

Hoffman, L. W. and Hoffman, M. L. (Eds.). *Review of child development research,* Vol. 2. New York: Russell Sage Foundation, 1966.

Hoffman, M. L., and Hoffman, L. W. (Eds.). *Review of child development research,* Vol. 1. New York: Russel Sage Foundation, 1964.

Hollenberg, C. K. Functions of visual imagery in the learning and concept formation of children. *Child Development,* 1970, 41, 1003-1015.

Holt, R. R. Recent developments in psychoanalytic ego psychology and their implications for diagnostic testing. *Journal of Projective Technology,* 1960, 24, 254-266.

Holt, R. R. The emergence of cognitive psychology. *Journal of the American Psychoanalytic Association,* 1964, 12, 650-665.

Holt, R. R. Beyond vitalism and mechanism: Freud’s concept of psychic energy. In J. H. Masserman (Ed.), *Science and psychoanalysis,* Vol. 2. New York: Grune & Stratton, 1967.

Holt, R. R. Drive or wish? A reconsideration of the psychoanalytic theory of motivation. *Psychological Issues,* 1976, 9 (4, Whole No. 36, 158-198).

Holzman, P. S., and Klein, G. S. Cognitive system principles of leveling and sharpening: Individual differences in assimilation effects in visual time error. *Journal of Personality,* 1954, 37, 105-122.

Honzik, M. Value and imitations of infant tests. In M. Lewis (Ed.), *Origins of intelligence: Infancy and early childhood.* New York: Plenum, 1976.

Horowitz, F. D. (Ed.). *Review of child development research,* Vol. 4. Chicago: University of Chicago Press, 1975.

Hurwitz, J. I., and Kaplan, D. Parental coping patterns and delinquency. *Journal of Offender Therapy,* 1962, 6, 2-4.

Inhelder, B., Sinclair, H., and Bovet, M. *Learning and the development of cognition.* Cambridge, Mass.: Harvard University Press, 1974.

IPAT Test of g: Culture-free Scale 2. Champaign, Ill.: Institute of Personality and Ability Testing, 1962.

Jackson, J. P. The relationship between the development of gestural imagery and the development of graphic imagery. *Child Development,* 1974, 45, 432-438.

Jacobson, L. I., and Greeson, L. E. Effects of systematic conceptual learning on the intellectual development of preschool children from poverty backgrounds: A follow-up study. *Child Development*, 1972, 43, 1111-1115.

Jaensch, J., and collaborators. *Grundformers menschlichen Seins.* Berlin: Otto Eisner, 1929.

Janis, I. L., and Leventhal, H. Human reaction to stress. In E. F. Borgatta and W. W. Lambert (Eds), *Handbook of personality theory and research.* Skokie,: Rand McNally, 1968.

Janis, I. L., Mahl, G. F., Kagan, J., and Holt, R. R. *Personality*: *dynamics, development and assessment.* New York: Harcourt, Brace and World, 1969.

Jastak, J. F., and Jastak, S. R. *Short forms of the WAIS and WISC vocabulary subtests, monograph supplement, No. 18,* Brandon, Vt.: Journal of Clinical

Psychology, Inc.

Jefrey, D. B., Hartmann, D. P., and Gelfand, D. M. A comparison of the effects of contingent reinforcement, nurturance, and nonreinforcement on imitative learning. *Child Development,* 1972, 43, 1053-1059.

Jellinek, E. M. Some principles of psychiatric classification. *Psychiatry,* 1939, 2, 161-165.

Jensen, A. R., and Rohwer, W. D. The Stroop color-word test: A review. *Acta Psychologica* (Amsterdam), 1966, 25, 36-93.

Jessner, L., and Pavenstedt, E. (Eds.). *Dynamic psychopathology in childhood.* New York: Grune & Stratton, 1959.

Judson, A. J., and Katahn, M. Levels of personality organization and production of associative sequences in process-reactive schizophrenia. *Journal of Consulting Psychology,* 1964, 28, 208-213.

Kagan, J. Body build and conceptual impulsivity in children. *Journal of Personality,* 1966a, 34, 118-128.

Kagan, J. Reflection-impulsivity: The generality and dynamics of conceptual tempo. *Journal of Abnormal Psychology,* 1966b, 71, 17-24.

Kagan, J. The role of evaluation in problem solving. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 2. New York: Brunner/Mazel, 1971.

Kagan, J., and Kogan, N. Individual variation in cognitive process. In P. H. Mussen (Ed.), *Carmichael's manual of child psychology,* Vol. 1, 3rd ed. New York: Wiley, 1970.

Kagan, J., Moss, H. A., and Siegel, I. E. Psychological significance of styles of conceptualization. *Monographs of the Society for Research in Child Development,* 1963, 28 (2, Serial No. 86, 73-112).

Kagan, J., Pearson, L. and Welch, L. Modificability of an impulsive tempo. *Journal of Educational Psychology,* 1966, 57, 359-365.

Kagan, J., Rosman, B. L., Kay, D., Albert, J., and Phillips, W. Information processing in the child: Significance of the analytic-reflective attitudes. *Psychological Monographs,* 1964, 78 (No. 1, Whole No. 578).

Kahn, T. C., and Giffen, M. B. *Psychological techniques in diagnosis and evaluation.* New York: Pergamon, 1960.

Kaplan, B. The study of language in psychiatry: The comparative developmental approach and its application to symbolization and language in psychopathology. In S. Arieti (Ed.), *American handbook of psychiatry,* Vol. 3. New York: Basic Books, 1959.

Katz, M. M. and Cole, J. O. Reflections on the major conference issue: In M. M. Katz, J. O. Cole, and W. E. Barton (Eds.), *The role of classification in psychiatry and psychopathology.* Chevy Chase, Md.: U.S. Department of Health, Education and Welfare, 1965.

Katz, M. M., Cole, J. O., and Barton, W. E. (Eds.). *The role and methodology of classification in psychiatry and psychopathology.* Chevy Chase, Md.: U.S. Department of Health, Education and Welfare, 1965.

Kay, K. *Gaze direction as the infant's way of controlling his mother's teaching behavior.* Paper presented at the Biennial Meeting of the Society for Research in Child Development, Denver, Colorado, 1975.

Kelly, G. A. The role of classification in personality theory. In M. Katz, J. O. Cole, and W. E. Barton (Eds.), *The role of methodology and classification in psychiatry and psychopathology.* Chevy Chase, Md.: U.S. Department of Health, Education and Welfare, 1965.

Kendler, H. H., and Helland, J. Otogenetic changes in classification behavior. *Bulletin of the Psychonomic Society,* 1974, 4, 456—458.

Kessen, W. Research design in the study of developmental problems. In P. H. Mussen (Ed.), *Handbook of research methods in child development.* New York: Wiley, 1960.

Kessen, W., Haith, M. M., and Salapatek, P. H. Human infancy: A bibliography and guide. In P. H. Mussen (Ed.), *Carmichael's manual of child psychology,* Vol. 1 3rd ed. New York: Wiley, 1970.

Kessler, J. W. *Psychopathology of childhood.* Englewood Cliffs, N. J.: Prentice-Hall, 1966.

Kessler, J. W. Contributions of the mentally retarded toward a theory of cognitive development. In J. Hellmuth (Ed.), *Cognitive Studies,* Vol. 1. New York: Brunner/Mazel, 1970.

Kessler, J. W., Ablon, G., and Smith, E. C. Separation reactions in young, mildly retarded and brain damaged children. *American Journal of Orthopsychiatry,* 1968, 38, 216-217 (abstract).

