Theories of Symbolism

Consciousness and Affect Management Through Psychoanalytic Symbol Formation

Charles A. Sarnoff Md

CONSCIOUSNESS AND AFFECT MANAGEMENT THROUGH PSYCHOANALYTIC SYMBOL FORMATION

(AN HYPOTHESIS REGARDING THE LOCALIZATION OF PSYCHOANALYTIC SYMBOL FORMATION IN THE BRAIN)

Charles Sarnoff, MD

Table of Contents

CONSCIOUSNESS AND AFFECT MANAGEMENT THROUGH PSYCHOANALYTIC SYMBOL FORMATION (AN HYPOTHESIS REGARDING THE LOCALIZATION OF PSYCHOANALYTIC SYMBOL FORMATION IN THE BRAIN)

GENERAL PRINCIPLES OF SYMBOL FORMATION

Cryptic complex symbols (i.e. Psychoanalytic Symbols) are highly personal cryptic symbols. They are seen in health, in art, in dreams, in the fantasies of psychotic patients and in adjustment oriented behavior. They help in regulation of emotion associated with both memories and new experiences that are linked to excess affect. They mask and mute the impact of conscious disorganizing affect associated with threatened intrusions into consciousness of distressing psychic contents. Such intrusions include uncomfortable memories for concepts and insights, as well as interpretations of new perceptions.

Transformation of painful memories and threatening current perceptions of the world into affect neutral cryptic symbols is a means of managing affect. This is achieved through replacement of offending elements with less affect-loaded alternatives. Immature and pathological forms of symbols (i.e. affect porous symbols) produce mental disorders associated with impaired adaptation to affect.

The symbolizing function that produces psychoanalytic symbols is prominent among the brain mechanisms that are activated when fear inducing affects threaten to overwhelm psychological defenses. Failure or impairment in production of psychoanalytic symbols can result in failure of adaptation for the organism. Conscious content in part consists of affect porous symbols, which represent regressions and failures of cryptic symbolization to contain affect. These take the form of pathological distortions of reality.

Psychoanalytic symbol formation occurs when there is repression of awareness of the relationship between the affect of a referent and the masking symbol that represents it. Repression in this situation results when attention (cathexis) is displaced from affect charged referents to similar though less affect charged representations. Their relative affect neutrality permits their use as symbols in consciousness.

Either under the impetus of drive pressure or out of a need for mastery, affect charged and affect neutral contents rise toward *consciousness* in clusters. These consist both of highly affect valenced core concepts and less affect endowed concept groupings that are closely related in meaning to their confreres. In the formation of cryptic symbols, awareness cathexes illuminate for consciousness the less affect endowed concepts, leaving the rest of the contents of the concept cluster as the latent content referents of the conscious symbol.

CONSCIOUSNESS

THE CONTRIBUTION OF SYMBOLIZATION TO CONSCIOUSNESS

"Consciousness" as used in this chapter refers to that which is left of the totality of innate immediate animal awareness, after it has been enhanced in content by interpretations of reality-based on memory and the constructs of ambition, or diminished in content as the result of the repression of affect-linked words and concepts that is associated with psychoanalytic symbol formation. A knowledge of psychoanalytic symbols is therefore important for the understanding of "Consciousness", which depends on symbolization for much of its content. The defenses that alter and diminish subjective experiences in awareness in the service of affect control are suppression, denial, and displacement. Concepts, perceptions and memories that are cut from conscious awareness in the process of affect control are relegated to the proscribed content of the dynamic unconscious (system UCS). They retain potential for retrieval into awareness with altered impact as a result of cryptic symbolization. Human consciousness is a process, not a thing. It is a product of a direction of awareness to elements generated by the symbol forming mechanisms that alter its content. An understanding of dynamic consciousness, whose altered and truncated content in awareness is the product of mental mechanisms, offers a door to insight into mental pathology. Understanding of the workings and failures of mechanisms that produce the contents of dynamic consciousness by limiting its content, offers knowledge that exceeds the insight offered by a definition of consciousness, which is solely oriented toward content. An example of a concept of consciousness that is based on cognitive content alone, is "consciousness" as described by Damasio (1999). He distinguished between two distinct content categories of conscious awareness (p 91). The first category is core consciousness (simple focused awareness). The second category is extended consciousness (p 195) (an awareness of the present, the past, the abstract future, and evolving ideas).

Levin (2002) has identified this distinction with Edelman"s (1992) primary consciousness ("mental images in the present") and higher order consciousness ("a model of the past and the future as well as the present." p 112) These concepts (core/primary and extended/higher-order consciousness) have limits. They fail to recognize the dynamic processes that create, alter and truncate the content of consciousness and produce as end products a subjective experience in awareness, which consists of a tincture of symbols and reality. They ignore the influences that produce for man a consciousness with flexible borders. They neglect the force of eldritch memories, which though failing to obtain direct conscious expression, can express remnants of their power through interpretations of perceptions and alterations of latent concepts in memory that populate conscious content with cryptic symbols. Could one say, following Damasio's definition that a six year old child, whose concept of himself is devoid of a self reflective awareness encompassing himself in past, present and abstract future, is not conscious.

Calvin (1999) in commenting on the limitations of Damasio's concept of consciousness, notes that "Most of what Damasio treats would apply equally well . . . to the less structured consciousness of chimpanzees and bonobos." (p 8) Panksepp (1998) humanized the content of higher order consciousness by including in it the ". . . ineffable feeling of oneself as an active agent in the perceived events of the world." (p 310). This idea does not encompass all of consciousness. Describing the contents of consciousness and understanding what one actively feels during subjective experiencing in awareness are only facets of the understanding of consciousness. Other facets to understand relate to dynamic processes that in limiting conscious content become syncretic with the creation of consciousness. The dynamic processes to which I refer are involved in cryptic symbol formation. Cryptic symbols counter the awareness expansion that takes place during the development of abstraction loaded higher order consciousness. To comprehend consciousness in man, it is necessary to study the role of cryptic symbols in altering consciousness through diminishing man's scope of awareness.

Through repression (denial and displacement), masking symbols (cryptic, secondary, psychoanalytic) truncate the content of memory, as it gains access to conscious awareness. Symbolic representations find their way to conscious expression. The referent ideas and concepts that inspire them remain in an encasing limbo that affords little access to direct expression. Cryptic symbols are conscious traces of elements of knowledge so foresworn.

Symbolization (cryptic, secondary, psychoanalytic) contributes to interpretation of sensations derived from the world. Reality perceptions are interpreted under the guidance of a manifest symbolic worldview. An altered reality, created by interpretation of sensations based on symbol panels, results. The new reality becomes encoded and is retained in memory. Subsequently it is used both for interpreting and processing concepts that are being driven from memory toward awareness, and for new rounds of distorting interpretation applied to external perceptions. A potential to produce symbol sourced pathological distortions of reality, which dilutes and alters perception of the world is thus introduced.

Simple and poetic symbolizations structure potential future conscious awareness by verbally encoding subjective interpretations of perception into the contents of memory for later use. Cryptic symbol formation alters access to conscious awareness of memory concepts and perceptions. They alter content as a means of controlling affect. Their function of controlling affect is a key to an understanding of consciousness. Their comprehension opens the way to a comprehension of failures to control affect, and offers insight into the origins of the pathologic distortions involved in phobia formation, poor reality testing, and deformation of reality by fantasy.

THE INFLUENCE OF CHILDHOOD COGNITION ON ADULT CONSCIOUSNESS SOURCES FOR THE EXCLUSION OF CONCEPTS FROM CONSCIOUSNESS-

Full awareness of one's past, present, and future is not possible. Cryptic links between conscious content and associated memory systems create galaxies of potential awarenesses in memory, which become noncommunicating when the retrieving cognitive system changes. Memory for dreams, for instance, enters consciousness for what is at best a fragile residence. The content of Pavor Nocturnus dreams in children are remembered during partial awakening. It is not remembered the next morning. Commands made during hypnotic states are not recalled, yet are acted upon. Experiences during childhood, which enter memory through an immature cognitive memory organization, are not recalled spontaneously into the cognitively shaped consciousness of adults. There is an infantile amnesia in adults for emotion-laden experiences before six years of age. This is explained (Schachtel 1949) on the basis of the maturational cognitive drift from affectomotor memory with its intuitive symbolic way of encoding experience to a mental-verbal appreciation of the real world. There is difficulty for memory

retrieval of concepts derived from distorting symbolization and intuition by a cognition that is oriented to logical verbal and abstract concepts. During the years encompassing six to twelve, conflict oriented experiences, which have been attenuated in their immediate impact through fantasy and symbol formation, remain latent in memory and do not enter free association verbalizations during psychoanalyses unless prompted. This phenomenon is the basis for giving this childhood age period the name Latency.

CONSCIOUSNESS AND AGE

Symbolic linkages based on abstract similarities between referents and representations are introduced during the eighth year of life. Concrete interpretations may persist. Abstract elements aid in the shaping of symbolic interpretations of valid perceptions of immediate personal reality. They codify realistic perceptions and insights in memory. In adulthood, abstract cognition encourages an interpretation of perceptions that is based on the intrinsic similarities that identify accurate categorizations. The nature and content of dynamic consciousness is increasingly limited by a defensive infrastructure that grows with age. It consists of gradually maturing symbolizing structures and mechanisms of defense, which utilize abstract memory contents in forming the symbolic linkages from which symbols create internal representations of the world. The "mature system consciousness" (see Sarnoff 1976 P 339) with its related "abstract conceptual memory organization" (p 117), informs adult consciousness. It does not fully mature until midadolescence.

Understanding that there is a developmental aspect to dynamic consciousness, which gives it an evolving form adds levels of complexity to the function localizing tasks of neuroscience. A neuroscientific understanding of the shaping of the forms and contents of consciousness requires an appreciation of the relationship of maturing brain components to shifting interactions and influences that develop and change with age and the symbolizations that reflect these changes. Child development challenges any attempt to create a simple topographically oriented neural hypothesis of consciousness that assigns fixed function to an unchanging place in the brain, since that hypothesis would exclude the influence of age specific stages of the ontogenesis of repressions, abstract thinking, and symbolization.

CHILDHOOD MAGICAL COGNITION PERSISTS TO INFLUENCE ADULT CONSCIOUSNESS OF PERCEPTIONS

In the years of childhood before the age of eight, perceptions are remembered, interpreted, and understood primarily on the basis of intuition and symbol formation; both are based on concrete similarities in shared external characteristics. Remnants of this immature cognition persist into adulthood in the memory panels used for recognition of perceptions. As a result of these immature interpretative cognitions, magic, symbolic linkage through the predicate, and concrete interpretations of perception are tolerated in an adult's conscious image of the world. As a result they influence the content of the adult system consciousness when magical forces become acceptable as content in consciousness. In the process adult awareness widens to conform to culturally defined orientations and conceptions, some of which may be alien to objective reality. For the mind that has not matured in the use of abstractions based on shared intrinsic characteristics it is difficult to comprehend realistic interrelationships and categorizations of perceptual elements. Magical fantasies and beliefs, which otherwise might have been rejected, gain access to consciousness.

SYMBOLS AND REALITY TESTING

Symbolic interpretation places a distorting lens between the world and the mind. Experience and sensation are transformed by the symbolizing function into altered memory images during the transition that transmutes a perception into a concept in memory. Early on concrete and superficial similarities between perceptions and remembered images from a former world are mobilized to provide links through which perceptions can be stored in symbolic form. The network of transformed referents (symbols) so formed in memory is available to be called upon in creating affect dampening distorting interpretations of new stimuli and inputs. A memory system is developed which consists of panels of symbolized perceptions overlying preexisting layers of submerged and altered reality. Interpretation based on these panels provide preconceptions for use in settling discordances between immediate perceived realities and memory-based distortions. Interpretation of perceptions shaped by these panels produces new symbolized concepts for encoding in memory, which may introduce qualia (interpretations) at odds with physis (natural reality).

When compared to a panel of symbolically processed memories, a newly developed symbolized

concept of the world can be recognized as congruent with remembered experience and recognized as "real", reinforcing its recent alteration through symbolic interpretation. The sense quality of reality, that is achieved in this way is bestowed on later interpreted perceptions as they qualify to become contents in memory. This process replaces reality testing with a sense of reality, which accepts distortions as real. In the transition from concept in memory to concept in awareness, a similar infrastructure of masking defenses prevails. It is guided by preconceptions based on previously symbolized memory elements, which in modifying the content of memory, shape the potential contents of the dynamic system consciousness. The mutilayered content of dynamic consciousness (system CS) is produced by the superimposition of complex images, derived from remnants of perceived reality, on remembered distorting symbols. The content of consciousness so produced is best likened to a palimpsest.

Suppression of reality content in consciousness is produced when concept formation truncates awareness, creating a reality-distorting residue, which pushes aside affect charged content. Insufficient displacement in the production of the countercathectic residue during symbol formation leaves disquieting affect in awareness. Phobia, fear in neutral situations, anxiety dreams, transcendent art, and doubt filled expectations are examples.

SYMBOL TYPES AND THE BRAIN
SIMPLE SYMBOLS AND MASKING SYMBOLS

Both simple symbols and masking symbols are products of brain function. *Simple symbols* are solely communicative in function. They consist of verbal representations, which by convention convey memories, concepts and insights. The brain localization for the production of simple symbols is a circuit that begins with sources in the memory areas[1] of the cerebral cortices, and traverses the angular gyrus, Wernicke's Area, the Arcuate Fasciculus and Broca's area on the way to speech. This track for the formation of symbols lacks circuits involved in generation and control of affect.

Masking symbols control the affect levels of perceptions and memory contents, should they threaten to disorganize adjustment during moves toward consciousness. Control of affect is achieved through displacement of attention to a related more affect neutral content. This is part of the protective substitution of symbols for affect-laden content that occurs during interpretation of new perceptions and

preconscious memory content.

