This subcortical area of the brain, where the amygdala resides, is one of the first structures to process sensory information. The main objective of the amygdala is to determine, very quickly, whether a certain situation, context, person, etc. presents a threat or danger. It's always on, always receiving input from all your senses—even the orienting muscles in the neck as you turn your head to survey your surroundings for safety or danger.

Everything the amygdala evaluates is viewed through the lens of potential danger or threat. For example, when your cat walks into your living room, the amygdala receives sensory information about your cat (through vision, and perhaps sound or touch) and immediately evaluates whether or not it is dangerous. The amygdala asks, “Is this a lion? A tiger? A cat? Is it a safe cat?” Its main objective is to determine whether a situation, person, animal, etc. is threatening. No wonder this area has been called the smoke alarm by trauma experts van der Kolk, McFarlane, and Weisaeth (1996), as the main job of the amygdala is to detect danger. When this fear center interprets a situation as threatening, it activates, much like a smoke alarm when it senses smoke.

The stronger the threat is perceived to be, the higher the activation of the amygdala. When this activation occurs, the amygdala begins to suppress the functioning of the higher thinking areas of the brain needed for rational thought and emotion regulation, and activates the stress pathway through communication with the hypothalamus. In turn, the activation of the stress pathway (the hypothalamic-pituitary-adrenal axis) activates the stress response in the body (the sympathetic nervous system), which mobilizes an individual's resources and helps them to manage the threat through fleeing, fighting, or freezing.

The amygdala is often hyper-activated in those suffering from post-trauma symptoms, as well as those suffering from anxiety disorders (and some other disorders as well). One goal of trauma treatment is to reduce activation of this area of the brain. De-activation of this area can reduce the stress response, reactivity to trauma triggers, and the arousal and reactivity symptoms of PTSD (such as hypervigilance, feeling on guard, etc.).

**KEY RESEARCH FINDINGS**

- Increased activation of the amygdala in PTSD (Shin, Rauch, & Pitman, 2006)
- Hyper-reactivity of the amygdala in PTSD (Ledoux, 2000)
- Exaggerated responses to non-trauma-related emotional stimuli in PTSD (Rauch et al., 2000; Shin et al., 2005)
- The stronger the amygdala activation, the more severe the PTSD symptoms (Protopescu et al., 2005)
Top-down techniques use a variety of methods that engage awareness and thinking to change the brain. Research shows that thoughts can be used to alter brain regions, especially high cortical areas such as the prefrontal cortex (thinking center). Top-down approaches are critical to incorporate in trauma treatment, as individuals with post-trauma sequelae show under-activation of the thinking and emotion regulation centers of the brain.

While it is recommended that the first phase of trauma treatment focus on learning bottom-up techniques, treatment is not complete without a subsequent strong emphasis on top-down techniques. Examples of top-down techniques are found in Part III, Chapters 7-8 of this workbook.

Examples of bottom-up techniques are found in Part III, Chapters 7-8 of this handbook. They include (but are not limited to):

- Open awareness meditations
- Closed concentration meditations
- Cognitive restructuring techniques
- Cognitive techniques that work with memories
Change the Brain Top-Down

While the brain is responsible for producing thoughts, thoughts also produce brain change. Techniques that use thoughts, or the mind, to change the brain are referred to as “top-down” approaches. Whenever we try to focus on something, change our thinking, or redirect our thoughts, we are practicing changing our brain from the top down. Therapy techniques that work with thoughts are often utilized to change the upper, cortical parts of the brain, including the thinking and emotion regulation centers of the brain.

Top-Down Approaches
Using the mind (thoughts) to change the brain
(usually the upper parts of the brain)