Opposition and Creativity

Albert Rothenberg, MD

OPPOSITION AND CREATIVITY

Albert Rothenberg, M.D.

e-Book 2016 International Psychotherapy Institute

Table of Contents

OPPOSITION AND CREATIVITY

A story: It is a rainy day, a mother and her eighteen-month-old child are caught in the house all day. In order to amuse her child, the mother puts him in his playpen and surrounds him with toys. Almost immediately, the child begins to cry, wanting to get out. The mother then puts him on the living room floor and decides to let him follow her while she vacuums the rug, an activity he usually enjoys. At first, it works, happily, the child toddles and crawls after her. A few minutes later, however, he is crying again. Now, she finds him on the outside of the playpen, alternately trying to reach one of the toys inside or attempting to climb back in. She puts him inside and the cycle is repeated. At lunchtime, she serves him his favorite sandwich, peanut butter and jelly. He hardly touches it and, not wanting to make a fuss about his eating, she clears the table and lets him get down from his chair. Twenty minutes later, he complains of hunger and asks for his sandwich. Further into the afternoon, he responds to his mother's toilet training program and agrees to go to the potty when she asks him. Nothing happens there and ten minutes later he has soiled his diaper. Alternating cycles with food and play are repeated. Finally, at the end of the day when the father comes home, the first words out of the mother's mouth are: "I don't know what to do with our child; whatever I want him to do, he does the opposite,"

Another story: A seven-year-old child in an open classroom setting containing school children of various ages and levels is sitting with his group using Cuisenaire rods for learning arithmetic. After a fairly concentrated period of working alone, his interest declines somewhat and he spies a child in the group on the other side of the room making a model with a piece of shiny tinfoil. He gets up and starts over to the other group. When the teacher asks him where he's going, he says, "I'm going to the opposite side of the room."

The last: Ten-year-old children are doing a review assignment during their English period in school. They are asked to write the antonyms of a series of words in blank spaces next to the words. The words are: slow, tall, fat, hard, sharp, smooth, white, fair, always. They have previously been told what the antonyms to these words were and all but a few students do the assignment easily and rapidly. The dictionary definition of an antonym is: a word opposite in meaning to another.

All of the stories, of course, contain a reference to opposition and each story pertains to a different period of childhood development. Are the types of opposition couched in these examples related to the opposition intrinsic to janusian thinking? Or, put more dramatically, is it possible that these homely experiences pertaining to opposition in childhood have anything to do with creativity, the exalted and hallowed capacity of man? let us see.

On first approach, opposition might seem to be a rather simple and straightforward entity, so simple and straightforward that—as my own examples might suggest—"even a child can understand it." The opposites of words such as slow, tall, and fat are clearly and unequivocally fast, short, and thin, and the seven-year-old child uses the word "opposite" correctly with respect to a side of the room. Psycholinguists have recently been impressed by the frequent and facile use of verbal opposition by experimental subjects carrying out verbal learning and association tasks, and by the universality of opposition or binary contrasts in all languages. Viewed from the perspective of the features or linguistic characteristics of words, some psycholinguists have alleged an apparently minimal difference between antonyms or opposite words consisting only of a change of sign from positive to negative or vice versa.[1] But I must now emphatically point out that the simplicity of opposition is more apparent than real. For one thing, there is an important difference between linguistic opposition and conceptual or logical opposition.

Linguistic and Logical Opposition

Linguistic opposition is a fairly easy category to identify by empirical means. Certain words are readily considered to be the opposite of other words on the basis of ingrained and constant association. Thus, when one asks for the opposite of "low," the response will almost invariably be "high," although "elevated," "lofty," and "soaring" might also be acceptable on logical grounds. "High" is given as a response not necessarily because it is the logically perfect opposite but because the two words "low" and "high" are commonly associated with each other in speech and writing. Nevertheless, this linguistic pairing between "low" and "high" produces no conceptual complexities; high *is* logically opposite to low. Difficulties arise when considering a pair such as man and woman, or, better still, king and queen. For, when experimental subjects are asked for the opposites of man and king, the responses are almost invariably woman and queen, respectively.

Such responses must give us pause because they invite a consideration of the logical grounds for the pairing. After all, leaving aside formal dictionary definitions for the moment, we always think of opposition as consisting of some sense of sharp or radical difference. Positing that queen is the opposite of king is somewhat logically jarring because the king-queen pairing seems to conjure up more similarities than differences. Kings and queens are nobility, they share more in common with each other than they share with any of us, etc. Their only difference is their gender and, in the ultimate scheme of things—aside from the unisex obliteration of gender difference in current times—this seems too minor to warrant the clear designation of queen as true opposite to king. Some would argue that commoner or slave are better opposites to king, but there are problems with those solutions as well. So, too, the prior opposition between man and woman—prior in the sense that it enters into the king-queen pairing—is subject to question. We are aware of the so-called opposition in sex between man and woman but are equally aware of their shared similarities, such as humanness and maturity.

One of the factors involved in the logical discrepancies I have just cited is the matter of logical context, whether or not man or king is viewed in one or in several contexts. But before I get into this thorny issue, and the related one of the knowledge or sophistication of the person making judgments of opposites, I must stick with the difference between linguistic and conceptual opposition. The root meaning of the word "oppose," the basic term from which our words opposite and opposition derive, is simply "to put against." Without recourse to a lengthy and in this case essentially digressive account of dictionary definitions, I think few would disagree that current usage of the term falls into the following two broad and related categories: (1) "oppose" as being against or as providing resistance to an idea, act, command, etc.; (2) "oppose" as being contrary or radically different. Thus opposition means either resistance or conflict or being situated in a contrary or a radically different mode. There are implied issues of similarity, too, but I will come to that in a moment.

The term antonym, as I have said, refers to opposition of words. A cursory familiarity with some of the attempts to establish an adequate definition of this term for classification purposes—I now am referring to definitions in synonym-antonym dictionaries—illustrates the point I am making about the difference between linguistic and conceptual opposition. Webster's provides the best example. After a lengthy discussion of the complications and nuances regarding various definitions of an antonym, the editors of Webster's finally opt for the most restrictive and logically consistent definition possible: "a

word so opposed in meaning to another word, its equal in breadth or range of application, that it negates or nullifies every single one of its implications."[2] Examples of such antonyms are perfect-imperfect, black-white, and admit-reject. In order to use this definition in the word classification scheme within the dictionary, a task covering normative as well as common ordinary word use, the editors find it necessary to stipulate other types of word categories related to antonyms such as complementaries, relatives, and contrasts. This highly precise and reliable dictionary, in other words, recognizes a sharp discrepancy between the logical definition of antonyms and ordinary linguistic usage. In order to represent both aspects, the editors use a special classification scheme.

Linguistic opposition consists of all categories of verbal relationships commonly used to denote antonyms or opposites. Categories designated by Webster's both as relative terms, terms that appear in pairs and suggest one another such as husband and wife, and as complementary terms, pair terms that are incomplete without each other such as question and answer, are forms of linguistic opposition. In these categories, linguistic experience—that is, frequent association in speech and writing—dictates the designation of opposition more than strictly applied logical or conceptual criteria.

One of the reasons that opposition is sometimes thought to be simple and straightforward is that linguistic opposition is often not distinguished from conceptual opposition. Terms such as man and woman, husband and wife, and question and answer seem to differ only in one aspect or merely by having positive and negative qualities. But when more restrictive logical criteria are applied, such as Webster's nullification of "every single one of its implications," opposition becomes a far more complicated matter. With regard to the examples I cited earlier pertaining to opposition with respect to childhood experiences, the matter is more complicated still.

Opposition as a Concept

To clarify the import of my childhood examples, I will shift away from opposition between words, antonym classification, to the concept of opposition itself. While the distinction between linguistic and logical opposition continues to be borne in mind, I shall return to the two broad categories I mentioned before, resistance and being contrary or radically different. As I suggested in passing above, these categories are not sufficient alone for an adequate definition of opposition; some issue of similarity is

implied and must be incorporated. Opposites must be similar to each other in some particular respect in order to be considered opposed; they must, that is, be *specifically* resistant to each other or *specifically* different. Mere negation or absence of a quality or qualities does not produce opposition, it only produces nonspecific difference. Thus, not-tall is not a proper opposite of tall because not-tall could simply indicate regular or medium or even gigantic in size. Short is the proper opposite of tall, and short is a designation with definite properties of its own, properties which are specifically different from tallness.[3] Because the properties relate to each other in this way, both short and tall are placed in the same conceptual category —they are both dimensions within the category of height. Absence of resistance does not constitute opposition; in an argument, points of view must pertain to the same category in order to be considered opposed. There is a reciprocity in all opposition; applying the term "tall" to a particular person or a particular measurement intrinsically determines the general range of short, and vice versa for applying the term "short." Such categorical relatedness and reciprocity is a feature of all opposition, and therefore the proper definition should include "resistant or radically different as well as reciprocal within the same category."

In saying this, it is immediately necessary to add a caution: because opposites invariably belong to the same category, one cannot therefore say that essentially opposites are the same, as some have suggested.[4] To do so not only begs the logic of the matter, but requires extensive assumptions about the nature of reality.

With this more precise definition of opposition, let us return to the first of the childhood examples. The mother, confronting the highly common type of behavior in an eighteen-month-old child, describes it to her husband as doing the opposite. In using the term, she is not, of course, concerned with definitions or with the weighty considerations just outlined, but she is saying what most people would, and have, said about this phase of childhood: eighteen month olds tend to be negativistic and oppositional. The question I want to consider, however, is whether this term is appropriately used, not for semantic reasons but in order to assess the status of opposition as a concept or behavioral mode at this level of development. Is it correct to describe the child's behavior as oppositional and, if so, is the child aware of opposing?

Our best understanding of the child's behavior and thought at this level is that he is in the early

throes of identity formation, more precisely, that he is beginning to individuate. Following the long period of extensive dependency, during which the child gradually develops a sense of differentiation from his parents and from his environment, there is a rather sharp spurt of activity at this age, activity that seems to function to help the child differentiate himself further and to gain some sense of himself as an individual. Such activity, however, is not clear and consistent; the child does not adopt a pattern of asserting his own will or his desires in a constant way, he is quite willy-nilly about it. Characteristically, in fact, he seems to be indecisive, going back and forth over the same ground or reversing previous behavior. Toilet training can, of course, be a particular focus—possibly an instigating factor—in the spurt of individuating behavior at this age level. Toilet training usually involves a fairly consistent attempt, on the parents' part, to impose their wishes upon the child while offering little compensation, gratification, or reward outside of verbal encouragement or praise. By that I mean that verbal encouragement is less palpable than the food gratification associated with learning to eat on schedule earlier. In any event, the child is beginning to explore, with a vengeance, his own wants and needs now, and sometimes he tries things for their own sake and sometimes he does something because it is merely different from what the parent wants. From the parents' point of view, however, there are few clues to any distinctions between various aspects of the child's behavior. For the mother, it seems as though everything the child does is in direct resistance to her, or in defiance of her needs and wishes, the child appears to be opposing her.

Precious little about the child's behavior is really oppositional, however, and, as a corollary, there is little justification for believing that the child knows what opposition is, either as an experienced mode of behavior or as a concept. He probably knows the word, "opposite," and some of its referents by now—if not, he has just heard his mother use it to describe his behavior to his father—but such a small part of his behavior is directed against his mother, and he feels so minimally differentiated as a person that there is little basis for cognitive and/or affective appreciation of the meaning of the word.[5]

So far, I assume, there is no quibble with the argument I have proposed. The child himself does not use the word "opposite" and he is so young that most would be willing intuitively to acknowledge the lack of comprehension I describe. But now we come to the more complicated example of the seven-year-old child who actually uses the word to indicate the place he is going, the "opposite" side of the room. And here I would insist that there is still no comprehension of the meaning of opposition, merely the use of a word that the child has learned, through repeated association, to apply to that position in space.

Furthermore, in order to reveal the full dimensions of this point I am making, I will quickly add that, in my final example of children performing an antonym task, there is also no way of being sure whether each of them understands the meaning of opposition, even when the child performs the task successfully.

I have chosen these examples of opposition at various stages of childhood in order to clarify a potential source of confusion. In considering the development status of a concept or an intellectual operation, it is important to make a distinction between comprehension or a meaningful grasp, and use on the basis of learned association. In other words, when I raise the question about whether children understand opposition, whether there is comprehension of the concept of opposition or of its operational usage, many will immediately respond, "Why, of course, they understand, they use the word quite early (as shown in the example)." Word use and comprehension are not equivalent, however. When the child says that he is going to the opposite side of the room, it is not certain whether he is merely using the word "opposite" as a synonym for the word "other," the other side of the room, because he has frequently heard the words "opposite" and "other" used interchangeably, such as in "cross to the other side of the street," or "cross to the opposite side of the street."

