

Traumatology

Volume VI, Issue 3, Article 3 (October, 2000)

Sensorimotor Psychotherapy:

One Method for Processing Traumatic Memory

Pat Ogden, Ph.D. and Kekuni Minton, PhD.

Sensorimotor Psychotherapy Institute and Naropa University
Boulder, Colorado

Abstract

Traditional psychotherapy addresses the cognitive and emotional elements of trauma, but lacks techniques that work directly with the physiological elements, despite the fact that trauma profoundly affects the body and many symptoms of traumatized individuals are somatically based. Altered relationships among cognitive, emotional, and sensorimotor (body) levels of information processing are also found to be implicated in trauma symptoms. Sensorimotor Psychotherapy is a method that integrates sensorimotor processing with cognitive and emotional processing in the treatment of trauma. Unassimilated somatic responses evoked in trauma involving both arousal and defensive responses are shown to contribute to many PTSD symptoms and to be critical elements in the use of Sensorimotor Psychotherapy. By using the body (rather than cognition or emotion) as a primary entry point in processing trauma, Sensorimotor Psychotherapy directly treats the effects of trauma on the body, which in turn facilitates emotional and cognitive processing. This method is especially beneficial for clinicians working with dissociation, emotional reactivity or flat affect, frozen states or hyperarousal and other PTSD symptoms. In this article, we discuss Sensorimotor Psychotherapy, emphasizing sensorimotor processing techniques which can be integrated with traditional approaches that treat these symptoms. Because the therapist's ability to interactively regulate clients' dysregulated states and also to cultivate clients' self-awareness of inner body sensations is crucial to this approach, three sessions are described illustrating the clinical application of this method.

Sensorimotor Psychotherapy is a method for facilitating the processing of unassimilated sensorimotor reactions to trauma and for resolving the destructive effects of these reactions on cognitive and emotional experience. These sensorimotor reactions consist of sequential physical and sensory patterns involving autonomic nervous system arousal and orienting/defensive responses which seek to resolve to a point of rest and satisfaction in the body. During a traumatic event such a satisfactory resolution of responses might be accomplished by successfully fighting or fleeing. However, for the majority of traumatized clients, this does not occur. Traumatized individuals are plagued by the return of dissociated, incomplete or ineffective sensorimotor reactions in such forms as intrusive images, sounds, smells, body sensations, physical pain, constriction, numbing and the inability to modulate arousal.

These unresolved sensorimotor reactions condition emotional and cognitive processing, often disrupting the traumatized person's ability to think clearly or to glean accurate information from emotional states (Van der Kolk, 1996). Conversely, cognitive beliefs and emotional states condition somatic processing. For instance, a belief such as "I am helpless" may interrupt sensorimotor processes of active physical defense; an emotion such as fear may cause sensorimotor processes such as arousal to escalate. Most psychotherapeutic approaches favor emotional and cognitive processing over body processing, and it has been shown that such approaches can greatly relieve trauma symptoms. However, since somatic symptoms are significant in traumatization (McFarlane, 1996, p. 172) the efficacy of trauma treatment may be increased by the addition of interventions that facilitate sensorimotor processing. We propose that sensorimotor processing interventions can

help regulate and facilitate emotional and cognitive processing, and we find that confronting somatic issues by directly addressing sensorimotor processing can be useful in restoring normal healthy functioning for victims of trauma regardless of the nature of the trauma's origin. However, we also find that sensorimotor processing alone is insufficient; the integration of all three levels of processing – sensorimotor, emotional and cognitive – is essential for recovery to occur.

In this article we will discuss Sensorimotor Psychotherapy, a comprehensive method that utilizes the body as a primary entry point in trauma treatment, but one which integrates cognitive and emotional processing as well. We will emphasize sensorimotor processing, which entails mindfully tracking (following in detail) the sequential physical movements and sensations associated with unassimilated sensorimotor reactions, such as motor impulses, muscular tension, trembling and various other micromovements, and changes in posture, breathing and heart rate. These body sensations are similar to Gendlin's (1978) "felt sense" in that they are physical feelings, but while the felt sense includes emotional and cognitive components, the sensations we refer to are purely physical. Clients are taught to distinguish between physical sensations and trauma-based emotions through cultivating awareness of sensations as they fluctuate in texture, quality and intensity until the sensations themselves have stabilized, and clients are able to experience these sensations as distinct from emotions.

Sensorimotor processing is similar to Peter Levine's (1997) "Somatic Experiencing" in the tracking of physical sensation, but it differs in intent. For Levine, tracking physical sensation is an end in itself; his approach does not specifically include therapeutic maps to address cognitive or emotional processing. Similar to "Somatic Experiencing," Sensorimotor Psychotherapy encourages sensorimotor processing when necessary to regulate sensorimotor reactions, often the case in shock and non-relational trauma, but sensorimotor processing is most often used as a prelude to holistic processing on all three levels (cognitive, emotional, and sensorimotor). For example, a traumatized client's affective and cognitive information processing may be 'driven' by an underlying dysregulated arousal, causing emotions to escalate and thoughts to revolve around and around in cycles. When the client learns to self-regulate her arousal through sensorimotor processing, she may be able to more accurately distinguish between cognitive and affective reactions that are merely symptomatic of such dysregulated arousal and those cognitive-emotional contents that are genuine issues that need to be worked through. As this occurs, the approach of Sensorimotor Psychotherapy might shift from sensorimotor processing alone to include cognitive and emotional processing, and to address relational and transferential dynamics as well. Sensorimotor Psychotherapy's use of the therapeutic interaction to work through relational issues and promote self-regulation can be very effective in the resolution of relational trauma. Thus, Sensorimotor Psychotherapy lends itself to the treatment of relational trauma as well as shock and non-relational trauma.

Before discussing Sensorimotor Psychotherapy more fully, we will first address the question of how experience is processed on cognitive, emotional and sensorimotor levels, and the effects of unresolved sensorimotor reactions on all levels of information processing. Ken Wilber's (1996) notion of hierarchical information processing describes the evolutionary and functional hierarchy among these three levels of organizing experience -- cognitive, emotional and sensorimotor -- a hierarchy that reflects the evolutionary development of the human brain.

While functionally the three levels of information processing are mutually dependent and intertwined (Damasio, 1999; LeDoux, 1996; Schore, 1994), clinically we find that it is important for the therapist to observe the client's processing of information on each of these three related but distinct levels of experience, differentiate which level of processing will most successfully support integration of traumatic experience in any moment of therapy, and apply specific techniques that facilitate processing at that particular level. Such an approach ultimately fosters "holistic" processing where all three levels will operate synergistically.

