

# Robert Scaer's Trauma Model

adapted from Chapters 1 & 2 of his book,

## The Trauma Spectrum: Hidden Wounds and Human Resiliency

Norton, 2005

The effect of the experience of trauma over the life span lays the seeds for most chronic, poorly understood disease processes that defy explanation by our current concepts of health and disease. These chronic diseases make up the majority of symptoms for which patients present to doctor's offices.

### **THE BRAIN / MIND / BODY CONTINUUM**

The brain, mind, and body exist on a continuum, wherein sensory input from the body shapes and changes the structure and function of the brain, which concurrently shapes and alters the body in all of its parts -- particularly those that provided the sensory input to the brain. The brain and body are intimately inter-related rather than two distinct parts of the greater whole. These two parts of the continuum form a dynamically changing servo system, constantly and reciprocally adapting based on the influence of the other. The **mind** is a receptacle for perceptual experience, including body sensations or feelings, and the positive or negative emotions that are related to that information. The mind is based on brain activity and is the conscious manifestation of what we sense and feel based on the dynamic interaction of the brain / body.

### **THREAT AND TRAUMA**

A life-threatening experience, either 'real' or imagined, may also become a traumatic experience if it occurs in a state of helplessness. The field of psychology accepts the premise that such trauma affects the mind. Through imaging studies we now know that trauma affects the structure and physiology of the brain as well. If we accept the idea that the mind, brain and body exist on a continuum, then we must also consider the ways in which trauma affects the brain / body. Ideally, the brain / mind / body uses what it learns from a traumatic event to develop resiliency and fortify the individual against future similar occurrences. However, depending on the individual's prior experience and the nature and outcome of the event, the trauma may actually lead to dysfunctional physiological change in both the brain and body. The dynamic interaction of the brain / body in turn sends cues to the mind affecting what it senses, feels and perceives. If the brain / body has been overly conditioned and sensitized to react to life threats, the mind will perceive threat in situations where none may exist. This hypersensitivity to threat amounts to what I call 'the imprisonment of the mind' - a state in which the mind is primed to perceive threat, is continually assaulted by and frozen in the past, and cannot conceive of a self that is free of physical and emotional pain.

## **REALITY AND OUR SENSES**

Our concept of reality is tightly bound by the amount of meager information that our sensory organs are able to provide us at any given time. Other species possess organs of sensory perception that we totally lack. The entire function of the brain / mind / body continuum is altered by the nature and quality of the sensory information that the senses provide.

## **THE BRAIN**

The **brain** is defined as a plastic, fluid, and ever-changing electrical / chemical / structural system that generates new synapses and neurons and discards old ones in response to sensory / emotional / experiential input. Life experience therefore changes the brain permanently in the way that it specifically reacts to subsequent similar experiences.

## **CONDITIONING AND UNCONSCIOUS KNOWLEDGE**

Unconscious learned behavior in all species is primarily directed toward survival-based activities. This behavior is established primarily through the repeated chance association of successful forms of complex behavior with escape from a life-threatening situation or with access to a life-sustaining reward. The behavioral patterns which emerge from this learned association are called **conditioning**.

Like Pavlov's experiments which showed how animal behavior is classically conditioned, these **conditioned responses**, which are based on cumulative life experiences, are the basic means by which species accumulate knowledge to enhance survival. Because this knowledge must be available at all times and at a moment's notice -- and must be independent from the complexity of conscious problem solving -- it is basically **unconscious knowledge**. Such unconscious knowledge constitutes the primary source of learning and behavior, not only in animals but also in human beings. Although the brain's reciprocal responses to sensory experience are central to its role, they may be corrupted by traumatic experiences which drastically alters its ability to be an effective participant in the goal of survival.

## **THE MIND AND TRAUMA**

Trauma is a perceptual / somatic / emotional experience generated by a complex set of synapses, neurons, and neurochemical states and determined by genes, instinct, and experience, that is capable of developing and directing novel behavior.

Basically, the complex cognitive processes of the mind are unnecessary for survival in an immediately threatening situation and can even be a hindrance. However, after successful resolution of the life threat, the mind reflects, problem solves, and incorporates conscious information from the experience, both to avoid future exposure to a threat and to develop additional means of assuring safety. In addition to unconsciously incorporating survival-enhancing motor skills, the mind develops future self-protective and avoidant behaviors that also promote survival. This process of conscious skill acquisition, based on mind / body interaction, constitutes a continuum of mind and body.

## **TRAUMA AND LEARNED RESPONSES**

Traumatic life experiences often contribute to learned habits of movement and posture that reflect the self-protective movement patterns associated with those threats. Many of these trauma-related movement patterns affect the way that we move, sit and stand. They may lead to patterns of movement and posture that are abnormal and they may inhibit our normal coordination and our learning of other desirable motor skills.