In the case of the children performing the antonym task, it is not certain whether most give the correct answers because they have previously been told which words were called antonyms or whether they actually grasp the intellectual operation involved in identifying such antonyms. And it remains unclear even when they are able to supply the definition of an antonym, many or most may not understand the idea of opposite in the antonym definition, they may be repeating from memory.

It is easy to check what is going on in an individual case, of course. The child using the word opposite to refer to a side of the room or to "other" will eventually make tell-tale mistakes in usage, and the children supplying the antonym answers from memory will be unable to supply antonyms on an unrehearsed list. Those who take the trouble to make the assessment find that such errors and failings frequently do occur at both the seven- and ten-year-old levels. Use of the word "opposite" is not evidence for comprehension of the concept of opposition in childhood. In an experiment carried out with 100 high intellectual and social status level children ranging in age from five to seven and a half years, Kreezer and Dallenbach discovered that the children would often say that they understood the meaning of the word or idea "opposite," but, when asked to give opposites to an unrehearsed series of words, they could

not do so. Few children in the group gave evidence that they understood the opposition relation despite saying they understood the meaning. None below the age of six and a half understood it at all and only seven out of twenty of the seven and a half year olds showed any grasp of it.[6]

Though opposition applies to concrete and spatial phenomena, as a relation it is a purely abstract, and for a child, therefore, a difficult concept. Unlike symmetry or sameness, which derive fairly readily from perceived repetitions in the concrete world, nothing in nature is opposite unless we define it so. Opposition is relative, it depends on establishing a reference point and relating other points to it: "this side is opposite to that," "that side is opposite this." Not even left and right, which are also relative and notoriously difficult for a child to keep straight, are as complicated as opposition. One side is designated as left and the other as right, but then, as the child learns, the right side can never be left side nor vice versa. Fixed are the terms and their concrete referents and therefore the relationship eventually is grasped. Depending on the circumstances, however, either or both left and right can be labeled as opposites, and that is confusing.

Two further research findings, one focused on cognitive development and the other on language acquisition, tend to support the thesis that opposition is grasped fairly late in childhood. Piaget and Inhelder, whose extensive and outstanding research on the development of logic in childhood can only be touched on here, present findings about the acquisition of the notion of complementarity, negation, and duality which bear on the issue. While they have much to say about these concepts in general, I will, for the moment, focus on their work on the "null class." I will quote their posing of the question about this classification because their particular manner of presentation is of interest. For those not familiar with Piagetian terminology, the term "formal operations" in the following quotation roughly coincides with abstract or logical thinking and "concrete operations" is a type of thinking characteristic of a prelogical phase of development.

> There is . . . [a] question relevant to the dividing line between concrete and formal operations: the question of the null or empty class. "Elementary groupings" of classes imply this notion, for if A = B — A', then B — A — A' = 0 (or, more simply, A — A = 0). Also, A n A' = 0. In other words, a class becomes empty when subtracted from itself, and the intersection of two disjoint classes is empty. From a strictly operational point of view, the child of 7-8 years may be said to understand the operation + A — A = 0, insofar as he knows that adding A, and then taking it away, is equivalent to doing nothing, i.e. + 0. But, since concrete operations apply to objects and the empty class has no objects, we may well ask whether a child is likely to think of it as being on a par with other classes? This is not at all a question of operational manipulation. We know that zero was the last number discovered in arithmetic and that it was long after the invention of addition and subtraction (from which it

> results by virtue of the equation n — n = 0) that it was recognized as a true number. We might therefore follow up our study of complementarity and negation by finding out how children at different levels, will deal with a situation where a complementary class exists, as a class, but contains no objects and is therefore the null class.[7]

This presentation of the question is of interest because, aside from its valuable and clear specification of the nature of the null class, the reference to the historical background of the acquisition of the concept of zero in arithmetic introduces a pertinent analogy. Inhelder and Piaget suggest that the difficulty of developing an intellectual operation in childhood is paralleled in the culture; the more difficult the concept in childhood, the later and more difficult has it been to acquire or use in the historical development of knowledge. To return, however, to their findings, findings that are based on presentation of classification tasks to several children, I will again quote directly:

> "a class without any elements is . . . incompatible with the logic of "concrete" operations, i.e. operations in which form is inseparably bound up with content. That is why the null class is rejected right up to the time when the structure of inclusion relations [differentiating "some" and "all"] begins to be separated from their concrete content, at 10-11 years.[8]

These findings of the late development of comprehension of negation are further supported by a host of cognitive and linguistic experiments by others indicating difficulty in dealing with negative information and negative statements in adulthood as well.[9]

I have said that negation, or nullity in the Piaget and Inhelder research, is not the same as opposition. More must be included in the definition of opposition than negation alone and that is a specific contrariness or resistance and, hence, a factor of similarity. Nevertheless, with respect to the task of identifying classes, I think it is reasonable to assume that the capacity to form negative or null classes is intrinsic to the capacity to comprehend and to use the opposition relation. To return to the example of students giving antonyms in class: if the child were asked to give the antonym to an unrehearsed word, say "light," and he knew both the words "dim" and "dark," it would be necessary for him to be able to conceive the class of total absence of light before he could decide that "dark" is the proper term. As another instance, for the antonym of "hot," he requires facility with the null class to decide between "cool" and "cold." The task becomes even more difficult when picking antonym pairs among "crooked," "circular," and "straight."

With respect to the matter of similarity in the opposition relation, this further complicates the

concept for the child. I did not mean to suggest just now that the antonym task is approached by children, or anyone else for that matter, in some stepwise fashion such as thinking of the null class first and then picking a word related to the one presented. Nor is the solution found specifically by thinking of similar words and then deciding which belong closest to the null class. Words also similar to light are: bright, daytime, shiny, radiant, and glowing; and it is highly doubtful that such a diversity of associations is evoked in performing an antonym task. Grasp of opposition involves the capacity to use nullity, negation, and similarity in varying ways, all together and/or in sequence. The comprehension of similarity required to understand opposition, moreover, is not merely of the type involved in concrete operations, the recognition of similarity between objects. Understanding similarity with respect to opposition, and applying this understanding to the recognition and production of antonyms or other opposites, requires what Piaget has called the idea of the principle of conservation (what logicians call the "logic of relations").[10] The child must have mastered this idea in order to be able to comprehend that the specific features of two given opposites do not change despite their apparent differences. Horizontal and vertical, for instance, retain a common feature called direction despite differences in name and sharp differences in information, feeling, and effects. Characteristically, according to Piaget, understanding of this principle of conservation only begins at about nine years of age. Added then to the difficulty of understanding the null case is the ten-year-old child's only rudimentary appreciation of the stable feature of similarity in the opposition relation.

From linguistic studies of word association patterns of young children comes further evidence pertinent to opposition and development. Administering word association tests to 1,140 urban students at prekindergarten, kindergarten, first-grade, third-grade, and fifth-grade levels in Baltimore County, Maryland, Entwisle found that a very small percentage of responses to opposite evoking stimulus words by kindergarten and first-grade children consisted of opposites.[11] On the third-grade or nine-year-old level, however, percentage of opposite responses was markedly higher than at the earlier levels and, in the case of some stimulus words, the percentage of opposite responses was four times greater in the older group.[12] Such results, marked as they are, cannot be considered direct evidence for comprehension of opposition at the older levels because of the independence between conceptualization and word use or so-called linguistic habits in childhood. The upsurge of opposite word associations does, however, suggest an increased tendency toward connecting opposite words at the age of nine and later, a tendency

that very likely sets the stage for the understanding of the opposition relation that develops during the Piagetian phase of formal operations. Children often use words in an exploratory way, prior to the full comprehension of the referents of the words and as a means of achieving fuller comprehension. A conclusive finding, however, is the markedly low percentage of opposite associations at younger ages. At the kindergarten and first-grade level, the average percentage of opposite response to opposite evoking stimuli was 6.8 and 16.2, respectively as compared with 45-50 percent averages characteristic of college age adults.[13] Surely there is no reason to assume that six and seven year olds have less general exposure than do older children to such common opposite combinations as are elicited by the standard word association test, nor are particular words such as hot, cold, long, or black missing from their vocabularies. The virtual absence of opposite associations, therefore, is strong evidence for a corollary lack of perceived connectedness between words denoting opposites and a lack of comprehension of the opposition relations at these earlier age levels.

Sharply distinct from the lack of conceptual comprehension of opposition is the well-known tendency of children to think in simple dualisms, many of which have oppositional content. Terms such as good and bad, big and small, childish and grown-up, are among children's earliest verbal acquisitions and they constantly classify their experiences into these categories throughout childhood. This tendency to formulate simple dualisms does not end abruptly with the arrival at adolescence or the exalted state of adulthood. In an extensive investigation carried out at Harvard University, a group of investigators documented the large-scale persistence of dualistic thinking in adolescence and early adulthood. These investigators went on to propose, moreover, that the transition away from dualistic thinking to an appreciation of pluralism and more advanced types of conceptualization was the hallmark of mature intellectual and ethical development.[14] For the purposes of our discussion here, it is unnecessary to go into a lengthy digression at this point about the nature of dualistic thinking in childhood and the parents' role in instigating and encouraging it, nor is it necessary to trace manifestations of dualistic thinking in adulthood and evaluate the effects. For that matter, dualistic conceptions of the nature of the world, of the relationship of mind and body, and dualistic theories about virtually every aspect of human experience have been formulated throughout the history of intellectual thought. I want merely to emphasize that thinking in opposites, such as forming dichotomies between good and bad, may relate more to dualistic types of thinking than it does to the grasp of opposition I have discussed. As for the

general topic of thinking in opposites, dualistic or not, and related matters of unification and flow of opposites, all of which have interested philosophers and other thinkers, I shall return to these shortly.

The distinction between dualism and grasp of opposition brings us to the heart of the complexities, and incidentally the power, of opposition as a concept. Comparing dualism and opposition, we must immediately realize that opposites are not merely dual or binary but that there are also multiple opposites; binary opposition, therefore, is only one of the forms. Given that important clarification, I want to consider some other distinctions pertaining to opposition, many of which are analogous: binary and polar opposition; "scale" and "cut" opposition;[15] qualitative and quantitative opposition; opposites and contraries, contrasts, and contradictions. Considering these differentiations, the abstract nature of opposites and of the opposition relation becomes strikingly apparent.

Of all the types of opposition, binary opposition is usually the most frequently thought of, and most readily applied, in tasks requiring strictly logical application of the concept. This should be no surprise because binary opposition derives more closely than other types from tangible and irreducible spatial experience. The simplest way of forming a binary opposition is first to produce a dichotomy and then to define both parts as opposite to each other. This is exemplified spatially through a demarcation on the ground or on a surface produced by a fence or more sharply by a chasm. The chasm example is probably the most vivid one, and it led C. K. Ogden to formulate the term "cut" for this type of opposition. "Cut" refers to opposition produced when two areas, factors, or classes are related or compared to each other. The left side of the chasm or cut is thus always opposite the right side, the near side is always opposite the far side and vice versa, and so on. Important to note is that this type of opposition involves complete contradictions; the cut produces complete separation of the two sides. In distinction to the opposition of cut, Ogden proposed the term "scale" to refer to the oppositional relationship of the extremes of a series. Thus, hot and cold, darkness and light, and empty and full are oppositions of scale, while enemy and friend, citizen and alien, and here and there are oppositions of cut. This distinction essentially coincides with a distinction between oppositions designated as either binary or polar, either qualitative or quantitative, as well as a distinction between contradiction and contrariness. Although scalar or polar opposites such as darkness and light could also be compared to each other in an either-or cut or binary fashion, they are more appropriately considered the extremes or poles of a series or scale. In addition, though the difference between hot and cold could be considered qualitative, that is, sharply distinct or

cut apart on the basis of contradictory sensory qualities, just as citizen and alien are distinct on the basis of a quality or attribute of belonging or not belonging to a group or country, hot is more knowledgeably distinguished from cold in a quantitative way, that is, as a matter of degree. So, too, contradiction and contrariness tend to be distinguished in terms of quantity and matters of degree.

We cannot progress very far in a discussion such as this before exceptions are raised and assertions are challenged—because opposition is such an abstract concept. Moreover, it is a concept which, in its application to the world of things and ideas, admits of much relativity. The sharp critic, therefore, who is constantly on the lookout for lapses of logic and of definition, will immediately challenge my equating of binary, cut, and qualitative opposition. After all, he will say, when you compare darkness and light or hot and cold with each other, you only consider two elements each time. Yet you forswear calling that binary opposition and opt for the polar type. Also, you said earlier that there were multiple oppositions as well as binary ones and therefore you disclaimed dualism, but don't multiple oppositions of cut merely consist of repetitions of the very aspect you disclaim, namely dualisms over and over again? And one more point: I noticed you used the terms "knowledgeably" and "appropriately" distinguished to justify your examples of differentiations between scale, cut, qualitative, and quantitative, but who decides about such knowledge and appropriateness? Is the physicist talking about degrees of illumination or the electrician measuring the wattage of a bulb using the terms darkness and light more appropriately and more knowledgeably than the writer who describes scenes and sensations? For that matter, why aren't the designations zero and peak luminosity more appropriate scalar oppositions than darkness and light, respectively?

