

Advances in Neuropsychoanalysis, Attachment Theory, and Trauma Research: Implications for Self Psychology

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In 1971, Heinz Kohut, trained in neurology and then psychoanalysis, published *The Analysis of the Self*, a detailed exposition of the central role of the self in human existence. This classic volume of both twentieth century psychoanalysis and psychology was more than a collection of various clinical observations—rather it represented an overarching integrated theory of the *development, structuralization, psychopathogenesis, and psychotherapy of disorders of the self*. Although some of these ideas were elaborations of previous psychoanalytic principles, a large number of his concepts, including an emphasis on self rather than ego, signified an innovative departure from mainstream psychoanalysis and yet a truly creative addition to Freud's theory.

KOHUT EXPANDED THE THEORETICAL AND CLINICAL CONCEPTIONS OF SELF psychology in his second volume, *The Restoration of the Self* (1977)

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and finally in *How Does Analysis Cure?* (1984). Over the course of his career he continually attempted to deepen his understanding of the four basic problems he initially addressed in his seminal volume: How do early relational affective transactions with the social environment facilitate the emergence of self? (*development of the self*); How are these experiences internalized into maturing self-regulating structures? (*structuralization of the self*); How do early forming deficits of self-structure lead to later self-pathologies? (*psychopathogenesis*); and How can the therapeutic relationship lead to a restoration of self? (*the mechanism of psychotherapeutic change*).

In this paper I want to suggest that although Kohut's ideas represent perhaps the most significant revision of classical psychoanalysis in the last 50 years, despite the fact that he was originally trained as a neurologist, he, like his contemporaries, was highly ambivalent about the incorporation of scientific data into the core of psychoanalysis and into the core of self psychology. Although there have been certain notable exceptions, this ambivalence still exists within current self psychology, even now when an interdisciplinary perspective is rapidly emerging in a number of other clinical and scientific disciplines that border psychoanalysis.

In an earlier work I suggested that the time is right for a rapprochement between psychoanalysis, the study of the unconscious mind, and the biological sciences (Schore, 1997c). Developmental psychoanalysis is currently generating a complex model of the early ontogeny of the biological substrate of the human unconscious (Schore, in press a), one that can potentially bridge the relational and intrapsychic realms of the unconscious mind. And neuropsychology is also contributing to this effort, by identifying the brain systems involved in the development of the dynamic unconscious (Schore, 2002a). Writing in the neuropsychanalytic literature, Watt (2000) describes the critical importance of recent work on "(neuro) development":

In many ways, this is the great frontier in neuroscience where all of our theories will be subject to the most acid of acid tests. And many of them I suspect will be found wanting. . . . Clearly, affective processes, and specifically the vicissitudes of attachment, are primary drivers in neural development (the very milieu in which development takes place, within which the system cannot develop) [p. 191].

In the following I will first present a brief overview of Kohut's concepts that represent the core of self psychology. In subsequent sections I integrate interdisciplinary data in order to construct a psychoneurobiological conception of the *development* and *structuralization* of the self, focusing on the experience-dependent maturation of the early developing right brain. Then, in a major focus of this work, I apply this developmental neuropsychanalytic perspective to the *psychopathogenesis* of severe deficits in the self system. In particular, I articulate a model of the self psychology and neurobiology of infant trauma and the etiology of posttraumatic stress disorder and borderline states. Finally I will offer thoughts on the neurobiology of regulatory structures that result from *psychotherapeutic change*.

Introduction: Core Concepts of Kohut's Model

Development of the Self

Perhaps Kohut's most original and outstanding intellectual contribution was his developmental construct of selfobject. Indeed, self psychology is built upon a fundamental developmental principle—that parents with mature psychological organizations serve as selfobjects that perform critical regulatory functions for the infant who possesses an immature, incomplete psychological organization. The child is thus provided, at nonverbal levels beneath conscious awareness, with selfobject experiences that directly affect the vitalization and structural cohesion of the self. According to Wolf (1988):

The most fundamental finding of self psychology is that the emergence of the self requires more than the inborn tendency to organize experience. Also required is the presence of others, technically described as objects, which provide certain types of experiences that will evoke the emergence and maintenance of the self [p. 11].

The selfobject construct contains two important theoretical components. First, the concept of the mother–infant pair as a self–selfobject unit emphasizes that early development is essentially characterized as interdependence between self and objects in a system. This core concept of Kohut's theory was a major intellectual impetus for the expansion of the relational perspective in psychoanalysis. Indeed, his emphasis on the

dyadic aspects of unconscious communications shifted psychoanalysis from a solely intrapsychic to a more balanced intrapsychic–relational perspective. This challenged psychoanalysis to explore mechanisms that could integrate both the realms of a one-person psychology and a two-person psychology.

The second component of the selfobject construct is the concept of regulation. In his developmental speculations Kohut (1971, 1977) states that the infant's dyadic reciprocal regulatory transactions with selfobjects allows for the maintenance of his internal homeostatic equilibrium. These regulating self–selfobject experiences provide the particular intersubjective affective experiences that evoke the emergence and maintenance of the self (Kohut, 1984). Kohut's idea that regulatory processes and structures are fundamentally involved with affect is supported in current interdisciplinary studies that are highlighting not just the centrality of affect, but also affect regulation. Regulation thus occupies the intellectual core of Kohut's model, just as it does in the works of Freud (Schore, 1997c), Bowlby (Schore, 2000a, b, 2001c), and Klein (Schore, 2002d).

Despite his intense interest in the early ontogeny of the self, over the course of his career Kohut never spelled out the precise developmental details of his model, nor did he attend to the significant advances in developmental psychoanalysis that were occurring simultaneously to his own theorizing. There is now agreement that current psychoanalysis is “anchored in its scientific base in developmental psychology and in the biology of attachment and affects” (Cooper, 1987, p. 83). And yet it is only recently that self psychology has begun to incorporate the broad range of developmental research into its theoretical model. The integration of current attachment theory in very recent volumes of this journal is an example of that effort (Diamond and Blatt, 1999).

Structuralization of the Self

A cardinal principle of Kohut's model dictates that as a result of self–selfobject experiences the infant becomes able to perform the drive-regulating, integrating, and adaptive functions that had previously been performed by the external object. Specifically, he posits that phase-appropriate maternal optimal frustrations of the infant elicit “transmuting internalization,” the developmental process by which selfobject function is internalized by the infant and psychological regulatory structures are

formed. Indeed, the essential experience and definition of the self are built out of internalized selfobject functions that allow for the emergence of more complex psychological regulatory structures.

These ideas on psychic structure, in addition to the aforementioned effects of regulation on the maintenance of homeostatic equilibrium, clearly direct the theory toward not a psychology but a psychobiology of the self. However, Kohut, like Freud before him (Schoore, 1997c), eschewed his earlier neurological knowledge, and attempted to create a purely psychological model of the unconscious systems that underlie human functioning. Three days before his death he (Kohut, 1981) declared, "I do not believe, however hard as it was tried, that there is a possibility to create such a misalliance as psychobiology, or biopsychology or something of that order" (p. 529).

When self psychology, like psychoanalysis in general, discards the biological realm of the body, when it overemphasizes the cognitive and verbal realms, it commits Descartes' error, "the separation of the most refined operations of mind from the structure and operation of a biological organism" (Damasio, 1994, p. 250). Damasio (1994) now describes the essential adaptive function of the brain:

The overall function of the brain is to be well informed about what goes on in the rest of the body, the body proper; about what goes on in itself; and about the environment surrounding the organism, so that suitable survivable accommodations can be achieved between the organism and the environment [p. 90].

Indeed, according to Damasio, the self is a "repeatedly reconstructed biological state" that "endows our experience with subjectivity."

This same critique has been leveled against the heavy emphasis on cognition in developmental psychoanalysis. Lieberman (1996) asserts:

In the last two decades . . . efforts at understanding the subjective world of the infant have focused primarily on mental representations as the building blocks of inner experience. The baby's body, with its pleasures and struggles, has largely been missing from this picture [p. 289].

In upcoming sections of this paper I will suggest that very recent information on the developmental neurobiology of the selfobject

relationship (Schoore, 1994; Mollon, 2001) and the early developing right hemisphere, which is more deeply connected into the body than the left, can deepen Kohut's concept of self. Indeed, it is now thought that the function of the right hemisphere is to "maintain a coherent, continuous, and unified sense of self" (Devinsky, 2000). Current neuroscience is now intensely interested in "self-representation in neural systems," representations which "coordinate inner body signals to generate survival-appropriate inner regulation" that allow the organism "to act as a coherent whole" (Churchland, 2002, p. 310). *The biological organism, the body, must be brought into the core of self psychology.*

Psychopathogenesis

Kohut proposes that a defective self and an impaired regulatory structure lie at the foundation of early forming psychopathologies. He (Kohut, 1971) describes "the role of specific environmental factors (the personality of the parents, for example; certain traumatic external events) in the genesis of the developmental arrest" (p. 11), and speculates that when "the mother's response are grossly unempathic and unreliable . . . no transmuting internalization can take place, and the psyche . . . does not develop the various internal functions which re-establish narcissistic equilibrium" (p. 65). In a continuation of this principle, current writers in self psychology affirm that affect dysregulation is a central principle of psychopathogenesis. According to Lichtenberg and his colleagues (1996): "Self psychologists have demonstrated that disturbed regulation of physiological requirements in patients result from primary disturbances or deficiencies in [selfobject] experiences" (p. 143).

