Cognitive development, memory, trauma, treatment: An integration of psychoanalytic and behavioral concepts in light of current neuroscience research

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Abstract: The goal of Freud’s Project was to place all psychological functioning on a neurological foundation; however, the resources of his time were inadequate for the task. This article attempts to link basic psychoanalytic and behavioral constructs to current neuroscience, specifically the memory paradigm of multiple trace theory. We propose that Freud’s theory of early cognitive development, in which primary process is succeeded by secondary process, corresponds to the progression from a noncontextual taxon-based memory system to a locale system (mediated by hippocampal and cortical structures) in which memories are formed within space/time contexts. The effects of trauma within these models is then examined by noting how Freud’s views of repression and regression parallel neuropsychological hypotheses about the ways in which traumatic experience impacts specific brain areas. Finally, the treatment implications of this theoretical synthesis are explored. We posit that transference resembles the learning theory construct of generalization, and the non–contextualized coding of the taxon system. In conclusion, we suggest that orthodox psychoanalytic approaches may have overestimated the efficacy of words and intellectual vectors in effecting therapeutic change. Nonverbal strategies may be required to reach material that is stored in early developing brain areas that may be inaccessible to words.

In April of 1895, Freud began a work called The Project. Its goal was to place all mental functioning—both normal and abnormal—on a neurological foundation. He formally abandoned the effort several months later, in part because the medical resources of his time were not up to the task. However, he never gave up the hope that the two domains might someday be unified. Recent advances in neuroscience technology have rekindled the possibility that Freud’s old wish may be attainable, and there have been many recent attempts to update or interpret Freud’s project (e.g., Bilder & LeFever, 1998). Solms (2004) has noted the resur-
gence of interest in linking Freudian psychoanalysis and modern neuroscience. For example, researchers have focused on the possible correspondence between the right hemisphere and the Freudian unconscious (Schore, 2001), as well as the ways in which early traumatic experience impacts later functioning (Brockman, 2000; Pugh, 2002).

The goal of this article is to expand on these ideas, bringing together psychoanalytic theory, behavioral constructs, and current research in neuroscience. Specifically, we will attempt to draw parallels between Freud’s notion of primary and secondary processes and recent theoretical conceptions about amygdala versus hippocampal based memory systems. The theoretical model of multiple trace memory theory (Nadel, Samsonovich, Ryan, & Moscovitch, 2000) as well as the implications of this theory for the development of trauma-related symptoms will be discussed in relation to both Freudian and behavioral views. Finally, the treatment implications of this theoretical synthesis will be explored.

COGNITION

In 1900 and at various points throughout his later writings (e.g., 1911/1964, 1915/1964, 1933/1964) Freud proposed a model of early cognitive development. He postulated that the original form of mental functioning is one of “primary process.” Its operations are dominated by the “pleasure principle,” that is, the need for immediate discharge of tension without regard for, or awareness of, external reality. This is a solipsistic realm in which there are no boundaries yet developed between the self and the outer world. In primary process, wishes are represented as fulfilled through hallucinatory gratification, such as the conjuring up of imagery that attempts to satisfy a need. Primary process lacks comparisons, thinking, and language; experience is coded solely through sensory images.

Freud further characterized primary process as being without spatial and temporal distinctions. He was thus challenging the philosophy of Immanuel Kant, who believed that space and time were inherent to human perception. Freud notes that, in the unconscious,

there is nothing that could be compared with negation and we perceive with surprise an exception to the philosophical theorem that space and time are necessary forms of our mental acts. There is nothing in the id that corresponds to the idea of time. There is no recognition of the passage of time, and—a thing that is most remarkable and awaits consideration in philosophical thought—no alteration in its mental processes is produced by the passage of time. Wishful impulses which have been sunk into the id by re-
pression are virtually immortal; after the passage of decades they behave as though they had just occurred. (Freud, 1933/1964, p. 74).