Yes, these criticisms and questions are all relevant, though not, I believe, fatal, because the answer in each case is the same: opposition is always a matter of context. When darkness and light or hot and cold are used in a context that highlights or specifies their sensory differences, then they are related according to qualitative, binary, or cut opposition; when they are taken out of that context and related directly to each other, the implied opposition is usually scalar, polar, or quantitative. So, too, most oppositions of scale can be transformed into oppositions of cut and vice versa, depending on the context. As scientific and other knowledge increases, the extremes of previously determined scales are changed.

Multiple opposition also depends on context. A simple example is the opposition arising from the

multiple meanings of certain words: light is the opposite of dark or darkness and also of heavy. Another example comes from shifts of reference points on certain scales: shallow and elevated are, from one perspective or context, opposites, but shallow is also the opposite of deep or profound when the context is reversed. Many forms of multiple opposition, particularly those appearing in art, are far more complex than that, moreover. In art, different contexts of meaning, word nuance, and metaphorical use are employed to produce multiple oppositions. Depending on context, death is opposed to life, birth, or resurrection, but it is also more remotely opposed to spring, growth, sexuality, procreation, and bright colors. While many of these oppositions are derived from a dichotomy and are therefore examples of the binary or cut type, others are clearly derived from a context where some form of scale is implied.

The importance of context in defining and understanding instances of opposition helps clarify the confusing state of affairs pertaining to linguistic and logical opposition. Because context is crucial to all opposition, there should be no critical difference between these two types. Linguistic oppositions are appropriately considered to be opposed according to rules of logic, but such logic pertains strongly to the realities of the linguistic context. Linguistic oppositions differ from purely logical or conceptual ones in that the former are linked together by habitual association. Language patterns, in other words, take primacy over advances in knowledge, ideological shifts, and other factors playing a role in establishing logical contexts.

Returning now to our earlier controversial example of man opposed to woman, we see the following take place: man and woman are two classifications within the category of sex. If we admit into this category intermediate forms such as hermaphrodite, then we are liable to consider man and woman as scalar, polar, or quantitative opposites. If we do not admit intermediates, we have formed a dichotomous category in which man and woman are binary, cut, or qualitative opposites. For both alternatives, there is a defined and accepted designation of opposition, an opposition that pervades linguistic usage in all languages and is incorporated as a grammatical principle in some, and an opposition that has been adopted into the systems of philosophers, theologians, scientists as well as electricians. But then logic intervenes. By logic here I do not mean strict attention to the adequacy of the gender category and its classifications, questions could be raised about that at the start. I mean logic as influenced by increases in knowledge and changes in ideology. Informed by scientific knowledge of intersexuality in anatomy and physiology, as well as in psychological makeup, and influenced by

humanism, women's liberation, or some other ideological shift of context, logic declares that man and woman are, by no means, opposite. There is far more in common than not. If we compare men and women to rocks and trees, there is absolutely no doubt about it.

Linguistic opposition is not supravened by such logic, ideology or what-have-you. Most people, despite highly ingrained convictions or extensive scientific knowledge will, when asked to state the opposite of "man," reflexly say "woman," and the term "opposite sex" will probably never die. There is no real reason that it should, moreover. Not only are linguistic oppositions perfectly respectable, given an understanding of their contexts, but they have considerable psychological importance. And now, to introduce one more term at the possible risk of alienating my readers: "psychological opposition" is, after all, the matter which most concerns us here. Psychological opposition includes both the linguistic and logical forms.

Psychological Opposition

The factors of contradiction, contrariness, and contrast provide a useful means for discussing the common ground between linguistic and logical opposition. Although contradiction and contrariness are both primarily negative operations, and therefore not actually opposition types, they enter into the opposition relation as well as the more inclusive relation of contrast. Far less stringent a relation than opposition, contrast depends less on a particular context, or an extreme difference. Defined either through contradiction or contrariness, or both together, no full dichotomy nor scale need be involved. Most linguistic oppositions, because they have lost connection with their initial oppositional context through intervening logic, information, and ideology, probably belong within this more general category of contrast.

Like opposition, contrast requires similarity as well as difference. While neither point for point contradiction nor a scale of contrariness is necessary between elements in a contrast, there is relatedness and specificity. Circles and squares, for instance, are contrasts in that they are both geometric forms but are specifically different in overall shape, circles and spheres or circles and trees are not contrasts, however, because they are either too similar or too nonspecifically different, respectively. The line between contrast and mere difference is, in many cases, hard to draw. While contrast does not require as

much specificity of context as does opposition, some designation of context is necessary to distinguish contrasting factors from merely different ones. With respect to colors, for example, red and brown of the same value are merely different unless we refer to contrasting brightness. Even red and yellow are not considered contrasts by everyone. Factors such as hue, tint, and lighting must be considered and defined before designating color contrasts. To say, "today's weather is a welcome contrast to yesterday's" indicates more than difference because a dimension or context is specified; today's weather differs in that it is *better* than yesterday's.

The designation of "extreme" contrast is, on logical grounds, equivalent to opposition, as such a designation indicates a polar relation having both similarity and specific difference. The term "contrast" alone is quite general, however, and both logical and linguistic oppositions are often subsumed within it. The use of the term and the idea of contrast, therefore, is an instance of psychologically defined opposition. Many people designate contrasts as equivalent to opposites because the two categories are psychologically experienced as similar.

Opposition and Intellectual Thought

In his impressive book on opposition mentioned earlier, Ogden pays a good deal of attention to Aristotle, whom he describes as "obsessed by the problem of opposition." Claiming that Aristotle regards everything as proceeding from contraries, he also cites this philosopher's considerations of Unity and Multiplicity as well as Being and Not-Being in the *Metaphysics,* the deliberations on the causal aspect of opposition and on the Dense and the Rare, the Full and the Empty, the High and the Low in the *Physics,* and he suggests that Aristotelian ethics is based on a theory of contraries in which virtue is a mean between extremes. Ogden also discusses the key importance of opposition in the philosophies of the pre-Socratic thinkers Heraclitus, Xenophanes, and Parmenides, and later in the works of Saint Thomas Aquinas (Material and Subsistent forms), Nicholas of Cusa, Boehme, Kant, and Hegel. For the last mentioned, of course, opposition explicitly dominated his entire philosophical system, and Ogden argues that Kant's expositors have often missed the general importance of opposition—that is, Inner-Outer, Unity-Multiplicity, Activity-Passivity, Spontaneity-Receptivity, and Understanding-Sense—in that great thinker's deliberations and conclusions.[16] Continuing an historical account, Ogden cites in the nineteenth century the works of Schopenhauer, Hartmann, Rehmke, and Spencer as focused in a large

degree on opposites and opposition. Ludwig Fischer, also of the nineteenth century, gave the topic systematic philosophical consideration. Finally, there was the late-nineteenth-century social philosopher Tarde, whose extensive exploration and classification contained in *L'Opposition Universale* was the first application to an understanding of social forces.

To extend Ogden's account of the emphasis on opposition in intellectual history, another important pre-Socratic philosopher, Anaximander, conceived that the construction of the world consisted of the separating out of elemental opposites, such as fire and water, from a primitive togetherness, the "boundless." These opposites were then in constant conflict with each other, an undeniable fact of nature according to Anaximander, and from this conflict and the equilibrium between the opposites, all understanding of the universe arose. Empedocles, Pythagoras, and Heraclitus as well conceived of the world as composed of opposites. Heraclitus emphasized the unity of opposites or their constant equality in the face of conflict; he used the term "enantiodromia," opposites flowing into each other, to describe an overall principle or law. Empedocles specified four sensible opposites, the hot, the cold, the wet, and the dry as making up the entire "Sphere of Being." Pythagoras and his followers specified particular opposites, probably ten ascribed to them by Aristotle[17] (limit-unlimited; odd- even-, one-many; right-left; male-female; rest-motion; straight-curved; light-dark; good-bad; square-oblong), as the major categories through which they understood the world. Although Ogden's extensive listing includes Plato's basing his theory of ideas on contradictions between this world and the eternal as unchangeable and perfect, it does not include Socrates' famous argument for immortality in the *Phaedo* which is based on the assertion that opposites generate each other.

In addition to this early and extensive emphasis on opposition in Western intellectual thought, recent history bears witness to a rather massive adoption of Hegelian concepts regarding opposition by a highly influential intellectual movement, that is, the Marxist philosophy of dialectical materialism with its emphasis on the "negation of the negation" and other cyclical opposition. Furthermore, religious movements, some of which I have already mentioned, have frequently established opposition as an important principle of theological understanding. A couple of decades ago, in fact, a theist philosopher attempted to present a systematic case for the overriding significance of thinking in opposites for attaining religious knowledge and faith.[18] Aside from the sphere of Western intellectual thought, moreover, opposition has played an exceptionally prominent role in Eastern philosophy, religion, and

intellectual thought from early times of the already ancient Eastern civilizations. A major focus and pervasive interest in opposites has characterized the Eastern philosophies of Taoism, Confucianism, Buddhism, and some forms of Hinduism, from their beginnings up to the present. In these philosophies, there are constant allusions to the merging of opposites, expression of opposites, unity of opposites, succession of opposites, as well as formulations of questions in terms of irreconcilable opposites or paradoxes. It is probably a fair generalization to say, in fact, that much of what is referred to as Eastern mysticism turns on opposition as a basic issue, both as a problem and a solution.

In the previous chapter, I mentioned and quoted some of the specific oppositions involved in the thinking of Buddha and Lao-tzu and in the Zen formulations, and I do not intend here to produce a cataloging of the extensive focusing on opposition in Eastern thought.[19] I do, however, want to emphasize that, despite the large quantity of references to opposites and opposition in Eastern philosophy, it would not be appropriate to assert that opposition *characterizes* Eastern intellectual thought more than Western. There is little in Eastern philosophy, for example, to compare with Hegel's great system based on opposition, a system which was influenced by and, in turn, influenced many philosophers. Hegelian philosophy and its impact alone bears testimony to the pervasive importance of opposition in the West.

I have had several purposes in tracing opposition throughout the history of intellectual thought, East and West. For one, I have intended to continue the discourse, begun in the early part of this chapter, about the highly abstract and complicated nature of opposition as a conceptual tool. Though not a direct and incontrovertible piece of evidence, the major role of opposition and particular opposites in the highly complicated and abstract formulations of great thinkers emphasizes complexity. There is more to opposition than is grasped in naming operations and references to concrete phenomena, and there is more to thinking about opposites and opposition than following patterns of learned verbal association. Also, I have dwelt on the importance of opposition in intellectual history in order to introduce the suggestion that there are intrinsic reasons for the significance of opposition in creative thought. Not only does opposition, and by implication janusian thinking, play a role in the development of great intellectual formulations and other creations, but it is also likely that these great intellectual formulations point to something basic about the nature of reality. Opposition and factors derived from opposition may in fact be a crucial factor in the structure of reality, at least as it is grasped by and interacts with human

understanding. More of this later (chap. 13). Now, I shall clarify the cognitive structure of opposition further by considering some linguistic studies and analyses, including my own.

Linguistic Opposition

The psycholinguistic interest in opposition is, to some extent, a result of an historical accident having to do with the development of the word association test, the test described in the previous chapter. Invented by Sir Francis Galton in the nineteenth century, this test was relatively neglected by psychologists and other scientists until Carl Gustav Jung took it up in the early part of the current century. While Galton's interest in the test was based on his concepts of associational mental functioning, Jung used it as a diagnostic procedure aimed at identifying specific psychological blocks or "complexes" in connection with particular types of words. Then, influenced by Jung but diverging somewhat from him, the two psychiatrists Kent and Rosanoff began to apply a form of the word association test in the diagnosis of "insanity" or psychosis; this became the standard form of the test that is still in use today. In order to provide an easily administered, unambiguous, and repeatable procedure, one that produced responses regardless of education level, illness, and other circumstances, they settled on 100 relatively simple and common stimulus words after extensive sampling and experimentation. A host of administrations and the collection of an enormous body of data by clinicians and others followed in subsequent years. Because of the large amount of data, the ease of administration, and the obvious linguistic pertinence of the testing procedure, psycholinguists adopted the Kent-Rosanoff word association test as a major experimental tool. Turning away from the psychological and diagnostic interpretations of the clinicians and back to Galton's original concepts, psycholinguists attempted to explore patterns of verbal learning and verbal usage by means of this test or minor variations of it.

Now, it happens that several of the common, simple words on the Kent-Rosanoff list have elicited responses which, in the view of psycholinguists carrying out their explorations, seemed readily classifiable as opposites to the stimulus words. Another list of stimulus words would not in fact have done so, but the presence of this interesting finding has given rise to some extensive speculation on opposition. I stress this somewhat accidental nature of the finding about opposites because it bears on the discussion to follow.