The hierarchy of levels of information processing – sensorimotor, emotional, and cognitive – generally correlates with the three levels of brain architecture described by MacLean (1985): the sensorimotor level of information processing (including sensation and programmed movement impulses) is initiated primarily by lower rear portions of the brain, emotional processing by more intermediate limbic parts of the brain, and cognitive processing by the frontal cortical upper parts of the brain. These three levels interact and affect each other simultaneously, functioning as a cohesive whole, with the degree of integration of each level of processing affecting the efficacy of other levels, as described by Fisher & Murray (1991):

The brain functions as an integrated whole, but is comprised of systems that are hierarchically organized. The "higher level" integrative functions evolved from and are dependent on the integrity of "lower-level" structures and on sensorimotor experience. Higher (cortical) centers of the brain are viewed as those that are responsible for abstraction, perception, reasoning, language, and learning. Sensory integration, and intersensory association, in contrast, occur mainly within lower (subcortical) centers. Lower parts of the brain are conceptualized as developing and maturing before higher-level structures; development and optimal functioning of higher-level structures are thought to be dependent, in part, on the development and optimal functioning of lower-level structures. (p. 16)

Sensorimotor processing is in many ways foundational to the others and includes the features of a simpler, more primitive form of information processing than do its more evolved counterparts. With its seat in the lower, older brain structures, sensorimotor processing relies on a relatively higher number of fixed sequences of steps in the way it does its work. Some of these fixed sequences are well known, such as the startle reflex and the fight, flight or freeze response. The simplest sequences are involuntary reflexes (e.g., the knee jerk reaction) which are the most rigidly fixed and determined. More complex are the motor patterns that we learn at young ages, which then become automatic, such as walking and running. In the more highly evolved emotional and cognitive realms, we find fewer and fewer fixed sequences of steps in processing, and more complexity and variability of response. Thus, sensorimotor processing is more directly associated with overall body processing: the fixed action patterns seen in active defenses, changes in breathing and muscular tonicity, autonomic nervous system activation and so forth.

The nature of this hierarchy is such that the higher levels of processing often influence and direct the lower levels. We can decide (cognitive function) to ignore the sensation of hunger and not act on it, even while the physiological processes associated with hunger, such as the secretion of saliva and contraction of stomach muscles, continue. In cognitive theory, this is called "top-down processing" (LeDoux, 1996, p. 272), indicating that the upper level of processing (cognitive) can and often does override, steer or interrupt the lower levels, elaborating upon or interfering with emotional and sensorimotor processing.

Adult activity is often based upon top-down processing. Schore (1994) notes that, in adults, "higher cortical areas" act as a "control center," and that the orbital cortex hierarchically dominates subcortical limbic activity (p. 139). A person might think about what to accomplish for the day, outline plans, and then structure time to meet particular goals. While carrying these plans through, one may override feelings of fatigue, hunger, or physical discomfort. It's as though we hover just above our somatic and sensory experience, knowing it's there, but not allowing it to be the primary determinant of our actions.

In contrast, the activities of very young children are often dominated by sensorimotor (Piaget, 1952) and emotional systems (Schore, 1994), in other words by bottom-up processes. Tactile and kinesthetic sensations guide early attachment behavior as well as help regulate the infant's behavior and physiology (Schore, in press-a). Infants and very small children explore the world through these systems, building the neural networks that are the foundation for later cognitive development (Piaget, 1952; Hannaford, 1995). Hard-wired to be governed by somatic and

emotional states, infants respond automatically to sensorimotor and affective cues and are unregulated by cognition or cortical control (Schoore, 1994). The infant is a "subcortical creature ... [who] lacks the means for modulation of behavior which is made possible by the development of cortical control" (Diamond, Balvin and Diamond, 1963, p. 305). Similarly, traumatized people frequently experience themselves as being at the mercy of their sensations, physical reactions and emotions, having lost the capacity to regulate these functions.

In summary, bottom-up and top-down processing represent two general directions of information processing. Top-down processing is initiated by the cortex, and often involves cognition. This higher level observes, monitors, regulates, and often directs the lower levels; at the same time, the effective functioning of the higher level is partly dependent on the effective functioning of the lower levels. Bottom-up processing, on the other hand, is initiated at the sensorimotor and emotional realms. These lower levels of processing are more fundamental, in terms of evolution, development and function: these capacities are found in earlier species and are already intact within earlier stages of human life. They precede thought and form a foundation for the higher modes of processing.

The interplay between top-down and bottom-up processing holds significant implications for the occurrence and treatment of trauma. Psychotherapy has traditionally harnessed top-down techniques to manage disruptive bottom-up processes, through the voluntary and conscious sublimation of sensorimotor and emotional processing. This is achieved through activity, behavioral discharge, cognitive override or distraction. When sensorimotor experience is disturbing or overwhelming, conscious top-down regulation can allow a person to pace herself, modulating the degree of arousal or disorganization in the system, as evidenced by the following example:

Harriet... had a problem and had found a way to begin to control it. When a hallucination began, she would try to picture her library at home. She would look at the imaginary shelves and start to count the books, focusing on each one as best she could as she counted. Soon, her hallucination would stop – she was imposing top-down control, which quashed the bottom-up hallucination signal. She was purposefully lighting up her cortex so that it drowned out her lower brain, snapping her out of her episode just as cognition wakes us up out of a dream. (Hobson, 1994, p. 174)

While the above technique is an effective way to manage hallucinations and provide significant relief, and thus can be an important first step in therapy, it may not address the entire problem. It engages cognition, but ignores sensorimotor processes. Such top-down processing alone may manage sensorimotor reactions, but may not effectuate their full assimilation. For instance, a client may learn to mitigate arousal by convincing herself that the world is now safe, but the underlying tendency for arousal to escalate to overwhelming degrees may not have been fully resolved. The traumatic experience and arousal from the sensorimotor and emotional levels may be redirected through top-down management, but the processing, digestion and assimilation of sensorimotor reactions to the trauma may not have occurred.

In much the same way that a client who comes to therapy with unresolved grief must identify and experience the grief (emotional processing), a client who exhibits unresolved sensorimotor reactions must identify and experience these reactions *physically* (sensorimotor processing). Additionally, the client's awareness and processing of sensorimotor reactions on the sensorimotor level will exert a positive influence on emotional and cognitive processing, since, as we have seen, optimal functioning of the higher levels is somewhat dependent upon the adequate functioning of the lower levels. Sensorimotor processing is often a precursor to holistic processing –the synergistic functioning of cognitive, emotional and sensorimotor levels of processing.

In Sensorimotor Psychotherapy, top-down direction is harnessed to *support* rather than *manage* sensorimotor processing. The client is asked to mindfully track (a top-down, cognitive process) the sequence of physical sensations and impulses (sensorimotor process) as they progress through the

body, and to temporarily disregard emotions and thoughts that arise, until the bodily sensations and impulses resolve to a point of rest and stabilization in the body. The client learns to observe and follow the unassimilated sensorimotor reactions (primarily, arousal and defensive reactions) that were activated at the time of the trauma. Bottom-up processing left on its own does not resolve trauma, but if the client is directed to employ the cognitive function of tracking and articulating sensorimotor experience while voluntarily inhibiting awareness of emotions, content, and interpretive thinking, sensorimotor experience can be assimilated. Furthermore, it is crucial that the cognitive direction is engaged to help clients learn self-regulation.