Kestenberg, J. S. The role of movement patterns in development: III. The control of shape. *Psychoanalytic Quarterly,* 1967, 36, 356-409.

Kestenberg, J. S. Comments on movement therapy as a psychotherapeutic tool. *Journal of the American Psychoanalytic Association,* 1973, 21, 347-349.

Kestenberg, J. S., Marcus, H., Robbins, E., Berlowe, J., and Buelte, A. Development of the young child as expressed through bodily movement. *Journal of the American Psychoanalytic Association,* 1971, 19, 746-764.

Kimball, P. H. Personal communications, Pueblo, Colorado, Therapy Center, October 1969.

Klein, G. S. The personal world through perception. In R. R. Blake and G. V. Ramsey (Eds.), *Perception: An approach to personality.* New York: Ronald Press, 1951.

Klein, G. S. Need and regulation. In M. R. Jones (Ed.), *Nebraska Symposium on Motivation.* Lincoln: University of Nebraska Press, 1954.

Klein, G. S. Cognitive control and motivation. In G. Lindzey (Ed.), *Assessment of human motives.* New York: Holt, Rinehart, & Winston 1958.

Klein, G. S. *Perception, motives, and personality.* New York: Knopf, 1970.

Klein, G. S., and Schlesinger, H. J. Where is the perceiver in perceptual theory? *Journal of Personality,* 1949, 18, 32-47.

Klineberg, S. L. Changes in outlook on the future between childhood and adolescence. *Journal of Personality and Social Psychology,* 1967,7, 185-193.

Koenigsberg, R. S. An evaluation of visual versus sensorimotor methods for improving orientation discrimination of letter reversals by preschool children. *Child Development,* 1973, 44, 764-769.

Kogan, K. L. Specificity and stability of mother-child interaction styles. *Child Psychiatry and Human Development,* 1972, 2, 160-168.

Kogan, K. L., and Gordon, B. N. A mothers construction program: Documenting change in mother-child interactions. *Child Psychiatry and Human Development,* 1975, 5, 189-200.

Kogan, K. L., Tyler, N., and Turner, P. The process-of interpersonal adaptation between mothers and their cerebral palsied children. *Developmental Medicine and Child Neurology,* 1974, 16, 518-527.

Kogan, K. L., and Wimberger, H. C. Behavior transactions between disturbed children and their mothers. *Psychological Reports,* 1971, 28, 395-404.

Kogan, N. Educational implications of cognitive styles. In G. S. Lesser (Ed.), *Psychology and educational practice.* Glenview, 111.: Scott, Foresman, 1971.

Kogan, N. Creativity and cognitive style: A life span perspective. In P. B. Baltes and K. W. Schaie (Eds.), *Life-span developmental psychology. Personality and socialization.* New York: Academic Press, 1973.

Kogan, N. Categorizing and conceptualizing styles in younger and older adults. *Human Development,* 1974, 17, 218-230.

Kogan, N. *Cognitive styles in infancy and early childhood.* New York: Plenum, 1976.

Kohlberg, L. Development of moral character and moral ideology. In M. L. Hoffman and L. W. Hoffman (Eds.), *Review of child development and research.* New York: Russel Sage Foundation, 1964.

Kohlberg, L. A cognitive-developmental analysis of children's sex-role concepts and attitudes. In E. E. Maccoby (Ed.), *The development of sex differences.* Stanford, Calif.: Stanford University Press, 1966.

Kohlberg, L. Early education. A cognitive developmental view. *Child Development,* 1968, 39, 1013-1062.

Kohlberg, L. Stage and sequence: The cognitive- developmental approach to socialization. In D. A. Goslin (Ed.), *Handbook of socialization: Theory and research.* Skokie, 111.: Rand McNally, 1969.

Kohlberg, L. Continuities in childhood and adult moral development revisited. In P. B. Baltes and K. W. Schaie (Eds.), *Life-span developmental psychology. Personality and socialization.* New York: Academic Press, 1973.

Kohlberg, L., and Turiel, E. Moral development and moral education. In G. S. Lesser (Ed.), *Psychology and educational practice.* Glenview, 111.: Scott, Foresman, 1971.

Kohnstamm, G. A. Experiments on teaching Piagetian thought operations. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 1. New York: Brunner/Mazel, 1970.

Koocher, G. P. Emerging selfhood and cognitive development, *Journal of Genetic Psychology,* 1974,125, 79-88.

Kopfstein, D. Risk-taking behavior and cognitive style. *Child Development,* 1973, 44, 190-192.

Koppitz, E. M. *The Bender Gestalt Test for young children.* New York: Grune & Stratton, 1964.

Korner, A. F., Kramer, H. C., Haffnew, M. E., and Thoman, E. B. Characteristics of crying and noncrying activity of full-term neonates. *Child Development,* 1974, 45, 953-958.

Korner, A. F., Thoman, E. B., and Glick, J. H. A system for monitoring crying and noncrying, large, medium and small neonatal movements. *Child Development,* 1974, 45, 946-952.

Kreitler, H., and Kreitler, S. The cognitive determinants of defensive behavior. *Journal of Social and Clinical Psychology,* 1972, 11, 359-372.

Kreitler, S., Sigler, E., and Kreitler, H. The complexity of complexity. *Human Development,* 1974, 17, 54-73.

Kris, E. *Psychoanalysis explorations in art.* New York: International Universities Press, 1952.

Kuczaj, S. A., II, and Maratsos, M. P. On the acquisition of front, back and side. *Child Development,* 1975,46, 202-210.

Kuhn, D. Mechanisms of change in the development of cognitive structures. *Child Development,* 1972, 43, 833-844.

La Barbera, J. D., and Izard, C. E. Four and six month old infants' visual responses to joy, anger and netural expressions. *Child Development,* 1976,47, 535-538.

Langer, J. *Theories of development.* New York: Holt, Rinehart, & Winston, 1969.

Lavatelli, C. S. *Piaget's theory applied to an early childhood curriculum.* Cambridge, Mass.: American Science and Engineering, 1970.

Lax, R. F. Some aspects of the interaction between mother and impaired child: Mother's narcissistic trauma. *International Journal of Psychoanalysis,* 1972, 53, 339-345.

Lefford, A., Birch, H. G., and Green, G. The perceptual and cognitive bases for linger localization and selective finger movement in preschool children. *Child Development,* 1974, 45, 335-343.

Lehman, E. B. Selective strategies in children's attention to task relevant information. *Child Development,* 1972, 43, 197-209.

Lemieux, G. J. *Leveling-sharpening cognitive control and masculinity-femininity in college students.* National Science Foundation Research Project, Clark University, Worcester, Mass., 1966.

Lennard, H. L., Baulieu, N. R., and Embrey, N. G. Interaction in families with a schizophrenic child. *Archives of General Psychiatry,* 1965, 12, 166-183.

Lesser, G. S. (Ed.). *Psychology and educational practice.* Glenview, 111.: Scott, Foresman, 1971.

Lessing, E. E. Demographic, developmental and personality correlates of length of future time perspective (STP). *Journal of Personality,* 1968, 36, 183-201.

Levin, J. R., McCabe, A. E., and Bender, B. G. A note on imagery-inducing motor activity in young children. *Child Development,* 1975, 46, 263-266.

Levy, D. M. Critical evaluation of the present state of child psychiatry. *American Journal of Psychology,* 1952, 108, 481-494.

Lewis, M. The development of attention and perception in the infant and young child. In W. M. Cruickshank and D. P. Hallahan (Eds.), *Perceptual and learning disabilities in children,* Vol. 2, *Research and theory.* Syracuse, N.Y.: Syracuse University Press, 1975.