I have already presented some of my own findings regarding opposite responding on the Kent-Rosanoff word association test. In discussing the investigations and analyses of others, as well as the phenomenon I have described as linguistic opposition, I can perhaps put those findings into perspective as well as clarify opposition further. Several aspects of the opposite response to stimuli on the word association test have been studied and assessed. Already mentioned here was the landmark study of Carroll, Kjeldegaard, and Carton, on which my own experiment was based. Interested not at all in creativity but in the nature of popular or common responses to the test, the so-called commonality of response category, these investigators were able to identify a partly overlapping but independent tendency they called "opposite responding."[20] Another group, led by R. D. Wynne,[21] attempted to explore the reasons for such a tendency by carrying out experiments designed to reveal a particular response set in subjects taking the test. Wynne and his associates believed that subjects responding to a word association test adopted strategies of response in accordance with their understanding of the tester's implicit instructions. They pointed out that several so-called opposite-evoking words, such as dark, sickness, man, soft, and black, appeared quite early in the standard test stimulus sequence. Accordingly, they reasoned, some subjects responded with opposites throughout because, after responding to the early part of the test, they perceived an implicit instruction to give opposites. By altering the sequence of stimuli presentation, Wynne and his group achieved results that seemed to support their hypothesis: different orders of presentation modified the total number of opposites elicited.

While this finding of a modification of opposite response depending on word sequence is of some interest, the interpretation of the finding is based on a series of assumptions that must be seriously questioned. First, these investigators assume that the early opposite-evoking words on the list automatically produce opposite responses, an assumption that is totally unwarranted in view of the large number of subjects who do not give any opposite associations to these words. Second, they make several implicit assumptions about the nature of the testing situation, particularly the unsupported idea that subjects are so compliant they will search for and always respond to an implicit instruction of the tester. Third, they seem to believe that subjects always consciously adopt a particular response strategy.[22]

Although it is possible that conscious strategies of response are developed under the conditions of paper and pencil administration of the test used by these and other psycholinguistic investigators, my own experience with timed oral testing contravenes such an assumption. Subjects' oral associations

under any type of time pressure tend to be too automatic to result from any conscious and consistent strategies. On the contrary, many of my subjects were surprised or distressed when they became consciously aware of their own particular tendency to favor opposites, simple common words, or other patterns of response. Even under paper and pencil test conditions, testers give explicit instructions to respond with the first word that comes to mind and time pressure is involved. Consequently, although subjects may not have done so in the Wynne et al. study, they usually reply automatically, in all probability, rather than in accord with a conscious response strategy. The possibility of an unconscious response strategy affecting spontaneous response is another matter, but such an unconscious strategy would not likely result from the rather overwhelming degree of unrewarded and implicit compliance motivation suggested by Wynne et al. In view of the fact that many subjects hardly give any opposite responses at all, a particular unconscious opposite responding strategy is actually likely. Rather than a matter of test compliance, however, the difference among subjects and the tendency to respond in opposites indicate a particular pattern of thinking.

Other psycholinguistic investigators have been interested in opposite responding as a factor illuminating linguistic meaning, the acquisition of language, and the structure of associational process. Deese, carrying out an extensive factor analytical study of word association responses derived from large samples of subjects, developed patterns of organization of associations involving different types of English form classes such as nouns, adverbs, and adjectives.[23] The structure of associations to common adjectives, he concluded, was based on opposition or, as he called it, contrast. Explaining this association structure on the basis of the "contextual pattern of underlying sentences," or the relationship of these common adjectives to events in the natural world, he criticized classical formulations of associational laws that merely emphasized the effect of word frequency and contiguity, that is, either direct contiguity in speech and writing or contiguity mediated by another associated word.

Another psycholinguist, McNeill, using the previously mentioned argument that opposite word association responses consist of words having all features but one identical with the stimulus word, also emphasized contrast rather than contiguity as an explanation of another word association phenomenon. McNeill suggested that a characteristic change in children's patterns of response to word association tests at a certain age was due to the factor of contrast and not to contiguity.[24]

Pollio and his associates, interested in assessing the challenge to classical association theory posed by the previous two investigators, carried out a series of experiments testing the assumption or hypothesis of identical attributes or features between pairs of opposite words.[25] In one experiment, judges were asked to rate pairs of opposite words on a semantic differential scale, a scale allowing for judgments of various attributes of a concept or a set of words. In another experiment involving subjects learning a series of nonsense words, interference in learning due to the use of the opposite words "hot" and "cold" was compared to the interference produced between similar words such as "hot" and "warm," "cold" and "cool." Both experiments showed little support for the hypothesis that opposites were markedly similar as proposed. In the first, judges designated many differences in attributes between opposing pairs. In the second experiment, subjects demonstrated less confusion and consequently less learning error in connection with "hot" and "cold" than in connection with the similar pairs. The authors conclude that opposites are predominantly divergent rather than similar and they propose a "law of oppositional word pairs" that reaffirms the associational principle of contiguity. They suggest that, in the course of language acquisition, oppositional word pairs are brought together on the basis of "conceptual convenience," which they define as follows: "For purposes of conception and communication, it becomes extremely convenient to refer to a dimension in terms of contrasting pairs, with the understanding that if more precise distinctions are required these can always be provided by specifying the appropriate intermediary positions."[26] After oppositional pairs are brought into contiguity on the basis of conceptual convenience, the Pollio group argue, they undergo repeated concurrences and therefore mutual evocation becomes increasingly likely. In other words, "Frequency and contiguity *follow* rather than precede association."[27]

Psycholinguists' discussions of opposition tend to make little distinction between contrast and opposition; rather, both terms are used interchangeably and the designations "polar" and "reciprocal" relationships between word pairs are used to denote the more restrictive logical opposition I have discussed. Moreover, the concepts of "minimal contrast" and "conceptual convenience" arising from linguistic analyses are oriented to resolving a controversy about associational laws of language and thought, as I have indicated, and they also pertain to controversies about the linguistic approaches proposed by Noam Chomsky.[28] For example, Chomsky's system of syntactical signs is the basis for the mentioned proposals, especially H. FI. Clark's, that opposite words involve only a sign change from

positive to negative or vice versa.[29] Using these signs to denote several syntactical features of oppositional word pairs, such as commonness, abstractness, form class (noun, verb, etc.), Clark emphasizes a similarity between opposites rather than divergence.

I do not intend here to enter into a discussion of Chomsky's important and productive linguistic theories and systems, nor do I propose to evaluate the controversy about associational principles and laws. In order to clarify further the distinctions I have made between linguistic, logical, and psychological oppositions, however, I want to emphasize an aspect of Deese's findings that has escaped general attention. Deese's data on opposite responding to the adjective form class, data derived from tables of standard word association norms as well as from his own experiments, unequivocally apply only to *common* adjectives and not at all to so-called rare ones. Common adjectives are defined as those that occur with a frequency of fifty instances per million words on the Thorndike-Lorge norms of word frequency, a table compiled of word counts from extensive samples of written language.[30] Other adjectives, designated by Deese as "rare," *do not* generally stimulate opposite responses but often produce responses of a different kind.

Deese's explanation for this finding is that rare adjectives are qualitatively different from common ones, because rare adjectives derive their meanings from the meaning of underlying roots borrowed from other form classes, primarily nouns. The rare adjective "continental," for instance, is derived from the noun "continent." Although such an explanation has superficial plausibility and therefore some immediate appeal, it hardly stands up to a more rigorous consideration. Included among rare adjectives are scores of words underived from nouns such as "banal," "effete," "viscous," and "teeny," while, on the other hand, common adjectives include numerous noun derivatives such as "national" and "natural." My point here is that linguistic postulates about opposition such as Deese's, which emphasize association connections between adjectives as well as contrast or opposition, are derived solely from analyses of common responses and common adjectives, not at all on analyses of rare ones. This is partly due to the historical accident I mentioned earlier: linguists initially became interested in opposition because the Kent-Rosanoff list contained numerous common words that elicited common opposite responses. Also, it is due to linguists's proper concern with overall trends in linguistic patterns and usage and their interest in developing general laws. Focusing exclusively on common responses, however, is misleading and inadequate for assessing the word association response of creative persons, as has already been

indicated in my own experimental studies reported in the previous chapter. In those studies, I discriminated the creative subject's tendency to respond with opposites (N.B.: to both adjective and other form class stimuli) and the tendency to give common popular responses. But, aside from these issues about opposite responding and creativity, the linguistic approach to opposition does not in itself do justice to the psychological complexity of the matter.

Two studies of my own serve to illustrate some of this complexity. In one study, I asked a group of raters to make judgments about a series of word pairs derived from stimuli and responses on my previous word association studies.[31] Raters consisted of forty-three females and eighteen males ranging in age from twenty to sixty-four years and ranging in educational background from high school graduates to persons with doctoral degrees. Presented to these raters were a series of eighty-six randomly ordered word pairs consisting of the following: twenty-nine that my co-investigator and I considered in some sense to be opposites; twenty-five that were made up of a stimulus word and the primary (most popular on word association norms) response, thirty-two designated as "chaff" that we chose as having either little relationship or else a good deal of similarity to each other. They were asked to rate which pairs they considered to be opposites according to the following definition: "Two words are in opposition to each other if together they denote a continuum in which they are at different poles. For example: cold and hot are opposites because they are at different poles of a temperature continuum."[32] Table 4 shows the number of opposite judgments for each of the word pairs used. The results are organized in accordance with the investigators' grouping of the pairs as opposites, primaries (stimulus with primary response), or chaff. The randomized order of presentation of word pairs is indicated by the accompanying numbers to the left of each.

The results are of interest, not because they demonstrate high correlations or unanimity of agreement, but for precisely the reverse reason: there was a good deal of divergence of opinion in the raters' response. For one thing, several raters judged primary pairs and similars to be opposites. Although there was 50 percent or better agreement about twenty-four opposite word pairs, 100 percent agreement occurred only with the pairs "fair-unfair" and "comfort-discomfort;" 90 percent or better agreement includes four other pairs (hard-easy, quiet-loud, sleep-awake, soft-loud), six pairs in all.

The results of this rating task reveal the difficulties of applying linguistic concepts of conceptual

convenience and minimal contrast to behavior pertaining to opposition. Although there was 100 percent agreement on the opposition between comfort and discomfort, and both words have all syntactical features in common, "discomfort" is a very rare response to the stimulus word "comfort" on the Kent-Rosanoff list or on any type of word association response norm. Furthermore, the minimal contrast principle alone cannot account for the 90 percent or better agreement on the six word pairs. All consist of words in the form class of adjectives and all are contrasting, but these two attributes were not at all limited to the six pairs. Several pairs of words with both of these attributes received less than 50 percent of the positive opposite judgments. Strikingly, also, only 40 percent of the raters judged the music-noise pair to be opposites. These words share the syntactical features of being nonabstract nouns referring to inanimate entities and they are contrasting with respect to a particular attribute. According to the definition of opposition specified in the instructions to the raters, these words in fact do define a continuum with polar extremes. Comparing the music-noise pair to the pairs receiving 100 percent agreement indicates that the raters opted for the characteristic of total contradiction in agreeing on the latter pairs. Fair and unfair totally and completely contradict and negate each other, as do comfort and discomfort. This is the quality they both have specifically in common. Of the six pairs rated opposites by 90 percent or more, five are totally contradictory: hard- easy, fair-unfair, comfort-discomfort, quiet-loud, sleep-awake. Only soft-loud could be considered to have some overlapping content and, like music-noise, to have a positive attribute of being types of sound. According to these results, the psychological sense of opposition is not one of minimal contrast, but of extreme difference. Syntactical features, in a direct rating of opposites, do not play a primary or major role. While contrast or polarity may seem to be a single attribute of word pairs for a linguist concerned with word relationships, it is, as the diversity of results on this task shows, a difficult attribute to determine. Moreover, the psychological structure of opposition consists primarily of the sense of reversing all of a word's attributes rather than only a single one. Discomfort, for example, is the reverse of comfort in every one of the contexts in which the word can be used.