To harness such top-down cognitive direction, a specific kind of therapeutic relationship is imperative. Similar to a mother's interaction with her infant, the therapist must serve as an "auxiliary cortex" (Diamond et al., 1963), for clients through observing and articulating their sensorimotor experience until they are able to notice, describe and track these experiences themselves. Such relational communication is a process of "interactive psychobiological regulation," which resembles a mother's attunement to and interaction with her infant's physiological and emotional states (Schore, 1994). Schore writes that the therapist must act as an "affect regulator of the patient's dysregulated states to provide a growth-facilitating environment for the patient's immature affect regulating structures" (Schore, in press-b, p. 17).

In defining self-regulation, Schore (in press-b) differentiates between interactive and non-interactive forms, describing self-regulation as both "interactive regulation in interconnected contexts via a two-person psychology," and "autoregulation in autonomous contexts via a one-person psychology" (p. 13-14). When self-regulation is fully developed, clients can observe, articulate, and eventually integrate sensorimotor reactions on their own as well as utilize relationships to self-regulate. Without what Schore calls the "adaptive capacity to shift between these dual regulatory modes" (p. 14), the sensorimotor reactions of arousal and defensive responses are subject to becoming either hyperactive or hypoactive, as we shall see in the following section, leaving traumatized persons at the mercy of their bodies.

Physical Defensive Responses

Threat calls forth both psychological and physical defenses, the objectives of which are to evaluate and reduce stress and maximize the chances for survival (Nijenhuis & Van der Hart, 1999). For the purpose of this article, we will focus on physical defenses, rather than psychological defenses (such as projection, reaction formation, displacement, rationalization or minimization), acknowledging that both types may be responses to traumatic situations. Physical defenses are examples of the relatively fixed action patterns mentioned in the previous section, the effective functioning of which upper levels of processing depend upon for their efficacy.

Physical defenses may precede cognitive and emotional reactions in acute traumatic situations. Hobson writes:

Bottom-up processing takes precedence in times of emergency, when it is advantageous to short-circuit the cortex and activate a motor-pattern generated directly from the brain stem. If we suddenly see a car careening toward us, we instantly turn our car away; we react automatically, and only later (even if it is only a split second later) do we realize there is danger and feel afraid. (1994, p. 139)

However, during a more prolonged trauma, voluntary physical defensive impulses that are mediated through the cognitive level – such as thoughts of striking out or reaching for the phone – might also come into play.

Physical defenses may be active or passive (Levine, 1997; Nijenhuis and Van der Hart, 1999). Active defenses manifest through a wide variety of physical impulses and movements depending on the nature of the threat, and vary in intensity of activity. They include fight/flight and a multitude of other possible reactions such as engaging the righting reflexes to regain balance, turning away

from a falling branch, lifting an arm to avoid a blow, slamming on the brakes to prevent an accident, twisting out of the grip of an assailant, and so on. Additionally, the orienting response (scanning and adjusting to the environment) is heightened and all of the organism's attention is focused on the threat. The senses become hypersensitive to better smell, hear, see and taste the danger (Levine, 1997; Van Olst, 1972) in preparation for further assessment and response (Hobson, 1994).

In the animal kingdom, active defensive responses turn to passive freezing when active responses are likely to threaten survival (Nijenhuis and Van der Hart, 1999). For humans as well, when active defenses are impossible or ill advised, they may be replaced by passive defenses such as submission, automatic obedience, and freezing (Nijenhuis & Van der Hart, 1999). Nijenhuis and Van der Hart (1999) write:

... . applying problem-solving coping (attempted flight, fight or assertiveness) would be inevitably frustrating and nonproductive for a child being physically or sexually abused or witnessing violence. In some situations, active motor defense may actually increase danger and therefore be less adaptive than passive, mental ways of coping ... (p. 50)

Furthermore, passive defenses may be the best option when active ones are ineffective, as when a victim is unable to outrun an assailant.

While Levine (1997) claims that hyperarousal and active defenses precede passive defense and immobility, both Nijenhuis (e.g., Nijenhuis, Vanderlinden & Spinhoven, 1998) and Porges (1995, 1997) note that frozen states are not always preceded by active defenses or arousal. In some cases, such as those mentioned above, an individual might automatically engage passive defenses without first attempting active defense. Also, passive defenses alone are employed in infancy, long before capabilities for fight/flight.

In passive defense, the ordinarily active orienting response, which includes effective use of the senses, scanning mechanisms and evaluation capacities, may become dull and ineffective. The cognitive function of problem-solving may become severely diminished and confused, which may lead to a general dulling of cognition or "psychic numbing" (Solomon, Laror, and McFarlane, 1996, p. 106), a numbing of sensation, and the slowing of muscular/skeletal responses (Levine, 1997). Muscles may be extremely tense but immobilized, or flaccid. Clients may report that in this state, they find moving difficult, and they may even feel paralyzed.

Frequently, the complete execution of effective physical defensive movements do not take place during the trauma itself. As we have seen, a victim may instantaneously freeze rather than act, a driver may not have time to execute the impulse to turn the car to avoid impact, or a person may be overpowered when attempting to fight off an assailant. Over time, such interrupted or ineffective physical defensive movement sequences contribute to trauma symptoms. Herman (1992) observes:

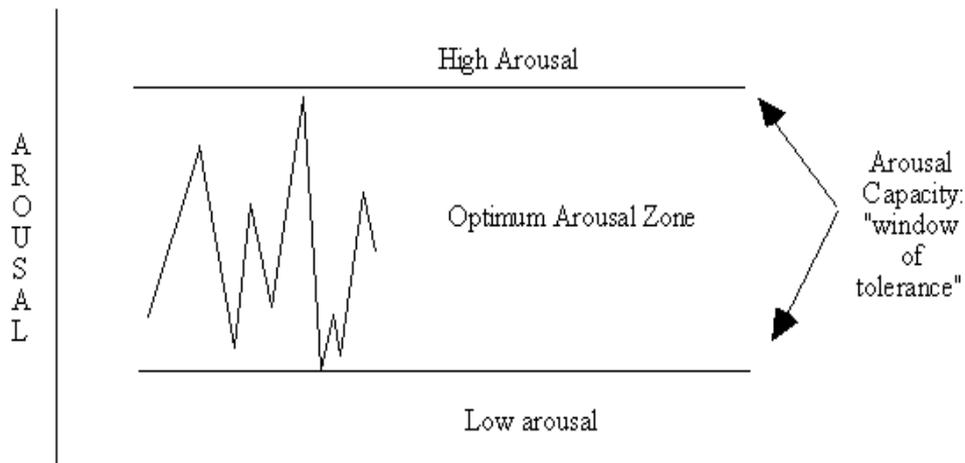
When neither resistance nor escape is possible, the human system of self-defense becomes overwhelmed and disorganized. Each component of the ordinary response to danger, having lost its utility, tends to persist in an altered and exaggerated state long after the actual danger is over. (p. 34)

Traumatized people may exhibit a propensity for either hyperactive or passive defense or an alternation between the two. When defenses become hyperactive, they manifest as habitual defensiveness, aggression against self or others, hyper-alertness, hyper-vigilance, excessive motoric activity and uncontrollable bouts of rage, and so on. Habitual passive defenses may manifest as chronic patterns of submission, helplessness, inability to set boundaries, feelings of inadequacy, automatic obedience, and repetition of the victim role. The person may appear lifeless and non-expressive, and may fail to defend against or orient toward danger, or even attempt to get help.