Cushioning verbal symbolic content has less affect than the perceptions and core memory concepts that it represents. Symbolization readies the mind for less affect charged interpretations of reality in new perceptions. It diverts conscious cathexis from affect-laden core memory content, which though replaced in conscious representation, does not disappear from memory. It persists as part of its original cluster of concepts.

MASKING SYMBOLS AND THE BRAIN

Masking symbols are products of a neuronal system through which perceptual traces, and memory elements from the cerebral cortices are altered in support of muted affect during their move toward awareness. The brain structures that serve this system serve symbolization. They function as the detectors, filters, and diverters that compare potential conscious representations with information about affect potentials that are stored in memory panels in the cortices of the frontal lobe. Affect is detected on a nonconscious level when potential conscious representations are recognized to be commensurate with danger to self or to ego functions.

Generation of signal affect is achieved through neuronal loops that are interposed in the circuits between perception and memory and in the circuits from memory to consciousness. The efferent pathways of the loops are activated by the appearance of fresh perceptual or memory content that in activating discharge from the amygdala into the autonomic nervous system, generates haptic visceral sensations. Detection of associated visceral sensations requires an afferent pathway (i.e. the vagus nerve and humeral messengers) to transmit them to the brain, where they can be identified as affect as a result of further comparison with the contents of frontal lobe memory panels.

Affect loops enable serial scanning of emerging and evolving cognitive content for affect with potential to signal impending disorganization of ego functioning (signal anxiety). Each time that such affect is detected, a duplicate circuit, which cushions further generation of affect, is activated. Serially each pass through the circuit activates a substitute representation that minimizes destabilizing affect through activating a shift of attention to milder cognitive content within the concept cluster, to which the

offending content belongs. The newly introduced cognitive content becomes a milder affect bearing representation. New content, which consists of perceptual or memory elements undergoes the same scanning process as the initial data. It is passed repeatedly through the metamorphosing affect loop until with each ever softening pass, finally a representation (symbol) is produced that has an affect level that can enter consciousness without an endangerment. As a result of this response to affect by psychoanalytic symbol formation homeostasis is modulated.

Psychoanalytic symbol formation entails displacement of attention from original affect-laden content to less threatening though related content. Related contents are sufficiently removed from original contents to be able to serve as manifest symbols, whose affect load bears diminished danger. The affect generating potential of manifest psychoanalytic symbols is more moderate than that of the original perception or referent content.

SUBSUMMARY

Cryptic symbol formation defends against affect. Were affect-linked concepts and drives to be faced or recalled in the absence of this aspect of the symbolizing function, strong and disorganizing forces associated with conscious feelings would threaten adjustment. The hypothesis presented in this chapter is that manifest Psychoanalytic (masking) cryptic symbols are generated in an attempt to adjust to the threat posed by preconscious affect-linked symbolized concepts as they reach the brink of awareness. The affect producing potential of emerging symbols is detected through a process that compares them with panels of remembered concept content, for capacity to generate the haptic sensations identifiable as affect that result from activating discharge from the central nucleus of the amygdala into the autonomic nervous system. In response to strong affect, a series of symbols with increasingly attenuated affect mobilizing strength is created until one is reached that has a level of affect, which will permit comfortable acceptance of the new representation into consciousness.

The structure of the brain involved in Psychoanalytic Symbol formation consists of an afferent leg from perception to memory storage upon which is superimposed an affect feedback loop to identify danger in the world, a central processing area, storage areas for memory panels, and a similar affect feedback loop superimposed on the efferent arc from memory to expression in consciousness. Both affect

feedback loops attach affect to concepts through the generation of sensations in the viscera that are recognized in the brain as the haptic sensations called affect.

PATHWAYS FROM PERCEPTION TO CONSCIOUSNESS THAT BYPASS SYMBOLIZATION

Conscious experience of the world first evolved in sensate beings without the interposition of symbolization. Remnants of this primitive system persist in reflex responses to stimuli and physiognomic thinking. Here we trace the course of those new percepts that find their way to immediate nonsymbolized conscious awareness. In this circuit telereceptor percepts transmit their affect potential through the centromedial area to the amygdala, from which autonomic discharge is generated without direct cortical registration. This independent circuit at first parallels the delivery pathway that carries percepts to receptive consciousness through the cortex. It parts company with cortex bound sensations at the level of the colliculi.

Parallel sensory pathways are part of the brain system required for making immediate and reflex responses to stimuli. Visual and auditory telereceptor systems initiate these parallel pathways. Within the brain the colliculi, which are contiguous with the tectum are enlisted to activate non-conscious reflex muscular responses such as knee jerks, physiognomic responses, reactions of awe, and autonomic changes including contraction of the iris in response to light.

PATHWAYS FROM PERCEPTION TO CONSCIOUSNESS THAT INVOLVE INTERPRETATION, SYMBOLIZATION, AND MEMORY CONTENT

Next we trace the interpretation of a teleperception—under the influence of previously stored and symbolically altered images of reality—into a symbolically altered sustained memory concept called by some a "qualia". Auditory and visual sensations that are involved in this process are directed to the brain cortices through the geniculate bodies. These nuclei are extensions of the thalamus. Auditory radiations from the medial geniculate bodies terminate in Heschl's gyrus in the Temporal lobe. Visual radiations from the lateral geniculate bodies place stimuli in the Calcarine fissure in the Occipital lobe. Neighboring gyri ready the stimuli to enter memory as categories.

Perceived true reality is not processed in isolation from the past experience of the observer. When

perceptions generate disquieting affect, memory based distortion using symbol enriched memories are invoked to create a calming interpretation of reality.

Should defense against disorganizing affect be required in dealing with perceptions, sustained symbolically altered images of reality are generated for retention as memory concepts under the guidance of frontal lobe memory panels, which activate affect loops. The transition from memory concept to consciousness is similarly governed by memory panels in response to affect loops. Affect loops consist of frontal lobe panels and amygdala activated autonomic tracts, which guide the displacement of threatening concepts to less affect-laden conscious representations (cryptic symbols).

CONCEPT CLUSTERS

PERCEPTIONS BECOME CONCEPT CLUSTER MEMORIES THROUGH SYMBOLIZATION

Concept clusters consist of groupings of symbols with common internal meanings and characteristics. Transformation of a perception into a member of a concept cluster is frequently guided by previously stored and remembered symbolically altered images of reality. Interpretation of perception based on effective psychoanalytic symbols as prototypes diminishes affect. As a result of altering the form of a representation so that it will conform to memory recalls, fit into a concept cluster, or reshape perceptions of external reality, the psychoanalytically symbolized world becomes a neutralized representation of affect-laden percepts. There is woven, from a web of symbols, an internal simulacrum, a topographically determined concept cluster, that when synthesized into a symbolic internal map is interpreted by the awareness of the subject to be a realistic image of the world. Synaesthesias, memory attrition, and cultural and personal infusions limit accurate representation of reality in this simulacrum. They create distorted interpretation of perception, enhancing the unique and personal nature of internal maps of the natural world. The remembered natural world combines external reality with recalls of established memory producing personal inner landscapes. Aragno (1997) notedthat "A certain synaesthesia prevails over the way in which experiences are internalized and memories are recalled." (P 250)

A symbolic interpretation that distorts reality perceptions is required in order to maintain

emotional equilibrium at times when affective responses to reality could flood the ego's defenses and disengage those functions of the mind devoted to adaptation to reality. Effective defense in confronting world based affect is the product of the creation of symbolic forms, whose minimized level of affect permits entry into consciousness of a reality that is minimally distorted and introduces a conflict free response to reality. The accuracy of interpretation is influenced by the degree of displacement involved in the creation of the conscious symbol that represents new perceptions. Overwhelming sensory inputs are softened to produce a compromise that permits attenuated reality to enter the central processing system in preparation for screening for entrance into consciousness. Interpretation gives perception a form, which has been so acceptably blunted that it appears to be old, known and familiar, and therefore under control and not threatening. Within limits this process makes possible a loosening of reality testing that serves adaptive object ground differentiation when it is required for survival. An example of the latter would be accepting the discipline required to belong to a social group, which shares occult beliefs.

There is a downside to this process. Displacement during interpretation of perceptions can produce changes that are so marked in degree that the reality that is represented is distorted and the original percept excluded from consciousness. Such distorting symbol informed interpretations of reality perceptions synthesize memory panels with a falsely remembered world. Memory panels such as these contribute to a future sense of reality that has potential to be faulty. This situation can produce a denial and truncation of perceived reality and an attendant bypass of detection of danger during cortical scanning of perceptions.

False memory content may mislead the interpretation of perception. The identifying characteristics of a fearsome attacker may be linked to imagery that permit its symbolic conversion to a friend as could happen were a thief to approach offering kindness. Alternatively the structure of the symbolic form to be used may have been poorly chosen by the symbolizing function, resulting in the assignment of an overabundance of affect to a perception. In pathological situations, in which the choice of manifest symbols is guided by poor reality testing and concrete symbolic linkages, or in which displacement stops short of affect neutral representations (see affect porous symbols in Unit 2, Section B, Chapter 4.), exaggerated fears interfere with adjustment.

THE AFFECT FEEDBACK LOOPS

Perceptions, concept clusters and other memory sources within the cortex have a potential to rise to consciousness via the hippocampus and the amygdala, where its affective charge is made manifest through activation of the efferent leg of the affect feedback loop, which discharges into and activates the autonomic nervous system. Activation generates visceral activity, which is accompanied by the generation of haptic signals from the skin and viscera, which enter the afferent leg of the feedback loop. Response to haptic visceral sensations takes on the form of a signal, which one learns to identify as anxiety, loneliness, anger, sexual feelings, awe, rage, hunger, depression, delight, joy, or orgasm. Panksepp (1998) has identified the receptive portal for the haptic autonomic sensations of the afferent portion of the affect feedback loop in the tectum, ". . . centromedial areas of the midbrain . . ." (p 311). The tectum is located in areas immediately caudal to the colliculi. The centromedial areas of the midbrain serve as way stations for a feedback loop involving the autonomic nervous system. It sends signals to the amygdala and its associated memory panels that there are, associated with a concept or percept, excess bodily sensations consisting of primary visceral-proprioceptive perceptions, which are experienced subjectively as affect.

In primitive creatures the centromedial area (including the colliculi and tectum) is a limited way station that activates reflex responses and physiognomic reactions to telereceptor stimuli. Centromedial areas in primitive creatures, which contain relatively few neurons, have little room for the many synapses required to make alternative action responses and delay possible.

As the number of neurons increases during evolution, the number of possible reflex responses increases. Enhancement of the number of centromedial synapses and associated response carrying neuronal groups in the cerebral cortex increases. This provides the neuronal infrastructure for selection between alternative reactions to sensations and stimuli. An evolved response, that promises to carry the least affect and which will best counter an affect-activating situation can be selected.

In higher-level creatures such as elephants and primates with many neurons, disjuncture (defined as freedom from automatic reflex responses to environmental stimuli) is possible. The large volume of neurons enhances potential for delay and the availability of choice of responses. In man the choice of responses includes the evolutionarily recent development of internal affect attenuating substitutes such

as fantasies and symbols and the alterations in the level of affect and the content of awareness that symbolization produces.

CENTRAL PROCESSING OF PERCEPTUAL ELEMENTS THAT HAVE BEEN INTRODUCED INTO CONCEPT CLUSTERS IN MEMORY

Here we trace the course of concepts as they acquire their places in memory. The activity of memory areas of the cortices is called central processing. It begins when symbolic interpretations of sensory inputs produce the form of a referent that augments the content of the symbolizer's preexisting remembered internalized world image. Central processing organizes memory content (referents and concepts) with varying degrees of ability to generate affect when entering consciousness. Affinity groups consisting of webs of symbols with common internal meanings and characteristics are called concept clusters. They consist of bridges of meaning across which displacements can be made.

Proverbs utilize concept clusters in the creation of their cautionary tales. In the proverb, "A rolling stone gathers no moss." the wandering of a forlorn person belongs in the same concept cluster as the rolling of a stone. The concept cluster to which both belong is organized around the abstraction "motility". When a proverb interpreter equates a motile rolling stone with a motile wanderer the interpretation of the proverb is correct. An example of a pathologically interpretation was presented when a patient interpreted the same proverb with the thought 'If they had brought their own bread with them, they wouldn't have had to make matzo'. In this case, the aspect of a rolling stone was extended to include a millstone, which rolls but does not move from its place, and by extension to the people of Israel wandering in the desert of Sinai.—a concrete concept linkage that is not inferred by the proverb.

THE SOURCES OF THE MEMORY CONTENT THAT INFLUENCE THE SHAPE OF CONCEPTS AND THE ESTABLISHMENT OF CONCEPT CLUSTERS DURING ENCODING IN MEMORY

Interpretation is informed by memory. In the sources of the contents of memory therefore lie much which shapes later human experience of the world and the contents of consciousness. Theories of the origins of memory contents fall into four groupings.

The first group holds that memory is derived from remnants of earlier afferent perceptions and

interpretations of reality as well as centrally located thought processing, synaesthetic distortions, and innate content such as physiognomic thinking. (see above Unit 1, Section B "The Ontogenesis of the Symbolizing Function"). Reality perceptions come to reside in memory after first traversing a circuit that involves the symbolizing function. In this circuit, warning stimuli are scanned for potential to generate affect with destructive potentials. They then may be neutralized by distorting symbolization which involves the use of repression, displacement and countercathexis formation, before being encoded in memory, creating a trap for the unwary in the interpretation of future events. Reactions to anxiety and fear underlie the reshaping of new perceptions of reality that will become the content of memory that is available to consciousness, Selective recall of these contents produce fantasy to buffer fear.