Self psychology has recently become very interested in the problem of trauma, an area of controversy since the dawn of psychoanalysis. In his earliest writings Freud accepted Janet's (1889) idea that dissociation is the central force in psychopathology, but he later rejected this for his repression theory. In classic writings Janet (in van der Kolk, 1996) postulated that "all [traumatized] patients seem to have the evolution of their lives checked; they are attached to an insurmountable object" (p. 53), and that the major psychological consequence of trauma is "the breakdown of the adaptive mental processes leading to the maintenance of an integrated sense of *self*" (in Liotti, 1999, p. 293; italics added).

In later sections on psychopathogenesis I will suggest that recent studies in developmental traumatology indicate that experiences with a traumatizing caregiver negatively impact the child's attachment security, right brain maturation, and sense of self. I will also propose that relational trauma and dissociation are common elements of the histories of borderline personality disorders, a clinical population of increasing interest to self psychology.

Psychotherapy

The selfobject and regulatory concepts embedded in Kohut's developmental model clearly suggest that affect and affect regulation are a primary focus of the treatment of early forming personality disorders. Indeed, Kohut's major contribution to clinical psychoanalysis is the expansion of its techniques to include the treatment of the deficits of affect regulation of early forming personality disorders, especially narcissistic personality disorders. In therapeutic models of such patients, all schools of contemporary psychoanalysis are now emphasizing the centrality of affect. Self psychology has been at the forefront of this trend, and it has recently been asserted that "Kohut makes major contributions to the understanding of emotional life, and his conceptualizations have far-reaching implications for the understanding and treatment of emotional states" (Siegel, 1996, p. 1).

Furthermore Kohut (1984) prescribes that "psychoanalysis cures by the laying down of psychological structure (p. 98). In upcoming sections I will argue that neuropsychoanalysis is now in a position to offer important information about the precise nature of the affect-regulating structures described by self psychology, and can elaborate the critical mechanisms by which the self-selfobject transactions embedded in the infant-mother and patient-therapist dyads create a growth-facilitating environment for the experience-dependent maturation of these same structures.

With this introduction in mind, throughout the following integration of interdisciplinary data into self psychology, keep in mind the words of Kohut's colleague, Michael Basch (1995):

The more I know about how we are designed to function—what neurophysiology, infant research, affect theory, cognitive psychology,

semantics, information theory, evolutionary biology, and other pertinent disciplines can tell me about human development—the better I am prepared to be empathic with a patient’s communication at a particular time in his or her treatment [p. 372].

*Development: Regulated Affective Communications,
Self–Selfobject Interactions, and the Dyadic Genesis of a
Secure Attachment*

In a recent review of Kohut’s work, Siegel (1996) concludes:

Although developmental concepts sit at the heart of Kohut’s theory, the microscopic elements of early development are not available for study. . . . The infant’s critical early states are unavailable to psychoanalysis (p. 197). The field of infant research, however, with its ingenious methods of investigation, does have access to the information we seek. Its observations are rich and can provide psychoanalysis with valuable information and explanations [p. 198].

Toward that end, in *Affect Regulation and the Origin of the Self* and subsequent works, I suggest that very recent research from developmental neuropsychology and affective neuroscience can make important contributions to a deeper understanding of how early attachment experiences indelibly affect the trajectory of the self over the course of the life span.

The essential task of the first year of human life is the creation of a secure attachment bond of emotional communication between the infant and primary caregiver. Indeed, research now suggests that “learning how to communicate represents perhaps the most important developmental process to take place during infancy” (Papousek and Papousek, 1997, p. 42). Developmental researchers Feldman, Greenbaum, and Yirmiya (1999) observe:

Face-to-face interactions, emerging at approximately 2 months of age, are highly arousing, affect-laden, short interpersonal events that expose infants to high levels of cognitive and social information. To regulate the high positive arousal, mothers and infants . . .

synchronize the intensity of their affective behavior within lags of split seconds [p. 223].

These dyadic experiences of “affect synchrony” (Kohutian “mirroring”) occur in the first expression of positively charged social play, what Trevarthen (1993) terms “primary intersubjectivity,” and at this time they are patterned by an infant-leads–mother-follows sequence. In this communicational matrix, both match psychobiological states and then simultaneously adjust their social attention, stimulation, and accelerating arousal to each other’s responses. In such synchronized contexts of “mutually attuned selective cueing,” the infant learns to send specific social cues to which the mother has responded, thereby reflecting “an anticipatory sense of response of the other to the self, concomitant with an accommodation of the self to the other” (Bergman, 1999, p. 96).

According to Lester, Hoffman, and Brazelton (1985), “synchrony develops as a consequence of each partner’s learning the rhythmic structure of the other and modifying his or her behavior to fit that structure” (p. 24). In order to enter into this synchronized communication, the mother must be psychobiologically attuned not so much to the child’s overt behavior as to the reflections of the rhythms of his internal state. These are critical events, because they represent a fundamental opportunity to practice the interpersonal synchronization of biological rhythms. And so, in these exchanges of affect synchrony, as the mother and infant match each other’s temporal and affective patterns, each recreates an inner psychophysiological state similar to the partner’s.

In such positively charged heightened affective moments, not only the tempo of their engagement but also their disengagement and reengagement is coordinated. The more the psychobiologically attuned mother tunes her activity level to the infant during periods of social engagement, the more she allows him to recover quietly in periods of disengagement, and the more she attends to the child’s reinitiating cues for reengagement, the more synchronized their interaction. These mutually attuned synchronized interactions are fundamental to the healthy affective development of the infant.

The context of a specifically fitted interaction between the infant and mother has been described as a resonance between two systems attuned to each other by corresponding properties (Sander, 1991). When synchronously vibrating with a neighboring object, a resonant system produces the largest and most prolonged possible response to the object.

Resonance refers to the condition in which an object or system is subjected to an oscillating signal having a frequency at or close to that of a natural vibration of the object or system and the resulting amplification of the natural vibration. In other words, an amplification of state especially occurs when external sensory stimulation frequency coincides with the organism's genetically encoded endogenous rhythms. The transfer of emotional information is thus intensified in resonant contexts. This means that the resonating caregiver does more than reflect back the infant's state. Rather, in cocreating a context of intersubjective resonance, her role as a "biological mirror" (Papoušek and Papoušek, 1979) is more precisely described as an "amplifying mirror" (Schore, 1994).

It is now well established that the primary caregiver is not always attuned and optimally mirroring, that there are frequent moments of misattunement in the dyad, ruptures of the attachment bond. The disruption of attachment bonds in infancy leads to a regulatory failure and an "impaired autonomic homeostasis" (Reite and Capitanio, 1985). Studies of interactive attunement following dyadic misattunement, of "interactive repair" (Tronick and Cohn, 1989), support Kohut's (1977) assertion that the parental selfobject acts to "remedy the child's homeostatic imbalance." In this pattern of "disruption and repair" (Beebe and Lachmann, 1994), the "good enough" caregiver who induces a stress response in her infant through a misattunement reinvents in a timely fashion a reattunement, a regulation of the infant's negatively charged affective state. Thirty years ago Kohut (1971) speculated that phase-appropriate maternal optimal frustration elicits the developmental process by which selfobject function is internalized. Current developmental data are consonant with this, although interdisciplinary research emphasizes that not just optimal stressful frustration but interactive repair is essential to the internalization of a structural system that can regulate stressful negative affect.

The dual regulatory processes of affect synchrony that creates states of positive arousal and interactive repair that modulates states of negative arousal are the fundamental building blocks of attachment and its associated emotions. They also allow for the maximization of the communication of emotional states within an intimate dyad, and represents the psychobiological underpinning of empathy, a phenomenon of intense interest to self psychology. Kohut (1977) describes that as a result of the empathic merger of the child's rudimentary psyche with the maternal

selfobject's highly developed psychic organization, the child experiences the feeling states of the selfobject as if they were his own.

Selfobjects are thus external psychobiological regulators that facilitate the regulation of affective experiences, and they act at nonverbal levels beneath conscious awareness to cocreate states of maximal cohesion (Wolf, 1988; Palombo, 1992; Schore, 1994; Mollon, 2001). Lichtenberg et al. (1996) point out that there are two classes of selfobject regulatory experiences: vitalization and soothing. If the former refers to the interactive regulation of positive affect, the latter refers to the interactive regulation of negative affect. These same processes are highlighted in current psychobiological models of attachment, now defined as the interactive regulation of states of biological synchronicity between organisms (Schore, 2000a, b, 2001a). Through the mechanism of the dyadic regulation of emotion, the baby becomes attached to the regulating caregiver who expands opportunities for positive and minimizes negative affective states.

Lichtenberg's group (Lichtenberg et al., 1992) also asserts that: "Regulation of state lies at the heart of our theory. In infancy . . . success in regulating smoothness of transitions between states is a principal indicator of the organization and stability of the emergent and core self as well as caregiver success" (p. 162). Emde (1983) identifies the primordial central integrating structure of the nascent self to be the emerging "affective core" which functions to maintain positive mood and to regulate the infant's interactive behavior, and Weil (1985) states that "the infant's initial endowment in interaction with earliest maternal attunement leads to a basic core which contains directional trends for all later functioning" (p. 337).

Structuralization: Selfobject and Attachment Dynamics and the Development of the Right Brain

Kohut (1977) describes a core or "nuclear self," an early developing structure that is the basis for "our experience that *our body and mind form a unit in space and a continuum in time*" and that "forms *the central sector of the personality*" (p. 178; italics added). What do we now know about how early selfobject regulatory experiences are internalized into the developing self, and why do emotional communications play such a central role in the evolution of the core self?