Interrupted or ineffective physical defensive movements can disrupt the overall capacity for sensorimotor processing, similar to the way a repeated suppression of a particular emotion disrupts the overall capacity for emotional processing. Unsuccessful patterns of sensorimotor responses may become habitual, negatively affecting the normal and healthy interplay between top-down and bottom-up processing, and thus contribute to trauma symptoms.

The Modulation Model

Figure 1 Modulation Model: Optimum Arousal Zone



Poor tolerance for arousal is characteristic of traumatized individuals (Van der Kolk, 1987). The top and bottom lines of the above diagram depict the limits of a person's optimum degree of arousal, which Wilbarger and Wilbarger (1997) call the "optimal arousal zone." When arousal remains within this zone, a person can contain and experience (not dissociate from) the affects, sensations, sense perceptions and thoughts that occur within this zone, and can process information effectively. In this zone, modulation can occur spontaneously and naturally. This optimum zone is similar to Siegel's "window of tolerance," within which "various intensities of emotional arousal can be processed without disrupting the functioning of the system" (1999, p. 253).

During trauma, arousal initially tends to rise beyond the upper limits of the optimal zone, which alerts the person to possible threat (Van der Kolk, Van der Hart, and Marmar, 1996). In successful and vigorous fight or flight, this hyperarousal is utilized through physical activity (Levine, 1997) in serving the purpose of defending and restoring balance to the organism. In the ideal resolution of the arousal, the level returns to the parameters of the optimum zone. However, this return to baseline does not always occur, which contributes significantly to the problems with hyperarousal that are characteristic of the traumatized person.

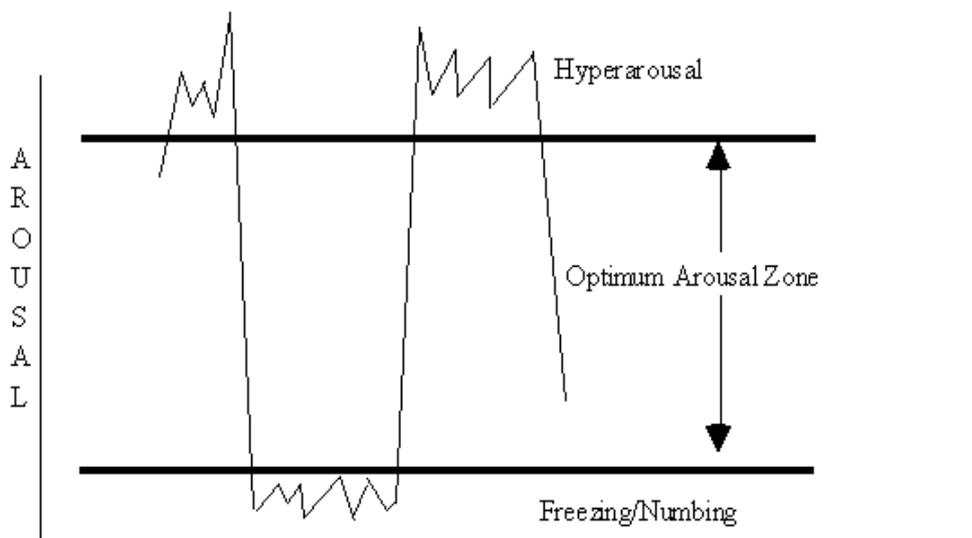
In relation to energy dissipation following hyperarousal, Levine (1997) writes that trauma symptoms " ... stem from the frozen residue of energy that has not been resolved and discharged..." and the individual exposed to trauma must "discharge all the energy mobilized to negotiate that threat or [the person] will become a victim ... " (p. 19-20). Although we agree that discharge of energy may be an element in trauma therapy, just as expression of emotion also may be an element of trauma therapy, we disagree with the discharge model. We believe that trauma symptoms stem from unassimilated reactions on all three levels of information processing, and that these reactions must be integrated through restoring the balance and synergy between top-down and bottom-up processing. Rather than to "complete the freezing response" by discharging energy (Levine, 1997, p. 111) our immediate intention is to teach the client to modulate sensorimotor processes, which sometimes means stimulating arousal if the client is hypoaroused.

Hyperarousal involves "excessive sympathetic branch activity [which] can lead to increased energy-consuming processes, manifested as increases in heart rate and respiration and as a "pounding" sensation in the head" (Siegel, 1999, p. 254). Over the long term, such hyperarousal may disrupt cognitive and affective processing as the individual becomes overwhelmed and disorganized by the accelerated pace and amplitude of thoughts and emotions, which may be accompanied by intrusive memories. As Van der Kolk, Van der Hart, et al. (1996) state, "This hyperarousal creates a vicious cycle: state-dependent memory retrieval causes increased access to traumatic memories and involuntary intrusions of the trauma, which lead in turn to even more arousal" (Van der Kolk, Van der Hart, et al., 1996, p. 305). Such state-dependent memories may increase clients' tendency to "interpret current stimuli as reminders of the trauma" (p. 305), perpetuating the pattern of hyperarousal. Van der Kolk points out that high arousal is easily triggered in traumatized persons, causing them to " ... be unable to trust their bodily sensations to warn them against impending threat, and cease to alert them to take appropriate action" (p. 421), thereby disrupting effective defensive responses.

At the opposite end of the Modulation Model, " ... excessive parasympathetic branch activity leads to increased energy conserving processes, manifested as decreases in heart rate and respiration and as a sense of 'numbness' and 'shutting down' within the mind" (Siegel, 1999, p.254). Such hypoarousal can manifest as numbing, a dulling of inner body sensation, slowing of muscular/skeletal response and diminished muscular tone, especially in the face (Porges, 1995). Here cognitive and emotional processing are also disrupted, not by hyperarousal as above, but by hypoarousal.

Both hyperarousal and hypoarousal often lead to dissociation. In hyperarousal, dissociation may occur because the intensity and accelerated pace of sensations and emotions overwhelm cognitive processing so that the person cannot stay present with current experience. In hypoarousal, dissociation may manifest as reduced capacity to sense or feel even significant events, an inability to accurately evaluate dangerous situations or think clearly, and a lack of motivation. The body, or a part of the body, may become numb, and the victim may experience a sense of "leaving" the body. Additional long term and debilitating symptoms might include "emotional constriction, social isolation, retreat from family obligations, anhedonia and a sense of estrangement" (Van der Kolk, 1987, p. 3) along with " ... depression ... and a lack of motivation, as psychosomatic reactions, or as dissociative states" (Van der Kolk, McFarlane, and Van der Hart, 1996, p. 422). As we can see, these symptoms are reminiscent of passive defenses, in which a person does not actively defend against danger.