The second group emphasizes the role of emotion in the creation of the content of memory that passes through the portals of consciousness. LeDoux (1994) in his ". . . inquiry into the relation between memory and emotion." P 50 stated that "Emotion is not just unconscious memory: it exerts a powerful influence on declarative memory and other thought processes." (p 57) He does not include repression as a factor.

The third group recognizes a theoretical source of memory in induced content. (See Unit 1 Section A, Chapter 4) This includes transcendent symbols for whose origins cognitive derivatives of divine origin are invoked. This knowledge is taught as information with origins in transmission from the world of the spirit to the mind of the mystic.

The fourth group finds sources of contents in memory in hereditary elements that preexist the birth of the individual. Recently there has been given favorable attention to such hereditary sources of memory content. (Lane (1970) These are the neolamarkian concepts embodied in structuralism. The concept of structuralism holds that 'there is in man an innate, genetically transmitted and determined mechanism that acts as a structuring force'. (which) 'determines the limits within which the structure of all types of social phenomena can be formed' (p. 18). Social structures are 'genetically rather than socially or culturally determined' (p. 31). Structuralism is the study of the effects of a postulated innate structuring mechanism, which guides, shapes, and limits the creative efforts and characteristics of man in society. Interpretation of memory and perception is linked in structuralist theory to memory of a primordial encounter with the universe of myths sustained by primitive man, which has stamped its influence on all

subsequent cosmologies, and religions. Brothers (1997), recognizes a related process in which ". . . faces, voices, and social actions (are) significant in themselves, eliciting amygdala activation through evolutionarily inscribed pathways." (p 61). Such a concept of preexisting knowledge is far from new. Both Freud (universal unconscious) and Jung (inherited unconscious) used similar ideas. In ancient days, Plato (Ant) described knowledge based on prebirth experience in heaven thusly, ". . . every human soul by its very nature has beheld true being otherwise it would not have entered into the creature we call man . . ." ". . . Some had but a brief glimpse of the truth in their former existence . . . the sacred vision they once saw . . . of the world above . . ." (Page 56) The concept of an essential verity, buried in a collective unconscious, was described in Humbert de Superville's mid nineteenth century "Essay on Absolute Signs in Art" as described by Stafford (1979 page 22).

His theory integrates expressive theory with all other historically relevant human disciplines, through the presence of a remembered universal truth.

Scientific observation of loci for storage for such innate perceived natural realities has as yet found no anatomical locale for the storage of these "essential verities" in man. Innately structured social orders can be observed in the behavior of antelopes in herds. (Estes 1993)

CHARACTERISTICS OF CONCEPT CLUSTERS

Any member of a concept cluster can be used to represent the whole cluster or any part. The brain enhances a concept cluster each time it records and stores a new percept. In this way new percepts come to be related to previously acquired content. Simple symbols are produced when neutral words are consciously and knowingly associated with a concept cluster. Poetic symbols are established when words which are associated with new concepts and insights are associated with preexisting memory clusters. Transcendent symbols are components of concept clusters with origins identified as arising in the precincts of deistic reality These precincts exist beyond the boundaries of the self. Their origins are thought to be in venues removed from the symbolizing function of the brain.

The internal connections between subunits of a concept cluster become concrete and abstract symbolic linkages. Displacement across these linkages during symbol formation follows abstract logical

connections and learned affinities in health. They follow seemingly logical leaps along superficial characteristics in pathology. Affect neutral cryptic symbols are created when the contents of recalled memory are altered by displacements and substitutions during symbol (affect attenuated representations) formation.

NOTES

1 See Damasio (1999) ". . . long-term memory of . . . facts relies on multicomponent brain systems, whose key parts are located in the vast brain expanses known as the cerebral cortices." (p 116)

During the move from a concept toward symbolic expression, alterations of content are achieved by the direction of awareness to related affect neutral elements across linkages within concept clusters. Referent memories (concept cluster elements) which have the strongest affect, are experienced as repressed, when displacement shifts conscious awareness to related concept cluster elements in memory, which are linked to less affect and which can serve as countercathectic content. This mechanism offers a weak point in the system. Weak displacement can produce a symbol that is porous to affect and can support the generation of phobias and nightmares. With enhancement of cortical neuronal mass as in man, the number of possible derivatives is enhanced by the use of abstraction. Similar elements with varying associated levels of affect contribute to the formation of concept clusters.

THE PASSAGE FROM MEMORY TO CONSCIOUSNESS FROM CONCEPT CLUSTER TO VERBAL EXPRESSION IN CONSCIOUSNESS

One of the venues for the formation of Psychoanalytic symbols is the pathway that leads from concepts in memory to their conscious expression through a related less affect-laden member of their concept cluster. Concept clusters consist of symbol groupings with common internal meanings or characteristics. Displacement produces substitution of an affect charged concept by a fellow member of its concept cluster with less valence for attracting affect. Newly arrived perceptions of the world are filtered for recognition through the same scanning neural networks created from remembered distortions and symbols, which scan memory concepts arising toward consciousness.

Established concept clusters rise toward consciousness when propelled by drives or called up by need to recall as occurs in active concept retrieval. Affect-laden referent concepts are moved from the cortex through the hippocampus (V.I.) to brain areas, approached by way of the Amygdala, which serve as sieves that screen for affect. As a given concept moves from memory toward consciousness derivatives are chosen from a serial cascade of related words or impressions. Each of the elements within the cascade of derivatives is treated as though it were a trial action. Each is scanned for elements stored in memory informed areas (i.e. dorsolateral prefrontal cortex) for its potential to generate discordant affects at motivating strengths. When manifest verbal symbolic forms are selected for the verbal expression of drives with a level of affect that is acceptable for use on a communicative level, a sophisticated choice of

conscious verbal substitutes as symbols becomes possible.

Concept clusters rise continuously toward dynamic conscious awareness. They are impelled toward consciousness by what Panksepp (1998) has called an ". . . endogenous urge of the brain." (p 290), a phenomenon independently described by Freud less than a century before. Freud called the urges that impel concepts to actions, words, dreams and somatic discharge, "trieb" (drive). He noted that drive manifestations are defined by four characteristics. These are source (organ urge), impetus (force), object (another person, an animal, food), and aim (discharge). Of all the drives, which impel man to contact with the world, three have potential for delayed discharge. These are the drives connected with aggression, hunger, sex and reproduction. As a result of disjuncture, these drives can undergo aim inhibition. Their discharge can be displaced across bridges of symbolic linkage between the elements of a concept cluster. Capacity for displacement contributes to the role of these drives in symbol formation. Of the three flexible drives, sexual and aggressive drives that generate affects are most commonly involved in psychoanalytic symbol formation and less often, as in the dreams of food of starving men, hunger drives are manifested in symbols.

When representations (manifest symbols) occur in dreams or other evocations with the unconscious connection to their referents effaced, representations are identifiable as psychoanalytic symbols. Kubie (1953) pointed out that the manifest symbolic dream elements that represent conceptual abstractions are predominantly derived from central cortical receptive visual and auditory areas, which store in memory the perceptions of distance receptors (p 83).

EXPRESSIVE SYMBOLIZATION AND THE CONTENT OF CONSCIOUSNESS

Trial action and proposed verbalizations enter a circuit that detects links to affect-laden memory and sensation. Proposed potential conscious manifestations of percepts and concepts are evaluated through a selection procedure based on potential for danger, judged in terms of predictions of affect (i.e. anxiety or depression) and peril. In man alone defense against affect associated with action or verbalization produces defensive substitutes (i.e. psychoanalytic symbols).

Psychoanalytic symbol formation is a response to affect that is generated by interpretations of new

perceptual realities as well as a rising toward consciousness of the affect that is associated with concepts in the process of recall. Detection of these associations is the result of scanning of cognitive content, as it moves toward consciousness. The process of detection of elements that generate threatening levels of affect falls to the amygdala and the prefrontal cortex (ventromedial and dorsolateral) in light of their capacity to intercept such potential in new perceptions and in the cognitive content of consciousness bound concept clusters that actively radiate through the brain from their loci in memory centers. These units scan cognitive content for affect generating potential. The progress toward consciousness of affect-laden cognitive content is blocked (gated) on its way toward consciousness. Gating involves interfering with the progress of content by substituting more neutral substitutes derived from related concept cluster content stored in the cortex. The substitutions so produced are psychoanalytic symbols. Such symbols attenuate affect charged thought contents and divert their powered flow towards consciousness leaving them latent.

CORTICAL ZONES THAT GUIDE EXPRESSIVE INTERPRETIVE SYMBOLIZATION

Vastag (2002) referring to the work of Drevets, has noted that "After the amygdala generates a strong emotion and the accompanying autonomic reactions, . . . the nearby orbital cortex keeps these mental and physical manifestations from spinning out of control." (p1788) These cortical guide zones in the frontal cortex provide the template of contexts against which the processing of sensations makes comparisons. Freshly introduced actions, concepts and words are evaluated in terms of prior experience. Detection by a filter, geared to provide an early distant warning that there is high affect risk, identifies verbal content that needs to be altered by symbolization in order to enter the dynamic system consciousness.

The impending appearance of strong affect in consciousness motivates symbolization. It sets in motion the following cascade of events. There is denial of the noxious percept or concept and its replacement by redirection (displacement) of attention cathexes from the denied referent to a countercathectic substitute (the symbol) drawn from within a concept cluster consisting of elements, which are shared by both the representation and that which is represented. Affect screening filters stand at the response decision interface at which affect-laden stimuli and memories are responded to with the activities or symbols that will substitute for them in consciousness. Triggering affect responses linked to

the future danger implied in current risk behavior and chance taking are generated under the influence of the Prefrontal Cortices (See Carter (1998 Pp 194-5) The evaluation of risk for generating affect in verbal content that is moving toward consciousness, is guided by the ventromedial prefrontal cortex (Becharia (1997). Choice between alternative responses to stimuli is the province of the anterior cingulate gyrus (Barch (1999).

When screening under the scanning influence of the prefrontal cortex reveals predictably high levels of potential affect (e.g. signal anxiety) a need for modification of mental content emerging into consciousness is indicated. This modification is triggered when elements pressing for representation in awareness are discerned to be laden with affect that will threaten ego function. This is especially so when affect with a disorganizing potential threatens disruptively to break through the boundaries of consciousness. Disruptive affects and sensations are quelled as the result of the formation of the cryptic manifest symbols of the dynamic system consciousness.

For example, a four year old girl began to stutter. A new born baby brother had recently changed the family configuration. She put on a puppet show for her grandfather, in which there was a panda bear, which stood apart from a large rabbit on whose lap a little bear sat. The ordinarily nonaggressive child began to hit the panda with a quick and persistent series of little fist socks. The grandfather asked, "Why hit the panda". She answered, "the panda is angry that they are together". That day the stutter dwindled and within a day, it was gone. The child had projected her need for punishment for becoming angry onto the panda. As a result of venting one side of her conflict over the arrival of her brother, which had been manifested in her stammer, her stammer lessened. Stammer can occur when there are conflicts that vie for expression in words. The panda served as a symbol for her own self rejected unacceptable anger at the arrival of her new baby brother.

Symbols are generated to counter potentially disorganizing affects associated with mental contents that advance toward awareness under the pressure of that which Panksepp calls urges and Freud calls drives (see above). *Memory based concepts* that are linked to uncomfortable affects are converted into manifest symbols that will mask and represent them with muted affect as they enter awareness. The latter are drawn from a bank of preformed and preconceptualized representations, to create a personalized interpretation of reality.

Symbols guard the gates of consciousness from the intrusion of disruptive remembered or assigned affect. Too great an affect conveying a sense of danger can produce disorganized thinking marked by thought disorders. Poor ability to produce neutralizing symbols results in affect porous symbols and nightmares. The amygdala and the ventromedial Frontal Cortex (VMFC) (see below) form an early warning system that signals the alarm that is responded to by activating the displacements that constitute the activity of the symbolizing function. The boundaries of consciousness shrink as many of its contents are replaced by substitutes whose meanings have a cryptic dimension.

Established concept clusters rise toward consciousness when propelled by drives or called up by need to recall as occurs in active concept retrieval. Affect-laden referent concepts are moved from the cortex through the amygdala by way of the hippocampus. Thence a combination of the affect loop and frontal cortical areas create sieves that screen for affect and in the case of threatening signal affect trigger cryptic symbol formation.

SUBSUMMARY

Anxiety loaded concepts generate affect through the activation of the autonomic nervous system by the amygdala. The sensations generated are detected within the brain, which under the tutelage of the dorso-lateral frontal cortex (future risk) and ventromedial lateral frontal cortex (chance risk) subject its content to reflection and judgment. If the affective valence that is revealed is too high, conscious expression of content is delayed, diverted (strained out), and altered in form through replacement by the selection of more neutral cryptic psychoanalytic symbols. Affect neutralization through symbolization makes possible a move of mental content from the cortex to consciousness, expression, and action.

The cryptic symbol is sufficiently removed from recognized association with the lead element (concept plus word representation plus affect) of its original concept cluster in memory that it produces less affect with an ensuing lessened need for fight or flight. This makes way for measured thought and action. This is achieved through affect regulating centers[1], which activate repression, projection, displacement, and somatization in the pursuit of creating symbolic representation. The link of affect to a memory is manifested through the amygdala. Symbolization occurs in situations in which associated affects in consciousness would be so distracting that reality oriented function would be derailed.

The original referent is held out of consciousness, where it retains the potential to generate activity. It can still enter consciousness and find expression in repetition compulsion tinged affect-laden manifestations. It can be approached therapeutically by free association, or activated in life situations by those external perceptions, which stimulate and reinforce the drives that push memory and affect into consciousness. External influence on the content of consciousness is strong while awake. In sleep, the external influence is slight. This encourages the formation of psychoanalytic symbols, which represent primarily internal psychic contributions. Concept cluster elements become linked to painful affects as a result of the uncomfortable nature of reality experience, or because of preexisting innate internal influences such as a physiognomic response to the features of a face.