In studies of “primary and secondary intersubjectivity” Trevarthen (1990) asserts that, “the intrinsic regulators of human brain growth in a child are specifically adapted to be coupled, by emotional communication, to the regulators of adult brains” (1990, p. 357). Even more specifically, researchers Semrud-Clikeman and Hynd (1990) now conclude: “The emotional experience of the infant develops through the sounds, images, and pictures that constitute much of an infant’s early learning experience, and are disproportionately stored or processed in the right hemisphere during the formative stages of brain ontogeny” (p. 198).

Indeed, the early maturing emotion processing right brain is dominant in human infants and for the first three years of life (Schore, 1994; Chiron et al., 1997). A very recent MRI study of infants reports that the volume of the brain increases rapidly during the first two years, that normal adult appearance is seen at two years and all major fiber tracts can be identified by age three, and that infants under two years show higher right than left hemispheric volumes (Matsuzawa et al., 2001). It is now established that the massive human brain growth spurt occurs at this same time (Dobbing and Sands, 1973), and that this growth is experience-dependent (Schore, 1994, 1996, 1998a, b, c, 2000c, d, 2001d).

Over the course of a number of works I have suggested that attachment represents synchronized dyadic bioenergetic transmissions (1994), that resonant emotional transactions involve synchronized and ordered directed flows of energy in the infant’s and mother’s brains (2000b), that the attachment dynamic involves the right brain regulation of biological synchronicity between organisms (2001a), and that the developing self system is located in the early maturing right hemisphere (1994, 2000c). This conception confirms Wolf’s (1988) assertion that early selfobject experiences provided to the child directly affect the energetic vigor and structural cohesion of the self.

In *Affect Regulation and the Origin of the Self* I asserted that the regulatory transactions embedded in self–selfobject transactions, equated with the emotional communications embedded in the attachment relationship, specifically impact the unique neurobiological processes of the early developing right hemisphere. Very recent neuroimaging studies demonstrate that infants as young as two months show right hemispheric activation when exposed to a woman’s face (Tzourio-Mazoyer et al., 2002), and that the human maternal response to an infant’s cry is also accompanied by activation of the (mother’s) right brain (Lorberbaum et al., 2002).

The right hemisphere, more so than the left, forms extensive connections with the emotion processing limbic system. The limbic system derives subjective information in terms of emotional feelings that guide behavior (MacLean, 1985), and functions to allow the brain to adapt to a rapidly changing environment and organize new learning (Mesulam, 1998). A large number of studies now indicate that this hemisphere is dominant not only for the nonconscious reception (Adolphs et al., 1996; George et al., 1996; Borod et al., 1998; Nakamura et al., 1999), expression (Borod, Haywood, and Koff, 1997), and communication (Blonder, Bowers, and Heilman, 1991) of emotion, but also for the physiological and cognitive components of emotional processing (Spence, Shapiro, and Zaidel, 1996), the control of spontaneously evoked emotional reactions (Dimberg and Petterson, 2000), the modulation of "primary emotions" (Ross, Hohman, and Buck, 1994), and the adaptive capacity for the regulation of affect (Schore, 1994, 1999a, d, e, 2000b, c, 2001a).

Current findings in neuroscience further suggest that "while the left hemisphere mediates most linguistic behaviors, the right hemisphere is important for broader aspects of communication" (Van Lancker and Cummings, 1999, p. 95). The activity of this hemisphere, the "right mind" (Ornstein, 1997), is thus instrumental in the perception of the emotional states of other selves, that is, for empathy. A recent study by Damasio's group reports that "recognizing emotions from visually presented facial expressions requires right somatosensory cortices," and in this manner "we recognize another individual's emotional state by internally generating somatosensory representations that simulate how the individual would feel when displaying a certain facial expression" (Adolphs et al., 2000, p. 2683).

But the right hemisphere is specialized for another essential function of the self system. It is centrally involved in "the analysis of direct information received by the subject from his own body and which, it can easily be understood, is much more closely connected with direct sensation than with verbally logical codes" (Luria, 1973, p. 165). This is due to the fact that this hemisphere, more so than the left, contains extensive reciprocal connections with the autonomic nervous system (ANS), which regulates the functions of every organ in the body. The energy-expending sympathetic and energy-conserving parasympathetic circuits of the ANS generate the involuntary bodily functions that represent the somatic components of all emotional states (Schore, 1994, 2001a, 2002b). An

autonomic mode of reciprocal sympathetic–parasympathetic control is behaviorally expressed in an organism that responds alertly and adaptively to a personally meaningful (especially social) stressor, yet as soon as the context is appraised as safe, immediately returns to the relaxed state of autonomic balance. (For a more extensive characterization of the ANS see Schore, 2002e).

Information about the operations of the ANS is directly relevant to self psychology's intense interest in regulation of state (Lichtenberg et al., 1992) and affective experience (Lichtenberg et al., 1996). In fact, Kohut's (1971, 1977) characterization of the infant's continuous dyadic reciprocal interactions with selfobjects describes the rapid, spontaneous, involuntary, nonconscious communications between the mother's and infant's autonomic nervous systems (Basch, 1976; Schore, 1994, 2002d). Kohut's observation of the selfobject's facilitation and maintenance of the infant's homeostatic balance in essence describes the external psychobiological regulation of the infant's organization of a state of sympathetic–parasympathetic autonomic balance (Schore, 1994).

According to Siegel, Kohut described “the drives” as “an intruding biological principle, not available to empathy or introspection, therefore not a part of psychology,” and concluded that the drive concept had significant deleterious consequences for psychoanalysis (Siegel, 1996, p. 197). However, the deep connections of the right brain, the biological substrate of the human unconscious into both the sympathetic and parasympathetic components of the ANS (Schore, 1996, 1997a, 1999e, 2001a), “the physiological bottom of the mind” (Jackson, 1931), supports Freud's idea about the central role of drive in the system unconscious.

The fact that the right hemisphere contains “the most comprehensive and integrated map of the body state available to the brain” (Damasio, 1994, p. 66) indicates that Freud's (1915) definition of “drive” as “the psychical representative of the stimuli originating from the organism and reaching the mind” may be more properly characterized as reaching the “right mind” (Ornstein, 1997). For the rest of the life span the nonverbal right brain, more so than the later maturing verbal left, plays a superior role in the regulation of physiological, endocrinological, neuroendocrine, cardiovascular, and immune functions (Hugdahl, 1995; Sullivan and Gratton, 1999). Its operations are essential to the vital coping functions that support self-survival, and therefore to the human stress response (Wittling, 1997). This information about the ANS and the right brain, the

locus of the corporeal self, again indicates that self psychology must incorporate current biological data into its models of self and subjectivity.

In an important review of the literature on the neurology of self, Devinsky (2000) delineates the known functions of the right hemisphere: identify a corporeal image of self and its relation to the environment, distinguish self from nonself, recognize familiar members of the species, emotionally understand and react to bodily and environment stimuli, recall autobiographical information, relate self to environmental reality and to the social group, and maintain a coherent, continuous, and unified sense of self. Indeed, neurobiological studies now indicate that *the right hemisphere is specialized for generating self-awareness and self-recognition, and for the processing of "self-related material"* (Keenan et al., 2000, 2001; Kircher et al., 2001; Miller et al., 2001; Ruby and Decety, 2001). These and the above data clearly indicate that self psychology is in essence a psychology of the unique functions of the right brain.

The highest level of the right brain that processes affective information, the orbitofrontal cortex (Schore, 1994, 1996, 1997a, 1998a, 2000b, 2001a), acts as the "senior executive of the emotional brain" (Joseph, 1996). The maturation of this prefrontal system overlaps and mediates what Stern (1985) terms the developmental achievement of "the subjective self." This cortex functions to refine emotions in keeping with current sensory input, and allows for the adaptive switching of internal bodily states in response to changes in the external environment that are appraised to be personally meaningful (Schore, 1998a). The orbitofrontal system thus acts as a recovery mechanism that efficiently monitors and autoregulates the duration, frequency, and intensity of not only positive but negative affect states.

The functioning of the "self-correcting" right hemispheric system is central to self-regulation, the ability to regulate flexibly emotional states through interactions with other humans in interconnected contexts via a two-person psychology, or autoregulation in independent, autonomous contexts via a one-person psychology. The adaptive capacity to shift between these dual regulatory modes, depending upon the social context, emerges out of a history of secure attachment interactions of a maturing biological organism and a psychobiologically attuned social environment. Furthermore, this "thinking part of the emotional brain" is centrally involved in integrating and assigning emotional-motivational significance to cognitive impressions, the association of emotion with ideas and

thoughts (Joseph, 1996), and thereby in “critical human functions, such as social adjustment and the control of mood, drive and responsibility, traits that are crucial in defining the ‘*personality*’ of an individual” (Cavada and Schultz, 2000, p. 205; italics added).

Neurobiological research now indicates that the orbitofrontal system critically contributes to “the integration of past, present, and future experiences, enabling adequate performance in behavioral tasks, social situation, or situations involving survival” (Lipton et al., 1999, p. 356). But perhaps the most complex of all functions of the right prefrontal cortex is what the neuroscientists Wheeler, Stuss, and Tulving (1997) call “the ability to mentally travel through time”—the capacity to mentally represent and become aware of subjective experiences in the past, present, and future. This unique capacity to self-reflect comes on line at 18 months (the time of orbitofrontal maturation):

[T]he [right] prefrontal cortex, in conjunction with its reciprocal connections with other cortical and subcortical structures, empowers healthy human adults with the capacity to consider the *self’s extended existence throughout time*. The most complete expression of this capacity, auto-noetic awareness, occurs whenever one consciously recollects or re-experiences a happening from a specific time in the past, attends directly to one’s present or on-line experience, or contemplates one’s existence and conduct at a time in the future [p. 350; italics added].