Opposites	*No. of Opposite Ratings*	*Primaries*	*No. of Opposite Ratings*	*Chaff*	*No. of Opposite Ratings*
6. hard-easy	58	1. table-chair	22	3. deep-soft	15
8. short-high	52	2. stomach-food	13	5. house-place to live	4
9. anger-smoothing it	35	4. eating-food	7	7. hand-glove	9

over

13. fair-unfair	61	12. foot-shoe	9	10. carpet-fluffy	7
17. eagle-St. Bernard	32	14. citizen-man	8	11. smooth-gentle	7
25. white-dark	47	15. wish-want	8	16. table-food	11
26. command-obey	42	18. whistle-sound	5	21. needle-sharp	6
29. beautiful-horrible	49	19. cabbage-vegetable	4	24, fruit-tree	11
30. music-noise	24	20. mutton-sheep	8	27. sour-not sweet	9
32. wish-command	34	22. earth-dirt	8	31. stomach-hunger	9
34. comfort-discomfort	61	23. river-water	5	38. fair-light	8
35. soldier-civilian	50	28. spider-web	11	39. mutton-stew	6
36. quiet-loud	59	33. mountain-hill	13	42. girl-hair	10
37. sleep-awake	58	41. window-glass	5	47. whistle-wolf	13
40. high-bottom	39	44. eagle-bird	5	49. hand-warmth	7
43. man-child	35	46. house-home	8	50. short-low	10
45. soft-loud	57	51. beautiful-girl	6	55. river-boat	12
48. butterfly-egg	21	54. trouble-bad	8	56. music-horn	9
52. working-sleeping	41	59. soldier-man	11	58. spider-black	7
53. citizen-king	33	61. comfort-chair	6	62. red-bright	7
57. deep-high	44	63. fruit-apple	3	67. foot-walk	6
60. smooth-harsh	54	65. anger-mad	5	69. high-windy	9
64. girl-man	41	77. sleep-bed	4	70. man-male	2
66. sour-beautiful	22	82. command-order	5	71. hard-ice	3
68. eating-hunger	19	84. working-hard	7	72. soft-fluffy	6
73. trouble-ease	51			74. cabbage-leaf	6
76. earth-water	39			75. needle-syringe	6
78. carpet-high	12			79. white-light	8
83. mountain-molehill	48			80. butterfly-collecting	10
				81. window-sill	8
				85. quiet-rest	5
				86. red-color	8

Note: There were 61 raters.

On the other hand, the results also show the influence of linguistic factors on the concept of opposition. How else can the surprisingly large number of judgments of opposition (20 percent or more) for the pairs deep-soft, table-chair, mountain-hill, stomach-food, whistle-wolf, be explained? Logically, it is very difficult to conceive of the context in which these word pairs could denote opposition. Tables and chairs could possibly be considered opposite in terms of use: one neither sits on tables nor eats from chairs, stomach and food could be conceived of as being located at opposite ends of the esophagus while a person is chewing or else dichotomously opposite in function or action; mountain and hill could be considered to be to some degree opposite in size. But deep and soft could only be opposite if the hard rocks or the hard earth of a deep chasm or pit are brought to mind. Wolf and whistle would not in the ordinary colloquial use of "wolf whistle" be opposites but, in the context of sound, a wolf's baying and a whistle could seem to be opposed. And trying to establish the context for the few opposite judgments on other primary or chaff pairs would be extremely difficult indeed.[33] Remote logical contexts are in fact highly improbable; it is far more likely that some linguistic quality of these word pairs dictated the opposite judgment. Minimal contrast is a possibility—the five pairs from the primary and chaff list having 20 percent or better opposite ratings could be considered to have more of a quality of difference than others on those lists.

I believe there is another even more pervasive linguistic factor. When pairs of words are presented together, they form a binary and potentially dichotomous linguistic entity. This is especially so for the popular associated primaries on the list. Dichotomy, as I stated earlier, is an intrinsic aspect of one type of opposition, and binary entities therefore readily lend themselves to being structured as opposites. The mere presentation of word pairs in series, as done here, produces a linguistic context in which mere difference is overstressed and is therefore perceived as divergence or dichotomous opposition.[34]

In separating the roles of logic and language in relation to these rating results, I hardly mean to suggest that thought and language are independent of each other. I brought up the matter of logical context here because a particular feature of any rating or appreciation of opposition often involves somewhat remote logical, or linguistic, contexts. In our own initial choosing of the "eagle-St. Bernard" pair as opposites, for instance, we were thinking of the context of the aggressive predatory qualities of the

eagle as opposed to the gentle savior stereotype of the dog. That most raters considered this to be a nonsalient context, or merely did not think of it at all, is evidenced by the small number of opposite ratings for this pair. On the other hand, a very large number of raters agreed on the opposition in the pair "smooth-harsh," despite the more common oppositional contexts of "smooth" with "rough" as well as "soft" with "harsh."

Besides linguistic factors and logical context, other matters such as experience, sophistication, and point of view also play an important role in judgments of opposition. Because, for instance, few of the raters were musicians, the "music-noise" pair was not highly frequently rated as opposites,- it is hard to imagine that a musician would ignore that pair. Also, unlike the relatively small number from this group of American—non-royalty oriented—raters, one would, with English or European raters, expect a large number of opposite judgments for the pair "citizen-icing." On the other hand, a rater who was a king, or a guerrilla sniper, might not see much opposition between "soldier" and "civilian," while quite a large number of the raters here did. And biologists would surely rate "butterfly" and "egg" as opposites far more frequently than the few times here.

Another problem in linguistic discussions of opposition has been an exclusive focus on binary word pairs, dictated in part historically by the interest in simple word association. In another investigation, I have attempted to assess the effects of using multiple stimulus words in a word association task. In constructing the task, a series of single words and short phrases of multiple words were selected, all of which were determined beforehand to have clear opposites. As the purpose of the experiment was to determine the effect of multiple word stimuli on opposite responding, care was taken to use only low-frequency single words (according to the Thorndike-Lorge tables) but compound phrases containing words with higher frequency. On the basis of Deese's finding mentioned earlier that high-frequency adjectives stimulated opposite word associations, an attempt was made to stack the cards in favor of getting opposite responses to multiple word phrases. In order to use both structures of opposite word and opposite phrase pairs, two test protocols were made up. One of an opposite pair, either a single word or a compound phrase, was relegated to one test protocol or the other in order to avoid any suggestion effects. Sequence of presentation of single words and multiple word phrases was randomized on both protocols. Administered orally to thirty-eight student subjects, table 5 shows the two sets of test stimuli used. Twenty subjects received test 1 and eighteen received test 2. The number of opposite responses for

each stimulus was computed and is shown on the table.

Total opposite response on both tests was 15 percent. This amount is considerably below the usual student percentage of approximately 30-35 percent opposite response on the standard Kent-Rosanoff test and it indicates that using rare adjectives and multiple words, as might be expected, reduces the opposite responding tendency overall. But comparing the opposite response to the two types of stimuli on both test protocols yields a striking result. As seen on the table, the 24 single stimulus words evoked 102 opposite responses while the compound or multiple word stimuli evoked 70 opposite responses. This degree of association of a larger number of opposite responses with single stimuli and a smaller number of responses with compound stimuli is significant at the $p < .001$ level (chi-square = 33.59, *df* = 1). When these results are broken down for each type of test administered, test 2 shows a somewhat stronger tendency in this direction but neither is alone responsible for the result. For test 1, chi-square equals 7.08 (significant at $p < .01$); for test 2, chi-square equals 32.82 (significant at $p < .001$).

Table 5. Opposite Responses to Single and Multiple Word Stimuli

Single Word Stimuli	No. *of Opposite Responses*	*Multiple Word Stimuli*	No. *of Opposite Responses*
		Test 1 (n = 20)	
Careless	6	Death is long	8
Repel	3	Come down	7
Lucky	2	Fall apart	2
Inside	10	Hang loose	1
Forbid	1	Wake up	4
Hindsight	8	Hot and light	1
Exclude	3	Daylight breaks	1
Output	8	Speed up	6
Mobile	0	First breath	0
Hopeless	1	Soft and wet	2
Past	5	Dark night	1
Cowardly	4	Tear down	5

		Small time loser	2
		Dirty wash	0
		Give in	0
		Count me out	4
		New joys	2
		Hurry up	1
Subtotal	51	Subtotal	47
		Test 2 (n = 18)	
Careful	1	Life is short	1
Attract	3	Get high	1
Unlucky	3	Pull together	2
Outside	8	Up tight	0
Allow	2	Sack out	0
Foresight	3	Cold and dark	0
Include	6	Night falls	0
Input	13	Slow down	4
Immobile	5	Last gasp	1
Hopeful	0	Hard and dry	1
Future	7	Bright day	0
		Big time winner	1
		Clean laundry	2
		Hold out	1
		Count me in	2
		Old sorrows	2
		Go to sleep	0
		Go up	2
Subtotal	51	Subtotal	23
Total	102	Total	70

Note: n = number of subjects

Multiple word stimuli do not tend, in other words, to evoke opposite responses in a word association task to the degree that single word stimuli do. This finding lends strong support to my previous suggestion that the use of tasks involving binary word pairs has strongly influenced the results and conclusions pertaining to opposition in linguistic investigations. Single word stimuli call for single word responses; most word association test procedures include an instruction for subjects to respond with a single word but such an instruction is generally unnecessary. In the investigation I just reported, single word stimuli evoked single word responses in 100 percent of the cases even though, because of the inclusion of multiple word stimuli, no such instruction was given. Multiple word stimuli, on the other hand, generally evoked multiple word responses. Presenting a single word stimulus does, therefore, produce what can properly be considered a response set, a set to respond with a single word and to produce *a binary word pair*. Such binary pairs seem to suggest dichotomies, and dichotomies, as I pointed out, are connected or related to opposition. Consequently, single word stimuli seem to stimulate subjects to respond with opposites or else, as the high level of relativity of the previous rating experiment suggests, data presented in binary pairs may influence experimenters who score subject responses as having contrasting or oppositional qualities between stimulus and response.

The paucity of opposite responses to multiple word stimuli also bears on the hypotheses both of "conceptual convenience" with respect to opposites and of conscious opposite responding strategies on the word association test. If opposite responding were only a matter of conceptual convenience there would be every reason to expect that the common compound phrases included in these tests would have been strongly connected to opposites just as much as single words. But such was not the case at all. Instead, it appears that thinking of the opposite to a multiple word phrase required some conceptual effort rather than ease or convenience. Not only were there fewer opposites on multiple word phrases, but there was also another pattern shown on the test response: several partial opposites were given as responses, such as "old joys" to "new joys" and "soft and dry" to "soft and wet," indicating a not-quite-but-almost attempt to give an opposite response. If opposition or opposite responding were a matter of conceptual convenience alone, why wouldn't "new joys" and "old sorrows" be strongly associated with each other and therefore be a preferred response?

Opposite responses to multiple word stimuli surely should betray an intentional opposite responding strategy as well, if one existed in the ordinary case. As seen in the partial type of opposite

response just mentioned, multiple word stimuli on this task generally contained at least two reference points with regard to the formation of opposite responses, such as "new" and "joy," respectively, for "old" and "sorrow," or "soft" and "wet" for "hard" and "dry," and so on.

Forming an opposite to such stimuli, giving a complete opposite response involving both reference points, would surely indicate a responder's intent or strategy. In distinction to the ambiguity with respect to an individual word stimulus with one reference point, responses such as "big time winner" to the stimulus "small time loser" definitely indicate an intentional conceiving of the opposite. That relatively few such complete opposite responses occurred on these tests suggests that intentional opposite responding strategies are the exception rather than the rule.

Despite some limitations of linguistic studies pertaining to opposition, contributions such as Deese's suggestion that opposition has something to do with the structure of common adjectives as a form class are noteworthy and important. The connection between adjectives and opposition pertains to issues I shall pursue for the remainder of this chapter. Adjectives belong to a linguistic form class denoting abstract entities; adjectives are words for the qualities of things, and qualities always consist of abstractions. To determine qualities, features that appear salient to the human mind are abstracted from the concrete world. To some extent, opposition is intrinsic to the structure and definition of adjectives of all sorts because opposition pertains to abstractions. An opposite relationship exists on an abstract level only, and conceiving of opposition requires the abstracting mental capacity. Because opposition is an abstraction and because it is quite complex are two of the reasons opposition is important in creativity.

Opposition and Creativity

One of the baffling aspects of creativity has been the startling leaps of thought, the penetration into the unknown and the unfamiliar, and the sometimes dazzling and highly complex formulations in art, science, and other areas. New ideas, new discoveries, new forms, new metaphors, new styles, these are the hallmarks of creativity and, though classically we have difficulty understanding and accepting this newness—sometimes we even reject it—we eventually come to appreciate it. We eventually accord the creator the accolades he so richly deserves. In chapter 12,1 shall take up some of the complicated psychological and philosophical matters pertaining to the newness (novelty) of creativity. Now, I shall

relate some aspects of opposition to these dazzling and complex products of creativity, a task I have been leading up to all along.

While creations in art, science, and other fields invariably appear to be new and unfamiliar, they cannot ever be completely so. Such creations are products of a human mind, understood by other human minds. Hence, they cannot be totally disconnected from the previous experience of either the creator himself, or of his audience, or of other types of recipients. This much seems obvious: the creator does not, at any given moment in time, use totally new thought processes or develop a totally new language to convey them; nor does he produce theories, inventions, or works of art completely devoid of relationship to previous human experience. Were he to do so, there probably would be no way of understanding his creation. Labeled idiosyncratic or otherwise incomprehensible, it would be relegated to the dustbins of history—if even it received that much attention—until some future creator came along, perhaps to create its meaning or use. This does not merely apply to creations that are highly abstract or very difficult to understand: Einstein's theories of relatively when first proposed, or quantum theory, for instance. Though a theory be highly abstract, with little in the way of concrete referents that aid understanding, the abstract elements nevertheless can and do relate to other abstractions previously known. Someone with a particular type of knowledge does understand it. Modern conceptions in physics of atomic or subatomic structure or of black holes in space are difficult to grasp in visual or concrete terms but, as abstractions, they are comprehensible and useful. In music, early experiments with electronically produced and randomized sound seemed totally meaningless and incomprehensible to some, but many musicians found something in it related to their previous experience. They hailed it as a new form.