Self-protective movement and postural patterns of the experienced trauma are stored in the brain and the body's survival memory. These learned dysfunctional patterns persist because they are, in a metaphorical sense, necessary for defense against future threats similar to those that elicited the defense in the first place.

If traumatic memories are implanted in the brain, internal cues (such as dreams, imagined scenarios, and memories) as well as sensory information from the external environment will evoke motor, autonomic, somatic, and visceral responses to a perceived threat. This process is almost entirely unconscious and occurs typically before any conscious recognition or awareness.

**Using the term 'psychological' as opposed to 'physical' to explain a physical symptom or somatic feeling state or emotional event defies the obvious - that all perceptions, thoughts, symbols, or experiences have a physiological basis within the mind / body continuum.**

## **THE FIGHT / FLIGHT / FREEZE RESPONSE**

All animals must have the capacity to learn from life-threatening experiences. All animals learn to survive through the functions of the areas of the brain that process information through a complex behavioral process that has been termed '**the fight / flight / freeze response**'.

The brain pathways and behaviors in this response are common to all animals from reptiles to primates. But these instincts only form a template on which exposure to a series of life threats builds specific survival skills. Whether one fights or flees when exposed to a threat must be learned very quickly through such experiences. The information from these learning experiences must be stored in unconscious form in order to be of use in the survival game. It must be capable of triggering a predictable behavioral response learned through trial and error without thinking or planning. The process through which we learn these survival skills is called classical conditioning, a term coined by Pavlov (1926).

All threatening experiences, even those that are successfully resolved, will prompt unconscious responses related to cues from that experience. Persistence of the conditioned response to the conditioned stimulus is dependent on reinforcement. The internal or external repetition of the traumatic event (or events of a similar kind) will deliver such reinforcement.

The process of classical conditioning involves intrinsic or unconscious memory, part of which is 'procedural memory' (the part that we use to learn skills). **Survival depends upon classical conditioning through procedural memory.**

The capacity to initiate the fight / flight response is determined by the sympathetic nervous system - one of the two branches of the autonomic nervous system. The

sympathetic nervous system is responsible for activating the cardiovascular and motor systems of the body and for making available the extra energy for the vigorous physical activity required to fight or flee.

### **THE FREEZE RESPONSE**

Sometimes fight or flight options are no longer available. Under these circumstances a third survival option is available: the freeze response. The freeze response, common to all species, indeed may allow the animal to survive, but in mammals it sometimes comes at a terrible cost. Animals who survive the freeze response experience an unconscious 'discharge' of all of the energy and stored memories of the threat and failed escape through stereotyped body movements as the animal 'awakens'. If they don't experience this discharge, a host of adverse behavioral and health problems may follow. Classical conditioning in this context can fool the brain and lead to a host of inappropriate and ineffectual survival behaviors. When this happens we may say that 'trauma' has occurred.

When fight or flight are unsuccessful or not possible, a third instinctual and quite unconscious option will be exercised. The animal collapses and becomes immobile. This is the **freeze response**. If the freeze response is successful in preventing the animal from being killed, the animal will gradually emerge from immobility.

The freeze response is made possible through the functioning of the parasympathetic nervous system. When the parasympathetic response is very strong or extreme, the animal in freeze is in a precarious state of abnormally dysregulated and fluctuating autonomic nervous system activity.

One of the expressions of the freeze response in humans is the phenomenon of **dissociation**. Dissociation is reflective of a state of shock, stunning, trance, numbing of emotion and cognitive fogging. Dissociation is physiologically the same as the freeze.

The work of Peter Levine showed that PTSD patients experienced a dramatic clearing of many of their symptoms when they were allowed to complete the motor discharge of their freeze response through unique therapeutic behavioral techniques. In the absence of this freeze discharge, the 'energy' of the intense arousal associated with the threat and attempted escape remains bound in the body and brain, leading to a host of abnormal symptoms that we attribute to PTSD. Levine also noted that repeated freeze events without discharge seemed to be cumulative, adding to a progressive worsening of post-traumatic symptoms and to the development of progressive helplessness in the face of threat.

### **EXPLICIT / DECLARATIVE MEMORY**

The type of memory that we use in the specific process of conscious, cognitive learning is called 'explicit or declarative memory'. Access and retention of conscious, declarative memory is in part a learned skill based to a degree on native intelligence; it is exquisitely sensitive to decay with distraction, emotional distress, impaired attention, and to the passage of time. When paired to an intense emotional event it may assume features of unconscious memory, including long-term accuracy and resistance to decay.

Declarative memory is notoriously unstable, is subject to prior preference or bias, and may change significantly with the passage of time. It is often distorted by subsequent life experiences and memories, including the abortive attempts to revisit and reprocess emotionally charged or painful events.

The area of the brain that processes declarative memory is called the hippocampus. This small brain center in the temporal lobes, represented on both sides of the brain, processes incoming information from the sense organs of the body.