*Psychopathogenesis: The Neurobiology and
Self Psychology of Infant Trauma*

It is important to stress that the developmental attainment of an efficient self system that can adaptively regulate various forms of arousal and psychobiological states, and thereby affect, cognition, and behavior, only evolves in a growth-facilitating emotional environment. The good-enough mother of the securely attached infant permits access to the child after a separation and shows a tendency to respond appropriately and promptly to his or her emotional expressions. She also allows for the interactive generation of high levels of positive affect in co-shared play states. These regulated events allow for an expansion of the child’s coping capacities, and thus security of the attachment bond is the primary defense against trauma-induced psychopathology.

In contrast to this scenario, the abusive caregiver not only shows less play with her infant, she also induces long-lasting traumatic states of negative affect in the child. Because her attachment is weak, she provides little protection against other potential abusers of the infant, such as the father. This caregiver is inaccessible and reacts to her infant's expressions of emotions and stress inappropriately and/or rejectingly, and therefore shows minimal or unpredictable participation in the various types of arousal regulating processes. Instead of modulating she induces extreme levels of stimulation and arousal, very high in abuse, and very low in neglect. The enduring detrimental effects of parent-inflicted traumatic abuse and neglect on the attachment bond is now well-established: "The continued survival of the child is felt to be at risk, because the actuality of the abuse jeopardizes (the) primary object bond and challenges the child's capacity to trust and, therefore, to securely depend" (Davies and Frawley, 1994, p. 62). In contexts of relational trauma the caregiver(s), in addition to dysregulating the infant, withdraw any self-object interactive repair functions, leaving the infant for long periods in an intensely disruptive psychobiological state that is beyond her immature coping strategies. According to McDougall (1989), "It must . . . be emphasized that the long-range traumatic impact of a catastrophic event depends to a large degree on the parental reactions to the trauma in question (1989, p. 208).

Lachmann and Beebe (1997) point out that an event becomes traumatic when it ruptures the individual's selfobject tie, without opportunity for repair, thereby dramatically altering her self-state. Similarly, Mollon (2001) emphasizes:

It is the non-availability of caregivers who can provide empathy and soothing which means the child abused within the family must resort to pathological forms of internal escape. . . . [W]ithout this soothing by reliable and consistent caregivers, the traumatized child is unable to regulate his or her mental state and restore emotional equilibrium [p. 212].

In studies of a neglect paradigm, Tronick and Weinberg (1997) describe:

When infants are not in homeostatic balance or are emotionally dysregulated (e.g., they are distressed), they are at the mercy of these states. Until these states are brought under control, infants

must devote all their regulatory resources to reorganizing them. While infants are doing that, they can do nothing else [p. 56].

The “nothing else” these authors refer to is a failure to continue to develop. Traumatized infants forfeit potential opportunities for socio-emotional learning during critical periods of right brain development (Schore, 2001b, 2002e).

It should be noted that recent National Child Abuse and Neglect Statistics (2000) report that the highest victimization rate occurs in children 0 to 3, and that over half of fatalities due to maltreatment occur in this age group. Early experiences with a traumatizing caregiver are well known to impact negatively the child’s attachment security, stress coping strategies, and sense of self (Crittenden and Ainsworth, 1989; Erickson, Egeland, and Pianta, 1989). It is here that attachment theory can offer self psychology important information about the origins of severe self psychological deficits.

Indeed in classic research, Main and Solomon (1986) studied the attachment patterns of infants who had suffered trauma in the first year of life. This led to the discovery of a new attachment category, “type D,” an insecure-disorganized/disoriented pattern, one found in 80% of maltreated infants (Carlson et al., 1989). These authors contend that such infants are experiencing low stress tolerance and that their disorganization and disorientation reflect the fact that the infant, instead of finding a haven of safety in the relationship, is alarmed by the parent. They note that because the infant inevitably seeks the parent when alarmed, any parental behavior that directly alarms an infant should place it in an irresolvable paradox in which it can neither approach, shift its attention, or flee. At the most basic level, these infants are unable to generate a coherent behavioral coping strategy to deal with this emotional challenge (see Schore, 2001b, 2002e, for a detailed description of the developmental and neuropsychological analysis of the disorganized/disoriented attachment).

Recent neurobiological studies in developmental traumatology indicate that the infant’s psychobiological response to trauma is comprised of two separate response patterns, hyperarousal and dissociation (Perry et al., 1995; Schore, 1998d, 1999b, c, 2001b, e, f, 2002e). In the initial stage of threat, an alarm reaction is initiated, in which the sympathetic component of the ANS is suddenly and significantly activated, resulting in increased heart rate, blood pressure, and respiration. Distress is

expressed in crying and then screaming. Beebe (2000) describes an episode of “mutually escalating overarousal” of a disorganized attachment pair:

Each one escalates the ante, as the infant builds to a frantic distress, may scream, and, in this example, finally throws up. In an escalating overarousal pattern, even after extreme distress signals from the infant, such as ninety-degree head aversion, arching away . . . or screaming, the mother keeps going [p. 436].

This state of fear-terror is mediated by sympathetic hyperarousal, and it reflects increased levels of the major stress hormone corticotropin releasing factor, which in turn regulates noradrenaline and adrenaline activity (see Schore, 1997a, 2001b, 2002e).

But a second later-forming, longer-lasting traumatic reaction is seen in dissociation, in which the child disengages from stimuli in the external world and attends to an “internal” world. The child’s dissociation in the midst of terror involves numbing, avoidance, compliance, and restricted affect. Traumatized infants are observed to be “staring off into space with a glazed look.” This parasympathetic dominant state of conservation-withdrawal occurs in helpless and hopeless stressful situations in which the individual becomes inhibited and strives to avoid attention in order to become “unseen” (Kaufman and Rosenblum, 1967; Schore, 1994).

This primary regulatory process for maintaining organismic homeostasis (Engel and Schmale, 1972) is characterized by a metabolic shutdown (Schore, 2001b, in press a) and low levels of activity (McCabe and Schneiderman, 1985). It is used throughout the life span, when the stressed individual passively disengages in order “to conserve energies . . . to foster survival by the risky posture of feigning death, to allow healing of wounds and restitution of depleted resources by immobility” (Powles, 1992, p. 213). Beebe and Lachmann (1988b), describe a stress-induced “inhibition of responsivity” in which a sudden total cessation of infant movement accompanies a limp, motionless headhang.

Tronick and Weinberg (1997) observe:

[W]hen infants’ attempts to fail to repair the interaction infants often lose postural control, withdraw, and self-comfort. The disengagement is profound even with this short disruption of the mutual

regulatory process and break in intersubjectivity. The infant's reaction is reminiscent of the withdrawal of Harlow's isolated monkey or of the infants in institutions observed by Bowlby and Spitz [p. 75].

It is this parasympathetic mechanism that mediates the "profound detachment" (Barach, 1991) of dissociation. If early trauma is experienced as "psychic catastrophe" (Bion, 1962), dissociation represents "detachment from an unbearable situation" (Mollon, 1996), "the escape when there is no escape" (Putnam, 1997), and "a last resort defensive strategy" (Dixon, 1998).

The neurobiology of the later-forming dissociative reaction is different from the initial hyperarousal response (see Schore, 2001b, and Scaer, 2001, for models of the neurobiology of dissociation). In this passive state, pain numbing and blunting endogenous opiates and behavior-inhibiting stress hormones, such as cortisol, are elevated. This intensified parasympathetic arousal allows the infant to maintain homeostasis in the face of the internal state of sympathetic hyperarousal. This same sequential defensive operation has been observed in the psychophysiological literature by Porges (1997) who describes "the sudden and rapid transition from an unsuccessful strategy of struggling requiring massive sympathetic activation to the metabolically conservative immobilized state mimicking death" (p. 75). Notice that in the traumatic state, and this may be of long duration, both the sympathetic energy-expending and parasympathetic energy-conserving components of the infant's developing ANS are hyperactivated.

The Developmental Psychoanalysis and Self Psychology of Relational Trauma

As episodes of relational trauma commence, the infant is processing information from the external and internal environment. The mother's face is the most potent visual stimulus in the child's world, and it is well known that direct gaze can mediate not only loving but powerful aggressive messages. In coding the mother's frightening behavior, Hesse and Main (1999) describe "in non-play contexts, stiff-legged 'stalking' of infant on all fours in a hunting posture; exposure of canine tooth accompanied by hissing; deep growls directed at infant" (p. 511). The image of

the mother's aggressive face, as well as the chaotic alterations in the infant's bodily state that are associated with it, are indelibly imprinted into the infant's developing limbic circuits as a "flashbulb memory" and thereby stored in imagistic implicit-procedural memory in the visuospatial right hemisphere.

But within the traumatic interaction the infant is presented with another affectively overwhelming facial expression, a maternal expression of fear-terror. Main and Solomon (1986) note that this occurs when the mother withdraws from the infant as though the infant were the source of the alarm, and they report that dissociated, trancelike, and fearful behavior is observed in parents of type D infants. Current studies show a specific link between frightening, intrusive maternal behavior and disorganized infant attachment (Schuengel, Bakersmans-Kranenburg, and Van Ijzendoorn, 1999).