Figure 2 The Modulation Model: The Bi-Phasic Response to Trauma



The traumatized individual may reside primarily either above or below the parameters of the optimum arousal zone, or swing uncontrollably between these two states (Van der Kolk, 1987, p 2). This bi-phasic alternation between hyperarousal and numbing or freezing (Van der Kolk, p. 3) -- the top and bottom segments of the modulation model in Figure 2 -- may become the new norm in the aftermath of trauma.

When a person's arousal is outside the optimum zone at either end of the spectrum, upper levels of processing will be disabled, and holistic processing will be replaced by bottom-up reflexive action. As Siegel (1999) notes, internal states outside the "window of tolerance" are "characterized by either excessive rigidity or randomness. These states are inflexible or chaotic, and as such are not adaptive to the internal or external environment" (p.255). Siegel goes on to say, "In states of mind beyond the window of tolerance, the prefrontally mediated capacity [cognitive processing] for response flexibility is temporarily shut down. The 'higher mode' of integrative [cognitive] processing has been replaced by a 'lower mode' of reflexive [sensorimotor] responding" (bracketed text added; pp. 254-255).

Stephen Porges's (1995, 1997) work, which elucidates a hierarchical relationship among the levels of the autonomic nervous system, has important implications for the regulation of both arousal and defensive responses. He concludes that hypoarousal (described above) is due to a specific branch of the parasympathetic nervous system, the "dorsal vagal complex," which causes the organism to conserve energy by drastically slowing heart and breath rates. The other branch of the parasympathetic nervous systems, the "ventral vagal complex", which Porges calls the "Social Engagement System, " is the "smart" vagal because it regulates both the dorsal vagal and sympathetic systems. This "smart" system is much more flexible than the other two more primitive levels of the autonomic nervous system, which if unregulated, tend to the extremes of hyperarousal or hypoarousal. The Social Engagement System gives humans immense flexibility of response to the environment (1995, 1997). For example, during social engagement, interaction and conversation can rapidly shift from strong affect and animation one moment, to calm listening and reflection the next. This "smart" branch of the parasympathetic nervous system regulates the sympathetic and "freeze" (dorsal vagal parasympathetic) responses to trauma and allows human beings to fine-tune their arousal to the needs of the situation. This sophisticated "braking" mechanism of the Social Engagement System facilitates the regulation of overall arousal and is akin to Schore's "interactive psychobiological regulation."

In effective modulation, the Social Engagement System regulates the more extreme behavior of the autonomic nervous system. Under the stress of trauma, an individual may at first attempt to

use the Social Engagement System to modulate, but, if ineffective, social engagement/interactive regulation will tend to shut down. As this occurs, the person has a compromised capacity to use relationships for regulation and instead reverts to the more primitive sensorimotor and emotional systems. The healthy functioning of cognitive direction is diminished. As we shall see below, in Sensorimotor Psychotherapy the Social Engagement System is activated as the therapist/client interaction effectively serves to regulate and modulate arousal. After the therapist fulfills this role (in other words, becomes an "auxiliary cortex" for the client), the client can learn the auto-regulation capacities of observing and tracking sensorimotor reactions. That is, the therapist's ability to interactively regulate the client's dysregulated arousal creates an environment in which the client can begin to access his own ability to regulate arousal (Schoore, in press-b) independent of relational interaction. Through this process, the client is helped to move from frozen states and/or hyperarousal to full participation with the Social Engagement System.

Sensorimotor Psychotherapy: Essentials and Case Discussion

Essentials of Sensorimotor Psychotherapy are 1) regulating affective and sensorimotor states through the therapeutic relationship, and 2) teaching the client to self-regulate by mindfully contacting, tracking and articulating sensorimotor processes independently. We believe that the former promotes the reinstatement and development of the client's Social Engagement System through interactive regulation, while the latter promotes an independent assimilation of sensorimotor reactions. The former is a prerequisite for the latter. As Schoore observes, the therapist's "interactive regulation of the patient's state enables him or her to begin to verbally label the affective [and sensorimotor] experience" (bracketed text added; Schoore, in press-b, p. 20). Interactive regulation provides the conditions under which the client can safely contact, describe and eventually regulate inner experience.

The therapist must cultivate in the client an acute awareness of inner body sensations, first via the therapeutic interaction as the therapist observes and contacts sensorimotor states, and second as the client herself notices these inner body sensations without prompting by the therapist. Inner body sensations are the myriad of physical feelings that are continually created within the body through biochemical changes and the movement of muscles, ligaments, organs, fluids, breath, and so on. These bodily feelings are of a distinctly physical character, such as clamminess, tightness, numbness, and electric, tingling, and vibrating sensations, and of course many others. However, when clients are asked to describe sensations, they frequently do so with words such as "panic" or "terror," which refer to emotional states rather than to sensation itself. When this occurs, clients are asked to describe how they experience the emotion physically: for example, panic may be felt in the body as rapid heart beat, trembling and shallow breathing. Anger might be experienced as tension in the jaw, an impulse to strike out accompanied by a sense of heaviness and immobility in the arms. Similarly, a belief about oneself, such as "I'm bad" might be experienced as collapse through the spine, a ducking of the head, and tension in the buttocks.

Through cultivating such awareness and ability for verbal description, clients learn to distinguish and describe the various and often subtle qualities of sensation. Developing a precise sensation vocabulary helps clients expand their perception and processing of physical feelings in much the same way that familiarity with a variety of words that describe emotion aids in the perception and processing of emotions.

As clients describe traumatic experiences or symptoms, the therapist observes their arousal level, tracking for either hyperarousal or hypoarousal. The therapist's task is to "hold" the client's arousal at the optimal limits of the Modulation Model, accessing enough traumatic material to process but not so much that clients become too dissociated for processing to occur. When arousal reaches either the upper or lower limit, clients are asked to temporarily disregard their feelings and thoughts and instead follow the development of physical sensations and movements in detail until

these sensations settle and the movements complete themselves. In this way, the therapist acts as an auxiliary cortex, interactively modulating clients' levels of arousal, keeping them from going too far outside the optimum arousal zone, where it becomes difficult or impossible to process information without dissociating. At the same time, clients develop their capacity to self-regulate as they learn to limit the amount of information they must process at any given moment, which develops the capacity for self-regulation independent of their relationship with the therapist and prevents their being overwhelmed with an overload of information coming from within.

When a client describing a past trauma experiences panic, the therapist asks her to disregard the memory content and just sense the panic as bodily sensation. When the client then reports a trembling in her hands and a rapid heart rate, the therapist instructs her to track these sensations as they change or "sequence". As Levine notes, "Once you become aware of them, internal sensations almost always transform into something else" (Levine, 1997, p. 82). The trembling changes from affecting only the hands to involving the arms, which begin to shake quite strongly, then gradually quiet and soften; the heart rate also eventually returns to baseline. Only when this sensorimotor experience has settled is additional content described and emotional and cognitive processing included.