Lewis, M. What do we mean when we say "infant intelligence scores"? A sociopolitical question. In M. Lewis (Ed.), *Origins of intelligence*: *Infancy and early childhood.* New York: Plenum, 1976a.

Lewis, M. (Ed.). *Origins of intelligence*: *Infancy and early childhood.* New York: Plenum, 1976b.

Liebetrau, C. E. The relation between adjustment and body image at various age levels. *Journal of Personality Assessment,* 1974, 38, 230-233.

Livington, G. Touching and therapy: A rebuttal. *The Clinical Psychologist,* Spring 1973.

Loevinger, J. *Ego development.* San Francisco: Jossey-Bass, 1976.

Loutitt, C. M. The nature of clinical psychology. *Psychological Bulletin,* 1939, 36, 361—389.

Maccoby, E. E., and Jacklin, C. N. *The psychology of sex differences.* Stanford, Calif.: Stanford University Press, 1974.

Mack, J. E. Nightmares, conflict and ego development in childhood. *International Journal of Psychoanalysis,* 46, 403-428.

Mahl, G. F. Gestures and body movements in interviews. *Research in Psychotherapy,* 1968, 3, 295-346.

Mandler, J. M. Memory for orientation of forms as a function of their meaningfulness and complexity. *Journal of Experimental Child Psychology,* 1975, 20, 430-443.

Mann, L., and Goodman, L. Perceptual training: A critical retrospect. In E. Schopler and R. J. Reichler (Eds.), *Psychopathology and child development.* New York: Plenum, 1976.

Marcia, J. E. Development and validation of ego identity status. *Journal of Personality and Social Psychology,* 3, 551-559.

Marcia, J. E. Ego identity status: Relationship to change in self-esteem, "general maladjustment," and authoritarianism. *Journal of Personality,* 1967, 35, 118-133.

Marks, I. M., and Gelder, M. G. Different ages of onset in varieties of phobia. *American Journal of Psychiatry,* 1966, 123, 218-221.

Marmor, J. Neurosis and the psychotherpeutic process: Similarities and differences in the behavioral and psychodynamic conceptions. *International Journal of Psychiatry,* 1971, 7, 514-519.

Mattson, A., and Gross, S. Adaptation and defensive behavior in young hemophiliacs and their parents. *American Journal of Psychiatry,* 1966, 122, 1349-1356.

McCall, R. B., Appelbaum, M. I., and Hogarty, P. S. Developmental changes in mental performance. *Monographs of the Society for Research in Child Development,* 1973, 38 (3, Serial No. 150).

McKinney, J. D. Developmental study of the acquisition and utilization of conceptual strategies. *Journal of Educational Psychology,* 1972. 63, 22-31.

McKinney, J. D. Problem-solving strategies in impulsive and reflective second graders. *Developmental Psychology,* 1973, 8, 145.

McKinney, J. D. Problem-solving strategies in reflective and impulsive children. *Journal of Educational Psychology,* in press, 1977.

McKinney, J. D., and Banerjee, C. Concept attainment by reflective and impulsive children as a function of memory support. *Perceptual and Motor Skills,* 1975, 41, 417-418.

Megargee, E. I. Relations between barrier scores and aggressive behavior. *Journal of Abnormal Psychology,* 1965, 70, 307-311.

Menlove, F. L. Aggressive symptoms in emotionally disturbed adopted children. *Child Development,* 1965, 36, 519-532.

Michaels, J. J. *Disorders of characters.* Springfield, 111.: Thomas, 1955.

Michaels, J. J. The need for a theory of delinquency. *Archives of General Psychiatry,* 1964, 10, 182-186.

Millar, S. Effects of instruction to visualize stimuli during delay on visual recognition by preschool children. *Child Development,* 1972, 43, 1073-1075.

Miller, D. R. Psychoanalytic theory of development: A re-evaluation. In D. H. Goslin (Ed.), *Handbook of socialization theory and research.* Skokie, 111.: Rand McNally, 1969.

Miller, R. S., and Morris, W. N. The effects of being imitated on children’s responses in a marble-dropping task. *Child Development,* 1974, 45, 1103-1107.

Minuchin, S., Auerswald, E., King, C. H., and Rabinowitz, C. The study and treatment of families that produce multiple acting-out boys. *American Journal of Orthopsychiatry,* 1964, 34, 125-133.

Minuchin, S., Chamberlain, P., and Graubard, P. A project to teach learning skills to disturbed, delinquent children. *American Journal of Orthopsychiatry,* 1967, 36, 558-567.

Minuchin, S., and Montalvo, B. Techniques for working with disorganized low socioeconomic families. *American Journal of Orthopsychiatry,* 1967, 37, 880-887.

Mischel, W. (Ed.). *Personality and assessment.* New York: Wiley, 1968.

Mischel, W. Toward a cognitive social learning reconceptualization of personality. *Psychological Review,* 80, 252-283.

Mischel, W., and Baker, N. Cognitive appraisals and transformations in delay behavior. *Journal of Personality and Social Psychology,* 1975, 31, 254-261.

Mischel, W., Ebbesen, E. B., and Zeiss, A. R. Cognitive and attentional mechanisms in delay of gratification. *Journal of Personality and Social Psychology,* 1972, 21, 204-218.

Mittelman, B. Motility in infants, children, and adults: Patterning and psychodynamics. *The Psychoanalytic Study of the Child,* 1954, 9, 142-177.

Modaressi, T. The effect of system intervention in the cognitive control of preschool children. *Journal of Nervous and Mental Disease,* 1975, 160, 392-401.

Modgil, S. *Piagetian research: A handbook of recent studies.* NFER Publishing Co., Humanities Press, 1974.

Moore, B. S., Clyburn, A., and Underwood, B. The role of affect in delay of gratification. *Child Development,* 1976, 47, 273-276.

Munley, P. H. Erik Erikson’s theory of psychosocial development and vocational behavior. *Journal of Counseling Psychology,* 1975, 22, 314-319.

Murphy, L. B. Discussion of papers by Brill, Weinstock, Gleser, Overall, Hollister, Stein, and Neulinger in the light of research in human development. In M. Katz, J. O. Cole, and W. E. Barton (Eds.), *The role of methodology of classification in psychiatry and psychopathology.* Chevy Chase, Md.: U.S. Department of Health, Education and Welfare, 1965.

Murphy, L. B. *The widening world of childhood.* New York: Basic Books, 1962.

Murphy, L. B., and Moriarty, A. E. *Vulnerability, coping, and growth: From infancy to adolescence.* New Haven Conn.: Yale University Press, 1976.

Murray, H. A. Historical trends in personality research. In H. P. David and J. C. Brenglemann (Eds.), *Perspectives in personality research.* New York: Springer, 1960.

Mussen, P. H. (Ed.), *Carmichael's manual of child psychology,* 2 vols. New York: Wiley, 1970.

Mussen, P. H. *Handbook of research methods in child development.* New York: Wiley, 1960.

Nagel, E. Determinism and development. In D. B. Harris (Ed.), *The concept of development : An issue in the study of human behavior.* Minneapolis: University of Minnesota Press, 1957.

Nathan, S. Body image in chronically obese children as reflected in figure drawings. *Journal of Personality Assessment,* 1973, 37, 456-463.

Nelsen, K. Some evidence for the cognitive primacy of categorization and functional basis. *Merrill-Palmer Quarterly,* 1973, 19, 21-39.

Nelsen, K. Variations in children’s concepts by age and category. *Child Development,* 1974, 45, 577-584.

Nelson, T. F. *The effects of training in attention deployment in observing behavior in reflective and impulsive children.* Doctoral dissertation, University of Minnesota, 1968.