Established concept clusters rise toward consciousness when propelled by drives or called up by need to recall as occurs in active concept retrieval. Affect-laden referent concepts are moved from the cortex through the hippocampus to brain areas, approached by way of the amygdala. These serve as sieves that screen for affect.

BRAIN STRUCTURES REQUIRED FOR SYMBOL FORMATION

THE NEURAL INFRASTRUCTURE OF THE SYMBOLIZING FUNCTION

Mental image contents, recalled in consciousness, stand apart from the brain structures that produce them, much as a hologram stands apart from its source. There follows an extended description of those brain structures that are required for the production of symbolic representations.

THE ORGANS OF PERCEPTION

The brain receives afferent inputs from *external* perceptual apparatuses (i.e Telereceptors such as eyes, ears, nose). Natural reality may be perceived accurately within the limits provided by the perceptual potential of these organs. However perception of telereceptor based natural reality is altered by the application of symbolic filters during interpretation of perception. As a result memory contents may differ from the actual perception that they represent. This results in inaccurate recalls and intensification of the symbolized interpretation of new sensory inputs. Inaccurate recalls also occur as the

result of what Carter (1998) has called ". . . de-focusing on the outside world." (see p 200) The latter can result from at least three conditions.

The first condition is brain damage (p 128) involving the ". . . tegmentum, an area just above the reticular formation." (p 128) [probably what is referred to are the tegmental nuclei, which are cephalad to the reticular formation.]

The second condition is dream cognition, which reorganizes dream content during recall. This process was called by Freud (1900) "secondary elaboration". As a result of this process, symbol-based dream images are organized and ". . . enhanced (so that) . . ."coherence of object images can occur." Demassio (1999), assigns this activity to the tectum (the superior colliculi), the Cingulated cortex, the thalamus and some prefrontal cortices. (p 180)

The third condition is chemically mediated alteration in the cognition that organizes the sources of recalls (See Siegel (2000) p 78); Damasio 1999 p249 and Maquet 2000 p834.) For instance, during REM sleep there is cessation of the production of noradrenaline in the locus coeruleus (see Siegel (2000) p 78) and ". . . serotonin neurons are silenced, but some acetylcholine neurons are very active . . ." When there is such dominance of acetylcholine in the brain, (as occurs with REM sleep and infusion of physostigmine into the brain (Robbins (2000), there is a shift in the content of awareness from inputs derived from the prefrontal cortex and external organs of perception to inputs derived from visually encoded memories. The infusion of physostigmine is associated with ". . . increase in brain activity in the regions of the visual cortex" and decrease in the activity of the prefrontal cortex." (p. 2275)

THE THALAMUS

The thalamus is a brain nucleus that sits deep within and central to the cerebral cortex. The word thalamus is appropriate. It is derived from a Greek word (tholos), which means a deeply hidden chamber. The thalamus functions as a receiving switchboard containing the connections that distribute incoming sensations to individual differentiated areas of the brain in which they can be either interpreted or stored or responded to reflexly. Potential visual perceptions are transmitted through the lateral geniculate bodies to the perceptual areas of the occipital cortex, where they are interpreted in

preparation for conscious representation. Other visual inputs pass through the superior colliculus, which serves as a way station for their transmission to areas where reflex nonconscious responses are activated. Auditory stimuli are transmitted through the superior olivary nucleus and the medial lemniscus to the inferior colliculus from which transmission to areas where non-conscious responses are effected and in parallel transmitted through the medial geniculate body to the auditory cortex of the temporal lobe. (see Warner (2001) Page 500.) in preparations for conscious representation. Haptic sensations including vagal stimuli pass through the tegmentum in a position caudad to the colliculi but anterior to the reticular formation and thence to the cerebellum and the cerebral cortex. Perceptions which project to cortical areas are subject to interpretation during the transition through the passage to conceptual awareness.

THE STRUCTURAL PASSAGE TO AWARENESS
(BRAIN STRUCTURES THAT CARRY, AND STORE PERCEPTIONS AND THOSE, WHICH MODIFY THEM ON THE WAY TO CONSCIOUSNESS.)

The incoming route to those structures of the brain, which are assigned to the integration of affect, sensation, and perception, consists of three levels.

Level I consists of simple input circuits direct from sense organs through the thalamic colliculi to the amygdala, producing affect and autonomic responses independent of learning and without conscious awareness. Baraniga (1992) noted that Ledoux in studying the incoming route for perception found that ". . . the information takes ". . . a direct route from ear to amygdala, [cochlea to amygdala] traveling through the brain's lower auditory segments . . . skipping higher level processing." and bypassing reflective thought. This is the zone of simple sensations and simple reflexes that produce the quickest possible responses to danger. Simple and conditioned reflexes bypass the cortex producing direct activation of the amygdala. In support of this concept, LeDoux (1994) quotes Jacobs and Lynn to the effect that perceptions passing through the subcortical auditory thalamus pass simply and quickly to amygdala providing ". . . crude perception of the external world . . ." (p55) Similarly visual stimuli are *first* processed by the ". . . thalamus, which passes rough, almost archetypal, information . . ." (p 56) directly to the amygdala. Level one responses produce safety preserving activities, avoiding potential errors produced by abstraction and delay. Responses of awe, or physiognomic thinking are mediated in

Panksepp's (1998) ". . . centromedial areas of the midbrain . . ." (p 311)

LEVEL II consists of sensory activity that passes through afferent circuits where they activate automatic prelearned responses independent of conscious awareness. These responses are stored in interpolatedway stations, through which incoming sensations pass during transmission to the amygdala. A key interpolated way station on the way from perception to processing for consciousness involving the amygdala, the autonomic nervous system and the memory panels of the frontal cortex, exists in the hippocampus. For instance Russell Phillips (see Baraniga 1992) found that cues linked to fear associated with cages and spatial orientation are *processed in the hippocampus before reaching the amygdala (p 888).* In addition Zola-Morgan (1990) identified a primary role for the hippocampus in an early stage of memory acquisition and learning. Apparently ". . . the Hippocampal formation is required for memory storage for only a limited period of time after learning new inputs. As time passes, its role in memory diminishes, and a more permanent memory gradually develops independently of the hippocampal formation, probably in the neocortex." (p 288) This conclusion was based on ablation studies of the hippocampus. In addition expression of *responses to the surroundings* is blocked by making hippocampal lesions. (LeDoux (1994) p 53). *Hippocampal* involvement takes us beyond simple conditioned reflexes to a zone of function where other factors are involved in the formation of emotional memory. Apparently as in the case of the sensations entering the tectum, there are two pathways. There is an hippocampal pathway to an area, the amygdala, which activates a reflex response in the autonomic nervous system producing affect and a second pathway to cortex based memory. The former offers a circuit along which a content or memory may return from the cortex to activate discharge through the central nucleus of the amygdala producing internal changes including autonomic discharge, which expresses the affect associated with the cognitive content and activates screening responses based on memory panel contents that activate cognitive changes such as symbol formation. (see below.)

What is it that is stored in memory that makes a new experience fearful on this more complex reflex level (level II)? In the case of induced conditioned reflex, it is affect or shock associated with a past experience. LeDoux 1994 noted that the processing of unconscious non-declarative memory. "occurs in the hippocampus for ". . . hippocampal lesionsmade after fear conditioning had taken place . . . prevented the expression of responses to the surroundings."(p53)

Some emotional information can be stored in declarative memory in the hippocampus as a cold declarative fact. (LeDoux 1994) A representation derived from this memory segment can enter consciousness without being detected by the amygdala. It therefore arrives in consciousness without affect. This is not denial. Rather it is a characteristic of one pathway for information to the central processing area of the brain. As such it is only a partial expression of the referent. What is indicated here is the concept of a channel to memory, which permits acquisition of realistically encoded information for future use in interpretation of perceptions. The potential level of accuracy offered by this process when it contributes to the interpretation of danger has obvious survival value. As a result of bypassing the amygdala on the way to consciousness such a diversion of affect permits an accurate devitalized recall of referents in the form of a "protosymbolic" form in consciousness that makes possible accurate appraisals of reality.

Such symbolic forms have the subsequent potential to activate discharge from the amygdala of affects that signal danger. This process can result in a conflict between motivations arising from the original protosymbolic perception and the more neutral subsequently produced symbol. The conflict is resolved when through displacement and psychoanalytic symbolization a less affect charged representation results in repression of one leg of the conflict situation and maladaptive behavior or fantasy. This dynamic process can be undone through therapeutic interpretation or free association. The information acquired permits a return to potential for realistic choices.

LeDoux 1994 described the experience of reaffectivization of the protoymbol as "The individual may also become tense, anxious and depressed, as the emotional memory is reactivated through the amygdalic system." (p 57) The ability of the amygdala to serve as a venue for secondary coordination of declarative memory with affect is a process that has two functions. The first function activates the potential associated affects that generate cryptic symbols in consciousness that are used in modifying interpretation of memories and new perceptions.

The second function permits efficient and accurate perception in the absence of cryptic symbolization. It sets aside symbolic blurring of reality in preparation for accurate evaluation of danger in new situations. The latter is a skill that matures during late latency. The transition involved is part of ludic demise.

The first function is the basis for the distortions produced by symbolic and intuitive thinking. The second function is the basis for the interpretation of events and memories in terms of the accurate establishment of reality categories based on similar intrinsic characteristics. As the second process supercedes the first process, there occurs a loss of the use of symbols as a means for establishing a world context that can be used for the discharge of tension. (This is part of Level III input. See below.) As a result, with maturation reality becomes the arena for adjustment. In child analysis one can see the signs of this change. The play symbols of the child grow in size till only reality-sized items such as the therapist's desk or a large box—to be used as a tank—satisfy. The child moves from play to talk. The child moves from playroom to consultation room. Fantasy play is replaced by verbal reporting of reality problems and tasks.

LEVEL III consists of the alteration of initial primary perceptions by cryptic symbolic formation. After perceptual inputs are transmitted to visual, auditory and haptic receptors in the cerebrum, they can be passively modified by interpretation influenced by the symbolizing apparatus of the brain. Interpretations become new impressions, which are encoded alongside unaltered perceptions in cortical memory areas. The former take the form of distorted representations of natural reality. Memories so encoded in turn expand the basis for symbolic interpretation, which produce ever-newer alterations of perceptions of natural reality.

Internal perceptual apparatuses inform recognition and interpretation and assign the new organized knowledge units to membership in relevant preestablished concept clusters. Affinity assignment to concept clusters is guided by similarities in both concrete (external) and abstract (internal) characteristics. Through these similarities symbolic linkages are established, which afford a bridge, later to be used to guide displacement. Impelled by drives, sympathetic arousal responses to perceptual sensations are activated. Concept clusters radiate toward consciousness in search of words, actions, or images to express them. Conscious attention is drawn to the strongest affect-laden expression as the attention of beasts is drawn to a smell, a sound or a visual threat. Disorganizing affect when detected forces a shift of attention away from strong content toward related more neutral words or images. These become the manifest cryptic symbols, which buffer the manifestations of affect.

The third level takes perceived elements through channels, which lead to interpretation, storage,

and grouping by abstraction. For instance, the lateral geniculate body, which is located in the posterior portion of the thalamus, carries visual input from the retina to the calcarine fissure (the visual area of the occipital lobe of the brain), where proximity to the visual interpretive cortex means that a thoughtful characterized response to visual sensations is to be expected. [The superior colliculus (see above), which in the thalamus lies near the lateral geniculate body, transmits the same visual stimuli out of the range of possible reflective awareness to areas in which quick and automatic responses such as visual reflexes (i.e. flinching) free of the delay and influence of symbolization is activated.]

Third level input organization influences the storage of stimuli, which have been modified through symbolically educated interpretation of perception. This process links new experiences to old remembered trauma. This is a potentially psychopath genetic process which is the opposite of active symbolization. New percepts and experiences are equated with prior acquired memory on the basis of concrete characteristics. This identification process, often unconscious, underlies syllogistic thinking and the thought disorder called predicate identification. This is the basis for paranoid misinterpretations of perceptions, as is found in Schizophrenic thinking. Interposition of reality testing rejects such associations. Reality testing aids in making the interpretation of perception a source of awareness of that which is actually perceived.

Internal memory elements in radiating towards awareness have the potential to generate affect and to modify the interpretation of new perceptions. Since they are recognized to be similar to new stimuli through identification involving predicate similarities, it is well to remember that affect can function as a predicate adjective or nominative as a result of such syllogistic equations. New percept and old memory are experienced as equivalents. There is generated the same uncomfortable affects for the new stimulus as for the old memory to which it is newly linked through interpretation. New external percepts are passively experienced through symbols, which evoke affect-loaded memories. If the memory is noxious, the new percept is avoided or responded to negatively.

There are exceptions to the principle that new experiences are all interpreted in terms of prior experience. Kant (1781) and Starobinski (1982) have noted that war, injury, and some sights need not have been the subject of prior experience in order to have the capacity to generate the affect of awe. To this list Chalfant (1969) has added "Stimulus Qualities of [certain] Object[s]" (P81). Such response can

be seen in the awe production directly inherent in the perception of flood, storm, shadow, fire, and earthquake. These events can, as LeDoux (1994) tells us, evoke strong affect during a first level encounter, when "the amygdala, the thalamus and parts of the cortex interact—. to create memories[2] about fearful-I experiences . . ." (p51)

Memory can influence perception through influencing interpretations. In advance of the generation of painful awareness, reflective interpretation can exclude from within the boundaries of consciousness percepts and memories associated with unacceptable affects. The excluded elements are retained outside of consciousness as the result of diversion of attention to masking symbols.