Freud asserted (1915/1964, 1915–16/1964, 1938/1964) that the “unbound” energies of primary process, unfettered by a lack of inhibitory control, produce a medium in which condensations, displacements, and fusions of opposites take place. Thus, substitutions between persons, places, and things easily occur (e.g., another woman, female animal, or even enclosed space can substitute for one’s mother). The “here and now” can also easily replace the “there and then.” This lack of differentiation can be likened to the behavioral construct of generalization in which stimuli that are similar are reacted to in the same way. Thus, we propose that one can interpret primary process as operating under a broad generalization gradient.

The learning process that is presumed to accompany this phase can be likened to classical conditioning. It is largely associative in that infants can form connections between proximal stimuli. Behavior, at this point, can be characterized as “respondent” rather than “operant.” Infants respond to stimulation but cannot yet act purposefully to influence the environment.

Current psychobiological conceptions of early cognitive development bear striking resemblance to Freud’s notion of primary process. Critical areas of the brain, such as the orbital frontal cortex and the hippocampus, are not fully developed or adequately myelinated during the first years of life. Primary process thinking may indicate a lack of the executive functions thought to be controlled by the frontal lobes (Duncan, 1986). It is characterized by an inability to create and follow a plan, to flexibly adapt to changing situations, and to prioritize and sequence. Of particular relevance for the current article, however, is how aspects of primary process may relate to hippocampus development.

There has been considerable debate about the role of the hippocampus in memory formation and storage. According to the proponents of consolidation theory (e.g., Alvarez & Squire, 1994) the role of the hippocampus is to consolidate memories, which are ultimately stored elsewhere (in cortical structures). Consolidation theory has been recently challenged by proponents of “multiple trace theory” (e.g., Nadel, Samsonovich, Ryan, & Moscovitch, 2000) who propose that the hippocampus is always involved in some aspects of memory; specifically the tagging of memories with the location and time of their occurrence. According to this model, the role of the hippocampus is to provide and continue to store the temporal and spatial context of events.

There have been many models hypothesizing multiple memory sys-
tems. Declarative memories (representing information about people, places and things as well as the temporal and spatial relations between them) have been distinguished from procedural memories (memories that support the acquisition and expression of skilled performance; Cohen & Eichenbaum, 1993). Proponents of multiple trace theory have distinguished between “taxon” and “locale” memory systems (O’Keefe & Nadel, 1978). Taxon systems (which roughly correspond to procedural and emotional memory) do not require an intact hippocampus. Locale systems (which roughly correspond to declarative, or more specifically episodic, memory) rely on the hippocampus. Although this terminology is not currently used as frequently as other memory classification systems (e.g., procedural/declarative or episodic/semantic), it is useful for the current analysis because it points to the particular role of the hippocampus in providing time and space parameters and has specifically been discussed from a developmental framework (Jacobs & Nadel, 1985).

The taxon system is dominant in the first two years of life before the hippocampus is fully formed. It is characterized by learning that is free of contextual constraint. “Prior to the maturation of the hippocampal system, learning does not include acquisition of information about the space/time context within which early experiences transpire” (Jacobs & Nadel, 1985, p. 515). If there are no spatial–temporal markers, information learned at one place or time may be more easily generalized to other settings. This parallels the Freudian notion that material in primary process is fluid and easily interchanged. As with the primary process phase mentioned above, taxon stage learning seems characterized by the acquisition of the stimulus–stimulus and stimulus-response bonds, characteristic of classical conditioning.

One important component of the taxon system is the amygdala, which is responsible for evaluative learning, or the process of assigning affective significance to events. This structure is also known to mediate classical conditioning, specifically fear conditioning to simple unimodal stimuli (Phillips & LeDoux, 1992). Although episodic memories are not yet available in taxon systems, experiences (as with “primary process”) can be coded through emotional or sensory modalities (Jacobs & Nadel, 1985). It is also known that the right hemisphere, which is nonverbal, develops earlier than the left hemisphere (Schore, 2001). This further suggests that early learning is characterized by sensory images rather than language.

The taxon world is reminiscent of Freud’s primal “Realm of the Illogical” in which the governing rules of logic carry no weight, where urges with contrary aims exists side by side . . . (having) no organization or will . . . (and wherein) logical rules of thought do not apply (Freud,
1933/1964, p. 73). It is a “primitive and irrational domain in which causal connections are replaced by superficial ones” (Freud, 1938/1964, p. 168–169).