The therapist must learn to observe in precise detail the moment-by-moment organization of sensorimotor experience in the client, focusing on both subtle changes (such as skin color change, dilation of the nostrils or pupils, slight tension or trembling) and more obvious changes (collapse through the spine, turn in the neck, a push with an arm, or any other gross muscular movement). These sensorimotor experiences usually remain unnoticed by the client until the therapist points them out through a simple "contact" statement such as, "Seems like your arm is tensing," or "Your hand is changing into a fist," or "There's a slight trembling in your left leg." Any therapist is familiar with noticing and contacting emotional states ("You seem afraid") to facilitate clients' awareness and processing of emotions; the procedure is similar for sensorimotor reactions.

Mindfulness is the key to clients becoming more and more acutely aware of internal sensorimotor reactions and in increasing their capacity for self-regulation. Mindfulness is a state of consciousness in which one's awareness is directed toward here-and-now internal experience, with the intention of simply observing rather than changing this experience. Therefore, we can say that mindfulness engages the cognitive faculties of the client in support of sensorimotor processing, rather than allowing bottom-up trauma-related processes to escalate and take control of information processing. To teach mindfulness, the therapist asks questions that require mindfulness to answer, such as, "What do you feel in your body? Where exactly do you experience tension? What sensation do you feel in your legs right now? What happens in the rest of your body when your hand makes a fist?" Questions such as these force the client to come out of a dissociated state and future- or past-centered ideation and experience the present moment through the body. Such questions also encourage the client to step back from being embedded in the traumatic experience and to report from the standpoint of an observing ego, an ego that "has" an experience in the body rather than "is" that bodily experience.

For traumatized individuals, fully experiencing sensations may be disconcerting or even frightening, as intense physical experience may evoke feelings of being out-of-control or being weak and helpless. On the other hand, traumatized individuals are often dissociated from body sensation, experiencing the body as numb or anesthetized. Our view is that *failed active defensive responses* along with the inability to modulate arousal can be sources of such distressing bodily experiences, and that this distress can be at least somewhat alleviated by helping clients experience the somatic sequence of an active defensive response. Subsequently clients may access sensation without dissociating or feeling uncomfortable.

To illustrate the above points, we will describe three sessions with Mary, a middle aged, successful businesswoman who suffered both relational and shock trauma from being raped repeatedly by her

uncle from ages four to ten. Although she suffered from panic attacks, depression, and what she described as having "no boundaries," she had no clear memory of the trauma until a recent altercation with an authority figure triggered flashbacks accompanied by insomnia and disturbing physical symptoms such as hyperarousal, uncontrollable shaking, unprecedented vaginal bleeding, and a bout of immobility that lasted for over an hour. Mary reported that during the abuse she had tried to fight her uncle at first, but eventually she submitted and "watched from the ceiling."

As Mary recounted her history, she spoke rapidly with few pauses that would provide opportunity for verbal interaction with the therapist. Her Social Engagement System was markedly diminished; it was almost as though she were talking to herself, unable to utilize the relationship to interactively regulate her arousal. Mary appeared increasingly isolated and alone as she spoke. At times she experienced panic and hyperarousal, and she repeatedly spoke in judgment of herself for having allowed the abuse: "Why did I ever change clothes in front of him? Why didn't I tell my mother what was happening?" She also condemned herself for her inability to defend against the abuse, interpreting her dissociation and freezing as a personal weakness, a common response among trauma survivors (Nijenhuis & Van der Hart, 1999, p. 54).

This first session with Mary illustrates an important point: The initial stage of therapy usually entails the therapist helping the client to begin to regulate arousal. This is accomplished at first through the interactive regulation within the therapeutic relationship, which sets the conditions under which the client can learn self-regulation. Obviously, a healthy relational rapport between client and therapist must be present for interactive regulation to occur. In Mary's case, the therapist facilitated interactive regulation through tracking changes and movements in her body, making contact statements, demonstrating an ability to understand Mary's distress and tolerating the description of her traumatic experience without withdrawing or becoming hyperaroused himself. Gradually, Mary began to soften slightly in her body, slow her speech, and engage in reciprocal interaction with the therapist.

It was difficult at first for Mary to be mindful of her bodily sensations because when she tried to do so, the hyperarousal, shaking, panic and terror became overwhelming. Similar to Levine's notion of "exchanging ... an active response for one of helplessness" (Levine, 1997, p. 110), the therapist knew that if Mary could fully experience a physical defensive sequence, these symptoms might lessen. To accomplish this, he asked Mary if she would be willing to experiment by pushing with her hands against a pillow that he held, and to notice what happened in her body. Mary consented and as she performed this action, she first experienced nausea and increased fear, not uncommon when first working with activating a defensive sequence that has failed in the past. The therapist then asked Mary to temporarily disregard all memory and simply focus on her body to find a way to push that felt comfortable. Mary's sense of control was increased as she was encouraged to guide this physical exploration by telling the therapist how much pressure to use in resisting with the pillow, what position to be in, and so on. As Mary began to experience the active physical defense, the therapist tracked her body and made contact statements such as, "The strength of the pushing is increasing," and "You seem to be settling down," etc. Mary was also instructed to be mindful of the details of her sensations: "What's happening in your body as you push? What do you feel in your back and spine?"

Mary eventually experienced a full sequence of active defensive response: lifting the arms, pushing tentatively at first with just her arms, then increasing the pressure and involving the muscles of her back, pelvis, and legs. The therapist continued to evoke mindfulness of sensation, and Mary began to experience the physical pleasure of pushing, reporting, "This feels good!" Because many traumatized clients are anhedonic (unable to feel physical pleasure), experiencing and savoring pleasurable sensations can increase their overall capacity for experiencing pleasure and also can change their relationship with the body, which heretofore may have felt like "the enemy," the source of disconcerting sensations and physical pain. When the defensive sequence had been

thoroughly explored and completed, Mary was calmer and able to be mindful of sensations without becoming hyperaroused -- in other words, she was now situated within the optimum arousal zone of the Modulation Model.

The intention in Sensorimotor Psychotherapy is to work at the edge of the Modulation Model, accessing enough of the traumatic material to work with, but not so much that the client becomes overwhelmed and dissociated. To serve this end, as Mary returned to describing the trauma (her decision, not the therapist's), she was instructed to stay mindful of her body sensations. As she described her abusive experience her jaw began to tighten, her right shoulder and arm began to constrict, and her breath became labored -- all possible signs of defensive responses emerging spontaneously. After making contact statements with these physical observations by saying, "Your jaw and arm seem to be tightening up and your breathing is changing," the therapist directed Mary to be mindful of her bodily sensations: "Let's take a few moments to sense what's happening in your body before we go on with the content." Mary described the tension and stated that her head seemed to want to turn to the left, at which point she remembered a wall being on her left during the childhood abuse. Instead of interpreting her statements, or returning to the content of the memory, the therapist directed her to "allow that turning in your neck and notice what happens next."

At this point, Mary was no longer describing the past but was attentive only to present bodily experience. As she was mindful of her head and neck turning to the left, she was also aware of physical impulses that seemed involuntary, as if they were happening "by themselves." Her body seemed to take on a life of its own as she was encouraged to be mindful of her sensations and movements. Mary reported that "my hand wants to become a fist" and the therapist encouraged her to "feel the impulse and allow that to happen" without doing it voluntarily. While the previous pushing motion against the pillow was entirely voluntary, Mary's hand now slowly began to curl into a fist spontaneously.