Newman, A., and Kanfer, F. H. Delay of gratification in children: The effects of training under fixed, decreasing, and increasing delay of reward. *Journal of Experimental Child Psychology,* 1976, 21, 12-24.

Nisan, M. Exposure to rewards and the delay of gratification. *Developmental Psychology,* 1974a, 10, 376-380.

Nisan, M. Imposed inhibition and delay of gratification. *Child Development,* 1974b, 45, 1089-1092.

Nisan, M. Delay of gratification in children: Personal versus group choices. *Child Development,* 1976, 47, 195-200.

O’Connor, N., and Hermelin, B. Sensory dominance. *Archives of General Psychiatry,* 1965, 12, 99-103.

Ottenson, J. P., and Holzman, P. S. Cognitive controls and psychopathology. *Journal of Abnormal Psychology,* 1976, 85, 125-139.

Overton, W. F., and Jackson, J. P. The representation of imagined objects in action sequences: A developmental study. *Child Development,* 1973, 44, 309-314.

Owen, F. W., Adams, P. A., Forrest, T., Stotz, L. M., and Fisher, S. Learning disorders in children: Sibling studies. *Monographs of the Society for Research in Child Development,* 1971, 36 (4, Serial No. 144).

Parke, R. D. Issues in child development: On the myth of the field-lab distinction. *SRCD Newsletter,* Winter 1976.

Parke, R. E., and Servin, D. B. Infant characteristics and behavior as elicitors of maternal and parental responsibility in the newborn. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Denver, Colorado, 1975.

Patterson, C. J., and Mischel, W. Plans to resist distraction. *Developmental Psychology,* 1975, 11, 369-378.

Patterson, G. R. An empirical approach to the classification of disturbed children. *Journal of Clinical Psychology,* 1964, 20, 326-337.

Patterson, G. R. Behavioral intervention procedures in the classroom and in the home. In A. E. Bergin and S. L. Garfield (Eds.), *Handbook of psychotherapy and behavior change.* New York: Wiley, 1971.

Pettigrew, T. E. The measurement and correlates of category width as a cognitive variable. *Journal of Personality,* 1958, 26, 532-544.

Phillips, L., and Rabinovitch, F. M. Social role and patterns of symtomatic behaviors. *Journal of Abnormal and Social Psychology,* 1958, 57, 181-186.

Phillips, L., Zigler, E. Role orientation, the action- thought parameter, and outcome of psychiatric disorder. *Journal of Abnormal and Social Psychology,* 1964, 68, 381-389.

Piaget, J. *Biologie et connaissance.* Paris: Gallimard, 1967.

Piaget, J., and Inhelder, B. *The child's conception of space.* New York: Norton, 1967.

Piaget, J., Lambercier, M., Boesch, E., and Albertini, B. Introduction a l'etude des perceptions chez l'enfant et analyse d'une illusion relative a la perception visuelle des cercles concentriques (Delboeuf). *Archives Psychologiques*, 1942, 29, 1-107.

Pick, A. D., Frankel, D. G., and Hess, V. L. Children's attention: The Development of selectivity. In E. M. Hetherington (Ed.), *Review of child development research,* Vol. 5. Chicago: University of Chicago Press, 1975.

Pick, H. L. Development in complex perceptual activities. In E. Schopler and R. J. Reichler (Eds.), *Psychopathology and child development.* New York: Plenum, 1976.

Pick, H. L., and Pick, A. D. Sensory and perceptual development. In P. H. Mussen (Ed.), *Carmichael's manual of child psychology.* New York: Wiley, 1970.

Podell, J. E., and Phillips, L. A developmental analysis of cognition as observed in dimensions of Rorschach and objective test performance. *Journal of Personality,* 1959, 27, 439-463.

Prescott, J. W. On touching: A reply to Samuel Tenenbaum. *The Clinical Psychologist,* Spring 1973.

Provence, S., and Lipton, R. C. *Infants in institutions.* New York: International Universities Press, 1962.

Rapaport, D. Toward a theory of thinking. In D. Rapaport (Ed.), *Organization and pathology of thought.* New York: Columbia University Press, 1951.

Rapaport, D. On the psychoanalytic theory of motivation. In M. R. Jones (Ed.), *Nebraska Symposium on Motivation.* Lincoln: University of Nebraska Press, 1960a.

Rapaport, D. Psychoanalysis as a developmental psychology. In B. Kaplan and S. Wapner (Eds.), *Perspectives in psychological theory.* New York: International Universities Press, 1960b.

Rapaport, D., and Gill, M. The points of view and assumptions of metapsychology. *International Journal of Psychoanalysis,* 1959, 40, 1-10.

Rapaport, D., Gill, M., and Schafer, R. *Diagnostic psychological testing.* Vol. 1. Chicago: Yearbook, 1945.

Reed, J. L. Children's explanations. In G. S. Lesser (Ed.), *Psychology and educational practice.* Glenview, 111.: Scott, Foresman, 1971.

Rees, L. Constitutional factors and abnormal behavior. In H. J. Eysenck (Ed.), *Handbook of abnormal psychology.* New York: Basic Books, 1961.

Reese, H. W. Imagery in children's learning: A symposium. *Psychological Bulletin,* 1970, 73, 383-421.

Reese, H. W., and Overton, W. F. Models of development and theories of development. In L. R. Goulet and P. B. Baltes (Eds.), *Life-span developmental psychology.* New York: Academic Press, 1970.

Reichler, R. J., and Schopler, E. Developmental therapy: A program model for providing individualized services in the community. In E. Schopler and R. J. Reichler (Eds.), *Psychopathology and child development.* New York: Plenum, 1976.

Reiss, D. Varieties of consensual experience: III. Contrasts between families of normals, delinquents and schizophrenics. *Journal of Nervous and Mental Disease,* 1971, 43, 73-95.

Renaud, H., and Estess, F. Life history interviews with 100 normal American males: “Pathogenicity” of childhood. *American Journal of Orthopsychiatry,* 1961, 31, 786-802.

Rhoads, J. M., and Feather, B. W. Transference and resistance in behavior therapy. *British Journal of Medical Psychology,* 1972, 45, 99-103.

Rhoads, J. M., and Feather, B. W. The application of psychodynamics to behavior therapy. *American Journal of Psychiatry,* 1974, 131, 17-20.

Rhodes, W. C., and Tracy, M. *A study of child variance: Conceptual project in emotional development*. Ann Arbor, Mich.: Institute for the Study of Mental Retardation and Related Disabilities, 1972.

Ricks, N. L. *Sustained attention and the effects of distraction in under-achieving second grade children*. Doctoral dissertation, Boston University, 1974.

Ridberg, E. N., Parke, R. D., and Hetherington, E. M. Modification of impulsive and reflective cognitive styles through observation of film mediated models. *Developmental Psychology,* 1971, 5, 369-377.

Rieser, J., Yonas, A., and Wilkner, K. Radial localization of odors by human newborns. *Child Development,* 1976, 47, 856-859.

Robins, L. N. *Deviant children grown up: A sociologic and psychiatric study of sociopathic personality.* Baltimore: Williams & Wilkins, 1966.

Robinson, J. E., and Gray, J. L., Cognitive style as a variable in school learning. *Journal of Educational Psychology,* 1974, 66, 793-799.

Roff, M., Mink, W., and Hinrichs, G. *Developmental abnormal psychology: A casebook.* New York: Holt, Rinehart, & Winston, 1966.

Roff, M., Robins, L. N., and Pollack, M. (Eds.). *Life history research in psychopathology,* Vol. 2. Minneapolis: University of Minnesota Press, 1972.