Most new perceptions are assigned to memory units that are easily accessible to dynamic consciousness; but not all. Those, which at first generate interpretations associated with strong affects, when later taking part in efferent discharge through the amygdala, are removed from inclusion in those areas of concept clusters, which have access to expression in awareness. Memory based percepts in the active process of recall are scanned for potential affect, as the radiation of content comes into the zone at which discharge from the amygdala into the autonomic nervous system occurs. If threatening affects are generated, the percept contents are returned to that area of their concept cluster that includes words that cannot rise toward consciousness but which can be acted out or manifested in action or psychosomatically.

THE CENTRAL PROCESSING SYSTEM

The central processing system consists of cortical functions that serve memory, reflection, and judgment. The psychodynamic clinician works to correct a patient's distorting interpretative associations. Fear can be generated in response to new stimuli as a result of interpretative recognition informed by memory residua of prior overwhelming inputs. These associations are derived from concrete and abstract memory elements. They are organized in panels in frontal lobe cortical areas of the brain. Pathological reactions arise when interpretations stray from reality. Dynamic psychotherapies are focused on defusing this experience.

THE CEREBRAL CORTEX AWAKE

We now shift our focus from reception of stimuli to the workings of central memory storage areas. These occur primarily in the cerebral cortex. When awake the cortex counters affect generated through the amygdala by initiating action, withdrawal of attention and through triggering displacements that take attention from latent referents, which have been activated by external stimuli. Attention goes to less affect charged manifest declarative content, which becomes the source of manifest waking symbols. This response to amygdalic discharge is guided by memory panels in the frontal cortex.

THE CEREBRAL CORTEX ASLEEP

Symbols alter data for two observers. These are the audience and the self-observing ego. The dreaming process places emphasis on the latter. In sleep there results a shift to cortically stored memory as the primary source for manifest symbols. This results in a reduction in the number of neutral reality-based simple symbols to be used to counter affect.

Latent contents (referents) in memory reveal their affect charges when they approach awareness. Affect is detected at the gates of consciousness through a review of content. This is a part of the affect scanning function of the amygdala (see below). This amygdalic function, initiates frank signal anxiety by activating the autonomic nervous system. The formation of manifest symbols derived from related more neutral elements within the concept cluster counters the formation of such potentially disquieting manifest affects in dreams and as a result protects sleep.

THE CEREBRAL CORTEX IN SLEEP AND DREAMING

The cortex during sleep experiences a marked reduction in the influence of external stimuli. External perception is lessened during sleep. As a result sleep symbols represent internal memory referents. This phenomenon is at its height during arousal from second and from fourth stage sleep.

The EEG during arousal from second-stage sleep contains low frequency high voltage irregular waves. This EEG pattern reflects rapid movement of the eyes (REM). REM Periods are part of a consistent set of physiological changes that occur about five times per night during second stage sleep. These changes include flagrant variations in respiration, heart rate, and blood pressure, as well as erections, and loss of muscle tone. In addition because with any eye movement there is cessation of external visual

stimuli to the brain, during REM periods there is a shift to sources for ideation in the memory areas of the cerebral cortex.

Humeral changes during REM sleep focus this shift onto the visual cortex. Cessation of the production of noradrenaline in the locus coeruleus occurs (see Siegel (2000) p 78), and ". . . serotonin neurons are silenced, while some acetylcholine neurons are very active . . .". (see Damasio 1999 p249 and Maquet 2000 p834). The reduction in catecholamines and the increase in acetylcholine that occurs produces a situation that parallels Robbins (2000) observation that "a decrease in brain activity in the dorsolateral prefrontal cortex . . . and an increase in brain activity in the regions of the visual cortex" occurs as a result of an infusion of physostigmine (an acetylcholine like substance) in the brain (p 2275). The focus of dream content on visual imagery during REM dreaming is explained by this effect, which confirms Freud's observation that there is a topographic regression in the focus of awareness manifested in the visual content of dreams.

The decrease in prefrontal cortical affective tonus in the forebrain described by Robbins lessens affect. This helps to preserve second stage sleep. It diminishes the activation of displacement that underlies the creation of dream symbols. This contributes in part to the primitive content of cryptic dream symbols. In addition diminution of the influence of telereceptor percepts that occurs with sleep frees the cognitive content from external influences. As a result the potentials of the symbol forming function of the ego is freed from the reality testing that contact with the world brings into focus. Decrease in brain activity in the prefrontal cortex decreases the influence of memory panels and frees the symbolizing function from the restraints posed by memory panel contents such as culture, superego, and the influence of current behavior on future prospects. The resulting loss of temporal object ground differentiation dominates the loss of cause and effect that characterizes dreams.

The symbols that defend against second stage sleep arousal are less frightening than the symbols generated during fourth stage sleep, which force arousal. Though less displaced than waking cryptic symbols, they are more displaced than the raw symbols of fourth stage sleep which in the absence of hypnogogic hypersynchrony initiates arousal. Because second stage REM dream symbols persist, they permit a more direct working through of traumatic memory residues than fourth stage sleep symbols.

INTERPRETATION OF THE INTRICACIES OF REALITY

Reflex responses are not adequate for dealing with intricate situations and inputs. As LeDoux (1994) noted "The cortex is not needed to establish simple fear conditioning; instead it serves to interpret stimuli when they become more intricate." (p 54) Interpretations of intricate reality are retained in cortical memory and processed through cortico-limbic circuits. Apparently interpretive memory elements, which are stored in the cerebral cortex represent, but as a result of prior interpretations are not identical with, perceived reality. In turn, prior perceptions modified in memory influence interpretation, which adapts symbols to express experiences of past events and opinions. Preconceptions make reductive interpretation of newly perceived intricacy possible. And what is remembered is different from what is perceived. Derived memory elements are precipitates of abstract level linkages. The personal world of opinion, sensed reality, and affect are interpretations influenced by these constructions. In regard to the role of the amygdala in such interpretations, it is interesting to note LeDoux's (1994) quote of Schneiderman to the effect that ". . . in primates . . . projections to the amygdala from sensory regions of the cortex are important in processing the emotional significance of complex stimuli." (p 54) One of the results of such processing using ". . . perceptual sophistication . . ." is the ability of the cortex to deactivate fear reactions mediated by the amygdala. (see LeDoux (1994) quoting Jacobs and Lynn.)

BRAIN PATHWAYS FROM MEMORY CENTERS TO EXPRESSION

The simple symbol serves to communicate concepts through the conventional use of signs and words. The memory portion of the cortex retains concepts. Concepts find their way to simple word representations by passing through the angular gyrus, Wernicke's area, and Broca's area, on the way to conscious expression. This topographic march across the posterior temporal region of the left brain carries concepts to expression in speech.

Benign manifest representations of strongly affect-laden concepts may be sensed to be awkward upon entering consciousness. Such cryptic symbols are displaced representations, whose removal from original meaning alters their fit in the contexts into which they belong. For instance the elements of a dream or a legend often seem unrelated to one another. The interposition of such substitute forms is

rationalized by its being secondarily elaborated into the contexts of neutral dreams and the matrixes of psychic reality into which they intrude. The story is altered to make them fit. In this way symbolic representations acquire seemingly logical relevance to conscious contexts of thought. Denial of any direct connection between a referent and the manifest concept cluster element, which as a result of displacement has become its representation, reinforces the cryptic character of a symbol. Representations become a focus of attention (countercathexis), which in supporting denial produces repression. Symbolization occurs when concept clusters contain elements with moderate traces of affect, and these less affect-toned contents draw selective attention from more highly charged concept cluster elements. As a result of this process, poetic and psychoanalytic symbols offer no direct access to their referents. They appear to be rootless and cryptic. Referents, evoked memories, and primitive drive responses accompanied by threateningly strong affect, which is beyond the ability of the individual's symbolizing function to handle, follow a different course. They lose access to attention through displacement to a representation that pierces the boundaries of awareness in the form of discharge from the amygdala producing exaggerated somatic organ function (psychosomatic symptoms). This is a narcissistic, evocative pole symbolic form, which protects close objects from the force of drives by a shift of attention to a zone within the boundaries of the self.

NON-CONSCIOUS JUDGMENT AND THE DECISION AREAS THAT INFLUENCE DISPLACEMENT IN SYMBOL FORMATION

INTRODUCTION

Control of affect motivates the formation of cryptic symbols that represent cognitive contents as they move toward consciousness. In cryptic symbol formation, the communicative function of the symbol is diminished in the service of affect modification and dampening of impact. Cryptic symbol formation is initiated when contents of memory storage areas, in seeking consciousness generate a subliminal autonomic discharge. The amygdala generates these warning affects through stimulating the autonomic nervous system. These affects are responded to by guidance responses, which are influenced by the ventromedial prefrontal cortex and the dorso-lateral prefrontal cortex. Neutralization of the potential for conscious disruptive affect results from displacement of attention to more affect neutral representational substitutes (the symbol).

The cryptic symbol communicates memory referents in a representational form that is altered beyond easy recognition. This masking function quiets discomforting affects specific to content, which approach consciousness in the form of haptic vital sensations involving the autonomic nervous system.

Abstract concepts, which represent the pressure of drives, seductions, and sympathetic stimulation when encoded in memory, can themselves become referents. They can move from memory storage areas in the cerebral cortex toward temporal lobe areas where consciousness is manifest. The transit is accompanied by activation of inherent affect, when vagrant content is scanned by the frontal cortex-amygdalic circuit. The presence of potential affect activates discharge into the autonomic nervous system. An experience of affect, consisting of haptic sensations and humeral discharge products returns to the brain from the effector organs. Should the level of affect (signal anxiety) reached be sufficiently uncomfortable, there results a defensive shift of sibliminal attention to a less affect charged substitute content (the cryptic symbol).

Representations of contents whose referents have origins in cortical memory are created by this process involving passage of the concept through the hippocampus and amygdalic discharge into the autonomic nervous system, which produces haptic sensations and humeral discharge that is detected by the AVFC[3] as it guides the selection of acceptable symbolic forms on their way to speech areas of the temporal lobe.

BRAIN LOCALIZATION OF SUPEREGO AFFECTS

The ego deforming affects whose detection initiates the formation of symbols include affects associated with superego function. Superego motivating affects are the driving forces in symbolic moralism (see below) and conscience. Brain localization, related to these affects, is in the frontal lobes. Superego affects diminish when the frontal lobes are damaged. This occurs clinically in General Paresis. A pathognomonic presenting symptom of this condition is loss of social judgment. Pincus and Tucker (1974) note that "destruction of the frontal lobe leads to poor self-control, inability to understand the consequences of actions, and an inability to orient actions to the social and ethical standards of society" (p. 103). Conversely, the increase of the mass of the frontal lobes that occurs during the phylogenesis of man is accompanied by an augmentation of ethical concept recognition, increasing capacity to form value

judgments and to consider the future implications of current plans when making ethical decisions. The Dorso-Lateral Prefrontal cortex has been described (see Carter 1998 p 195) as the memory locale for the content sources that inform these influences on the symbolizing function. Awareness of the influence of present behavior on future consequences, which is an important part of superego function, has been placed by Sawaguchi (1991) in the prefrontal cortex. Using a biochemical localization technique, he found that "D1 Dopamine receptors play a selective role in the mnemonic, predictive functions of the primate prefrontal cortex". (p 947.)

PATHOLOGIES ASSOCIATED WITH IMPAIRED SYMBOL FORMATION

SYMBOLS AND DISORDERS OF AFFECT CONTROL

Davis (quoted by Baraniga 1992) noted that "The real problem for people with anxiety disorders seems to be that they cannot turn off or inhibit their anxiety." (p 888) From the standpoint of symbol theory the source of this defect may be found in a lack of a technique, such as suppression which could diminish affect, or symbol formation which would substitute an alternate perception or concept to head off anxiety. The latter process is the function of the amygdala and the ventromedial and dorsolateral gyri of the prefrontal lobes.

Symbol impaired people regress to a primitive recall mechanism, such as evoking the original synaesthesia of concept and affect by activating a topographic regression to original sensations. Hallucinations and psychosomatic disorders are generated in this way. Another form of impaired symbolization which is associated with poor affect controlis the production of affect porous symbols. This form of impaired symbol formation is characterized by the inability to detoxify affect-laden percepts through adequate degrees of distraction or distancing.

THE AMYGDALA

DISORDERS OF AFFECT CONTROL ASSOCIATED WITH THE AMYGDALA

The amygdala consists of almond[4] shaped groups of small bilateral structures located in the temporal lobes and pendant to the tail of the hippocampus. One of the functions of its nuclei (cell

groupings) is to activate affect through transmission of sensations associated with the declarative contents of perception, interpretation and memory into the autonomic nervous system. (Baraniga (1992) noted a related phenomenon. She reminded us that if one would "stimulate the amygdala of an epilepsy patient during brain surgery, . . . he will report a surge of anxiety not-produced by stimulating other parts of his brain." (p 887)

Perceptions, without the preexisting innate affect responses found in physiognomic responses, acquire affect as the result of a learning process. Affective reactions to new stimuli are acquired and then encoded in memory, ever after altering the autonomic response of the organism to a given stimulus. This is the basis of fear conditioning. The amygdala is associated with the assignment of affects to percepts.

HOW THE BRAIN HANDLES EXCESS AFFECT

The level of subliminal (nonconscious) affect tonus in the brain is regulated and influenced by both chemical influences and symbol formation. The brain is capable of suppressing perception of referents that promise to introduce severe affects into consciousness, in favor of bland manifest contents, which pass the gates that block content associated with proscribed affect. The amygdala is a location in the brain in which the mechanisms of perceptual rivalry and suppression are activated in symbol formation.

EFFECT OF ABLATION OF THE AMYGDALA THE KLUVER-BUCY SYNDROME

Patients with Kluver-Bucy syndrome exhibit "an aberration of motivational assignment" according to Duffy and Kant (1997 p. 4041) and typically display inappropriate responses (i.e. sexual, aggressive, and eating), toward any object within the immediate environment. The Kluver-Bucy Syndrome is associated with bilateral amygdalic damage. This clinical entity identifies the amygdala as the anatomical locus wherein linkage with affect is effectuated.