Mary reported that her arm wanted to "hit out." The defensive movement sequence was now emerging without conscious top-down direction from either the client or the therapist. The therapist said, "Feel that impulse to hit out and just notice what happens next in your body." Mary was encouraged to simply track and allow the involuntary micromovements and gestures, rather than "do" them voluntarily. Sensorimotor processing was occurring spontaneously through mindful attention to body sensation and impulses, and by harnessing cognitive direction in suspending content and emotion to support the body's processing.

As the therapist directed Mary to track her sensations and involuntary movements, and as her right hand formed a fist, her forearm also tightened, and her arm slowly rose off her lap without conscious intention on her part. Mary stated that she was starting to feel panicky, and the therapist asked her to just experience the physical elements of the panic (which Mary reported as increased heart rate and constriction) rather than the emotion. This was an important directive to separate trauma-based emotions from sensation so that sensorimotor processing could occur without interference from emotional or cognitive processes, and without overloading Mary with more information than she could effectively handle. Gradually, Mary's head and body turned back toward the center, and her right arm progressed through a slow rising and hitting motion accompanied by shaking. (Inwardly this experience of shaking is similar to shudders passing through the body when one is cold.) After several minutes of sensorimotor processing during which both Mary and the therapist followed the slow and unintended progression of movements, Mary's arm finally came to rest in her lap. Mary continued to shudder, and she was instructed to "stay with the shudders and sensations as long as you are comfortable doing so."

All the while, Mary was encouraged to trust her body by allowing the movements to occur without trying to direct them or change them in any way, and she was also encouraged to stop at any moment if she felt too much discomfort to go on. Since physical constriction from the gradual

"exposure" to the traumatic memory can be extremely intense before it begins to unwind and soften, clients need the therapist's help in following the sensorimotor process. They are also encouraged to self-regulate -- to stop if ever it becomes too intense.

Eventually the shudders ceased, and Mary said she felt relief and a sensation of tingling throughout her body. The therapist instructed her to savor her bodily feeling and sense of relief, and to describe these physically in detail. Reporting a softening in her musculature, a slowed heart rate and a good feeling of heaviness throughout her body, Mary stated that she felt peaceful for the first time in weeks. In speaking about the abuse, Mary was less judgmental of herself, saying she was angry that her mother had turned a blind eye to her uncle's behavior, and that no four-year-old girl should have to worry about changing clothes in front of a relative. While she had not worked directly with her self-judgments, beliefs, or emotions associated with the traumatic experience, working with sensorimotor processing had a positive effect on both her emotional and thinking processes. Toward the end of this session, the therapist helped Mary address emotional and cognitive processing. Mary gave full expression to her sadness and arrived at new meanings while she also became more fully conscious of her sensorimotor reactions. Mary experienced a new integration and reorganization of the physical, emotional, and cognitive levels of her experience as these three levels were addressed simultaneously.

At her next session, Mary reported that her sleep pattern had returned to normal, and she was much calmer in general. Her panic attacks had nearly ceased, and she wanted to continue to explore her childhood trauma, more confident in her ability to do so with an expectation of personal mastery. Mary was increasingly able to interact with the therapist, which was demonstrated by her asking questions, engaging in more dialogue in contrast to her original monologue, and in her using the relationship with the therapist to soothe herself. In subsequent sessions, Mary further developed her ability to actively defend herself and to set boundaries, which expanded her capacity to engage in interactive regulation, for the ability to actively defend and set boundaries increases one's safety in relationship. Mary was increasingly able to process emotional and cognitive elements of the trauma and to address relational issues with the therapist, while frequently returning to sensorimotor processing when physical impulses and sensations emerged, or when she again felt hyperaroused or dissociated.

Eventually, Mary experienced a therapy session in which she confronted the memory of the moment she first dissociated and "watched from the ceiling to what he [her uncle] was doing to another little girl," while another part of her submitted to the abuse. However, she now had developed the skill of tracking her body sensations, and she felt more confidence in being able to get through these experiences. Mary writes:

At the time of this session I had recently been experiencing what seemed like a new wave of earlier memories that had brought an increase both in the level of physical activation and in emotional terror and despair. This time though, it felt like I knew I could get through this, I'd been here before and knew there was a process and steps that led to a better, more whole experience.

In this session, Mary was again instructed by the therapist to be mindful of her body, and as she remembered the trauma, she became aware of the physical reactions she had experienced as a child. She experienced the physical components of submitting and dissociating from her body (numbness, muscle flaccidity, feeling paralyzed) *along with the impulse to fight back* (tension in her jaw and arms). Awareness of sensation became the unifying force in resolving this "dissociative split," as Mary realized: "This disintegration is not real...I'm two bodies in the same body, doing two different things." As Mary experienced this split somatically and processed the physical components of it (such as the impulse to fight her uncle), she was able to experience the grief associated with the abuse without dissociating from her body. More able to process cognitively, her negative beliefs about herself eventually were replaced by a sense of accomplishment of having

been able to defend herself through dissociation and submission, acknowledging that these passive defenses had been effective in her particular situation and realizing that active defenses at that time would probably have made her trauma worse. At one point in the session, Mary proudly says, "There's nothing wrong with me -- look what I did!" referring to her dissociation as a way to survive unbearable abuse.

Shortly after this session, Mary's therapy terminated. Six months later, she writes:

I am aware that there has been a lasting and profound change in both my body (the way I hold it) and my sense of integration and ability to stay present with fearful situations, memories and sensations that would previously have been so overwhelming that they would be suppressed ...

I also feel emotionally integrated in a new way. It's as though the part of me that had been the victim of ... abuse is not alone any more but has other stronger, more whole and resistant parts mixed up with it. I no longer so desperately need the contact [with the therapist] to go into the memories. It's though I can be there for myself.

Conclusion

Sensorimotor Psychotherapy was developed entirely from clinical practice, and although there has been no formal empirical research at this time, there are many anecdotal reports from both clients and therapists that attest to the efficacy of the method. Professionals who have learned Sensorimotor Psychotherapy report that it often reduces PTSD symptoms such as nightmares, panic attacks, aggressive outbursts and hyperarousal, and that the ability to track body sensation helps clients experience present reality rather than reacting as if the trauma were still occurring. Such reductions of distressing bodily-based symptoms and increased capacity for both tracking body sensation and interactive self-regulation appears to help clients become increasingly able to work with other elements of trauma, such as attachment, meaning-making, and dissociative patterns that were previously overshadowed by bodily states and the inability to utilize interactive self-regulation.

Sensorimotor Psychotherapy provides clients with tools to deal with disturbing bodily reactions, and they frequently report feeling increasingly safe as they begin to learn how to limit the amount of information they must process at any given moment by focusing attention on sensation. Clients also report that their feeling of safety is enhanced when they experience the potential to physically protect and defend themselves. It should be noted that clients who experience hyperactive defenses in the form of uncontrollable rage may also increase their feeling of safety by learning to sense the physical precursors to full-blown aggressive outbursts, and at that moment begin to engage mindfulness. This intervention increases self-regulation and prevents the escalation of arousal to the point of discharge through aggression or other undesirable behavior.