Following the primary process stage, Freud speculated in the Two Principles of Mental Functioning (1911/1964), secondary process evolves. However, primary process remains the thinking of the unconscious and is retained in dreams, fantasies, superstition, myths, and works of art. The succeeding secondary process is also governed by the pleasure principle, but with regard to the requirements of social constraints (“the reality principle”). The reality-oriented “ego” forms, and differentiations arise between self and other, as well as between objects in the external world. Discharge is postponed until the appropriate time, place, and person become available. Such suspension of discharge in turn requires an awareness of space and time dimensions. For example, in toilet training, the ability to postpone defecation in the present necessitates the knowledge that a bathroom will be available in the future. The ability to say “no” until an appropriate situation appears further depends on the development of ego functions such as attention and memory. The organism must attend to the environment in order to determine when particular behaviors are permitted. It must also remember the contexts in which specific actions led to specific consequences (Freud, 1938/1964). This can be likened to the production of “operant” responses, which are behaviors designed to gain reinforcement based on realistic assessments of the outer world.

The development of the hippocampus and what has been referred to as the “locale” memory system can be linked to the formation of some aspects of secondary process. Proponents of multiple trace theory hold that the hippocampus continues to store the spatial and temporal coordinates of a memory, even after many years have elapsed. Research demonstrating that even very old memories stimulate the hippocampus supports this notion (Nadel et al., 2000). After the development of the hippocampus, learning can be contextualized and provided with autobiographical details. Simultaneously, the left hemisphere, which develops later, allows language to be used to provide a coherent autobiographical narrative of one’s life (Schore, 2001). The ability to register spatial and temporal information, as well as the use of language, allows for discriminative learning. For example, a child can learn that a tarantula is to be feared if sitting on her shoulder, but not when in a cage at a museum (Jabobs & Nadel, 1985). Orbital frontal executive functions also assist in these distinctions.

The hippocampus has also been implicated in operant conditioning; specifically, it appears to mediate the ability to infer cause and effect relationships (Corbit & Balleine, 2000), a capacity that Freud clearly attrib-
utes to the secondary process ego. The hippocampus is also required in order to condition to the complex, multi-sensory context of an event (Phillips & LeDoux, 1992).

TRÄUMA

In Studies in Hysteria (1895/1964), Freud speculated that trauma occurs when an influx of stimulation floods the nervous system with more energy than it can absorb or discharge. He initially believed that such stimulation could stem from both internal and external sources. However, following his partial rejection of the “seduction theory” in 1897, etiological emphasis veered toward the role of “instinctual” (endogenous) excitations. This enhanced accent on internal excitations confounded the true nature of the traumatic material: was it composed of memories, instinctually induced fantasies, or some combination of the two? It should be noted, however, that Freud never fully abandoned the belief that externally based shocks could induce pathology. His emphasis on the relative import of the two vectors seemed to oscillate throughout his life. Given the realization that traumas emanating from the outer world do, in fact, occur, most post–Freudian research has explored the effects of such impacts. This will be the thrust of our further discussion.

When painful stimuli overwhelm protective barriers, Freud (1933/1964) hypothesized, the ego attempts to push it out of consciousness into the “abyss” of the unconscious. Amnesia therefore overtakes the traumatic incident; yet memory of it persists in the unconscious. This defensive mechanism works temporarily. But eventually the repressed material, after being transformed by the primary process operations that reign in the unconscious (rendered timeless, spaceless, and regressed into sensory images), returns in the form of symptoms (Freud, 1915/1964). Later material which resembles the earlier (“primal”) repressed content triggers anxiety, is itself repressed, and may incite a recurrence of symptoms. These later repressions may occur without the threatening input being allowed admission to consciousness.

For example, one patient, “Jim,” reported an extreme phobia of being near or in water, including a fear of bathing, going into pools, lakes, and oceans. Upon once being playfully pushed into the shallow end of a pool, he went into shock and had to be hospitalized. When questioned, Jim was unable to recall any traumatic experience involving water. Nevertheless, his father informed the therapist that the patient’s mother had attempted to drown Jim as an infant. Even after being told of this harrowing incident, the patient could not evoke any conscious memory of its having taken place. Yet his body had obviously “recalled” the life-threatening trauma. From a behavioral standpoint, the uncondi-
tioned stimulus of drowning produced an unconditioned fear response. Water became associated with drowning and produced fear as a conditioned response. This fear of water then generalized to all situations involving water or the connotations of water.