During these episodes the infant is matching the rhythmic structures of these states, and this synchronization is registered in the firing patterns of the right corticolimbic brain regions that are in a critical period of growth. And so not just the trauma but the infant's defensive response to the trauma, the regulatory strategy of dissociation, is inscribed into the infant's right brain implicit-procedural memory system. In light of the fact that many of these mothers have suffered from unresolved trauma themselves (Famularo, Kinscherff, and Fenton, 1992), this spatiotemporal imprinting of terror and dissociation is a primary mechanism for the intergenerational transmission of trauma (see Schore, 2001b for a detailed discussion of the neurobiology of the dissociative defense and body-mind psychopathology).

Even more specifically, in certain critical moments, the caregiver's entrance into a dissociative state represents the real-time manifestation of neglect. Such a context of an emotionally unavailable, dissociating mother and a disorganized infant is evocatively captured by Fraiberg (cited in Barach, 1991):

The mother had been grudgingly parented by relatives after her mother's postpartum attempted suicide and had been sexually abused by her father and cousin. During a testing session, her baby begins to cry. It is a hoarse, eerie cry. . . . On tape, we see the baby in the mother's arms *screaming hopelessly; she does not turn to her mother for comfort*. The mother looks distant, self-absorbed. She makes an absent gesture to comfort the baby, then gives up. She

looks away. The screaming continues for five dreadful minutes. In the background we hear Mrs. Adelson's voice, gently encouraging the mother. 'What do you do to comfort Mary when she cries like this?' [The mother] murmurs something inaudible. . . . As we watched this tape later . . . we said to each other incredulously, "It's as if this mother doesn't hear her baby's cries" [p. 119; italics added].

Ultimately, the child will transition out of heightened protest into detachment, and with the termination of the intensely energy-expending extreme protest, she'll become silent. She'll shift out of the hyperarousal, and she'll dissociate and match the mother's state. This state switch from a regulatory strategy of intense struggling into the dissociative immobilized state mimicking death is ultimately experienced as a "dead spot" in this child's subjective experience (Kestenberg, 1985).

Notice that this traumatic context is totally devoid of any mutually regulating interactions. Rather, both mother and infant, although in physical proximity, are simultaneously autoregulating their stress, in a very primitive manner, in parallel but nonintersecting dissociative states. There is a void of subjectivity within each, and there is a void in the communications within the intersubjective field. There's no dyadic attachment mechanism to convey or sense signals from the other. What stands out between them, both verbally and nonverbally, is this silent void, this vacuum, this black hole of nothingness. In fact, in this dissociated context, there is no intersubjective field. This is a context in which a two-person psychology does not exist and does not apply.

The extreme alteration of subjectivity within the traumatically dissociated infant has been characterized by Winnicott (1958) as an episode of discontinuity in the child's need for going-on-being. Dissociation has classically been described as a constricted state of primary consciousness, a void, therefore, of subjectivity. This is the context of a one-person psychology, but a trauma-induced, radically altered, survival-focused one-person psychology. Thus, in infancy, as at all later points of the life span, in the profound detachment of dissociative moments both the subjective self and the intersubjective field instantly switch off and do not exist. Due to the metabolic shutdown, higher brain activity, including the capacities of processing external social stimuli and generating internal images ceases. During dissociative episodes the complex processing of both external and internal objects ceases.

In classical developmental research, Ribble (1944) observes:

The infant is, by its very incompleteness of brain and nervous system, continuously in danger of functional disorganisation. Outwardly the danger is of sudden separation from the mother who either intuitively or knowingly must sustain this functional balance. . . . Inwardly the danger appears to be the mounting of tension from biological needs and *the inability of the organism to maintain its inner energy or metabolic equilibrium* and reflex excitability [italics added].

In contemporary neuroscience Damasio (1994) writes that the self is a “repeatedly reconstructed biological state” that “endows our experience with subjectivity.” Current psychoanalytic models support this neurobiological concept, and expand upon it. Indeed, the central tenet of self psychology prescribes that regulatory self–selfobject experiences provide the particular intersubjective affective experiences that evoke the emergence and maintenance of the self (Kohut, 1984). But in the case of relational trauma-induced dissociation, under conditions of massive default in metabolic energy production for basic brain/mind/body functions, there is not sufficient energy to reconstruct the biological state that sustains cohesion of self function and thereby subjectivity.

Mollon (2001) refers to the devastating effects of early “selfobject catastrophes.” I suggest that in contrast to the optimal continuous dyadic reciprocal interactions with regulating selfobjects that maintain the infant’s homeostatic balance and thereby the energetic vigor and structural cohesion and integration of the self, the selfobject catastrophes and defensive dissociative responses embedded in relational trauma induce a severe failure of the infant’s capacity to maintain metabolic-energetic equilibrium in both its central and autonomic nervous systems, and thereby a disintegration of the self. How long the infant remains in this state is an essential factor in psychopathogenesis.

Recall that Kohut (1977) refers to two types of disintegration, differentiating a “fragmented self” from a “depleted self” (p. 243). According to Mollon (2001), “fragmentation arises in the baby and child whose mental and physiological state is not regulated adequately by the caregiving environment” (p. 13). I suggest that at all points in the life span a fragmented self describes the context of a self system that is in intense, dysregulated sympathetic hyperarousal, a condition of excessive energy

expenditure, an explosive disaggregation of the core, or nuclear self. This hyperenergetic state would be subjectively experienced as “organismic panic,” which Pao (1979) describes as “a shock-like reaction in which the ego’s integrative function is temporarily paralyzed” (p. 221). I would amend this to say that it is more than the ego that is paralyzed; it is the right brain core self.

But in addition, Kohut’s “depleted” self characterizes an organismic state of dysregulated parasympathetic hypoarousal, dissociation, and excessive energy conservation, subjectively experienced as an implosion of the self, wherein there is not enough energy in the brain/mind/body system to form the interconnections responsible for coherence. This would be clinically manifest as an anaclitic depression that accompanies a state of conservation-withdrawal marked by high levels of dissociation (see Weinberg, 2000, on right hemisphere deficiency and suicide). In this condition there is a simultaneous loss of both modes of self-regulation, interactive regulation and auto-regulation. The former would be subjectively experienced as a lingering state of intense hopelessness, the latter of helplessness. These self survival states and their accompanying self-cognitions are obviously relevant to Kohutian, intersubjective, relational, as well as classical psychoanalytic perspectives. Self psychology, like psychoanalysis in general, must now revise its theoretical and clinical models of early trauma and reincorporate the concept of dissociation into its models of psychopathogenesis.

Clinical Psychoanalytic Conceptions of Trauma

Indeed, the problem of trauma has been one of great controversy for psychoanalysis. In 1893 Breuer and Freud, citing the recent work of Janet (1889), described dissociation as the major mechanism for “strangulations of affect,” but by 1900 and *The Interpretation of Dreams* Freud discarded this notion and favored repression as the major mechanism of psychopathogenesis. Despite this, there has been a long tradition in the classical psychoanalytic literature of the severely detrimental effects of the traumatic effects of a sudden and unexpected influx of massive external stimulation (sympathetic hyperexcitation) that breaches the infant’s stimulus barrier and precludes successful self-regulation (Freud, 1920, 1926). This has led to an emphasis of the role of overstimulation and annihilation anxieties in classical, object relational, and self

psychological models of trauma. Kohut (1984) also suggested that the experience of fragmentation of the mind-body self represents “the deepest anxiety man can experience” (p. 16). I suggest that Fraiberg’s description of “screaming hopelessly” is the vocal expression of the earliest manifestation of annihilation anxiety, the threat to one’s bodily wholeness and survival, the annihilation of one’s core being.

However, Freud (1926) additionally described the psychic helplessness associated with the ego’s immaturity in the first years of childhood, and postulated that the passively experienced re-emergence of the trauma is “a recognized, remembered, expected situation of helplessness.” (p. 166). In writings on psychic trauma and “emotional surrender” Anna Freud (1951, 1964) also referred to helplessness, defined as a state of “disorientation and powerlessness” that the organism experiences in the traumatic moment. Although almost all psychoanalytic theoreticians have overlooked or undervalued this, Krystal (1988) and Hurvich (1989) emphasize that at the level of psychic survival helplessness constitutes the first basic danger. This helplessness is a component of the survival strategy of conservation-withdrawal, the early appearing primitive organismic defense against the growth-inhibiting effects of maternal *over* or understimulation.

These issues also bear on another area of longstanding controversy. Winnicott (1965) offers the observation:

In certain cases, the mother’s central internal object is dead at the critical time in her child’s early infancy, and her mood is one of depression. Here the infant has to fit in with a role of dead object. . . . Here the opposite to the liveliness of the infant is an antilife factor derived from the mother’s depression [p. 181].

This scenario is described in the previously cited observation of Fraiberg. Instead of interactively generating vitality affects, each member of the traumatized dyad experiences “an antilife factor” and “dead spots” in their subjective experience. Very recent basic research indicates that maternal deprivation increases cell death in the infant brain (Zhang et al., 2002). Is this the death instinct? Recall, the state of conservation-withdrawal, a primary regulatory process of decreased metabolic energy is accessed when active coping (flight or fight) is not possible, occurs in hopeless and helpless contexts, and is behaviorally manifest as feigning death (Engel and Schmale, 1972; Powles, 1992). Dissociation is defined

as “a submission and resignation to the inevitability of overwhelming, even psychically deadening danger” (Davies and Frawley, 1994).