The amygdala, which is located in the temporal lobe, serves modification, delay and regulation of emotional and maturational aspects of behavior in response to anxiety responses. Removal of the temporal lobes produces a syndrome (Kluver-Bucy) in which these functions are absent. Delay of discharge and the symbolization of aggressive, hunger, and sexual drives are impaired. Of the drives that motivate man, aggression, hunger, and sex, are the ones that are capable of the delay of discharge that

provides time for the production and utilization of alternative pathways for discharge such as symbols. Symbols produced in dreams of hunger often represent food. Fantasy and dreams contain symbols which represent unacceptable aggressive feelings and feelings of sexual stimulation. In the Kluver-Bucy patient, delay is lost. Raw drives are expressed. Undifferentiated and undelayed hypersexuality, omnivorous eating and uncontrollable exploratory assertiveness appear instead of symbols. Such immediate and undifferentiated discharge saps cognitively informed conation, such as fantasy. An apparent apathy toward structured pursuits is produced. Diversion of affect into the autonomic system and evaluation of the affect potential of representation with adjustment to affect through substitutes and sublimations is lost.

Kluver and Bucy (1937) described this syndrome following bilateral temporal lobectomy in monkeys. They described a constellation of emotional symptoms. This included "psychic blindness" (p 353) in which one can see objects but one lacks ability to produce appropriate affective responses. Psychic blindness is associated with emotional placidity and an inability to ascribe appropriate emotional valency to percepts. The capacity to articulate affects with perceptions is lost. The subjects were". . . unable to recognize objects by the sense of sight" and did not exhibit the reaction generally associated with anger and fear (p 353). A function of an intact amygdala is apparently the linking of appropriate affect to content and stimuli. This is achieved through a cascade of circuits. Percepts, which activate awe, are associated in memory with external danger. Anxiety linked evocations representing internal sources in memory activate the amygdala. The amygdala sends signals, which follow pathways that traverse the lateral hypothalamus and the rostral ventrolateral medulla. This signal activates the autonomic nervous system. This activation is manifested in activity in the viscera, skin and the vasomotor system (e.g. discharge of adrenaline, piloerection, elevated blood pressure, increased heart and respiratory rate.) These changes are identified in conscious awareness by the term "anxiety".

Anxiety sensations express amygdala mediated detection of latent valence for affect that is generated when potential manifest symbolic expressions of ideas of things and concepts rise toward manifest consciousness. If the affect produced is perceived as too strong, the representation of the referent or perception can be deferred and a substitute in the form of a related less charged percept, derived from its associated concept cluster (symbol net) can take the attention of awareness. If sufficient muting or neutralization is achieved through the introduction of the substitute cryptic symbol, the level

of affect becomes acceptable. As a result, the substitute enters consciousness. It becomes a symbol for the referent.

Kluver-Bucy syndrome symptoms involving emotional and motivational aspects of behavior and vegetative functions, also can appear in humans after an attack of herpes simplex encephalitis, anoxia, or carbon monoxide poisoning (Harrison, 13th edition). Baraniga (1992)notes that when Bruce Kapp removed the amygdala in rabbits, learned-fear response was lost. Duffy and Kant (1997) in describing the syndrome following bilateral destruction of the amygdala, noted loss of valence for attracting affect for both animate and inanimate objects. Cummings and Duchen (1981) described Kluver-Bucy like behavior in humans who were suffering from Pick's disease. Pick's disease is a dementia associated with atrophy of brain tissue, which can involve the amygdala (p 1420).

A suppressed referent unit (concept and affect) remains active out of consciousness, either as a subliminal or fully repressed unit. Exclusion from awareness by cortical suppression, displacement, and countercathexis does not deactivate the repressed unit's contribution to motivation, which remains sufficiently available to be approached by free association, and to influence non-conscious decision making.

ANXIETY AND THE AMYGDALA.

Baraniga (1992) described the amygdala "[as] a reflex serving brain structure that mediates autonomic affective reactions in response to both external and internal stimuli. This circuit links a variety of emotions—including fear—to certain memories and situations." (P 887) As perceptions of reality and referents from memory pass through the amygdala, learned or innate associated affects become evident as a result of related discharge into the autonomic nervous system. As such, the amygdala functions as an association area that unveils the affect inherent in new stimuli as well as in memories while they are taking part in the process of evocation.

NEW STIMULI AND THE AMYGDALA

A stimulus from the cochlea (organ of hearing) can go directly through the auditory thalamus (inferior colliculus) to the *amygdala* as well as to the auditory cortex (Heschel's gyrus). Of all the areas to

which the auditory thalamus sends fibers, only damage to the amygdala was followed by a loss of ability to develop fear conditioning. By the use of this pathway, the auditory cortex can be bypassed without interfering with conditioned fear formation.

On a primitive animal level, perceptions at the physiognomic syncretic level are transmitted directly though the colliculi to the amygdala, where innate response (withdrawal[5]) to experienced dangerous perceptions are activated as strong sympathetic and parasympathetic readying reactions. Autonomic discharges are experienced as feelings of rage and anxiety, which impel autonomic (fight or flight) reactions.

Physiognomic responses of the amygdala to new perceptions have a survival function. This can be observed in the behavior of the inexperienced kitten who hides at the appearance of each new person who comes into her view until the safe nature of the new entrant into his world scene is determined. Once a benign character for a new entrant is determined, new associations to the entrant as a stimulus are acquired. The entrant is assigned to a concept cluster associated with a bland affect. New intrusions by the now familiar person no longer have negative effects on a now older and wiser cat.

IMPAIRED WORD RETRIEVAL

Word retrieval is a function that is closely related to symbol formation during the expression of memory content. The structures involved are the same. The main difference between the two functions is that in symbol formation the force that propels the concept to consciousness is an internally generated drive with emphasis on evocation, while in word retrieval the self reflective portion of the conscious ego draws content in the service of communication from memory towards awareness. I speak specifically about the form of word retrieval impairment in which no effort can unlock the hidden word for there is another word in place that holds the attention. Often the patient knows he knows the word and says, "Wait it will come to me." No matter how one tries, the barrier word will not give way. Usually the barrier word has sounds in common with the target word or belongs to its concept cluster. For instance, a scholarly man stopped near a park entrance too look at some Russian black lacquer boxes. The proprietor of the kiosk identified the three painted figures on the box with a mumbled word. Then he admitted he was not sure of the work. The scholar knew for sure that the picture depicted medieval knights errant

called "?". No matter how often he tried to remember, he could only come up with the word Bogomil. Only when the proprietor came up with the name Ilya Moremetz, a Russian knight errant and a rough pronunciation of the word, did the target word come into focus. It was "Bogatyr". Bogomil served as the countercathectic focus for awareness in the way a symbol blocks a referent.

MEMORY AND ANXIETY

When a disquieting affect is associated with a memory, delay of expression in consciousness produced by the amygdalic processing that contributes to symbol formation is adaptive. It preserves the calm required for neutral activities, such as learning and modulates the nature and strength of the affects associated with stored elements. LeDoux (1994) has described the existence of two such types of memory contents. He differentiates memories into "Emotional and declarative memories." These are stored and retrieved in parallel. (These ". . . activities are joined seamlessly in our conscious experience (and) . . . combine with current declarative memory to form a new declarative memory" p 57). The same content can be associated with damaging emotion or can be declarative in form and supportive of the neutrality needed for neutral activities. Content that stirs emotion strong enough to activate an avoidance mechanism, (i.e. a symbol) ". . . modulat(es) the storage and strength of memories." (p 57 LeDoux, quoting Jacobs and Lynn).

THE AMYGDALIC NUCLEI

The amygdala itself is subdivided into a series of nuclei with varying functions.

(1) The Subiculum and the Lateral nucleus-. LeDoux (1994) describes the subiculum as ". . . a region of the hippocampus that projects to other areas of the brain . . ." It communicates with the lateral nucleus of the amygdala. Another of the sources of inputs to the lateral nucleus is the "auditory thalamus" (P52") Ledoux (1994) suggests that ". . . contextual information may acquire emotional significance . . . via transmission to the lateral nucleus" (p54). The lateral nucleus is assumed to be a location in the amygdala for the activation of latent affect associated with concepts.

(2) The Basomedial Nucleus-LeDoux (1994) describes the basomedial (aka accessory basomedial) nucleus as a way station for inputs to go from the lateral nucleus to the central nucleus through direct neuron to neuron communication. (p53)

(3) The Basolateral nucleus is an extension of the lateral nucleus. It projects to the central nucleus (p53). Cummings and Duchen (1981) noted that the basolateral group of amygdalic nuclei is larger in humans, than in any other species. It has extended neocortical connections, and is involved in alerting and affective responses. (P 1420)

(4) The Central Nucleus -LeDoux (1994) describes the central nucleus of the amygdala as the unit that connects with areas in the brain stem involved in the control of heart rate, respiration and vasodilation (these are aspects of manifest experienced anxiety). The central nucleus is a ' . . . crucial part of the system through which autonomic conditioned responses are expressed." (p 52) The ". . . central nucleus appears to be the interface with the systems that control responses." (p53)

THE AMYGDALA IN AFFECT PROCESSING

LEARNED FEAR

The amygdala brings out the potential for affect in concepts and perceptions as they move toward awareness. Affect is generated when, as an expression of this potential, the central nucleus of the amygdala activates the autonomic nervous system (see LeDoux (1994) P 103), generating the nonconscious bodily changes, which would be recognizable as affect (anxiety) if they were sufficiently strong to attract the cathexes of consciousness. He quotes Michael Davis as saying "Evolution has hardwired in all the connections between the central nucleus of the amygdala and all these target areas that are involved in the specific signs and symptoms of fear." (p 103) In response to learned cues internal ". . . signs we have learned to associate with danger . . ." (Baraniga 1992 p887) are activated through discharge from the amygdala into the autonomic system. Persistence of these signs supports acquired fear. Acquisition of fear is a form of learning which when sustained is called long term potentiation (LTP). Injection of an LTP blocking drug into the amygdala blocks such fear learning.

THE AFFECT LOOP

Physiognomic level responses to afferent environmental stimuli activate the periaqueductal grey matter (PAG) and the amygdala, which are at that point in maturation equivalent inducers of affect-loaded emotional sensations in the body (Ledoux (1996) (p 60). Damasio (1999) also describes both the amygdala and the PAG as "inducers of emotion" (p 60).

The initial experiences of affect are induced by this *efferent* discharge of signals from the amygdalic central nucleus by way of the hypothalamus and from the PAG (Periaqueductal Grey Matter) into the autonomic nervous system. The loop consists of efferent discharge into the autonomic nervous system, and afferent signals for recognition of emotional sensation by the scanning functions of the Amydala-Ventrolateral-Ventromedial-Prefrontal complex. The amygdala becomes the main driver for the efferent portion of the affect loop.

The efferent arm of the affect loop begins with this discharge. The target organs influenced by this discharge, which produces autonomic nervous system arousal, are the adrenal medulla, and the activating nerve endings of the visceral tissues. The medulla releases adrenaline, which has widespread actions in the body. The visceral tissues release adrenergic catecholamines, which activate the functions of the viscera and the skin.

The afferent arm of the affect loop consists of pathways for the detection and transmutation of these phenomena into sensations interpreted by the brain as the affects of anxiety, depression, grief and awe. The afferent arm of the affect loop consists of nerves, which carry impulses to the brain and humeral agents (hormones), whose influence on the body includes activating receptors in the brain. The adrenergic catecholamines play this role. Adrenaline may not. Adrenaline cannot normally enter the brain from the blood (adrenaline molecules are too big to cross the blood-brain barrier). Adrenergic catecholamines can pass the blood brain barrier and affect the brain.

The sensations that bodily events produce are detected in the brain, to which they have been transmitted through many portals, both indirect and direct. The indirect pathway to the brain from visceral events activated by humeral influences passes through the afferent fibers of the vagus nerve. These terminate in the nucleus of the solitary tract in the medulla. LeDoux (1996) observed that the nucleus of the solitary tract sends signals to the locus coeruleus to release noradrenaline, which travels through diffusion and through axonal microtubules to "widespread areas of the forebrain, including the amygdala . . ." (p 208). This chemical would elevate the affect tonus and lower the kindling point for activating synaptic receptors in the prefrontal cortex. Differentiated responses would be pendent to the differentiated sensitivities of the activated receptors. Panksepp (1998) has described a direct neuronal portal for haptic sensation in ". . . the centromedial areas of the midbrain, including the deep layers of the

colliculi (tectum) and the periaqueductal grey . . ." (p 311) Damasio (1999) and Ramachandran (1998) have suggested that another portal exists in the ". . . insular cortex, which is driven partially by sensory input . . . from the viscera . . ." (p 248). Damasio (1999) suggests that the nerves that populate these portals for emotion and affect sensations pass from the body into the brain through ". . . spinal cord pathways, and the trigeminal nerve, . . ." and addresses the possibility that adrenaline can enter the brain directly through the "area postrema." (p 151, 156) The latter is located in the fourth ventricle. (Fix 1995 page 310) It is chosen on the basis of its lack of a blood brain barrier, which makes possible the passage into the brain of humeral agents such as emetics and possibly adrenaline. (p 151)

AFFECT AND THE AMYGDALA

Noradrenaline influences amygdalic and ventromedial frontal cortical functions by increasing the level of basic affect to the point that the affective valence of potential manifest symbols on the way to the system CS is enhanced. This enhancement of affect triggers a further substitution in the form of displacement to a manifest masking psychoanalytic symbol. This occurs when under the influence of the functional contents of the dorsolateral prefrontal cortex (future impact of the symbol) and the ventromedial prefrontal cortex (prediction of risk outcomes in the use of the symbol) strong enough subliminal affect signals activate cortical suppression and substitute formation. This results in the production of manifest substitute forms such as symbols. Barch (1999) notes that the anterior cingulate cortex (located posterior to the genu and superior to the corpus callosum) may serve to monitor conflicts between potential responses to stimuli. She infers that the cingulate gyrus "provides a signal that serves to recruit the dorsolateral prefrontal cortex to play a more central role in complex task performance." (p 1849) The influence of future risk evaluation would be brought to bear on the choice of concept cluster element to use as the symbol in consciousness.