Rose, S. A., Blank, M. S., and Bridger, W. H. Intermodal and intramodal retention of visual and tactual information in young children. *Developmental Psychology,* 1972, 6, 482^186.

Rosenwald, G. C., Mendelsohn, G. A., Fontana, A., and Portz, A. T. An action test of hypothesis concerning the anal personality. *Journal of Abnormal Psychology,* 1966, 71, 304-309.

Rosovold, H. E., Mirsky, A. F., Sarason, I., Bransome, , and Beck, L. A continuous performance test of brain damage. *Journal of Consulting Psychology,* 1956, 20, 343-350.

Ross, A. O. *The practice of clinical child psychology.* New York: Grune & Stratton, 1959.

Ross, N. Affect as cognition. Paper presented at the meeting of the Topeka Psychoanalytic Society, February 22, 1973.

Royce, J. R. The conceptual framework for a multifactor theory of individuality. In J. R. Royce (Ed.), *Multivariate analysis and psychological theory.* New York: Academic Press, 1973.

Rubinstein, B. B. On the role of classificatory processes in mental functioning: Aspects of a psychoanalytic theoretical model. *Psychoanalysis and Contemporary Science,* 1975, 3, 101-185.

Saarni, C., and Kogan N. Cognitive styles. In G. Steiner (Ed.), *The psychology of the 20th century.* Zurich and Munich: Kindler, 1976.

Salapatek, P. Pattern perception in early infancy. In L. B. Cohen and P. Salapatek (Eds.), *Infant perception: From sensations to cognition.* New York: Academic Press, 1975.

Saltz, E., and Finkelstein, C. Does imagery retard conceptual behaviour? *Child Development,* 1974,45, 1093-1097.

Sander, L. W. Issues in early mother-child interaction. *Journal of the American Academy of Child Psychiatry,* 1962. 1, 141-166.

Sander, L. W. Adaptive relationships in early mother-child interaction. *Journal of the American Academy of Child Psychiatry,* 1964,3,231-264.

Sander, L. W. The longitudinal course of early mother- child interaction: Cross-case comparison in a sample of mother-child pairs. In B. M. Boss (Ed.), *Determinants of infant behavior.* London: Methuen, 1966.

Sander, L. W. Regulation and organization in the early infant-caretaker system. In R. Robinson (Ed.), *Brain and early behavior.* London: Academic Press, 1969.

Sander, L. W. Infant and caretaking environment: Investigation and conceptualization of adaptive behavior in a system of increasing complexity. In E. J. Anthony (Ed.), *Explorations in child psychiatry.* New York: Plenum, 1975.

Sander, L. W. Primary prevention and some aspects of temporal organization in early infant-caretaker interaction. In E. Rexford, L. Sander, and T. Shapiro, (Eds.), *Infant psychiatry. A new synthesis.* New Haven, Conn.: Yale University Press, 1976.

Sander, L. W., Julia, H. L., Stechler, G., and Burns, P. Continuous 24-hour interactional monitoring in infants reared in two caretaking environments. *Psychosomatic Medicine,* 1972, 34, 270-282.

Sander, L. W., Stechler, G., Burns, P., and Julia, H. L. Early mother-infant interaction and 24-hour patterns of activity and sleep. *Journal of the American Academy of Child Psychiatry,* 1970, 9, 103-123.

Santostefano, S. Miniature Situations Test as a way of interviewing children. *Merrill-Palmer Quarterly,* 1962, 8, 261-269.

Santostefano, S. A developmental study of the Deboeuf illusion. *Perceptual Motor Skills,* 1963, 17, 23-29.

Santostefano, S. Cognitive controls and exceptional states in children. *Journal of Clinical Psychology,* 1964a, 20, 213-218.

Santostefano, S. A developmental study of the cognitive control leveling-sharpening. *Merrill-Palmer Quarterly,* 1964b, 10, 343-360.

Santostefano, S. Construct validity of the Miniature Situations Test: I. The performance of orphaned, brain-damaged, and public school children. *Journal of Clinical Psychology,* 1965, 21, 418-421.

Santostefano, S. *Training in attention and concentration: A program of cognitive development for children.* Philadelphia: Educational Research Associates, Inc., 1967 (monograph and training kit).

Santostefano, S. *Cognitive controls in development and adaptation: Theory and implications for clinical practice.* Paper presented at the meeting of the New England Council of Child Psychiatry, Boston, November 1968a.

Santostefano, S. Situational testing in personality assessment. *International encyclopaedia of the social sciences,* Vol. 12. New York: Macmillan, 1968b, 48-55.

Santostefano, S. Clinical education and psychoanalytic cognitive theory: A structure-oriented approach to assessing and treating cognitive disabilities in children. Paper presented at the meeting of the American Association of the Advancement of Science, Chicago, December 1969a.

Santostefano, S. Cognitive controls versus cognitive styles: An approach to diagnosing and treating cognitive disabilities in children. *Seminars in Psychiatry,* 1969b, 1, 291-317. Also in S. Chess and

Thomas (Eds.), *Annual progress in child psychiatry and child development.* New York: Brunner/Mazel, 1970.

Santostefano, S. Assessment of motives in children. *Psychological Reports,* 1970, 26, 639-649.

Santostefano, S. Beyond nosology: Diagnosis from the viewpoint of development. In E. Rie (Ed.), *Perspectives in child psychopathology.* New York: Aldine-Atherton, 1971.

Santostefano, S. Minimal brain dysfunction: Time to take a new look. *Medical Times,* 1975, 103, 83-95.

Santostefano, S. On the relation between research and practice in psychiatry and psychology: The laboratory of the McLean Hospital, 1889. *McLean Hospital Journal,* 1976a, 1, 120-129.

Santostefano, S. Shepherd Ivory Franz: The father of research for clinical practice. *McLean Hospital Journal,* 1976b, 1, 49-55.

Santostefano, S. Action, fantasy, language: Developmental levels of ego organization in communicating drives and affects. In N. Freedman and S. Grand (Eds.), *Communicative structures and psychic structures.* New York: Plenum, in press, 1977.

Santostefano, S., and Baker, H. Research in child psychopathology: The contributions of developmental psychology. In B. B. Wolman (Ed.), *Manual of child psychopathology.* New York: McGraw-Hill, 1972.

Santostefano, S., and Berkowitz, S. Principles of infant development as a guide in the psychotherapeutic treatment of borderline and psychotic children. *McLean Hospital Journal,* 1976, 1, 236-261.

Santostefano, S., and Paley, E. Development of cognitive controls in children. *Child Development,* 1964, 35, 939-949.

Santostefano, S., Rutledge, L., and Randall, D. Cognitive styles and reading disability, *Psychology in the Schools,* 1965, 2, 57-62.

Santostefano, S., and Stayton, S. Training the pre-school retarded child in focal attention: A program for parents. *American Journal of Orthopsychiatry,* 1967, 37, 732-743.

Santostefano, S., and Wilson, G. Construct validity of the Miniature Situations Test. II. The performance of institutionalized delinquents and public school adolescents. *Journal of Clinical Psychology,* 1968, 24, 355-358.

Sapir, S. G. Learning disability and deficit centered classroom training. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 2. New York: Brunner/Mazel, 1971.

Sarason, S. B., Davidson, K. S., Lighthold, F. F., Waite, R. R., and Ruebush, B. K. *Anxiety in elementary school children.* New York: Wiley, 1960.

Schachtel, E. G. The development of focal attention and the emergence of reality. *Psychiatry,* 1954, 17, 309-324.

Schacter, R. S. Kinetic psychotherapy in the treatment of children. *American Journal of Psychotherapy,* 1974, 12, 430-437.