Freud felt that traumas also generated “fixations” of emotional and cognitive functioning; that is, part or all of the individual would become “stuck” at the point at which the trauma occurred. Fixations, in turn, led to “repetition compulsions”—the unconscious tendency to keep repeating past traumatic experiences. Since he believed that the pleasure principle ruled all mental functioning, Freud was puzzled at the wish to repeat painful experiences. In Beyond the Pleasure Principle (1920/1964), he attempted to account for this by assuming that repetition compulsions had the power to override the pleasure principle, and were caused by a “Death Instinct,” a conclusion strongly questioned by many of his successors.

The neuroscience model comes to similar, although not identical, conclusions about the role of trauma on cognitive functioning. Stress triggers a variety of neurochemical activities including the production of cortisol. Cortisol from earlier painful experiences may continue to operate in the brain, even after the stress is over. When an animal is exposed to early extreme trauma, responses to later stressors are exaggerated (Anisman, Zaharia, Meaney, & Merali, 1998). The impact of early trauma on later development is moderated by many complex factors including genetic susceptibility and maternal care (Anisman et al., 1998; Caldji, Diorio, & Meaney, 2000).

The stress response directly affects hippocampal functioning. While in moderate amounts cortisol enhances the effects of the hippocampus, at higher levels, it becomes disruptive (Jacobs & Nadel, 1998; Pugh, 2002). Thus, when trauma is intense, the hippocampus is rendered less operative. This interferes with the ability to code memories with their spatial and temporal markers intact. Therefore, the sensory or emotional aspects of an extremely stressful memory may be encoded in the absence of the context necessary to consciously remember that the event happened at a specific place and time.

Extreme acute or prolonged stress may cause permanent hippocampal damage. Research has consistently shown that individuals who suffer from Posttraumatic Stress Disorder have smaller hippocampal volume than matched controls (Nutt & Malizia, 2004). For example, one study found that hippocampal volume was significantly lower in women with histories of abuse compared with matched controls (Stein, Koverola, & Hanna, 1997). Another study found hippocampal volumes 8% smaller in veterans with PTSD compared with non–PTSD controls (Bremner et al., 1995).
Research has also shown that stress enhances amygdala function (e.g., Pissioti et al., 2002). Increased amygdala activation appears to be associated with flashbacks of highly emotional incidents involving “intense fear, terror or sexual intercourse” (Nutt & Malizia, 2004, p. 179). A characteristic of flashbacks associated with PTSD is their lack of spatial–temporal coordinates. A flashback feels as though it is happening in the here and now and is accompanied by the affect associated with current experience. The combination of decreased hippocampal activation with enhanced amygdala arousal leads to the encoding of decontextualized emotional and sensory impressions (Jacobs & Nadel, 1998). Under stress, information may also bypass cortical structures. LeDoux (1996) has noted that there is a direct pathway between the thalamus and the amygdala that acts as a rapid responder and can influence emotional processing independent of cortical control. Furthermore, prefrontal cortex has been shown to be deactivated in individuals with PTSD (Nutt & Malizia, 2004).

In the neuroscience model, input received while the individual is under stress may not be processed by cortically and hippocampally conscious memory systems. Instead, it is more likely to be mediated by the earlier developing and faster acting taxon systems (Brockman, 2000). This may parallel Freud’s contention that trauma instigates repression, which casts painful material out of consciousness (or even precludes it from entering consciousness), regressing it into systems that were dominant earlier in life. This material will also be less accessible to words. Bessel Van der Kolk (1996) observes that recollection of a traumatic episode is accompanied by increased blood flow to the limbic system but diminished flow to Broca’s (speech) area.