The role of the *norepinephrine* producing cells of the locus ceruleus, in the feedback pathway involved in the role of affect in psychoanalytic symbol formation, calls for more than passing attention. Siegel (2000) tells us that these cells are ". . . inactive when . . . animals are in REM sleep.) (P 78) Implied is a reduction in the tonus of affect during REM sleep. Less tonus means less need for displacement in symbol formation. Therefore the symbols of REM sleep will be closer to the non-displaced elements of the concept cluster that arises from memory uninfluenced by reality inputs. With affect tonus blunted,

eldritch symbolic forms become manifest in REM dreams. It is likely that there are further influences on affect tonus in sleep. The dreams of arousal from fourth stage sleep during hypnogogic hypersynchrony are manifested in even less displaced symbols. (see Sven Brandt (1955)

A feedback loop is thus identified[6] through which nonconscious somatic anxiety sensations, with origins in amygdalic discharge, are transmitted back to the brain, where they influence gating mechanisms. A gating mechanism enables automatic response to affect. In this case the choice of responses are either passing undistorted representations of offending content to consciousness, maintaining affect in a reverberating circuit within the feedback loop so as to motivate adaptive response, or require that repression of offending content be achieved as a result of the creation of a distorting psychoanalytic symbol substitute for that content. The latter choice is activated through an alteration of manifest content as a result of displacement of attention to a countercathectic content, with less valence for attracting affect.

THE MIDTEMPORAL AREA AND THE EXPERIENCE OF PERCEPTION

The experience of perception as conscious awareness, according to Penfield (1959), is located in the midtemporal area. It is here that associational symbol net components could influence conscious decision making. Such associational memory nets[7], according to Cartwright (1990) are stored in the cortex. Manifest conscious derivatives of these nets are symbolic forms that have been selectively cathected at the expense of related referents within the same memory net or concept cluster. The experience of perception is colored by symbolic interpretation.

Symbol formation is generated when interpretations, which connect new perceptions to abstractly related affect charged memories, are activated under the tutelage of the ventromedial prefrontal cortex (see Bechara, below). In this circumstance, affect is generated through discharge from the amygdaloid body through the hypothalamus into the autonomic nervous system. Should nonconscious apprehension of this disquieting affect threaten, the road to consciousness for the dangerous affect can be blocked by the introduction of a substitute, as occurs with cryptic symbol formation.

Chemical influences maintain the subliminal affect tonus that is associated with symbol formation.

Kent (2000) noted that "a serotonergic pathway originating in the dorsal raphe nucleus (in rats) innervates the amygdala and the frontal cortex via the medial forebrain bundle." (p. 737). It follows logically that catecholamines produced by the raphe nuclei (located in the periaqueductal gray matter) produce an affecttonus in the neural substrate of the reverberating circuit that is the infrastructure for symbol formation. Affect tonus establishes the basic level of affective response to emerging nonconscious content and perception. The basic level of response to an affect generating input is determined by the affect tonus. An high affect tonus predisposes a person to levels of anxiety response that distract and require defenses or medication in pursuit of an equilibrium. A flexible attenuation and alteration of affect tonus that motivates attitude, fear, and behavior can be achieved by defense mechanisms such as psychoanalytic symbol formation. Symbols bring variable input affects under control. A consistent fixed derivative level of acceptable affect can be produced by manipulation with medication.

There is a sustained baseline level of subliminal affect that is produced by a synergistic interaction between chemically mediated affects and cryptic symbols. The latter binds affect-linked content and transmutes it into the tolerable affect that is associated with acceptable thought, and action. The higher the baseline of affect and the greater the response sensitivity in reaction to perceptual and memory based inputs, the greater will be the need for mechanisms of defense such as symbol formation aimed at attenuating affect.

Absolute level of affect and affect-linked to content are not the only factors involved in the activation of symbolic substitutes. Value judgments influence as well. Morality affects (guilt and shame) and apprehension associated with chance, contribute to the censorship of content entering consciousness that requires that the content be displaced to more affect neutral symbols. The addition of these factors to influences, which activate the symbolizing function, requires that we identify anatomical locales (VMFC), which participate in the formation of cryptic symbols. Moral value based affects associated with potential actions or referents, which are on the way to consciousness, can be sufficiently threatening to activate an avoidant shift of awareness to a more acceptable action strategy or substitute representation derived from companion referents contained in its concept cluster. Such "non conscious» biasing of manifest content or action is localized to the ventromedial prefrontal cortex [VMFC] (See Damasio below).

Solms (1998) has described the clinical effect of bilateral ablation of the ventromedial frontal

cortex. In his cases, this pathology was the result of an occlusion of the anterior cerebral arteries and the anterior communicating artery of the Circle of Willis. The patients showed an impairment of censorship. There were produced states in which fantasy overwhelmed reality. Delusional dream like states occurred. Thinking became destructuralized. In brief these patients' thinking took on the special characteristics of the primary process dominated system UCS.

"NON-CONSCIOUS BIAS" AND SIGNAL ANXIETY IN THE SELECTION OF SYMBOLIC REPRESENTATIONS

Cryptic symbols arise as a response to nonconscious affect that threatens to enter consciousness with a destructive force that will disorganize the ego (i.e. the executive apparatus of the personality).

THE CONCEPT OF THE NONCONSCIOUS IN BRAIN SCIENCE

The affect that triggers cryptic symbol formation is characteristically nonconscious. The "non-conscious" is a term used by Bechara (1997) in referring to an arena in which psychic stimuli and responses take place, which are beyond the conscious awareness of the subject. The nonconscious covers a broader set of phenomena than the dynamic unconscious, whose content by definition is a product of awareness altered by repression.

Bechara (1997) demonstrated mentation that is nonconscious when he performed the following experiment. Normal participants and patients with prefrontal damage associated with decision-making defects were given a gambling task during the performance of which behavioral, psychophysiological, and self-account measures were obtained in parallel. Normal subjects chose advantageously before they realized consciously which strategy worked best. ". . . prefrontal patients continued to choose disadvantageously even after they knew the correct strategy." (1293) "Moreover, normal subjects began to generate anticipatory skin conductance responses whenever they pondered a choice that turned out to be risky . . . whereas patients [with damage to the ventromedial prefrontal cortex] never developed anticipatory [planning] . . ." (P 1293). Bechara (1997) saw this as ". . . evidence for a complex process of nonconscious signaling, which reflects access to records of previous individual experience specifically of records shaped by reward, punishment, and the emotional state that attends them." (p 1294) Bechara (1997) noted, in relation to apprehension associated with chance in a gambling like situation, ". . . that overt reasoning is preceded by a *nonconscious* biasing step that uses neural systems other than those that

support declarative knowledge." (P 23)

Gretchen Vogel (1997) in commenting on Bechara's paper notes that ". . . the authors say the overall findings suggest that in normal people, nonconscious emotional signals may well factor into decision-making before conscious processes do. Antonio Damasio believes the ventromedial prefrontal cortex is part of a system that stores information . . . and triggers the non-conscious emotional responses that normal people may register as intuition . . . .". (p 1269) Gardner is quoted as having described this as an "early-warning system" that guides reasoning. (p 1269)

A role for the ". . . deep ventrome(d)ial frontal region . . ." in dreaming was introduced by Solms (1998, 2000) when he observed that patients with bilateral damage to the white matter of these areas have (p 45) cessation of the conscious experience of dreaming.

Among the mental experiences contained within Bechara's "non-conscious" zone are "the unconscious" (system UCS) and "the preconscious" (system PCS) as they are described in Freud's topographic theory. Freud's unconscious and Bechara's nonconscious are not sequestered and idiosyncratic abstractions. They are detectable zones in the vast ever expanding terrain of potential awareness that is one of the insights of brain science.

Awareness of the Nonconscious zone is not limited to Bechara. LeDoux (1994) introduced a concept similar to the non-conscious in his description of ". . . emotional learning that comes about through fear conditioning . . . which in *all* likelihood operates *independently of our conscious awareness*." (p 57). Berns(1997) has added to the growing body of knowledge that relates to unconscious declarative mentation. His finding ". . . suggests that the ventral striatum is responsive to novel information, and the right prefrontal area is associated with the maintenance of contextual information, and both processes can occur *without awareness*." (P. 1272)

Freud's concept of the non-conscious differs from that of the others. Where the affects and concepts in the generalized nonconscious arise freely toward consciousness, the affects and concepts of Freud's dynamic unconscious consist, to a large extent, of affect charged elements that have been interdicted and denied entry to awareness by an internal censorship. The censorship is informed and guided by memory contents of the ventromedial and dorsolateral frontal cortexes, which activate recognition of the affects

associated with potential danger. Cognitive contents, moving toward awareness, or verbalization, or action, are returned to being a memory as the result of the pressure of this signal anxiety. They become inaccessible to awareness, having been replaced in the approach to consciousness by more acceptable representations such as manifest symbolic forms.

One of the functions of Psychoanalytic Psychotherapy is to bring nonconscious content, both that which is repressed and that which contributes to biasing, into conscious awareness, permitting decisions free of nonconscious bias. Free association and reflection on manifest thoughts and actions integrate unconscious content into consciousness. Insight, which is based on such full awareness can enhance intuitive logic, bringing it to the level of secondary process thinking.

NONCONSCIOUS RESPONSES TO SIGNAL ANXIETY CREATE THE DYNAMIC UCS.

An early warning system exists as a component of "nonconscious" mentation. It is in this system that intuition guiding non-conscious anticipatory affect is detected. It is in this system that subliminal nonconscious anxiety motivates the formation of cryptic symbols. In 1915 this early warning system was called "Signal Anxiety" by Freud. He referred to small amounts of anxiety that warn of the danger of great affect, that would accompany a given concept representation were it to be admitted unaltered into consciousness. It is signal anxiety that activates defenses such as repression. It also initiates the nonconscious biasing steps that precede overt reasoning (Bechara 1997 p 1293).

Bechara (1997) has identified an anatomical location for the memory content that guides biasing. Content scanning for threatening content is detected as the result of the mentoring influence of the memory content of the ventromedial prefrontal cortex. It is here that there takes place unconscious value influenced decision making. The decisions are based on interpretations influenced by prior experience. Drive impelled memory content, which in approaching conscious awareness generates morally sensitive affect (anxiety or guilt) is here responded to by withdrawal of attention from offending manifestations of the internal percept. Further pursuit of activities recognized as associated with risk in the past is avoided as a result of this non conscious biasing. It is the «nonconscious signal» (P 1294) that applies «prior individual experience to the creation of interpretation and response to internal perceptions generated by memory or new sensations.» (p 1294)

Freud in 1916 described an "expectant preparedness" (p 395). This idea is pertinent here. He noted that "The more the generation of anxiety is limited to a mere abortive beginning—to a signal—the more will the preparedness for anxiety transform itself without disturbance into action and the more expedient will be the shape taken by the whole course of events." (P 395)

TISSUE FUNCTIONS INVOLVED IN SYMBOL FORMATION

SCANNING AND GATING

The boundary of the Freudian system consciousness has a gate through which awareness of psychic reality as well as endopsychic perceptions, and precipitates in memory of natural and imagined worlds, may pass into awareness. The amygdala serves as guardian of this gate to consciousness for it is a part of the distant early warning system that *scans* sensory input. When there are sensory inputs that in the ventromedial prefrontal cortical memory of the subject are signals of danger, the amygdala generates affect. Affect so mobilized responds by closing the *gates* of consciousness to the offending concept. This is achieved through the distracting cathexis of a less threatening accompanying member of the concept cluster to which the offending input is assigned. The offending input is gated out and ignored.

Scanning and gating are here introduced as mechanisms that initiate symbol formation. "Scanning" refers to the detection of contents of memory, which are associated with affects that are too strong to be tolerated as they rise toward consciousness. (see above, non-conscious bias) This triggers a gating out of such units through suppression of the content. This is supported by a shift of the countercathectic focus of attention to less affect tainted symbolic forms.

Elements associated with more moderate amounts of affect pass through the gates of consciousness unchanged. Gating closes the way to consciousness for elements of memory, which are linked to strong affect. Gating is achieved through the activation of mechanisms that shift perceptual attention to cryptic symbols in support of suppression of noxious content elements and their affect.

Cryptic symbols attract awareness. Cryptic symbolization draws attention to symbols and in the process supports suppression and denial. When symbols hold attention effectively, countercathexis, the complex (multipart)[8] mechanism of psychical defense at work is called repression.

In exceptional circumstances the amount of affect is so great that the original concept affect unit overrides the gate, and gives affect coloration to the manifest symbol. This process occurs with certain types of symbols (affect porous) and in certain cognitive states (arousal from fourth stage Delta Wave sleep) (see Sarnoff 1976). Those examples are associated with undoing or loss of repression.

GATING AND THE ATTENUATION OF AFFECT THROUGH SUPPRESSION, DISPLACEMENT, AND COUNTERCATHEXIS.

SUPPRESSION AND DISPLACEMENT

Up to this point, there have been discussed the steps involved in the formation of cryptic symbols, the brain areas in which these steps take place, the mental functions involved, scanning which identifies the need to activate these steps, and gating which through suppression, denial, and displacement create cryptic psychoanalytic symbols. Now we explore the characteristic functions of brain tissues that are the enabling components of the symbolizing process. The mechanisms intrinsic to gating are suppression, displacement, and countercathexis.