Schachter, S. The interaction of cognitive and physiological determinants of emotional states. In P. H. Leiderman and D. Shapiro (Eds.), *Psychobiological approaches to social behavior.* Stanford, Calif.: Stanford University Press, 1964.

Schafer, R. *Psychoanalytic interpretation in Rorschach testing: Theory and application.* New York: Grune & Stratton, 1954.

Schafer, R. Bodies in schizophrenic Rorschach responses. *Journal of Projective Techniques,* 1960, 24, 267-281.

Schafer, R. Ideals, the ego ideal, and the ideal self. *Psychological Issues,* 1967, 5, 131-174.

Schecter, M. D., Toussieng, P. W., Slernlof, R. E., and Pollack, E. A. Etiology of mental disorders: Prenatal, natal and postnatal organic factors. In B. Wolman (Ed.), *Manual of child psychopathology.* New York: McGraw-Hill, 1972.

Schilder, P. *The image and appearance of the human body.* London: Kegan, Trench, Turbner, 1935.

Schonfeld, W. A. Body image disturbances in adolescents. *Archives of General Psychiatry,* 1966, 15, 16-21.

Schopler, E. Visual versus tactual receptor preference in normal and schizophrenic children. *Journal of Abnormal Psychology,* 1966, 71, 108-114.

Schopler, E., and Reichler, R. (Eds.). *Psychopathology and child development.* New York: Plenum, 1976.

Schucman, H. Evaluating the educability of the severely mentally retarded child. *Psychological Monographs,* 1960, 70 (14, Whole No. 501).

Schwartz, F. Psychoanalytic research in attention and learning: Some findings and the question of clinical relevance. *Annual of Psychoanalysis,* 1973, 1, 199-215.

Scott, J. P. Critical periods in behavioral development. *Science,* 1962, 138, 949-958.

Sears, R. R. Your ancients revisited: A history of child development. In E. M. Hetherington (Ed.), *Review of child development research,* Vol. 5. Chicago: University of Chicago Press, 1975.

Selman, R. L. Interpersonal thought in childhood, preadolescence, and adolescence: A structural analysis of developing conceptions of peer relationships. Paper presented at the annual meeting of the American Psychological Association, Washington, D.C., 1975.

Selman, R. L. Review of *Thinking goes to school*: *Piaget's theory in practice,* by H. Furth and H. Wacks. *Harvard Educational Review,* 1975, 45, 127-134.

Senn, M. J. Relationships of pediatrics and psychiatry. *American Journal of Disease in Children,* 1946, 71, 537.

Shakow, D. The role of classification in the development of the science of psychopathology with particular reference to research. In M. Katz, J. O. Cole, and W. Barton (Eds.), *The role and methodology of classification to psychiatry and psychopathology.* Chevy Chase, Md.: U.S. Department of Health, Education and Welfare, 1965.

Shapiro, D. *Neurotic styles.* New York: Basic Books, 1965.

Shapiro, I. F. *Cognitive controls and adaptation in children.* Doctoral dissertation, Boston College, 1972.

Sheehan, P. W. *The function and nature of imagery.* New York: Academic Press, 1972.

Sherman, J. A., and Bushell, D. Behavior modification as an educational technique. In F. D. Horowitz (Ed.), *Review of child development research*, Vol. 4. Chicago: University of Chicago Press, 1975.

Shoben, E. J. Psychotherapy as a problem in learning theory. *Psychological Bulletin,* 1949, 46, 366-392.

Shontz, F. C. *Perceptual and cognitive aspects of body experience.*New York: Academic Press, 1969.

Shontz, F. C. Body image and its disorders. *International Journal of Psychiatry in Medicine,* 1974, 5, 461-472.

Shore, M. F., Massimo, J. L., and Mack, R. Changes in the perception of interpersonal relationships in successfully treated adolescent delinquent boys. *Journal of Consulting Psychology,* 1965, 29, 213-217.

Shore, M. F., and Massimo, J. L. Verbalization, stimulus relevance, and personality change. *Journal of Consulting Psychology,* 1967, 31, 423-424.

Shows, W. D. Psychological differentiation and the A-B dimension: A dyadic interaction hypothesis. *Genetic Psychology Monographs,* 1975, 92, 79-113.

Siegal, E. Movement therapy as a psychotherapeutic tool. *Journal of the American Psychoanalytic Association,* 21, 333-343.

Silverman, J. Scanning-control mechanisms and “cognitive filtering” in paranoid and nonparanoid schizophrenia. *Journal of Consulting Psychology,* 1964, 28, 385-393.

Silverman, L. H. An experimental approach to the study of dynamic propositions in psychoanalysis. *Journal of the American Psychoanalytic Association,* 1959, 27, 439-463.

Simmel, M. L. Developmental aspects of the body scheme. *Child Development,* 1966, 37, 83-95.

Singer, J. L. *Imagery and daydreams'. Methods in psychotherapy and behavior modification.* New York: Academic Press, 1974.

Singer, M. T. and Wynne, L. C. Differentiating characteristics of childhood schizophrenics, childhood neurotics, and young adult schizophrenics. *American Journal of Psychiatry,* 1963, 26, 234-243.

Singer, M. T., and Wynne, L. C. Principles for scoring communication defects and deviances in parents and schizophrenics: Rorschach and TAT scoring manuals. *Psychiatry,* 1966, 29, 260-288.

Slaughter, C. H. Deficits is cognition: Implications for curriculum and instruction. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 2. New York: Brunner/Mazel, 1971.

Sloane, R. B. Short term analytically oriented psychotherapy versus behavior therapy. *American Journal of Psychiatry,* 1975, 132, 373-377.

Sluckin, W. *Imprinting and early learning.* Chicago: Aldine, 1965.

Smart, R. G. Future time perspectives in alcoholics and social drinkers. *Journal of Abnormal Psychology,* 1968, 73, 81-83.

Smith, A. C., Flick, G. L., Ferriss. G. S., and Sellman, A. H. Prediction of developmental outcome at seven years from prenatal, perinatal and postnatal events. *Child Development,* 1972, 43, 495-507.

Smith, L. C., and Phillips, L. Social effectiveness and developmental levels in adolescents. *Journal of Personality,* 1959, 27, 239-249.

Solnit, A. J. Commentary on movement therapy as a psychotherapeutic tool. *Journal of the American Psychoanalytic Association,* 1973, 21, 344-346.

Spiker, C. C. The concept of development: Relevant and irrelevant issues. *Monographs of the Society for Research and Child Development,* 1966,31 (5, Whole No. 107).

Stabenau, J. R., Tupin, J., Werner, M., and Collin, W. A comparative study of families of schizophrenics and delinquents, and normals. *Psychiatry,* 1965, 28, 45-59.

Staffieri, J. R. A study of social stereotype of body image in children. *Journal of Personality and Social Psychology,* 1967, 7, 101-107.

Stanely, G., and Hall, R. Short-term visual information processing in dyslexics. *Child Development,* 1973,44, 841-844.

Stein, A. B., Finch, A. J., Horke, J. F., and Montgomery, L. E. Cognitive tempo and the mode of representation in emotionally disturbed and normal children. *Journal of Abnormal Psychology,* 1975, 90, 197-201.

Stein, K. B., Sarbin, T. R., and Kulik, J. A. Future time perspective: Its relation to the socialization process and the delinquent role. *Journal of Consulting and Clinical Psychology,* 1968, 32, 257-264.

Steiner, G. On the psychological reality of cognitive structures: A tentative synthesis of Piaget's and Bruner's theories. *Child Development,* 1974, 45, 891-899.