Behavioral theorists have also long noted that animals under stress revert to earlier, less sophisticated problem solving mechanisms (O’Kelly, 1940) that dominated prior functioning. For example, rats experience regression to earlier learned habits when a shock is presented after a new behavior is learned (Hamilton & Krechevsky, 1933). Furthermore, a rat shocked during an initial conditioning trial tends to fixate on the earliest learned material (Hamilton & Krechevsky, 1933). These behavioral studies of constructs such as fixation, regression, and perseveration represented initial attempts to synthesize behavioral and analytic models, which have been largely neglected, and deserve current reconsideration.

The construct of the repetition compulsion, which emerges from fixation in the Freudian system, may be explained by the finding that earlier learning styles and behavioral patterns re-emerge in stressful situations. Furthermore, when operating under the broad generalization gradient of the earlier taxon learning systems, with its ablation of spatial
and temporal discriminations, all current stimuli may be reacted to as echoes from the past. Thus, individuals may repeat maladaptive past behaviors, acting toward current people and situations in terms of past experience.

Although these perspectives are similar, they are not fully compatible. An important difference lies with the role of motivation. The neuroscience model hypothesizes that under stress, information may not be recalled simply because the appropriate memory systems were either not formed or not functioning while the traumatic event occurred. However, Freud believed that threatening thoughts, feelings, or events may be pushed into the unconscious (repressed) because of a motivation to protect the ego from anxiety. Both views, however, question the veracity of recalled memories. Freud’s rejection of the seduction theory obscured the true nature of recollected material, questioning whether it was memory, fantasy, or some hybrid of the two. Comparably, the neuroscience model acknowledges that all memory is a reconstructive process and may be driven by confabulation and the “smoothing over” of context to complete fragmented impressions (Jacobs & Nadel, 1998). This process resembles Freud’s (1900/1964) concept of “secondary revision,” in which disconnected unconscious material may be linked together through a rationalizing process that gives it a facade of continuity and logical coherence.

An implication of this model is that registration of memories in a traumatic context can be distorted, and that details of that memory may never be fully accessible. Although recovery of memories of repressed events is possible, the veridicality of these memories has been the source of intense debate. Although some contend that such material can be accurately retrieved (Brown, Scheflin, & Whitfield, 1999), others argue that repressed memories are rarely, if ever, accurate (Loftus & Ketcham, 1994). In fact, recent data about the authenticity of repressed memories has suggested that individuals who have difficulty accessing the specific space/time context of memories are more likely to become confused between reality and fantasy (did this actually happen to me or did I imagine or dream it?) and are therefore more likely to have a false memory (McNally, Clancy, Barrett, & Parker, 2005).

**DREAMS, MEMORY CONSOLIDATION, AND CORTISOL**

It has long been known that an essential function of sleep is the strengthening of memories. However, recent research has suggested that explicit, episodic memories (or locale memories, as we have referred to them) are only strengthened during sleep that occurs early in the night and is characterized by slow delta waves and a lack of REM
(rapid eye movement; Plihal & Born, 1999). In contrast, nonepisodic memories (including procedural and emotional memories—we have referred to as taxon memories in the current article) are preferentially enhanced during REM sleep that occurs later in the night (Payne & Nadel, 2004; Plihal & Born, 1999).

Although it was previously thought that dreaming only occurred in REM sleep, recent evidence has suggested that dreams also occur in non–REM sleep (Nielsen, 2000). However, reported dream quality is different when an individual is wakened during REM versus non–REM sleep. Dreams reported during REM sleep have few episodic memories and generally emerge as bizarre and fragmented, in which normal rules of space and time can be bypassed (Payne & Nadel, 2004). For example, during REM “it is possible to walk through walls, fly, interact with an entirely unknown person as if she was your mother, or stroll through Paris past the Empire State Building” (Payne & Nadel, 2004, p. 672). In other words, dreams during REM lack the temporal and spatial qualities of the hippocampus-based locale memory system. In contrast, dreams during non–REM tend to involve both recent and remote episodic (locale) memories and generally lack the bizarre fantasy quality of REM dreams (Payne & Nadel, 2004).