The comprehensibility of creations does not arise merely from some minor factor such as that literature must be conveyed in existing language or physical theories are transmitted in generally accepted mathematical terms, or music consists of recognizable and preexisting physical sounds. These are surely aspects of the matter, but more is involved. For comprehension to occur, elements relating to shared experience must to some degree be present in the substance of the creation. I realize, in saying this, that I am skirting on the edge of controversy with respect to modern art forms such as random music. But rather than pursue somewhat digressionary particular issues about whether the listener completely imposes patterns on the sounds, and about what the composer does, I want to push my point further and assert that, in artistic creation, familiarity allowing for comprehension along with unfamiliarity and

newness are crucial for the development of an aesthetic experience.

It is easier with art than with science and other fields to emphasize the importance of the familiar together with the unfamiliar because everyone has experienced the pleasures of hearing and rehearing the same piece of music or of seeing and reseeing the same Shakespearean play.[35] Everyone knows the powerful alternation and balance between familiarity and unfamiliarity or strangeness in art: the hearing of new sounds in familiar music and of new meanings in old soliloquies, and the reverse experience of an immediate feeling of recognition when confronting new metaphors in a poem. I particularly mean to emphasize this latter intuition of familiarity with respect to new metaphors, an intuition that imparts the sense of comprehensibility.[36]

Scientific and other intellectual creations do require some balance between familiarity and strangeness but this balance is not always so apparent in a scientific discovery or a scientific theory. After all, for a scientific creation particularly to be believed or accepted, the scientist must go to great lengths to render it familiar—in science, this means logically comprehensible—despite its newness and strangeness. Tightly knit logic, experimentation, indeed a major portion of the scientific enterprise is devoted to accomplishing familiarity and producing widespread and general acceptability and agreement. With scientific creations, the balance between familiarity and strangeness appears less in the result or product and more in the thinking that goes into the development and discovery of theory or fact. Because of the need for comprehensibility and agreement, the essence of such exciting thinking must be hidden or submerged in scientific presentations; witness the necessarily dry but rigorous articles that abound in scientific journals. Yet seldom does the process of scientific discovery occur along the well-trod familiar paths such as journal articles would seem to indicate, neither does it involve totally new experiences or totally strange and unfamiliar territory at every step of the way. The creative scientist dips into the unknown with firm footing in the known.

The balance between the familiar and the strange both in artistic and scientific creation especially points to the widespread importance of opposition as a conceptual tool. As an abstract operation, conceiving the opposite provides a means for moving as far into the unknown as possible while still retaining a reference point in the known. A pertinent illustration comes from the physicist Dirac's revolutionary theory of the existence of antimatter. Confronting a whole series of physical phenomena in

which the behavior of elementary particles could not be explained, Dirac postulated the existence of particles that were completely opposite in electric charge to all particles then known. These oppositely charged but otherwise identical particles he called collectively "antimatter." Both electrons and positrons had corresponding antielectrons and antipositrons in the universe. Now, for anyone reading my intentionally sketchy account of this theory and confronting the idea for the first time, I am sure there is an experience of strangeness, a "mind-bending" quality in attempting to comprehend this "antimatter." And that quality, of course, is due to the highly abstract nature of such a concept. Here, I hope I have made a difficult point: rather than reconceptualizing the whole of particle physics and, for instance, proposing to explain the data with a new concept of matter that encompassed both types or classes of particles he was postulating—I personally have no idea how or whether anything such as that could possibly be done—he developed a strange and new abstraction. There was another type of entity, he said, that was exactly opposite to the known entity of matter; therefore, all laws pertaining to the known entity also applied to the hitherto unknown one. Thus, he was able to understand and to describe the strange and unknown in terms of the familiar.

In art, conceiving opposites also serves to help the artist move from the familiar to the strange. As I briefly mentioned in the previous chapter, styles in the visual arts especially have undergone many oppositional shifts in the last century, some gradual and some more rapid. There was a major shift from representational art to abstract art, the dadaist's reversal of traditional artistic conventions in what was called "antiart," and the rise of the pop art movement as another type of reversal both of traditional art and of antiart as well. Others could be mentioned, but suffice it to cite the development of the op art movement, a movement producing yet another type of reversal by definitively shifting the locus of aesthetic creation to the eye of the observer. Although other artists and art movements had been interested in optical effects, the op movement produced objects with optical qualities that required the onlooker to integrate the perceptual experience in his mind rather than to admire separated qualities of an external art object. Op art could not, for instance, be reproduced in photographs. In modern literature also, there has been a shift from naturalism to absurdism as well as the emergence of the antihero as the major modern literary entity. And in music, the development of random, or, as John Cage calls it, antiteleological music, the supposed opposite of traditional goal-oriented composition, has already been mentioned. More basically, however, oppositions intrinsic to metaphor, comedy, and tragedy in all artistic

forms play a critical role in producing a balance, and a shift, between the familiar and the strange. I shall specifically discuss these more basic oppositions in the final chapter of this book.

To return to science, opposition also plays a basic and general role in the development of scientific creations. As the broad and erudite historian of science, Gerald Holton, points out, scientific knowledge itself is often structured in terms of antithesis. I shall quote him extensively and directly:

> Not far below the surface, there have coexisted in science, in almost every period since Thales and Pythagoras, sets of two or more antithetical systems or attitudes, for example, one reductionistic and the other holistic, or one mechanistic and the other vitalistic, or one positivistic and the other teleological. In addition, there has always existed another set of antitheses or polarities, even though, to be sure, one or the other was at a given time more prominent—namely, between the Galilean (or, more properly, Archimedean) attempt at precision and measurement that purged public, "objective" science of those qualitative elements that interfere with reaching reasonable "objective" agreement among fellow investigators, and, on the other hand, the intuitions, glimpses, daydreams, and *a priori* commitments that make up half the world of science in the form of a personal, private, "subjective" activity.
>
> Science has always been propelled and buffeted by such contrary or antithetical forces. Like vessels with draught deep enough to catch more than merely the surface current, scientists of genius are those who are doomed, or privileged to experience these deeper currents in their complexity. It is precisely their special sensitivity to contraries that has made it possible for them to do so, and it is an inner necessity that has made them demand nothing less from themselves.[37]

Cited also by Holton are specific and crucial conceptual antitheses in physical science as follows: matter and energy; space and time; the gravitational and electromagnetic field; and what he calls "the great themata" of continuum versus the discrete, of classically causal law versus statistical law, of the mechanistic versus the theistic world interpretation. All of these themata have, he says, "haunted" great scientists such as Newton, Bohr, and Einstein. Holton's view, then, points to opposition as a concern and a central preoccupation of creative scientists. His further developed description of progress in science as both moving calmly in one direction in a monolithic way and being buffeted by contrary or antithetical forces also coincides with Kuhn's.[38]

While Holton's description of the great scientists' preoccupation with antitheses or opposites strongly emphasizes the importance of opposition in creative scientific thought, further clarification is necessary. Of key significance for understanding the role of opposition in scientific and other types of creative thought are two matters I have discussed here: (1) opposition is an abstract relation; (2) designation of specific opposites is always relative, dependent on context, and a matter of sophistication

and point of view. The abstract nature of opposition has already been emphasized; the relativity and point of view have only been touched on.

A clear and commonplace example of the relativity of opposition comes from the elementary art class. When a student is learning to paint or color, he is very early exposed to the dictum of three primary colors: blue, red, and yellow. Because these colors are elemental and do not reduce to other colors, it is easy to think of them as extremes—not merely as broadly contrasting colors but as opposites. When in the course of painting, however, the student thinks of putting in opposite color effects, as often happens, he will, if he is using primaries, invariably choose either blue and yellow or red and yellow, never blue and red. The example need not be confined to the use of primary colors, of course, and most students—and accomplished artists as well—will also think of red and green, or perhaps purple and yellow, or orange and green, as opposites, depending on the context and their own color experiences and associations. And, taking into consideration factors of tone and value, I believe all artists would agree that such thinking is perfectly valid and artistically meaningful.[39] From the point of view of optical physics, however, there is less room for variation in the judgment of color opposites: blue and red are clearly at opposite ends of the physical optical spectrum and they are therefore *the* opposites.

I don't intend to make these points of view appear antagonistic to each other because the differences between colors as part of the wave spectrum and colors of the palette produced by reflected light are well known, artists and scientists function very comfortably with both perspectives. Also, it should be clear from my previous discussion that two types of opposition, binary and scalar, are involved. To move on to other examples, however: cold and hot are, everyone would agree, clear opposites. If a ruthless examiner, interested in opposites, raised his eyebrows and pushed on to question this judgment, most people would come up with "freezing" and "boiling" as better designations. And surely they would be right. A person standing outside on a winter day, shiveringly viewing ice-covered ponds and lakes, would need little convincing that he is experiencing the end point of an extreme and would readily acknowledge that the boiling water for his tea or coffee waiting on the stove inside was at the other end of the scale. The physical behavior of water has served as a fairly adequate standard for the temperature scale and, despite our possession of thermometers registering well below 32° Fahrenheit or 0° Celsius, we still use the term "freezing" to describe the lower end of the temperature scale. As we enter the domain of the physical scientist, however, water disappears as a standard, and judgment of opposites

of temperature depends on the freezing point of substances such as nitrogen at minus 273° Celsius or, with increasing knowledge, on the range of temperatures actually measured in the physical world. The physical scientist, in fact, brings in a notion of temperature as a virtually limitless scale on which opposite points are totally determined by the particular standard employed or by the knowledge then available.

One more example, from my own field: in my early days of word association testing and working with judgments of opposition in word pairs, I was constantly struck by the large number of people who made the judgment that the opposite of "anger" was "happiness," or its equivalent. Because I happened to be particularly interested in anger,[40] both clinically and theoretically, I was quite taken by this response because it seemed to reveal an important psychological and, perhaps, a sociological problem. The judgment that anger and happiness were opposites seemed to mean that many people viewed the total absence of anger as necessary to a state of being happy. I should say that I was struck but not really surprised by this implication, as it coincided with what I and numerous other clinicians have constantly observed to be a dominant point of view both of society in general and of our patients in particular, that is, the conviction that anger is a noxious emotion that should be denied and suppressed. On the contrary, however, a considered view of healthy psychological functioning—not experimentally proven but consistently derived from clinical observation—holds that anger is not at all antithetical to happiness. Expression of anger or, more important, recognition of one's anger, is important to psychological health and, consequently, to happiness as well. Notice I have not said that expression or recognition of anger does away with anger, expression and recognition of anger may facilitate happiness, and happiness and anger may often therefore coexist. Psychologically, an appropriate opposite of anger is "smoothing it over" (as in the rating task described). Thus, again, sophistication and viewpoint play a role in choice of appropriate opposites.

These examples should sharpen the position about opposition in science Professor Holton has taken. I do not intend to suggest that a scientific designation of opposites is invariably more true, in some absolute sense, than is an ordinary, unsophisticated choice of particular opposites. Creative artists, in fact, deal with opposites and opposition in a manner closer to common ordinary usage and understanding and, surely, they arrive at deep understandings or, if you will, truths. The examples serve to illustrate that opposites and opposition are relative. Close consideration of some of the antitheses Holton cites would lead to challenges from various quarters about whether a given pair were truly antithetical or

whether a particular antithesis adequately described a system or attitude. What, for example, is really antithetical about space and time? Isn't time experienced as a result of movement through space? Or, from the point of view of existential philosophy, is there really an antithesis between subjective and objective? Such challenges, which can be raised about virtually any designated opposites, are potentially productive of more refined definitions and better ideas.

Opposition is relative but formulating oppositions in science, in art, and in other intellectual pursuits as well, serves as an aid to thought, conceptualization, and progress. Sophistication is important because increases in knowledge lead to the formulation of oppositions which more and more adequately characterize the materials and the understandings required within a particular context. While the ordinary man, out on a cold blustery winter's day, need have no more complex standard of temperature than the behavior of water, the scientist must go beyond this. And, in going beyond, he formulates new polarities and oppositions of temperature that aid him to tackle problems about physical reality. The conceptual antithesis between matter and energy cited by Holton is a cardinal case in point. Einstein's interest in this seemingly rockbound antithesis led him to overthrow it as an antithesis by showing that matter and energy were interchangeable or the same. In so doing, he increased sophistication to the point that new antitheses were conceived. As another instance, waves and particles have for many years been considered antithetical or else, in some way, similar. When the particular formulation is developed that renders them simultaneously operative, another set of antitheses will appear. Science does indeed progress because of the presence of antithesis. But these antitheses are products of the mind of man interacting with the world of nature. It is also necessary for man to formulate antitheses in order to move from the known to the unknown. Working with antitheses or oppositions in art, in science, and in other intellectual areas does not require that such antitheses or oppositions be absolute, or applicable to every context, only that they be meaningful and applicable in the context in which they are considered.