On the other hand, therapists using Sensorimotor Psychotherapy report that some clients are not so available for, or interested in, body processing as was Mary. Such clients must slowly and painstakingly learn to experience sensation and be open to the potential value of doing so. They must gradually learn from their own somatic experience that paying full attention to body sensation and movements can be safe and even pleasurable. Additionally, severely disorganized or dissociated individuals may be unable to be mindful of sensation without becoming further disorganized or dissociated. It must be realized that accessing too much sensation too quickly, particularly before clients are able to observe their experience and put aside content and emotional states, may be counterproductive and may in fact increase dissociation and exacerbate PTSD symptoms. Therefore therapists must proceed appropriately according to each client's pace and ability to integrate. Nevertheless, an occasional client may remain unable or unwilling to work with

sensorimotor processing, finding body sensations too overwhelming and distressing, or otherwise finding a somatic approach uninteresting or unappealing. In such cases, sensorimotor processing is contraindicated and the therapist must use other techniques.

Although we have focused almost exclusively on sensorimotor processing in this article, the full spectrum of Sensorimotor Psychotherapy integrates sensorimotor processing with emotional and cognitive processing. During therapeutic sessions, the therapist must evaluate moment by moment which level of processing to address that will produce the most positive overall effect. Emotional or cognitive processing is often called for, and in fact can have a positive effect on further sensorimotor processing.

It should also be noted that while this article has emphasized sensorimotor processing, numerous other therapeutic maps and body-inclusive techniques exist in the overall approach developed by the authors and their colleagues that deal in different ways with relational dynamics, psycho/structural patterns and dissociation. Above all, it is important to stress that the ultimate and overriding goal of Sensorimotor Psychotherapy is to foster holistic processing by integrating the three levels of our being: cognitive, emotional, and sensorimotor.

References

Damasio, A. (1999). The feeling of what happens. New York: Harcourt, Brace.

Diamond, S., Balvin, R. & Diamond, F. (1963). Inhibition and choice. New York: Harper and Row.

Fisher, A. G. & Murray, E. A. (1991). Introduction to sensory integration theory. In A. Fisher, E. Murray, & A. Bundy (Eds.), Sensory integration: Theory and practice (pp. 3-26). Philadelphia: Davis.

Gendlin, E. (1978). Focusing. New York: Bantam Books.

Hannaford, C. (1995). Smart moves: Why learning is not all in your head. Arlington, VA: Great Ocean Publishers.

Herman, J. (1992). Trauma and recovery. New York: Basic Books.

Hobson, J. A. (1994). The chemistry of conscious states. New York: Back Bay Books.

LeDoux, J. (1996). The emotional brain. New York: Simon and Schuster.

Levine, P. (1997). Waking the tiger: Healing trauma. Berkeley, CA: North Atlantic Books.

MacLean, P. D. (1985). Brain evolution relating to family, play, and the separation call. Archives of General Psychiatry, 42, 405-417.

McFarlane, A. C. (1996). Resilience, vulnerability, and the course of posttraumatic reactions. In B. Van der Kolk, A. C. McFarlane, & L. Weisaeth (Eds.), Traumatic stress: The effects of overwhelming experience on mind, body, and society (pp. 155-181). New York: Guilford.

Nijenhuis, E. R. S. & Van der Hart, O. (1999). Forgetting and re-experiencing trauma: From anesthesia to pain. In J. Goodwin & R. Attias, Splintered reflections: Images of the body in trauma (pp. 39-66). New York: Basic Books.

Nijenhuis, E. R. S.; Vanderlinden, J. & Spinhoven, P. (1998). Animal defensive reactions as a model for trauma-induced dissociative reactions. Journal of Traumatic Stress, 11 (2), 243-260.

Piaget, J. (1952). The origins of intelligence in children. New York: International Universities Press.

Porges, S. (1995). Orienting in a defensive world: Mammalian modifications of our evolutionary heritage. A polyvagal theory. Psychophysiology 32, 301-318.

Porges, S. (1997). Emotion: An evolutionary by-product of the neural regulation of the autonomic nervous system. The integrative neurobiology of affiliation. Annals of the New York Academy of Sciences, 807, 62-77.

Schore, A. (1994). Affect regulation and the origin of the self: the neurobiology of emotional development. Hillsdale, NJ: Erlbaum.

Schore, A. (in press-a). The effects of a secure attachment relationship on right brain development, affect regulation, and infant mental health. Infant Mental Health Journal.

Schore, A. (in press-b). The right brain as the neurobiological substratum of Freud's dynamic unconscious. In D. Scharff & J. Scharff (Eds.), Freud at the millenium: the evolution and application of psychoanalysis. New York: The Other Press.

Siegel, D. (1999). The developing mind: toward a neurobiology of interpersonal experience. New York: Guilford.

Solomon, Z., Laror, N., & McFarlane, A. C. (1996). Acute posttraumatic reactions in soldiers and civilians. In B. Van der Kolk, A. C. McFarlane, & L. Weisaeth (Eds.), Traumatic stress: The effects of overwhelming experience on mind, body, and society (pp. 102-116). New York: Guilford.

Van der Kolk, B. A. (1987). Psychological trauma. Washington, D.C.: American Psychiatric Press.

Van der Kolk, B. A. (1996). The body keeps the score; Approaches to the psychobiology of posttraumatic stress disorder. In B. Van der Kolk, A. C. McFarlane, & L. Weisaeth (Eds.), Traumatic stress: The effects of overwhelming experience on mind, body, and society (pp. 214-241). New York: Guilford.

Van der Kolk, B. A., & Fisler, R. (1995). The psychological processing of traumatic memories: Review and experimental confirmation. Journal of Traumatic Stress, 8, 505-525.

Van der Kolk, B. A., McFarlane, A. C., & Van der Hart, O. (1996). A general approach to treatment of posttraumatic stress disorder. In B. Van der Kolk, A. C. McFarlane, & L. Weisaeth (Eds.), Traumatic stress: The effects of overwhelming experience on mind, body, and society (pp. 417-440). New York: Guilford.

Van der Kolk, B. A., Van der Hart, O. & Marmar, C. (1996). Dissociation and information processing in posttraumatic stress disorder. In B. Van der Kolk, A. C. McFarlane, & L. Weisaeth (Eds.), Traumatic stress: The effects of overwhelming experience on mind, body, and society (pp. 303-322). New York: Guilford.

Van Olst, E..H. (1972). The orienting reflex. The Hague, Nederlands: Mouton.

Wilbarger, P. & Wilbarger, J. (1997). Sensory defensiveness and related social/emotional and neurological problems. Van Nuys, CA: Wilbarger. (May be obtained from Avanti Education Program, 14547 Titus St., Suite 109, Van Nuys, CA, 91402).

Wilber, K. (1996). A brief history of everything. Boston: Shambhala.