SUPPRESSION AS A CEREBRAL CORTEX TISSUE FUNCTION

Suppression is a tissue function of the cells of the cerebral cortex. When a choice must be made between overlapping percepts or affect memory elements within the same concept cluster, there is competition for awareness. The competition is resolved by removal from awareness of one of the elements.

An example of suppression may be observed during the resolution of visual rivalry. If one eye is exposed to a series of horizontal white dots, while the other eye is exposed to three white dots with a vertical arrow pointing at the central dot, the brain will superimpose the arrow and its dots on the initial dot series. At either end of the three dot series, there develops conflict between the dots as seen in each eye. (see Binocular Rivalry in Jennings (2000) p 743) This situation is relieved by the exclusion from awareness of the dot at each end of the three dot series. This is called visual suppression. This is an innate tissue function of the cerebral cortex.

THE PHYSIOLOGY OF VISUAL SUPPRESSION

In dealing with visual suppression, which he calls "Visual Rivalry", Ramachandran (1991) offers what is a neurophysiological explanation for the form of "repression", which is based on denial supported by countercathexes, a process which produces increased awareness (cathexis) of one object at the expense of awareness of another. Ramachandran (1991) found that "If one is aware of an object, the firing of all neurons that are simultaneously activated by that object alone becomes synchronized. This synchronization does not include other neurons that are activated by objects that one is not attending to." (p. 950). Bariniga (1991) p. 1025) in commenting on Ramachandran's work noted that ". . . electrical activity of direction-selective neurons in the middle temporal and the superior temporal sulcus was monitored. One might suppose that neural responses corresponding to the suppressed image would be silenced while neurons corresponding to the other image would be active. Although 10% of the cells showed the expected suppression, in most neurons no simple suppression was observed—certainly nothing similar to the complete occlusion that occurs perceptually". Tononi and Edelman (1998) describe a similar exclusion of perceived stimuli from consciousness during visual suppression. (p 1849) Repressed content is not obliterated. Attention is drawn away from it. This is the essence of countercathectic repression.

The middle temporal area referred to by Baraniga is the area Penfield (1949) identified with the function of conscious awareness. He demonstrated this through electro stimulation of the living human brain. (p 118) He identified the seat of conscious awareness in the temporal lobe. He concluded that "Psychical responses come only from the temporal cortex and occasionally from the insular cortex" (p. 44). Awareness of comparative interpretations of new experiences and old memories are made here (pp. 47-48).

Lumer (1998) also studied the phenomena of visual suppression in the human brain. He found that the phenomenon was "specifically associated with perceptual alternation only during rivalry." Hence his name for the phenomenon, "binocular rivalry" (p 1930) Binocular rivalry entails ". . . the suppression of visual information from conscious perception." (p 1933) "Monocular stimuli become periodically invisible during rivalry . . ." (p 1933) Concomitant with this ". . . sensory events associated with unattended stimuli have a diminished impact on awareness . . ." (p 1933) He suggested that "front

parietal areas play a central role in conscious perception . . ." He identified the organic locus for the existence of ". . . biasing the content of visual awareness toward abstract internal representations of visual scenes, rather than simply toward space." (p. 1930) This is one of the rare references in the brain science literature to the direction of attention (cathexes) to internal representations, which are abstract, in the place of the concrete experience of external reality. Abstract internal representations, which are cathected in the place of conflictual perception fulfill the requirements of a displacement generated symbol.

Further studies of visual supression were reported by Kanwisher (1998) and Kastner (1998). Kanwisher described visual suppression and displacement of attention. He noted that "Only a limited amount of what we see reaches consciousness and becomes stored in memory . . .".

". . . there is limited processing capacity within the visual system . . . multiple object representations are in competition for access to this limited capacity system. One way to resolve the competition is through spatially directed attention. If one attends, for example, to a specific location in a cluttered scene, information processing is greatly facilitated at that location, while interfering information from objects at nearby locations is efficiently filtered out."

"Evidence for competition is provided by the finding that the response to an otherwise optimal stimulus presented within a neuron's receptive field is often reduced when a second stimulus is presented simultaneously at a different location within the same receptive field. Hence, multiple stimuli are not processed independently from each other but rather interact competitively in a mutually suppressive fashion." [pp 57-58]

A Form of repression is described by Kastner (1998) who noted that "Modulation of suppression at several extrastriate stages may therefore be a mechanism by which attention filters out unwanted information." P 110

Visual suppression is a physiological correlate of the denial mechanism, which asserts, "If it bothers me, I won't see it." Suppression of affect-laden content is the effective process that accompanies each cycle of selection during symbol formation. As noted above suppression and displacement are activated when the intact amygdala, through discharge into the autonomic nervous system, creates an affect signal that

would be unacceptable in consciousness when scanned by the frontal cortex. The percept or memory associated with the affect is denied direct entry into consciousness. This diversion is accomplished through affect driven cortical suppression of the offending referent and displacement of attention to a substitute (the symbol). During symbol formation, there are many such cycles of selection. Cycles of selection repeat until displacement of attention to a related word within the concept cluster draws so much of the conscious attention that there is dimming of conscious connection to the original content.

In response to affect that could overwhelm the integrity of the self (ego) or that might override moral strictures, suppression of awareness of an offending referent percept occurs. Suppression of a referent reduces tension and attenuates discomforting affect. Suppression can be sustained if one can shift the focus of awareness onto a less affect-linked companion element within the concept cluster group that is rising toward consciousness. Conscious attention to the substitute element occurs at the expense of the suppressed element. The process of shift is called displacement. Attention to the substitute is called countercathexis. Repeated cycles of displacement and countercathexis are core mechanisms in symbol formation.

DISPLACEMENT AND COUNTERCATHEXIS

DISPLACEMENT

Displacement of attention from one percept or activity to another is a very primitive and evolutionarily early function developed by brain tissue. Werner (1948) described the occurrence of this mechanism in dreams, children, and primitive men (p 162) manifested in symbolic transpositions, which mask communicative meanings. Estes (1993) describes displacement activities in antelopes responding to territorial pressures and tense situations with everyday maintenance activities. (P30, P 57) These displacements include scratching one's back with horn tips and self scratching with incisors. Condensation refers to the combining of two referents into one representation or symbol. It is a mechanism as primitive as displacement and as much a part of primary process thinking as displacement.

COUNTERCATHEXIS

> Countercathexis refers to the establishment of an intense focus for attention-consciousness that results in a loss of the focus of attention to another object. The new focus for attention becomes the cryptic symbol. Freud (1915) described this process thus, ". . . the cathexis directed to (the threatening content or impulse) has drawn back from the impulse and the unconscious libidinal cathexis of the rejected idea has been discharged in the form of anxiety." ". . . (in) a first step . . . taken in the direction of mastering the unwelcome development of anxiety . . . (t)he cathexis that has taken flight attaches itself to a substitutive idea which on the one hand, is connected by association with the rejected idea, and, on the other, has escaped repression by reason of its remoteness from that idea . . . securing it against an emergence in the (system consciousness) of the repressed idea." (p. 182).

Following Freud's lead, Sarnoff (1976) noted that "Repression proper exists when it is possible to exclude from consciousness the link between what represents and what is represented. This results when substitute formations, which (seem) either unrelated to the original idea of the thing or so well masked that they are unrecognizable, are cathected in place of direct representation of objects . . . we call this countercathexis[9]." (p339)

Damasio in (1999) described the phenomenon thus "Sometimes we use our minds to hide a part of our beings from another part of our beings." (p 29)and ". . . mental imagery based on nonbody objects and events masks the reality of the body." (p29)

Burnett (1911) offered a metaphor for countercathexis. "Much more surprising things can happen to anyone who, when a disagreeable or discouraged thought comes into his mind, just has the sense to remember in time and push it out by putting in an agreeable determinedly courageous one. Two things cannot be in one place."

> "Where you tend a rose, my lad,
> A thistle cannot grow." (p 294)

SUMMARY

Man has a capacity to delay conscious reaction to increased levels of those negatively experienced subliminal affects, which are generated when an affect-linked percept or concept cluster is detected by the amygdala as it moves toward consciousness. Reactions to this affect can be deferred through the production of creative countercathectic substitutes in support an exclusion from consciousness of an idea, a reaction, or perception.

There are two types of content inputs to the amygdala. One input represents internal drives, concept memory and affects, associated with concept clusters, which rise toward consciousness from memory. This is revealed when passage of the idea of the thing through the amygdala activates the autonomic nervous system. A second source of input is external perception. This input which contributes content to storage in memory, is subject to symbol-based interpretation when affect generated by symbolic recognition based on prior experience represents a danger. Perceptual elements provide the manifest symbol content that is used when external reality is used as a countercathexis to memory content.

SYMBOLIZATION OF INTERNAL MEMORY ELEMENTS

Clinically repression of internal memory elements is not isolated to exclusion of single recalls. Rather it is expressed in an amnesic resistance to bringing to consciousness a penumbra of concept cluster elements, which move in cohorts toward awareness. Consciousness views a single symbol with an hungry eye, neglecting representations of other concept cluster elements, which are as a result, repressed.

Selection—aimed at deciding that which should become the conscious symbol and that which should keep its assignment in memory—begins when potentially disorganizing affects belonging to the most threatening concept element of the concept cluster group activate the amygdala, which in turn generates affect that signals danger. Should this signal affect threaten to break through into consciousness, defensive displacement and suppression comes into play. Alternate less affect-laden content elements within the concept cluster receive the displaced attention cathexes of consciousness. Shift of attention cathexis from threatening content mitigates the threat offered by disquieting affects.

SYMBOLIZATION OF EXTERNAL PERCEPTIONS

When attention and conscious awareness are drawn away from perceptual reality, the content of consciousness is truncated. What is left in consciousness is a protected confine of thought and awareness. Increasingly reality and its stress are converted into evocative symbol-based fantasy. This is adaptive when production of symbols becomes a means of limiting disorganization from reactions containing impetuous and possibly antisocial responses to reality. Examples of such reality stresses are threats of

parental punishment or erotic wishes toward a forbidden love object. Such denial of reality may aide immediate reality adaptation. However in the long run, delay in response to reality stresses tends to be maladaptive. Psychoanalytic symbols support hiding from stresses rather than finding means by which the personality can deal with reality. Some examples follow: a man, who finds comfort in pictures which reflect his private fantasies whenever he is confronted with any reality rejection, will not strive to correct the cause of the rejection. People, who turn to music listening or TV drama at the end of the day to certain themselves in their discomforts, delay response to painful personal dramas. Latency age children respond to humiliation by investing their energies in fantasy play. There can be only a momentary cushion of adjustment provided by such reactive symbol formation.

This response is an evolutionary remnant of the reaction time that offers to high memory animal attention a moment of delay in which to decide to fight or flee. As a result of man's capacity for disjuncture a longer moment of delay is introduced that make possible choices based on abstract memory. A scanning process in which frontal lobe based recognition of danger elements are detected, as they become content inputs to the amygdala, influences this activity. The moment of delay permits abstract memories, organized as concept clusters, to influence the interpretation of percepts and memories. In pathological situations such mental activity opens a potential to disorganize reality testing, threaten future survival, or sunder equanimity. Banks of data contained in the ventromedial, dorsolateral frontal cortexes helps scanning to recognize content (both perceptual and memory) with linked potential for affect danger. Affects that threaten to disorganize the executive apparatus of the personality (ego) are responded to by a displacement of attention to substitute content such as symbols that are less threatening. When sufficient displacement takes place so that the relationship between the new representation and the original concept or percept is lost, cryptic psychoanalytic symbols are formed. Such symbols contribute content to dreams, poems, delusions, fantasies, phobias as well as poor reality testing.

SUMMARY

External perceptions and internal sensations that represent concepts, are scanned through the amygdala. The presence of potentially ego disorganizing affect content triggers nerve impluses, which are sent from the amygdala into an efferent circuit that generates Peripheral Autonomic Nervous System

activity, which produces visceral discharge that is detected by the brain through an afferent arc consisting of hormones, humeral agents, and the Vagus nerve, which activates additional catecholamine production in the raphe nuclei, the locus coeruleus, and the periaquaductal grey matter. Catecholamine hormone like substances are transported through microtubules and the vascular system of the brain to the amygdala in the anterior brain. As a result of the function of this circuit, generated affect is perpetuated. The catecholamines produced by the raphe nuclei and nuclei contained in the periaquaductal gray matter (LC), produce an enhanced affect stimulus, which invites further scanning aimed at comparing content, which is moving toward consciousness, against memory panels tuned to detect potential affect. When content approaches the consciousness areas of the temporal lobe, suppression[10] gates the content from consciousness. Drive energies continue to push related concept cluster contents and symbolically altered percepts that have latterly become linked to preexisting concept clusters, that have less valence for attracting affect, into the zone of scanning. Affect driven multiple cycles of scanning on a nonconscious level follow. Eventually contents with sufficiently attenuated affect pass into consciousness. Elements with strong affect are gated out of consciousness. Conscious awareness of relationship between the original referent and the non-gated one is lost. Abstract links between a manifest symbol and suppressed threatening referents within the concept cluster and perceptions are lost to consciousness. The concept cluster element that was chosen to become conscious becomes the psychoanalytic symbol.

NOTES

1 amygdalic -ventromedial frontal cortex complex -the AVFC

2 Cortically stored as part of a third level response.

3 Amygdalic ventromedial frontal cortex complex -see below.

4 Amygdala means almond in Greek.

5 On this primitive level of response, there is scientific support for structuralism.

6 Adapted from Le Doux (1996) Page 208.

7 i.e. processed derivatives of concept clusters

8 There are simple defenses such as denial which works alone. There are complex defenses which consists of combinations of simple

defenses such as repression which consist of denial, displacement and countercathectic symbol formation.

9 Since the term antecathexis as used by Freud has more than one meaning (see Freud (1900) "Interpretation of Dreams" p 605) I use the translation "countercathexis" to indicate the specific function herein described.

10 An innate function of these brain tissues (see Below).