Creators formulate antitheses and oppositions in order to gain conceptual clarity. In distinction to contrasts and differences, oppositions and antitheses are crucial for scientific and intellectual creative thought because they are *specific* and *clear*. Entities in opposition have distinct, definite and reciprocal relationships to each other and, as in the Dirac example of antimatter, the characteristics of one side of the opposition also apply to the other. Sophistication in science and other fields allows for greater and greater specification of meaningful and appropriate opposites. As old opposites are overthrown, new

ones arise in a never ending spiral of self-generation paralleling the spiral of increasing knowledge.

An important aspect of scientific discovery, acknowledged by most creativity researchers and by outstanding creative scientists who have been my research subjects as well, is the initial formulation of the problem to be solved. It is at this stage of the process of discovery that formulating oppositions can play a crucial role. Just as it is necessary for the scientist, both ordinary and creative, to deal with red and blue as opposites in optics, it is necessary for the creative scientist also to go beyond everyday scientific matters and to abstract other oppositions from the body of scientific knowledge or from the activities of the scientific enterprise. The antitheses proposed by Holton are examples of abstractions that seem to have contributed to the formulation of scientific problems and to the progress of science. A careful reading of the historical account by Kuhn provides a good deal of evidence that formulating such large-scale antitheses and oppositions, and resolving them, has been a cardinal characteristic of scientific advance.[41] Increases in knowledge do not, in themselves, lead to the formulation of new opposites and antitheses, but scientists—especially creative ones—tend to organize new knowledge in terms of antitheses and opposites in order to facilitate conceptualization. This is done not merely out of "conceptual convenience," incidentally, even though antitheses are clearer and more specific than difference and contrast. Formulating appropriate and meaningful antitheses is conceptually difficult and the results are perplexing and challenging. Making such difficulties for oneself is, as I have said earlier, a particular characteristic of the creative process. Formulating antitheses and opposites is helpful and facilitative, but it is not easy.

In addition to specificity and clarity, opposition involves either or both dichotomies and scales. Consequently, formulating opposites provides a means for structuring information and concepts in a useful way. Known dichotomies and scales can be organized to facilitate abstract manipulation. To use a mundane illustration, ice is cold and therefore at the opposite pole from entities that are hot, but ice formed from carbon dioxide, "dry ice," belongs to two different scales. It feels hot when touched but, on the temperature scale, it is quite cold. Conceptualizing the circumstances in these terms facilitates an understanding of the nature of sensation as a form of interpretation of physical events. Moreover, formulating oppositions provides a means for dichotomizing or scaling information that might otherwise appear totally haphazard. Another everyday example: calling men and women opposites served for many centuries to aid the—now rejected—dichotomization of work tasks in human society. A more

contemporary view maintained the notion of opposition but, instead of the man-woman dichotomy, emphasized scalar features of maleness and femaleness with many intervening degrees. That the most modern position on the relationship between men and women is geared toward overthrowing the opposition completely should not suggest that the previous conceptualizations had no purpose. On the contrary, one of the most telling approaches of the modern women's liberation movement is to ask for examination of the basis for the notion of opposition between sexes in order to facilitate understanding of the impact of this long held idea on both men's and women's characteristic ways of thinking and behaving. Another illustration of the conceptual usefulness and significance of formulating oppositions in order to organize otherwise haphazard data into dichotomies and scales comes from a very influential modern movement in linguistics and anthropology, the structuralism of Roman Jakobson and Claude Levi-Strauss. Jakobson, whose work was antecedent, developed a point of view—now known as structural linguistics—which virtually revolutionized the modern field of linguistics. A cardinal feature of Jakobson's approach was identifying binary oppositions in complicated linguistic forms. Levi-Strauss, whose work in anthropology stimulated the adoption of structuralism by numerous intellectual disciplines—literature, art, psychology, natural science—was able to develop extensive understanding of primitive cultures on the basis of a highly perceptive identification of binary oppositions in rituals and myths.[42]

Opposition and Artistic Creativity

So far, I have drawn most of my illustrations of the role of opposition in the creative process from the realm of science. Formulating oppositions in the arts is intrinsic to creative thinking for some of the same reasons as already discussed. While it is difficult to speak of art as a body of knowledge analogous to the body of scientific knowledge, there surely are traditional canons in art and referential features pertaining to knowledge outside of the artistic realm. I have already alluded to the tendency of modern artists to overthrow old styles and traditions within the artistic canon by developing opposite styles and principles. Such a tendency is, in modern times, only more extreme and obvious than in the past. Artists characteristically have adopted opposite styles and movements, both with respect to artistic canons and with respect to knowledge outside of the artistic realm. Artists frequently formulate opposites of what is generally accepted and believed, whether derived from science, politics, philosophy, or from everyday

experience, and such opposites are intricately interwoven into the fabric of their art. Moreover, sophistication with respect to opposites also plays a critical role. If a previous artist has used a particular pair or multiplicity of opposites in his work, a later artist often attempts to develop the issue further by going beyond, superceding, or providing different and hopefully more knowledgeable or penetrating terms. Opposition between death and life may be superceded or enlarged to include opposition between inanimate and animate in the universe; James Joyce retold the Odyssey of Homer and, rather than focusing on the opposition between man and the gods, he emphasized the opposition between man's will and forces within himself.

Artists find the clarity, specificity, dichotomizing, and scaling factors involved in opposition quite as useful and facilitating as creative scientists do, and for artists, the relativistic and reciprocal aspects of opposition seem to play an even larger role. Insofar as art deals with the entire realm of human experience, it confronts issues and areas where truth seems almost entirely relative, or at least a far lesser degree of absolute than sometimes appears in science. In the face of such large-scale relativism, the relativism of opposition serves the artist well in his attempts to organize and integrate experience of all types. For opposition, while pertinent only within particular contexts, also has another feature that has particular value for the artist. Opposites are, by definition, *limits*. The opposite ends of a scale are reciprocal and the same as the limits of that scale, and binary opposition defines the limits of a class. Man and woman, again, are only opposites if no other entity is included in the same class, such as a third sex or an animal, and male or female are the end limits of a sexual attribute scale. Such limits are immovable, totally restrictive, and absolute; one could not change these limits without redefining the opposites involved. This limit-setting aspect of formulating oppositions is one of its most salient and intrinsic features and one that is extremely valuable for the artist. In seeking stability, coherence, and oftentimes a perspective on human experience that yields a sense of the absolute, in some cases possibly absolute truth itself, the artist formulates oppositions and defines clear limits. Though opposition is essentially relative, for the artist it may not be necessarily so. He hopes to find basic and even absolute truths, if such exist, behind and beyond the surface of things. Thus, he formulates and uses opposites. The artist uses the relativistic device of opposition to find limits and absolutes in an apparently relativistic world.

Artists, art critics, and scholars constantly allude to opposition and elements of opposition in artistic works. Indeed, I anticipate little criticism from those quarters about what I say here about the importance

of opposition in art. Despite the wide agreement about the salience of opposition, however, it is another matter to identify particular opposites with certainty. In many art fields, the relativistic aspect of opposition is quite apparent when the matter is subjected to careful scrutiny. In the visual arts, for instance, where it might be expected that the originally spatial basis of the idea of opposition—putting against or establishing sides—would make for easy and consistent use and identification of opposites, agreement in any particular case can be quite hard to attain. Only the familiar and definite spatial orientations of left and right, up and down, and also perhaps inner and outer, concave and convex, foreground and background, provide a clear and incontrovertible basis for designating particular oppositions in visual form. Now, I don't mean to say that thinking about these orientations in connection with varying and unlimited types of content does not provide a virtual infinitude of possible oppositions; as a matter of fact, such possibility exists. But the visual artist is often interested in highly subtle and complex forms of opposition in his works and it is therefore difficult to identify and obtain definite agreement about various oppositions of tone and value as well as in-context oppositions between the form of lines or geometric shapes, such as squares, rectangles, circles, triangles, or spheres, and the highly relative oppositions of dark and light or short and long. When visual art is representational, of course, agreement about particular opposites can be easier to attain. In representational art, such familiar categories as man and woman, sacred and profane, rich and poor, downtrodden and uplifted, saint and sinner, or gaiety and sadness are unequivocally manifest and doubts and questions are stilled. Hence, when specificity and increasingly abstract categories are possible, the chances of wide agreement about opposition are increased.

From these considerations, it would appear that literature is the art form par *excellence* for producing and identifying definite oppositions. Literature depends on language and, in comparison to other media, language provides the possibility of the highest degree of specificity.[43] And, in practice, such is the case: opposition in literature is rather easily described and discussions of particular opposites in a literary work need little exegesis or justification in the majority of instances. But this circumstance reflects a more general issue with respect to the analysis of art. The more there is a focus on the nonspecific, so-called formal aspects of art, the more difficult it is to achieve widespread consensus and agreement. As opposition is often a quality of artistic form, its presence and function are often controversial. Music, the type of art that stimulates a focus on form more persistently than others,

provides a clear instance of the difficulty. Musicians, including composers, constantly refer to oppositions in music: opposite themes, rhythms, keys, tempos, symphonic movements; inversions, counterpoints, opposite ends of the scale, retrogrades future and retrogrades past; and dissonance opposed to consonance. But close inspection of any particular allegation of opposition invariably raises an issue of relativism along with diverging points of view because music has few stable or specific reference points to support a particular claim. Many proponents of opposition of themes in various composer's music, for instance, find themselves referring to so-called extramusical experiences or the description of particular emotional states, to try to make their case.[44] Appreciation and understanding of music need not involve such extramusical elements, yet a strict or logical analysis of incontrovertible opposition in music requires that only physically antagonistic elements and complete antitheses be considered. Thus, only upbeats and downbeats, silence and sound, extremes of sound, or possibly antithetical motions required to produce different sounds or rhythms on a particular instrument, are clearly and uncontestably opposites.

Are musicians, and other artists not using language as a medium, wrong, then, when they talk about oppositions in their thinking and their art products? Surely this could not be so, because particular pieces of music, painting, sculptures, dances, and works of architecture constantly generate a sense of opposition about which sophisticated persons, and the not-sophisticated as well, can often agree. The answer to the dilemma resides in the limit-setting aspect of opposition, the defining and construction of particular contexts involved clearly both in the production and in the appreciation of works of art. The artist defines opposition by the limits of the particular context in which he is working as follows: a painting dull overall in tone may have striking opposition of dark and light within that particular tone range or context; a melodic sequence once stated in a piece of music is opposite to another sequence in which the tones are reversed; fast and slow tempos are oppositional in a particular work; square and round may appear as opposites in a particular building and the same architect may build another building in which square and round appear similar; finally, the dancer may produce a dance in which moving forward and backward are sharply emphasized despite their occurring in a rather narrow range of space.

Setting limits is a crucial aspect of the focus on opposition in art and, although not superficially apparent, setting limits is an aspect of the formulation of opposites in science as well. When the creative scientist pays attention to the alleged opposition between holism and reductionism, space and time, or

electromagnetic versus gravitational field, he too is circumscribing and setting limits on his area of inquiry. In formulating such oppositions, or taking them seriously, he must ignore much blurring or subtlety that make it very difficult to specify such categories clearly. Usually aware of these subtleties at the time he formulates the opposition, he may even return to use them later in arriving at the solution of a given problem he poses. The stage of formulating oppositions and limits is, however, a critical aid to his thought.

Although formulating oppositions involves limit setting and specificity, that by no means interferes with the subtlety and complexity of creative thought. For one thing, oppositions themselves frequently involve highly complex interrelationships and domains of knowledge. Although many of the examples I have used here consist of rather simple oppositions, these should certainly not necessarily be considered to be the particular oppositions in creative thinking. Most oppositions involved in intellectual creations cannot be designated by single words or phases. Though we talk about an opposition between a wave and a particle, for instance, we refer to a highly complex series of antithetical relationships. Moreover, much of the opposition in creative thinking consists of multiple rather than binary elements. Again, while many examples here have referred merely to binaries such as hot and cold, darkness and light, and so on, opposition in creative thinking involves the great complexity and subtlety of concatenations of ideas denoting such multiplicities as formed and formless, human and animal, sacred and profane, adult and child, ideal and natural. Such multiplicities enter into the multilevel nature of art and of other types of creation as well.

In discussing the various features of opposition such as limit setting, dichotomizing, scaling, clarity, specificity, and relativity, I trust it has also been clear that I have not meant to suggest that any one of these features in itself dictates a particular choice of opposites by the artist or scientist. Nor have I meant to indicate a defined and invariant sequence of events involved in thinking of opposites. The scientist does not formulate a particular opposition in order to dichotomize data, set limits, etc., nor does he first dichotomize data, clarify it, etc., before formulating a particular opposition. He, as well as the artist, formulates particular opposites because for both it seems that these opposites are there, that is, a specific and reciprocal difference exists between the electromagnetic and gravitational field, between space and time, between red and green, and so on. And, in developing a work of art especially, an artist may perceive an oppositional context that others cannot immediately perceive. Creative people do not use

opposition consciously to accomplish any set purpose, but they are drawn to opposition and they tend to formulate opposites because such a procedure is useful, and often critical, for making discoveries and producing artistic creations.