### **IMPLICIT / NONDECLARATIVE / PROCEDURAL MEMORY**

Survival skills acquired by life experience through the process of conditioning depend on specific memory mechanisms and structures in the brain. Much of this learned behavior is stored in our most primitive (or reptilian) brain: the mid-brain, cerebellum, and brainstem. Because these brain centers frequently operate separately from higher centers that control conscious thought and emotions, information stored and processed in these parts is intrinsically unconscious in nature.

Generally we refer to behavior generated by the reptilian brain as being **reflexive** in nature - occurring automatically without regards to planning or intent and without being based on input from the thinking brain. Only through repeated and varied exposures to different forms of threat can the human / animal develop the conditioned responses necessary for survival in their particular world. And only by bypassing the conscious brain and its complex circuits can this system work effectively.

The type of memory that serves conditioned responses is called 'implicit or non-declarative memory'. By definition, it is unconscious and is acquired without intent or effort. When implicit memory pertains to motor skills and to conditioned sensorimotor responses, it is called '**procedural memory**'. Procedural memory, in general, is also hardwired into the brain.

When procedural sensorimotor learning takes place in a situation experienced as a threat to life, that pattern of unconscious memory is rendered more permanent and resistant to decay. The unconscious sensations that the body experiences during a traumatic event are therefore permanently retained in procedural memory.

In unresolved traumatic stress, procedural memory turns inward, responding to internal cues of a threat that no longer exists - thus evoking inappropriate somatic and autonomic experiences and responses that pertain to cues unwittingly emerging from past memory rather than from present external experiences.

**The varied symptoms of trauma, of which a small number are included under the diagnosis of PTSD, fall under the definition of conditioned responses. These symptoms are incredibly varied.** They include abnormal memories (e.g. flashback images, intrusive conscious memories, recurring physical sensations, nightmares), abnormal arousal (e.g. panic, anxiety, startle), and numbing (e.g. confusion, isolation, avoidance, dissociation). The broad spectrum of expression of these symptoms reflect a dysfunction involving the brain and most of the regulatory systems of the body (i.e. autonomic, endocrine, and immune). They are based on a disruption of the usually modulated regulation of brain centers that govern arousal, emotional tone, memory, and perception.

The core of this problem is the fact that procedural and declarative memories for the

traumatic event, and the conditioned sensory perceptions and reflex motor responses associated with those memories, **continue to replicate failed efforts of successful fight or flight responses.**

### **THE NEUROPHYSIOLOGY OF THREAT AND TRAUMA**

The frontal and central areas of the right cerebral hemisphere are the regions in the brain which attend to the arousal response and to threatening information. The parts of the brain that function in an executive fashion (e.g. thinking, planning, communicating, using any type of rational thought) are, in general, not essential for the execution of emergency behavior.

Typically, the first level of information that warns us of an impending threat is accessed and received by the primary senses (smell, vision and hearing). Messages from these basic senses are routed to the **locus ceruleus** or blue center - a tiny cluster of cells in the brainstem. The **locus ceruleus** sends the message on to the **amygdala** (the 'olive') which is **the center for memory of emotionally laden information.** Because of its function as the storehouse and processor of emotionally charged experiences, the **amygdala** plays a crucial role in the mediation of the response to a perceived / conditioned threat experience. Therefore, any part of the brain receiving information which has been processed by the **amygdala** is likely to be influenced significantly by the emotional conditioning attached to the threat experience.

The **amygdala** then sends messages to the **hippocampus** (the 'sea horse'), as well as to other parts of the brain. The **hippocampus** forms a conscious structure for the threat-based message that includes its emotional / conditioned importance, and then sends it on to the **orbitofrontal cortex**, the master regulator of survival behavior (both conscious and unconscious). The **orbitofrontal cortex** then sends information to many parts of the brain which may then organize and initiate the necessary behavior patterns which can help the individual survive.

It also activates the body's endocrine response through the **hypothalamic / pituitary / adrenal (HPA) axis.** The **hypothalamus** is a center deep in the middle and base of the brain. In addition to regulating many other complex functions (e.g. sleep and appetite), it also regulates the **autonomic nervous system.** In the case of a threat, the **sympathetic nervous system** (the energy-burning survival part) is activated. The **pituitary gland** (the master endocrine gland) is also activated and initiates the body's endocrine response.

The pituitary gland, through the hormone **adrenocorticotrophic hormone (ACTH)** stimulates the adrenal glands to release **cortisol**, which puts a brake on norepinephrine - thus modulating the brain's arousal response. In the event that the individual survives the immediate threat, cortisol also prepares the animal to manage ongoing stress through changes in its circulation, metabolism, and immune responses.

This complex interaction of nerve centers, glands, and chemicals is typical of the multiple interactive feedback systems by which the body is designed to not only survive a threatening event, but also to regulate itself and to promote stability of the entire organism.