Furthermore, Kohut (1977) speculates that in optimal contexts the parental selfobject acts to “remedy the child’s homeostatic imbalance,” and so the relational context of a selfobject catastrophe is characterized by not only the induction of abuse but also a lack of interactive repair of the infant’s dissociative reactions. Because these events are occurring in a critical period of development they have long enduring effects. McDougall (1989) asserts: “The way in which the potential trauma is handled by the environment is therefore a critical factor in determining the extent to which the child will suffer future pathological consequences” (p. 208). This context of psychopathogenesis is, again, characterized by Winnicott (1960):

If maternal care is not good enough, then the infant does not really come into existence, since there is no continuity in being; instead, the personality becomes built on the basis of reactions to environmental impingement [p. 54].

Tustin (1981) refers to this impingement as a “psychological catastrophe,” which is responded to by “autistic withdrawal” or “encapsulation,” an innate defensive measure against bodily hurt that involves a “shutting out of mind” what can not be handled at the moment. This is an operational definition of the growth-inhibiting defense of dissociation.

Mollon (2001) describes the outcome of the selfobject failures embedded in ambient and cumulative relational trauma:

Dissociation and related forms of detachment, including depersonalization and derealization, are among the most fundamental reactions to trauma. If childhood trauma or abuse is repeated, and if the abuser is a caregiver, so that the child has *nowhere to run and no one to turn to*, then internal escape is resorted to—the child learns to dissociate more easily and in a more organized way. In this way, the personality system preserves at least parts of itself from the impinging trauma or violation, by sequestering, or sealing off, the area of damage [p. 218].

In the current relational literature, Bromberg (1994), Davies (1996) and Aron and Anderson (1998) are making important efforts to reincorporate the concept of dissociation into psychoanalysis.

Although Kohut never used the term dissociation, in his last book (1984) he characterized an early interaction that could describe a type D attachment, and spoke of the dire long-term consequences of a tendency of an individual to characterologically “wall himself off” from traumatizing experiences.

If the mother’s empathic ability has remained infantile, that is, if she tends to respond with panic to the baby’s anxiety, then a deleterious chain will be set into motion. She may chronically wall herself off from the baby, thus depriving him of the beneficial effect of merging with her as she returns from experiencing mild anxiety to calmness. Alternatively, she may continue to respond with panic, in which case two negative consequences may ensue: the mother may lay the groundwork in the child for a lifelong propensity toward the uncurbed spreading of anxiety or other emotions, or by forcing the child to wall himself off from such an overly intense and thus traumatizing [experience, she] may foster in the child an impoverished psychic organization, the psychic organization of a person who will later be unable to be empathic himself, to experience human experiences, in essence, to be fully human [p. 83].

*Traumatic Attachment and Right Brain
Pathomorphogenesis*

The “psychically deadening danger” of excessive unregulated dissociation that accompanies early relational traumatic attachments and creates a context for an “impoverished psychic organization” is the major mechanism that engenders what Balint (1968) calls the “basic fault,” a deep and pervasive sense that there exists within a fault that extends widely to include “the whole psychobiological structure of the individual” (p. 22), and that is experienced as “a feeling of emptiness, being lost, deadness, and futility” (p. 19). This structural defect is due, according to Balint, to a severe discrepancy between the needs of the person as an infant and the capacity of people in his early environment to provide them.

What has been undetermined to date in the psychoanalytic literature is, as Mahler (1958) stated almost 50 years ago, precisely how trauma

interferes with psychic structure formation. Freud (1940) observed that trauma in early life effects all vulnerable humans because “the ego . . . is feeble, immature and incapable of resistance.” Bowlby postulated that the major negative impact of early traumatic attachments is an alteration of the organism’s normal developmental trajectory. Over 30 years ago he (Bowlby, 1969) wrote:

[S]ince much of the development and organization of [attachment] behavioral systems takes place whilst the individual is immature, there are plenty of occasions when an atypical environment can divert them from developing on an adaptive course [p. 130].

Specifically how this developmental deflection takes place can only be answered with reference to current neurobiological models of how detrimental early socioaffective experiences provide a growth-inhibiting environment for the developing brain.

Current studies in developmental traumatology conclude that “the overwhelming stress of maltreatment in childhood is associated with adverse influences on brain development” (de Bellis et al., 1999, p. 1281). And so it is now thought that specifically a dysfunctional and traumatized early relationship is the stressor that leads to PTSD, that severe trauma of interpersonal origin may override any genetic, constitutional, social, or psychological resilience factor, and that the ensuing adverse effects on brain development and alterations of the biological stress systems may be regarded as “an environmentally induced complex developmental disorder” (de Bellis, 2001).

Advances in the “decade of the brain” are therefore allowing us more deeply to understand the underlying mechanisms by which dysregulating traumatic attachments embedded in abuse and neglect interfere with the organization of particularly, the right brain (Schore, 2001b, 2002e). During the first two years of life, chronic and cumulative states of overwhelming, hyperaroused affective states, as well as hypoaroused dissociation have devastating effects on the growth of psychic structure. The survival mode of conservation-withdrawal induces an extreme alteration of the bioenergetics of the developing brain. In critical periods of regional synaptogenesis this would have growth-inhibiting effects, especially in the right brain, which specializes in withdrawal. This is because the biosynthetic processes that mediate the proliferation of synaptic connections in the postnatally developing brain demand, in

addition to sufficient quantities of essential nutrients, massive amounts of energy. An infant brain that is chronically shifting into hypometabolic survival modes has little energy available for growth (see Schore, 1994, 1997a, 2001b).

Furthermore, during the brain growth spurt, when psychic structure is organizing at a rapid rate, the severe and prolonged states of physiological dysregulation that results from relational trauma abuse, neglect, or both are routinely accompanied by deficiencies in the provision of selfobject experiences of affect synchrony and interactive repair. Instead of optimal dyadic contexts of right-brain-to-right-brain intersubjectivity, the infant is exposed to severe “breaks in intersubjectivity” (Tronick and Weinberg, 1997) which engender “dead spots” in this child’s subjective experience (Kestenberg, 1985). These experiences negatively impact the experience-dependent maturation of the right hemisphere, which is dominant for “subjective emotional experiences” and affect regulation (Schore, 1994, 1999a, 2001a, in press a).

Laub and Auerhahn (1993) propose that the essential experience of trauma is a disruption of the link between the “self” and the mothering “empathic other,” and therefore the maternal introject, or mothering (selfobject regulatory) function, is deficient or “damaged.” Grotstein (1983) refers to “a failure in the development of self-regulatory functions under the sponsorship of the selfobject.” This failure to evolve an efficient regulatory system would cause the personality to have a deficient and decreased capacity for autoregulation, which is partially compensated for by an increased need for external regulators at later stages. In fact, this very deficit, a direct parallel to Kohut’s increased need for pathological selfobjects in developmental disorders, is now considered to be a risk factor of insecure attachments (Maunder and Hunter, 2001). The deficits described by self psychology are thus, specifically, functional deficits that reflect structural defects of cortical-subcortical circuits of the right brain, the locus of the corporeal-emotional self.

Right Brain Dysfunction and Self-Psychological Deficits

What would be the functional indicators of this structural impairment of the right brain? Due to the altered development of the right cortical system that nonconsciously decodes emotional stimuli by actual felt emotional responses to stimuli, individuals with poor attachment histories display

empathy disorders, the limited capacity to perceive the emotional states of others. An inability to read subtle facial expressions leads to a misattribution of emotional states and a misinterpretation of the intentions of others. In addition to this deficit in social cognition in appraising external social cues, such individuals also exhibit a poor ability to appraise the internal cues of their bodily states, and what Krystal (1997) terms desomatization. Impairments of these right-brain functions preclude an adaptive capacity to evaluate external-social and internal-physiological signals of safety and danger.

The coping deficits in right hemispheric self-regulation are manifest in a limited capacity to modulate the intensity and duration of affects, especially biologically primitive affects like shame, rage, excitement, elation, disgust, panic-terror, and hopeless despair. Under stress, such individuals experience not discrete and differentiated affects, but diffuse, undifferentiated, chaotic states accompanied by overwhelming somatic and visceral sensations. The poor capacity for what Fonagy and Target (1997) call mentalization leads to a restricted ability to reflect upon their emotional states. Solms describes a mechanism by which disorganization of a damaged or developmentally deficient right hemisphere is associated with a “collapse of internalized representations of the external world” in which “the patient regresses from whole to part object relationships” (1996, p. 347), a hallmark of early forming personality disorders. This regression is equated with Kohut’s “disintegration” into a “fragmented” or “depleted” self.”

Traumatic attachment experiences negatively affect the early organization of the right brain, and thereby produce deficits in its adaptive functions of emotionally understanding and reacting to bodily and environmental stimuli, identifying a corporeal image of self and its relation to the environment, distinguishing the self from the other, and generating self-awareness. Optimal attachment experiences allow for the emergence of self-awareness, the adaptive a capacity to sense, attend to, and reflect upon the dynamic changes of one’s subjective self states, but traumatic attachments in childhood lead to self-modulation of painful affect by directing attention away from internal emotional states.