Stern, D. Mother and infant at play: The dyadic interaction involving facial, vocal, and gaze behavior. In M. Lewis and L. Rosenbaum (Eds.), *The origins of behavior,* Vol. 1. New York: Wiley, 1973.

Stevenson, H. W., Kagan, J. N., and Spiker, C. (Eds.). *Child psychology: The sixty-second yearbook of the National Society for the Study of Education.* Chicago: University of Chicago Press, 1963.

Stoops, J. W. *The assessment of aggression in children'. Arguments for a multimodal approach.* Doctoral dissertation, Kent State University, Kent, Ohio, 1974.

Stott, D. H. *Studies of troublesome children.* New York: Humanities Press, 1968.

Strauss, A. A., and Lehtinen, L. E. *Psychopathology and education of the brain-injured child.* New York: Grune & Stratton, 1947.

Strauss, J. The clarification of schizophrenic concreteness by Piaget's tests. *Psychiatry,* 1967, 30, 294-301.

Stromberg, E. L. *Stromberg dexterity test.* New York: Psychological Corporation, 1960.

Stroop, H. R. Studies in interference in serial verbal reaction. *Journal of Experimental Psychology,* 1935, 18, 643-661.

Strutt, G. G., Anderson, D. R., and Well, A. D. A developmental study of the effects of irrelevant information on speeded classification. *Journal of Experimental Child Psychology,* 1975, 20, 127-137.

Stunkard, A., and Burt, V. Obesity and the body image: Age at onset of disturbances in the body image. *American Journal of Psychiatry,* 1964, 124, 1443-1447.

Switzley, H. N., Haywood, C. H., and Isett, R. Exploration, curiosity and play in young children: Effects of stimulus complexity. *Developmental Psychology,* 1974, 10, 321-329.

Szasz, T. S. Behavior therapy and psychoanalysis. *Medical Opinion Review,* 1967, 2, 24-29.

Tatsuoka, M. *Discriminant analysis: The study of group differences.* Champaign, 111.: Institute for Personality and Ability Testing, 1970.

Thompson, D. W. *Psychology in clinical practice.* New York: World, 1968.

Toner, I. J. Maintenance of delay behavior in grade school children. *Psychological Reports,* 1974, 34, 1247-1250.

Torgensen, J. Problems and prospects in the study of learning disabilities. In E. M. Hetherington (Ed.), *Review of child development research,* (Vol. 5). Chicago: University of Chicago Press, 1975.

Tryon, R. C. *Identification of social areas by cluster analysis.* Berkeley: University of California Press, 1955.

Turiel, E. An experimental test of developmental stages in the child's moral judgments. *Journal of Personality and Social Psychology,* 1966, 3, 611-618.

Van De Castle, R. L. Development and validation of a perceptual maturity scale using figure preferences. *Journal of Consulting Psychology,* 1965 29, 314-319.

Vardy, M., and Greenstein, M. Perceptual field dependence and psychopathology: Replication and critique. *Perceptual Motor Skills,* 1972,34,635-642.

Viney, L. L., and Clarke, A. M. Children coping with crisis: An analogue study. *Journal of Social and Clinical Psychology,* 1974, 13, 305-313.

Von Bertalanffy, L. General system theory and psychiatry. In S. Arieti (Ed.), *American handbook of psychiatry,* (Vol. 3). New York: Basic Books, 1966.

Voth, H. M. Ego autonomy, autokinesis and recovery from psychosis. *Archives of General Psychiatry,* 1962, 6, 288-293.

Voth, H. M., and Maynam, N. A dimension of personality organization. *Archives of General Psychiatry,* 1963, 8, 366-380.

Wachtel, P. L. Conceptions of broad and narrow attention. *Psychological Bulletin,* 1967, 68, 417-429.

Wachtel, P. L. Psychology, metapsychology and psychoanalysis. *Journal of Abnormal Psychology,* 1969, 74, 651-660.

Wachtel, P. L. Cognitive style and style of adaptation. *Perceptual and Motor Skills,* 1972a, 35, 779-785.

Wachtel, P. L. Field dependence and psychological differentiation: Reexamination. *Perceptual and Motor Skills,* 1972b, 35, 179-189.

Wachtel, P. L. Psychodynamics, behavior therapy, and the implacable experimenter: An inquiry into the consistency of personality. *Journal of Abnormal Psychology,* 1973, 82, 324-334.

Wagner, I., and Cimiotti, E. Impulsive and reflective children's hypothesis testing: Strategies in problem solving shown in eye movements. *Zeitschrift fur Entwicklungs Psychologie und padagogische Psychologic,* 1975, 7, 1-15.

Waldrop, M. F., Pederson, F. A., and Bell, R. Q. Minor physical anomalies and behavior in preschool children. *Child Development,* 1968, 39, 391^100.

Wallach, M. A. Commentary: Active-analytical vs. passive-global cognitive functioning. In S. Messick and J. Ross (Eds.), *Measurement in personality* *and cognition.* New York: Wiley, 1962.

Wallin, J. E. W. Development of clinical psychology. *Exceptional Children,* 1958, 24, 413-420.

Wapner, S. Some aspects of a research program based on an organismic-developmental approach to cognition : Experiments and theory. *Journal of the Academy of Child Psychiatry,* 1964, 3, 193-230.

Wapner, S., Werner, H., Ajuriaguerra, J., Cleveland, S., Critchley, M., Fisher, S., and Witkin, H. *The body percept.* New York: Random House, 1965.

Watson, R. I. A brief history of clinical psychology. *Psychological Bulletin,* 1953, 50, 321-346.

Watson, R. I. *Psychology of the child,* 2nd ed. New York: Wiley, 1965.

Webster, T. G. Problems of emotional development in young retarded children. *American Journal of Psychiatry,* 1963, 120, 38-43.

Weikart, D. P. Relationship of curriculum, teaching, and learning in preschool education. In J. C. Stanley (Ed.), *Preschool programs for the disadvantaged.* Baltimore: Johns Hopkins University Press, 1972.

Weinberg, N. H. and Zaslove, M. Resistance to systematic desensitization of phobias. *Journal of Clinical Psychology,* 1963, 19, 179-181.

Weiner, B., and Kukla, A. An attributional analysis of achievement motivation. *Journal of Personality and Social Psychology,* 1970, 15, 1-20.

Weininger, O., Rotenberg, G., and Henry, A. Body image of handicapped children. *Journal of Personality Assessment,* 1972, 36, 248-253.

Weinstock, A. R. Family environment and the development of defense and coping mechanisms. *Journal of Personality and Social Psychology,* 1967, 5, 67-75.

Weitzman, B. Behavior therapy and psychotherapy. *Psychological Review,* 1967, 74, 300-317.

Wellman, H. M., Ritler, R., and Flavell, J. H. Deliberate memory behavior in the delayed reaction of very young children. *Developmental Psychology,* 1975,11, 780-787

Werner, H. The concept of development from a comparative and organismic point of view. In D. B. Harris (Ed.), *The concept of development: An issue in the study of human behavior.* Minneapolis, University of Minnesota Press, 1957.

Werner, H. *Comparative psychology of mental development,* rev. ed. New York: International Universities Press, 1964.

Werner, H., and Kaplan, B. *Symbol formation: An organismic-developmental approach to language and the expression of thought.* New York: Wiley, 1963.

Wessel, M. A., and La Camera, R. G. The pediatrician and the adolescent. *Clinical Pediatrics,* 1967, 6, 227-233.

White, S. H. Evidence for a hierarchical arrangement of learning processes. In L, P. Lipsitt and C. S. Spiker (Eds.) *Advances in child development and behavior,* Vol. 2. New York: Academic Press, 1965.