Opposition and Janusian Thinking

At this stage of the exploration of the creative process, it should be readily apparent that everything pertaining to the role of opposition in creative thinking also pertains to janusian thinking. The complexity, abstractness, limit-setting, structuring, and specifying qualities of opposition are all features of janusian thoughts. Opposition is intrinsically related to janusian thinking in that it is necessary for particular opposites to be formulated in order for them to be conceived as operating simultaneously. But again, no set sequences are involved. In the process of janusian thinking, formulating particular opposites does not necessarily occur at a separate, or distinctly prior, point of time. Often, the complete conception of particular opposites operating simultaneously occurs all at once. The process, in such cases, consists of recognition and identification of an opposition (or merely a tension) together with the conception or realization that particular opposites are operating simultaneously in a particular context. Such thinking frequently appears in artistic creation, as artistic metaphors expressing simultaneous oppositions emerge commonly fully formed. Sometimes, the artist himself may dimly sense rather than be explicitly aware of the particular oppositions he has formulated; he does not at all pause to analyze their logical interrelationships but is interested in their aesthetic impact and appeal.

The janusian process, although it may occur dimly and in a moment of time, consists of interest in opposites, formulating opposites, recognizing the salience or impact of particular opposites with respect to a particular problem, task, or field, and conceiving or postulating the opposites simultaneously. The creative person, in other words, engages in all these aspects of the process without systematically or explicitly knowing he is doing so. Though both formulating opposites and thinking about opposites are vital aspects of the janusian process, they also can be entirely independent activities. Formulating opposites, for instance, may play a role in any type of task, manual, intellectual, or creative. Important to the distinction between formulating opposites and janusian thinking is the factor of temporal sequence. In ordinary thinking, and some specialized types I shall discuss in the following chapter, opposites are formed or developed and considered sequentially or successively in time, in janusian thinking they are

formed or developed and considered simultaneously. With this distinction firmly in mind, we can turn more fully to the nature of janusian thinking as a psychological process.

Notes

1 See J. J. Katz and J. Fodor, "The Structure of a Semantic Theory," *Language* 39 (1963) :170—210; D. A. McNeill, "Study of Word Association," *Journal of Verbal Learning and Verbal Behavior* 8 (1966) :548—57. McNeill emphasizes a minimal contrast feature for verbal opposites to account for word association results. He does not discuss the conceptual factor of opposition and, by omission, would seem to suggest that the verbal feature of minimal contrast is the major factor in opposites. See also discussion in H. H. Clark, "Word Associations and Linguistic Theory," in *New Horizons in Linguistics* ed. J. Lyons (Baltimore: Penguin Books, 1970), pp. 275-76.

2 *Webster's New Dictionary of Synonyms* (Springfield, Mass.: Merriam, 1968).

3 Medium is not specifically different from tall because it is different from short as well.

4 Primarily this position has been at times taken in various oriental philosophies, Buddhism, Taoism, and Hinduism. The idea that opposites flow into one another has been adopted and forwarded by numerous mystics and mystical orders in both the Western and the Eastern world. See also an experimental study of similarity in opposition, T. F. Karwoski and J. Schachter, "Psychological Studies in Semantics: III. Reaction Times for Similarity and Difference," *Journal of Social Psychology* 28 (1948) :103-20.

5 There is nothing to suggest that a misapprehension problem would arise later because of the mother's "mislabeling" of the child's behavior with this word. The child constantly hears words applied to him which he does not understand or are inappropriate at the time and no later difficulties in apprehension seem to occur.

6 G. Kreezer and K. M. Dallenbach, "Learning the Relation of Opposition," *American Journal of Psychology* 41 (192,9) :432—41.

7 B. Inhelder and J. Piaget, The Early Growth of Logic in the Child, trans.E. A. Lunzer and D. Papert (New York: Norton, 1964), pp. 146-47.

8 Ibid., p. 149.

9 For an excellent review, see R. J. Wales and R. Grieve, "What Is So Difficult about Negation?," *Perception and Psychophysics* 6 (1969) :327-31.

10 *J.* Piaget, "Principal Factors Determining Intellectual Evolution from Childhood to Adult Life," in *Factors Determining Human Behavior,* Harvard Tercentary Conference (Cambridge, Mass.: Harvard University Press, 1937), pp. 32^-8.

11 D. R. Entwisle, *Word Association of Young Children* (Baltimore: Johns Hopkins Press, 1966). Opposite-evoking stimulus words and opposite responses were, as in my own word association studies reported in the last chapter, those defined in Carroll et al., "Opposites vs. Primaries."

12 Entwisle, *Word Association,* p. 71.

13 Children's averages computed from Entwisle's figures,- see Carroll et al., "Opposites vs. Primaries," and Rothenberg, "Word Association," for adult averages.

14 W. G. Perry, *Forms of Intellectual and Ethical Development in the College Years* (New York: Holt, Rinehart &. Winston, 1970). Using an open- ended interview approach along with independent judges' ratings of tape recorded interview content, Perry and his associates defined and documented nine positions or forms of intellectual and ethical development in college students. These positions progressed from the first stage of simple dualistic thinking—knowledge, conduct, and values are categorized into sweeping and unconsidered differentiations such as right and wrong, ingroup and outgroup—to the appreciation and recognition of relativism and, finally, the making of "commitments" or affirmations and choices within a relativistic world. Though focused on ethical as well as intellectual parameters, the findings and theory have pertinence to theories restricted particularly to cognitive development, as discussed here.

15 The terms "scale" and "cut" were introduced by Ogden *(Opposition).*

16 For an extensive discussion of Kant's antinomies, see N. K. Smith, *A Commentaiy to Kant's "Critique of Pure Reason''* (New York: Humanities Press, 1962).

17 See Allen, *Greek Philosophy,* p. 9.

18 Paul Roubiczek, *Thinking in Opposites* (London: Routledge & Kegan Paul, 1952).

19 See, for discussion of opposition in Eastern religions, C. f. Bleeker, and G. Windengren, eds., *Historia Religionum,* vol. 2, *Religions of the Present* (Leiden: Brill, 1971), pp. 242-43,372,466-67, 508-9.

20 Carroll et al., "Opposites vs. Primaries," pp. 22-23.

21 R. D. Wynne, H. Gerjuoy and H. Schiffman, "Association Test Antonym Response Set," *Journal of Verbal Learning and Verbal Behavior* 4 (1965) :354-59.

22 In another, more complicated, study, Wynne and associates varied instructions and sequence of stimulus presentation in order to assess practice effects in opposite response. They found that the frequency of the subjects' opposite responses increased after repeated testing and concluded that opposite responding resulted from the subjects' desire to expend the least conceptual effort. Again, however, they have assumed that a subject consciously employs some strategy to attain a goal other than that explicitly stated by the tester (R. D. Wynne, H. Gerjuoy, H. Schiffman and N. Wexler, "Word Association Variables Affecting Popular-Response Frequency," *Psychological Reports* 20 [1967] :423—32).

23 J. Deese, *The Structure of Associations in Language and Thought* (Baltimore: Johns Hopkins Press, 1965).

24 McNeill, "Study of Word Association." The shift referred to here is a so-called paradigmatic shift, at the ages of eight and nine. This shift is described in Entwisle's study cited earlier; it includes but is not synonymous with the increase in opposite responding at these ages. Paradigmatic responses on the word association test are those that can be substituted for the stimulus; they fall within the same syntactical category. Syntagmatic responses, in distinction, form a unit with the stimulus; they are usually associated in a syntactical sequence with the stimulus word. For example, "red" is a paradigmatic response to "green," while "grass" is a syntagmatic one. Paradigmatic responses characteristically increase at the expense of syntagmatic ones at ages seven, eight, and nine.

25 H. R. Pollio, R. Deitchman and S. Richards, "Law of Contrast and Oppositional Word Associates," *Journal of Experimental Psychology 79* (1969): 203-12.

26 Ibid., p. 211.

27 Ibid.

28 See, e.g., N. Chomsky, *Aspects of the Theory of Syntax* (Cambridge, Mass.: M.I.T. Press, 1965); N. Chomsky and M. Halle, *The Sound Pattern of English* (New York: Harper & Row, 1968); N. Chomsky, *Studies on Semantics in Geneiative Giammei* (The Hague: Mouton, 1972).

29 See n. 1 above.

30 E. L. Thorndike, and I. Lorge, *The Teacher's Word Book of Thirty Thousand Words* (New York: Teachers College Press, 1944).

31 I had been interested in developing and extending the definition of opposite responding used in the Carroll et al. experiment, because those experimenters had not included many responses that seemed to be logically opposite the stimulus. That was the reason for the particular design used here but it has little pertinence to the present discussion.

32 The definition used in the instructions covers only scalar or quantitative opposition, and only a continuum and poles are indicated. This was done intentionally because qualitative or cut opposition is harder to define and most people give the quantitative definition when asked to explain opposition. Because the experimenter was present when the ratings were done, subjects were able to ask questions and any confusions about the definition were resolved. The results, of course, show that subjects actually used both a qualitative and quantitative definition of opposition.

33 The persons judging the sour-not sweet and the man-male pairs as opposites seem merely to have been careless and unthinking in these particular cases. That these judgments did not represent a general misunderstanding of the instructions nor a special pressure on these raters to respond quickly was determined by the following two assessments: (1) other ratings for these raters did not show any consistent feature indicating misunderstanding; (2) these raters spent the same amount of average time on the entire rating task as did others.

34 It is worthy of note that the influence of linguistic usage on the production of dichotomous categories often appears as a confounding factor in Koestler's theory of creativity discussed earlier. Many of his examples of two mutually incompatible but self-consistent modes are based on his defining a dichotomous linguistic context in which differences are overstressed and appear as incompatibilities, much as dichotomy leads to the appearance of opposition above. For example, he recently referred to incompatibility between motions of tides and motions of the moon in Kepler's discoveries, and to arithmetic and music in Pythagoras's constructions of harmony and, in a joke, to the code of sexual morality and the logic of the division of labor. In bringing two entities together in a single context in such fashion, they can appear to be incompatible rather than being merely different from one another. See especially Koestler, *Janus,* pp. 109-64.

35 See Hausman, *Discourse on Novelty and Creation,* for a meaningful discussion of the familiar and unfamiliar in creations; see also, W. W. Gordon, "On Being Explicit about Creative Process," *Journal of Creative Behavior* 6 (1972) :295-300. Gordon uses the terms "familiar" and "strange" with respect to metaphors, although in a different sense than used here.

36 I do not, by any means, intend to suggest that metaphor or art in general needs to be rendered comprehensible in logical or prosaic terms in order to be appreciated; I am emphasizing only an intuition and a sense of understanding.

37 Holton, "On Trying to Understand Scientific Genius," p. 107. See also, L. von Bertalanffy on the opposites in science in *Problems of Life* (New York: Wiley, 1952), pp. 176-204.

38 Holton, "On Trying to Understand Scientific Genius"; see also chapter on Bohr in Holton, *Thematic Origins of Scientific Thought,* pp. 115-61. For Kuhn, see his, *Structure of Scientific Revolutions.*

39 Exploring such matters as opposition between colors, tones, and values is, in fact, a traditional concern of artists as seen in the remark of van Gogh (quoted in chap. 7 above, n. 34).

40 A. Rothenberg, "On Anger," *American Journal of Psychiatry,* 128 (1971) :86—92.

41 Kuhn, Structure of Scientific Revolutions.

42 See esp. R. Jakobson, and M. Halle, *Fundamentals of Language* (Grauen- hage: Mouton, 1956), and C. Levi-Strauss, *Structural Anthropology* (New York: Basic Books, 1963 [vol. 1], 1976 [vol. 2]). The brilliant achievements of Levi-Strauss demonstrate almost single-handedly the conceptual value of formulating oppositions as discussed below in chap. 13. By categorizing cultural practices and beliefs into opposites and opposite patterns, he has been able to provide profound understanding of intra- and inter-cultural relationships. As a methodology, structuralism has been criticized because of its exclusive use of binary opposition. Multiple opposition and the broader perspectives on opposition discussed here could possibly enrich the structural approach.

43 In this consideration, mathematical symbols would be included as a type of language.

44 See, e.g., D. M. Ferguson, *Music as Metaphor* (Minneapolis: University of Minnesota Press, 1960). I assume the reader is familiar with the ever-pre- valent argument between those who reject any referential element in music, any suggestion that music refers to anything beyond itself, and those who relate music to visual experiences, memories, historical events, etc. Most music aestheticians today come down hard against referential and so-called extramusical approaches.