Indeed, there is now evidence to show that early relational trauma is particularly expressed in right hemisphere deficits. Very recent studies reveal that maltreated children diagnosed with PTSD manifest right lateralized metabolic limbic abnormalities (de Bellis et al., 2000b), and that right brain impairments associated with severe anxiety disorders are

expressed in childhood (de Bellis et al., 2000a). Adults severely abused in childhood (Raine et al., 2001) and diagnosed with PTSD (Galletly et al., 2001) show reduced right hemisphere activation during a working memory task. Neurological studies of adults confirm that dysfunction of the right frontal lobe is involved in PTSD symptomatology (Freeman and Kimbrell, 2001) and dissociative flashbacks (Berthier et al., 2001). Current neuropsychiatric research indicates that the paralimbic areas of the right hemisphere are preferentially involved in the storage of traumatic memories (Schiffer, Teicher, and Papanicolaou, 1995), and that altered right-sided activity occurs in panic and social phobic anxiety states (Davidson et al., 2000; Galderisi et al., 2001).

The current neuroscience literature also indicates that dissociation is associated with a deficiency of the right brain (Weinberg, 2000), and describes “a dissociation between the emotional evaluation of an event and the physiological reaction to that event, with the process being dependent on intact right hemisphere function” (Crucian et al., 2000, p. 643). A failure of orbitofrontal function is seen in the hypometabolic state of pathological dissociation, and this dysfunction would interfere with its normal role in processing motivational information and modulating the motivational control of goal-directed behavior, and therefore manifest as a deficit in organizing the expression of a regulated emotional response and an appropriate motivational state for a particular social environmental context.

As a result, during times of traumatic dissociation the major motivational systems that are programmed to cope actively with the external social environment are switched off. This would lead to a deactivation of every component of Panksepp’s (1998) system of prototypic affective states, including those associated with “attachment to conspecifics,” such as nurturance/maternal care, play/joy/social affection, and sexuality, as well as the “organismic defence system” of rage/anger and fear. Similarly, the active coping strategies of Lichtenberg’s (1989) attachment-affiliation, exploratory-assertive, aversive, and sensual-sexual motivational systems all collapse in subcortically programmed survival states of passive disengagement, conservation-withdrawal, energy depletion, and dissociation, the escape when there is no escape, the last resort defensive strategy.

In current psychoanalytic work, Mollon (2001) describes the similarities of the enduring pathological effects of both early psychological and neurological damage. In the developmental neuropsychological

literature, Anderson et al. (2000) delineate the sequelae of early vs. late neurological damage to the prefrontal cortex and conclude that these “impairments largely reflect a failure to ever develop specific cognitive and behavioral competencies, whereas in the adult-onset cases the defects arose through deterioration or loss of normally developed abilities” (p. 291).

The deficits described by self psychology thus represent enduring developmental failures of specifically the higher regulatory prefrontal areas of the early developing right brain. This hemisphere is dominant for attachment functions (Henry, 1993; Schore, 1994; Siegel, 1999), and for the adaptive capacity to “maintain a coherent, continuous, and unified sense of self” (Devinsky, 2000). The maladaptive deficits of affect regulation that accompany pathological dissociation, a primitive defense against overwhelming affects, are expressed in a spectrum of severe self pathologies, from reactive attachment disorder of infants (Hinshaw-Fuselier et al., 1999), to psychotic experiences (Allen and Coyne, 1995), dissociative identity disorders (Putnam, 1989), posttraumatic stress disorders (van der Kolk, McFarlane, and Weisaeth, 1996), and borderline personality disorders (Golyunkina and Ryle, 1999). *Early traumatic attachments are therefore a powerful source generator of the most severe deficits described by self psychology.*

Continuity Between Early Traumatic Attachments and Later Severe Self Pathology

Integrating physiology, neurobiology, and attachment theory, James Henry concludes:

The ability to maintain personally relevant bonds is vital for our evolutionary survival. The infant’s tie to the mother’s voice and odor is recognized even by the newborn, yet this personal relevance and recognition of the familiar can be impaired by anxious insecurity resulting from difficult early experiences or traumatic stress. The vital task of establishing a personally relevant universe and the solace derived from it depend on right hemispheric functioning. If this function is indeed lost in the insecurely attached, much has been lost [Henry, cited in Wang, 1997].

The insecurely attached infant's all-too-common stressful experiences with a caregiver who chronically initiates but poorly repairs intense and long-lasting dysregulated states are incorporated into right-brain long-term autobiographical memory as a pathological internal object relation, an interactive representation of a dysregulated-self-in-interaction-with-a-misattuning-object (Schore, 1997b). This internal working model of a disorganized/disoriented insecure attachment stores critical exteroceptive information about the social source of relational trauma as well as the infant's interoceptive physiological responses to the stress. It encodes both an expectation of imminent "mutually escalating overarousal" and the autoregulatory strategy for coping with overwhelming interactive stress—the primitive coping strategy of dissociation. Kiersky and Beebe (1994) describe "nonverbal presymbolic forms of relating" that protected the infant from trauma and continue to be used by the adult to avoid retraumatization.

A central principle of this psychoneurobiological perspective dictates that there is a continuity between early traumatic attachment and later severe disorders of personality development (Schore, 1994, 1996, 1997a, 1998d, 1999b, c, 2001b, e, in press b). Clinical researchers are currently describing a continuity in infant and adult coping strategies (Nijenhuis et al., 1998):

The stress responses exhibited by infants are the product of an immature brain processing threat stimuli and producing appropriate responses, while the adult who exhibits infantile responses has a mature brain that . . . is capable of exhibiting adult response patterns. However, there is evidence that the adult brain may regress to an infantile state when it is confronted with severe stress [p. 253].

This "infantile state" is a disorganized-disoriented state of insecure attachment. As in infancy, children, adolescents, and adults with post-traumatic stress disorders and severe self-pathologies cannot generate an active coherent behavioral coping strategy to confront subjectively perceived overwhelming, dysregulating events, and thus they quickly access the passive survival strategy of disengagement and dissociation.

Indeed, clinical studies now affirm that the type D attachment classification is observed to utilize dissociative behaviors in later stages of life

(van Ijzendoorn et al., 1999), and that the occurrence of dissociation at the time of a stressful trauma is a strong predictor of PTSD (Koopman, Classen, and Spiegel, 1994; Shalev et al., 1996). In developmental psychopathological research Sroufe and his colleagues conclude that early trauma more so than later trauma has a greater impact on the development of dissociative behaviors. They write, "The vulnerable self will be more likely to adopt dissociation as a coping mechanism because it does not have either the belief in worthiness gained from a loving and responsive early relationship or the normal level of defenses and integration that such a belief affords" (Ogawa et al., 1997, p. 875). The characterological use of dissociation over the developmental stages is described by Allen and Coyne (1995):

Although initially they may have used dissociation to cope with traumatic events, they subsequently dissociate to defend against a broad range of daily stressors, including their own posttraumatic symptoms, pervasively undermining the continuity of their experience [p. 620].

These "initial traumatic events" are embedded in the abuse and neglect experienced by type D infants, the first relational context in which dissociation is used to autoregulate massive stress. The ultimate endpoint of chronically experiencing catastrophic states of relational-induced trauma in early life is a progressive impairment of the ability to adjust, take defensive action, or act on one's own behalf, and a blocking of the capacity to register affect and pain, adaptive functions that are all critical to survival. Ultimately these individuals perceive themselves as different from other people and outside of, as well as unworthy of, meaningful attachments (Lansky, 1995). These personalities clearly manifest the self-pathology of a developmental disorder. But can we be more specific about the type of severe personality disorder associated with early relational trauma?

*Traumatic Attachment and the Psychoneurobiological
Etiology of Borderline Personality Disorders*

Kohut's speculations on development and psychopathogenesis mainly centered on the etiology of the deficits of narcissistic personality disorders. In his last work (1984) he states that his analytic experience with

borderline states is “very limited.” And yet he offers a developmental speculation that in borderline states, “a nuclear self has not been shaped in early development” (p. 8). In my own work I suggest that the developmental psychoneurobiological origins of earlier-forming borderline personality disorders can be differentiated from later-forming narcissistic personality disorders (Schoore, 1991, 1994). In contrast to the narcissistic infant–mother dyad that derails their attachment communications in the last quarter of the first through the second year, the borderline dyad derails much earlier in the first year. As opposed to disorganized insecure attachments discussed here, narcissistic personality disorder is the outcome of an organized insecure pattern, specifically an avoidant (adult dismissive) attachment pattern (Pistole, 1995). This suggests a qualitatively different developmental history in these groups of personality disorders. Recall that insecure disorganized/disoriented and not organized insecure are associated with abuse and neglect.

At about the same time that Kohut was offering his conceptions of early forming personality disorders, two other pioneers were also putting forth new models of these disorders. In 1975 Masterson and Rinsley, influenced by the developmental models of Mahler, highlighted the role of the mother in the genesis of altered intrapsychic structure of borderline personality disorders. Very recently Masterson (2000) has incorporated contemporary developmental psychoanalysis and developmental neurobiology to update this model. The other major theoretician of severe personality pathologies was Kernberg, who emphasized the role of excess (unregulated) endogenous aggression. He (Kernberg, 1988) now asserts a conception of psychopathogenesis that is similar to the psychoneurobiological ambient relational trauma model described above: “The most important cause of severe personality disorders is severe chronic traumatic experiences, such as physical or sexual abuse, severe deprivation of love, severe neglect, unavailable parental objects as familial dispositions that can lead to the development of personality disorders.”