Whitemann, M. The development of conceptions of psychological causality. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 1. New York: Brunner/Mazel, 1970.

Wiest, W. M. Some recent criticisms of behaviorism and learning theory. *Psychological Bulletin,* 1967, 67, 214-225.

Wild, C. Creativity and adaptive regression. *Journal of Personality and Social Psychology,* 1965,2, 161-169.

Willerman, L. Activity level and hyperactivity in twins. *Child Development,* 1973, 44, 288-293.

Willerman, L., and Plomin, R. Activity level in children and their parents, *Child Development,* 1973, 44, 854-858.

Wilson, R. S. Twins' early mental development. *Science,* 1972, 175, 915-917.

Winder, C. O., and Kantor, R. E. Rorschach maturity scores of mothers of schizophrenics. *Journal of Consulting Psychology,* 1958, 22, 438-440.

Witkin, H. A. The perception of the upright. *Scientific American,* 1959, 200, 50-70.

Witkin, H. A. Psychological differentiation and forms of pathology. *Journal of Abnormal Psychology,* 1965, 70, 317-336.

Witkin, H. A. Social influences in the development of cognitive style. In D. A. Goslin (Ed.), *Handbook of socialization theory and research.* Skokie, 111.: Rand McNally, 1969.

Witkin, H. A., Dyk, R. B., Faterson, H. F., Goodenough, R., and Karp, S. A. *Psychological differentiation.* New York: Wiley, 1962.

Witkin, H. A., and Goodenough, D. R. *Field dependence and interpersonal behavior* (ETS RB-76-12). Princeton, N.J.: Educational Testing Service, 1976a

Witkin, H. A., and Goodenough, D. R. *Field dependence revisited* (ETS RB-76-39). Princeton, N.J.: Educational Testing Service, 1976b.

Witkin, H. A., Oltman, P. K., Chase, J. B., and Friedman, Cognitive patterning in the blind. In J. Hellmuth (Ed.), *Cognitive studies,* Vol. 2. New York: Brunner/Mazel, 1971.

Witkin, H. A., Oltman, R. K. Cox, P. W., Ehrlichman, , Hamm, R. M., and Ringler, R. W. *Field de- dependence-independence and psychological differentiation* (RB-73-62). Princeton, N. J.: Education Testing Service, 1973a.

Witkin, H. A., Oltman, R. K. Cox, P. W., Ehrlichman, , Hamm, R. M., and Ringler, R. W. Field dependence-independence and psychological differentiation: A bibliography through 1972. *Research Bulletin,* Princeton, N.J.: Educational Testing Service, 1973b.

Wohlwill, J. F. The age variable in psychological research. *Psychological Review,* 1970a, 77, 49-64.

Wohlwill, J. F. Methodology and research strategy in the study of developmental change. In L. R. Goulet and Baltes (Eds.), *Life-span developmental psychology*: *Research and theory.* New York: Academic Press, 1970b.

Wohlwill, J. F. *The study of behavioral development.* New York: Academic Press, 1973.

Wohlwill, J. F. Children's responses to meaningful pictures varying in diversity: Exploration time vs. preference. *Journal of Experimental Child Psychology,* 1975a, 20, 341-351.

Wohlwill, J. F. Children's voluntary exploration and preference for tactually presented nonsense shapes differing in complexity. *Journal of Experimental Child Psychology,* 1975b, 20, 159-167.

Wohlwill, J. F., and Carson, D. H. *Environment and the social sciences.* Washington, D.C.: American Psychological Association, 1972.

Wolf, E. Learning theory and psychoanalysis. *British Journal of Medical Psychology,* 1966, 39, 525—535.

Wolff, P. The development of attention in young infants. *Annuals of the New York Academy of Sciences,* 1965, 118, 815-830.

Wolff, P. The courses, controls, and organizations of behavior in the neonate. *Psychological Issues,* 1966, 19, (1, Whole No. 17).

Wolff, P. The developmental psychologies of Jean Piaget and psychoanalysis. *Psychological Issues,* 1960, 2 (1, Whole No. 5).

Wolff, P. Review of psychoanalytic theory in light of current research in cognitive disabilities. *Journal of American Psychoanalytic Association,* 1971, 19, 565-576.

Wolff, P., and Levin, J. R. The role of overt activity in children's imagery production. *Child Development,* 1972, 43, 537-547.

Wolff, P. and White, B. L. Visual pursuit and attention in young infants. *Journal of the American Academy of Child Psychiatry,* 1965, 4, 473-484.

Wolff, P., and Wolff, E. A. Correlational analysis of motor and verbal activity in young children. *Child Development,* 1972, 43, 1407-1411.

Wolitzky, D. L., and Wachtel, P. L. Personality and perception. In B. B. Wolman (Ed.), *Handbook of general psychology.* Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Wolman, B. B. *Manual of child psychopathology.* New York: McGraw-Hill, 1972.

Wolman, R. N. A developmental study of the perception of people. *Genetic Psychology Monographs,* 1967,76, 96-140.

Wolpe, J., and Lazarus, A. *Behavior therapy techniques.* New York: Pergamon Press, 1966.

Yarrow, L. J. Maternal deprivation: Toward an empirical and conceptual reevaluation. *Psychological Bulletin,* 1961, 58, 459-490.

Yarrow, L. J. Separation from parents during early childhood. In M. L. Hoffman and L. W. Hoffman (Eds.), *Review of child development and research.* New York: Russell Sage Foundation, 1965.

Yarrow, L. J. Child development research: Interface of theory and application. *SRCD Newsletter,* Summer 1973.

Yarrow, L. J., and Pedersen, F. A. The interplay between cognition and motivation in infancy. In M. Lewis (Ed.), *Origins of intelligence: Infancy and early childhood.* New York: Plenum, 1976.

Yates, G. C., Influence of televised modeling and verbalization in children's delay of gratification. *Journal of Experimental Child Psychology,* 1974, 18, 333-339.

Zarembo, A. L. *Interrelations of cognitive controls and the reflection-impulsivity dimension in children.* Doctoral dissertation, Ohio State University, Columbus, 1967.

Zeaman, D., and House, B. J. The role of attention in retardate discrimination learning. In N. R. Ellis (Ed.) *Handbook of mental deficiency. Psychological theory and research.* New York: McGraw-Hill, 1963.

Zigler, E. Metatheoretical issues in developmental psychology. In M. H. Marx (Ed.), *Theories in contemporary psychology.* New York: Macmillan, 1963.

Zigler, E., and Phillips, L. Social effectiveness and symptomatic behaviors. *Journal of Abnormal and Social Psychology,* 1960, 61, 231-238.

Zigler, E., and Phillips, L. Social competence and outcome in psychiatric disorders. *Journal of Abnormal and Social Psychology,* 1961, 63, 264-371.

Zigler, E., and Phillips, L. Social competence and the process-reactive distinction in psychopathology. *Journal of Abnormal and Social Psychology,* 1962,65, 215-222.

Zimbardo, P. G. (Ed.). *The cognitive control of motivation: The consequences of choice and dissonance.* Glenview, Ill.: Scott, Foresman, 1969.

Zimet, C. N., and Fine, H. J. Perceptual differentiation and two dimensions of schizophrenia. *Journal of Nervous and Mental Disease,* 1959, 129, 435-441.

Zimmerman, B. J. Modification of young children's grouping strategies: The effects of modeling, verbalization, incentives, and age. *Child Development,* 1974, 45, 1032-1041.

Zuckerman, M. Save the pieces: A note on "Role of the family in the development of psychopathology." *Psychological Bulletin,* 1966, 66, 78-80.