Sleep cycles vary throughout the night. Initially, slow-wave sleep dominates and REM is lacking. In the second half of the night, REM increases. These changes are mediated by neurochemical mechanisms. Although several neurotransmitters are involved in sleep (e.g., serotonin and acetylcholine) recent research has focused on the role of cortisol (Payne & Nadel, 2004). Cortisol has been shown to rise continually as night progresses, causing interference with hippocampus functioning (or hippocampus–cortical connections). Thus, episodic (or locale) memory consolidation that relies on intact hippocampal functioning only successfully occurs early in the sleep cycle. Memories that do not require hippocampal involvement are consolidated later. Furthermore, the bizarre, fragmented nature of REM may be due to decrease in temporal and spatial contextualization which occurs as hippocampal/cortical connections become less functional. Since cortisol is also secreted during traumatic events, similar mechanisms of hippocampal deactivation and resulting primary process resurgence may also manifest in such situations.

**TREATMENT**

We will now explore the implication of these models for therapy. The overriding therapeutic goal in Freudian psychoanalysis involves making the unconscious conscious. Freud also referred to this as shifting the
patient from primary process to secondary process thinking. This was to be achieved by attaching unconscious nonverbal material to *words*, thus facilitating abreaction, catharsis, and working through of the repressed. The other main strategy entailed resolution of the transference. The transference was a manifestation of the repetition compulsion, which in turn arose from fixations. When a patient re-enacted early pathological behaviors in therapy, intellectual analysis would be used to make conscious its origins, purposes, and current inexpediency, in order to “cure” it.

This model of therapy can be likened to an attempt to transfer content from taxon-based systems to hippocampal/cortical ones. The goal would be to contextualize traumatic memories and thereby gradually convince the patient that the “here and now” is no longer the “there and then.” In a behavioral model this resembles stimulus discrimination, that is, learning not to respond to current stimuli as one did in the past.

This is primarily a verbal enterprise in which words are the tools by which information is transferred from the decontextualized primary process to the logical and coherent domain of secondary process. One may suggest that sensory images deprived of their verbal correlates exist in the “anywhere or anywhen” realm characteristic of non-locale systems. The addition of words with their relational properties (e.g., tenses, prepositions, etc.) may be necessary to provide images with spatial and temporal coordinates that shift them from taxon to cortico-hippocampal governance. Freud (1915/1964) noted “what repression denies to the rejected idea . . . [is], translation of the idea into words which are to remain attached to the object (p. 203) . . . . The idea which is not put into words . . . remains in the unconscious in a state of repression” (p. 203). Thus, the goal of therapy involves “linking up of it with the verbal ideas of the words corresponding with it . . . make it possible for the primary process to be succeeded by the secondary process” (p. 202). This crucial development of ego functioning “gives mental processes an order in time and submits them to ‘reality testing’” (Freud, 1923/1964, p. 55).

Later in his life, Freud became pessimistic about the effectiveness of psychoanalysis as a therapeutic tool. In “Analysis Terminable and Interminable” (1937/1964), he spoke of seeing patients he had believed fully analyzed relapse into their old maladaptive habits. Based on what we have discussed up to this point, it may be that this lack of improvement stemmed from the overly optimistic belief that verbal and intellectual (left hemisphere) interventions could effectively influence infantile, nonverbal traumas. From the neuroscience perspective, traumas that have occurred early in life, when taxon systems predominate, may be inaccessible to words (e.g., the case of Jim). It might be difficult or impossible to contextualize information if the brain areas required were not de-
veloped, or were shut down when the information was originally absorbed. Instead, it may be necessary to directly access and intervene on the level of the amygdale-based taxon system (Jacobs & Nadel, 1985). One proposed mechanism for directly contacting taxon systems is to place the individual under stress during therapy (Jacobs & Nadel, 1985). However, deliberately imposing stress may not be necessary, and risk re-traumatization. In the "therapeutic regression" of the transference, emotionally charged re-enactments naturally occur. The transference itself can be viewed within a classically conditioned paradigm. In transference, the patient acts toward the therapist as a parent or other significant figure with whom he or she experienced still unresolved conflicts. Although he largely chose to reject Freudian constructs, John Watson (considered the father of behaviorism) himself tried to explain transference phenomena through classical conditioning. He viewed it as a conditioned emotional response that has been overgeneralized in maladaptive ways (Rilling, 2000). Thus, it (like all repetition compulsions) seems characterized by the broad generalization and context independence of the taxon system. We argue that it may be possible to directly access the taxon system through the "battleground" of the transference, which then provides opportunities to counter condition or extinguish maladaptive conditioned responses.