Indeed, a large body of studies now indicates disrupted early attachments and early trauma and abuse in the histories of children and adults diagnosed as specifically, borderline personality disorder (Lyons-Ruth and Jacobvitz, 1999), and thus there is a high correlation of PTSD and borderline diagnoses (Herman, Perry, and van der Kolk, 1989; Famularo et al., 1992; van der Kolk et al., 1994). Zanarini et al. (1997) report that 91% of borderline patients report childhood abuse, and 92% report some type of childhood neglect. In an overview of the literature, Paris (1995)

summarizes the developmental data and asserts “the weight of the research evidence supports the hypothesis that abuse during childhood is an important risk factor for borderline personality disorder” (p. 15). Herman and van der Kolk (1987) assert that PTSD and borderline personality disorders both share massive disturbances in affect regulation, impulse control, interpersonal difficulties, self-integration, and a bias to use dissociation when under stress.

The experiences of early abuse and neglect negatively impact the nonverbal right hemisphere, which is centrally involved in affect regulation, dissociation, and survival functions. Israeli neuropsychiatrist Vadim Rotenberg (1995) concludes:

[The] functional deficiency of the right hemisphere . . . may be caused by the lack of emotional relationships between the child and the parents. Such emotional relationships . . . stimulate the development of the right hemisphere functions and correspond to these functions as a key to the lock. If these emotional relationships are insufficient, the right hemisphere will become inefficient, its contribution in psychological defense mechanisms and emotional stabilization will be lost, and there will be a general predisposition to subsequent mental and psychosomatic disorders [p. 59].

The neuroscience literature now describes “early emotional learning occurring in the right hemisphere unbeknownst to the left; learning and associated emotional responding may later be completely inaccessible to the language centers of the brain” (Joseph, 1982, p. 243). In the trauma literature McFarlane and Yehuda (2000) observe, “Essentially, the core of traumatic syndromes is the capacity of current environmental triggers (real or symbolic), to provoke the intense recall of affectively charged traumatic memory structures, which come to drive current behaviour and perception” (p. 900). According to Valent (1998), early handling and misattunements may be deeply remembered in later life not in verbal explicit memory but in the form of disconnected physiological responses, emotions, and acting out.

The most significant consequence of early relational trauma is the loss of the ability to regulate the intensity and duration of affects. Clinical research now reveals that borderline personalities, when stressed, attribute high levels of primitive, negative (“all bad”) evaluations to others (splitting), exhibit poor empathy and psychological understanding,

manifest more intense negative responses to everyday life events, and show an increased sensitivity to even low-level emotional stimuli (Levine et al., 1997; Herpetz et al., 1999; Arntz and Veen, 2001). These severe deficits in socioemotional functions are paralleled by structural defects in limbic areas involved in the processing of socioemotional information. A growing body of neurobiological research demonstrates dysfunctions of the amygdala and the orbitofrontal cortex, the “Senior Executive” of the social-emotional brain, in both PTSD and borderline personality disorders (Goyer, Konicki, and Schulz, 1994; Shin et al., 1999; Berthier et al., 2001; Galletly et al., 2001; Herpetz et al., 2001; Koenen et al., 2001). This work implies a similarity in the developmental precursors, the functional deficits, and the structural defects of these early forming self psychopathologies.

*Psychotherapy: Changes in Right-Brain
Regulatory Structures*

In *The Restoration of the Self* Kohut (1977) referred to borderline states only once, concluding these “are in principle not analyzable.” The severe right-brain deficits that result from traumatic attachments characterize much more than the self-esteem regulation of narcissistic personality disorders—rather they are descriptive of the deficits in bodily based survival functions that characterize severe borderline personality disorders. These deficits are a focus of current updated treatment models.

Rotenberg (1995) now describes:

[T]he importance of the emotional relationships between psychotherapist and client can be explained by the restoration, in the process of such relationships, of . . . right hemispheric activity. In this way the emotional relationships in the process of psychotherapy are covering the deficiency caused by the lack of emotional relations in early childhood [p. 59].

The deficiency of the right hemisphere, the locus of emotional self and the human stress response, echoes the deficits in psychic structure described by Kohut’s self psychology.

Affect dysregulation, a central feature of borderline personality disorders, is specifically manifest when “highs and lows are too extreme, too prolonged, or too rapidly cycled and unpredictable” (Bach, 1998, p. 188).

Such rapid state shifts are expressed in moments of interpersonal stress within a close interpersonal relationship, including the therapeutic relationship. The ambient relational trauma of disorganized-disoriented insecure attachments, imprinted in implicit-procedural memory, is reexperienced in the arousal and autonomic dysregulation of severe self-pathologies. Liotti (1992) describes that patients using dissociation

often oscillate quickly between clinging to the therapist, emotionally withdrawing from him or her, and becoming frightened as if expecting to be assaulted by the therapist. Sometimes the display by these incompatible types of interpersonal behavior is almost simultaneous, taking place within a single session: in this case, the patient may show a trance-like or dazed expression while shifting from one attitude to another. This is of course, strongly reminiscent of . . . disorganized/disoriented behavior observed in infants [p. 202].

Furthermore, Valent (1999) contends that “transference and countertransference may be the only way infants or severely traumatized persons can communicate their stories of distress, and are therefore central tools for discerning unprocessed or defended events” (p. 73). This frequently occurs in the form of projective identifications, especially in highly charged, negatively affectively valenced intersubjective enactments (Schore, 2002b, c, d). In order to receive these transferential communications of traumatically dissociated affect, the therapist must shift from a left to a right hemispheric dominant state of evenly hovering attention (Schore, 1994, 1997b, 2000e, 2001c, 2002b, d), an empathic state in which, according to Kohut (1971):

[T]he deeper layers of the analyst’s psyche are open to the stimuli which emanate from the patient’s communications while the intellectual activities of the higher levels of cognition are temporarily largely but selectively suspended [p. 274].

The borderline’s impairment in the recognition and communication of overwhelming and therefore dissociated subjective states reflects the fact, that due to the ambient early trauma of a growth-inhibiting relational environment, the higher right brain corticolimbic regulatory systems have never evolved. In a number of works I present interdisciplinary data which suggests that the co-constructed therapeutic alliance can act as a

growth facilitating environment for the experience-dependent maturation of these same regulatory systems (1994, 1997b, 1999d, 2000e, 2001c, 2002e, in press b). Recall Kohut's (1984) description of "missing psychic structure" and his assertion that "psychoanalysis cures by the laying down of psychological structure" (p. 98). Writing in the psychoanalytic literature Spezzano (1993) asserts:

The analytic relationship heals by drawing into itself those methods of processing and regulating affect relied on by the patient for psychological survival and then transforming them. The mechanism of these transformations is the regulation of affect in a better way within the analysis than it was previously managed by the patient and the subsequent modification of what, in the classical language of structural change, might be called the patient's unconscious affect-regulating structures [pp. 215–216].

In parallel writings, Andreasen, the editor of the *American Journal of Psychiatry* concludes that psychoanalytic intensive therapy "may be viewed as a long-term rebuilding and restructuring of the memories and emotional responses that have been embedded in the limbic system" (2001, p. 314).

I suggest that these authors are describing developmental advances in complexity of the orbitofrontal system and its cortical and subcortical connections. This hierarchical apex of the limbic system represents the most plastic areas in the cortex (Barbas, 1995). In support of this, a recently published functional magnetic resonance imaging study provides evidence that higher regions of specifically the right prefrontal cortex attenuate emotional responses at the most basic levels in the brain, that such modulating processes are "fundamental to most modern psychotherapeutic methods," that this lateralized neocortical network is active in "modulating emotional experience through interpreting and labeling emotional expressions," and that "this form of modulation may be impaired in various emotional disorders and may provide the basis for therapies of these same disorders" (Hariri, Bookheimer, and Mazziotta, 2000, p. 48).

Note that the system that underlies psychotherapeutic change is in the nonverbal right as opposed to the verbal left hemisphere. The right hemisphere, the biological substrate of the human unconscious (Schoore, in press a), is also the locus of the emotional self. Kohut's emphasis on

the central role of nonconscious selfobject dynamics, which act at nonverbal levels beneath conscious awareness, also points to the right brain, the locus of the dynamic unconscious (Schore, 2002a). In an earlier work (Schore, 1999e) I contended that recent advances in developmental psychoanalysis and neuropsychology clearly suggest that the center of psychic life shifts from Freud's ego, which he located in the "speech-area on the left-hand side" (1923) and the posterior areas of the verbal left hemisphere, to the highest levels of the nonverbal right hemisphere, the locus of the bodily based self system (Schore, 1994). Also recall, "while the left hemisphere mediates most linguistic behaviors, the right hemisphere is important for broader aspects of communication" (Van Lancker and Cummings, 1999, p. 95). In total, the incorporation of interdisciplinary data into the clinical theory of psychoanalysis indicates that psychoanalysis is not "the talking cure," but more precisely "the communicating cure."

The clinical theory of psychoanalysis rests upon conceptions of psychopathogenesis and change. One of Kohut's major contributions was the expansion of the clinical theory beyond neurosis and into personality disorders, especially narcissistic personality disorders. In light of the documented finding that almost half of the patients seen by psychoanalysts have a personality disorder, with borderline personality disorder the most common and severe (DoIDGE et al., 1994; Friedman et al., 1998), self-psychological, relational, and intersubjective psychoanalytic clinicians now need to integrate updated developmental and neurobiological information into their conceptions of psychopathogenesis. Self psychology must move beyond narcissistic disorders, into trauma and borderline personality organizations. An incorporation of current neuropsychological data, developmental psychoanalytic findings, and trauma research into the theoretical base of self psychology could allow for a significant expansion of its clinical model, both in terms of deepening its therapeutic efficacy and broadening its application to a wider array of severe self-pathologies.

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