Achieving this goal may also require largely nonverbal, non-intellectual, communications. By not intellectually interpreting a negative transference but acting in a remedial way, a therapist may operate within the unconscious (taxon) system and slowly begin to alter pathological emotional responses. A similar point was made by Brockman (2000) who noted that interpretation of the negative transference may only be effective when hippocampal circuits are intact (and may even cause harm otherwise). A more ego-supportive, nurturing, and emotionally attuned approach may be necessary when the patient is in a regressed primary process/taxon state.

Actually, all good therapists may intuitively use extinction and counter-conditioning in their work. Through not repeating negative interactions from childhood (extinction)—or even attempting to provide "antidote" experiences (counter-conditioning), aversive conditioned responses to significant figures may gradually decrease. Franz Alexander (1946) spoke of this as the "Corrective Emotional Experience" and designated it the main agent of therapeutic change. Meta-analytic studies of therapeutic outcome (Horvath & Symonds, 1991) appear to corroborate this view. They have consistently shown that the quality of the working therapeutic alliance is the most predictive factor of positive outcome, regardless of the specific theoretical orientation of treatment. Therefore, while the value of verbal interventions should not be dis-
counted, care should be taken that they be couched in emotionally appropriate and empathic climates. Accordingly, such nonverbal variables as: tone, tempo, rhythm, timbre, prosody and amplitude of speech, as well as body language signals may need to be re–examined as essential aspects of therapeutic technique.

Though our article posits an overemphasis on verbal–left hemisphere modalities in psychoanalytic treatment, there have been exceptions. John Gedo (1993) has spoken of the need to approach therapeutic interactions in a “hierarchical” fashion, and gives Fereczi, Balint, Melanie Klein, Winnicott, and others as endorsing such a view. However, it is unclear to what extent truly nonverbal elements were really applied in their work.

The understanding that two types of memory systems are present has further implications for the therapeutic context. Miyashita (2004) has pointed out that an individual processes information both from top down (in which cortical processes predominate and information is consciously accessed) as well as from the bottom up (in which lower systems predominate and cortical systems must make senses of images or feelings that are generated from lower cortical centers). When one is asked to voluntarily summon up a memory of the past, it is likely that cortical/hippocampal systems mediate the process. By the very definition of “memory,” the material is placed within a locale (episodic) framework; that is, it is assessed as having occurred at another, specific place and time. However, a hallucination, flashback, or intense recollection may seem to be happening in the here and now, and therefore initiated by lower, more primitive centers. These memories may be described as emanating from the “taxon” systems and mediated by other structures (such as the amygdala) that bypass hippocampal–cortical connections.

Therapy sessions typically utilize both vectors. Patients are often asked to explore early memories, but these initially deliberate and organized recollections often give way to more involuntary and “loose” associations that may blur time and space distinctions, and even dissolve logical relationships (“The laws of logic do not apply in the Id,” Freud, 1933/1964, p. 73). This would signify the incursion of primary process material and mechanisms into consciousness. Indeed, Freud’s injunction of “free association” was an attempt to bypass the semantic ordering of ego–defense operations for direct access to the unconscious. It should be noted that the transition from ordered episodic memory recollection to looser memory associations that occurs during a therapy session may parallel the progression of dreams throughout the night as discussed above. Furthermore, the phenomenon of transference also tends to conflate now/then, here/there contexts, again suggesting the involvement of nonlocale systems.
In summary, this article has attempted to integrate psychoanalytic, behavioral and neuroscientific perspectives. By pointing out brain systems that may underlie certain subjective experiences, we have attempted to explore the fundamental connection between what has traditionally been considered disparate areas of study. Our goal was not to reduce psychical functioning to brain states (an error termed the “mereological fallacy” by Bennett & Hacker, 2003), but to demonstrate that it is a fundamental error to place the “mental” and “physical” in opposition to one another. Rather, the mind/brain should be seen as a unified whole, and the mechanisms it employs as psychophysical strategies intended to promote its integrity and ensure its survival.

References


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