

Emotions, Mindfulness and the Pathways of the Brain

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The brain is divided into three major areas: the cortex, the limbic system and the brain stem. One part of the limbic region, the, **amygdala**, is important for processing emotions, especially fear, sadness and anger. "Processing" means generating the internal emotional state and the external expression of the emotion. In an important sense, the amygdala is the emotional center of the brain.

The cerebral cortex, or cortex, is the region at the top of the brain and is generally regarded as the center of the most evolved functions of reflection and awareness. An important part of the cortex is the **prefrontal** lobes behind the eye sockets. Among other functions, the prefrontal lobes regulate emotion and emotionally attuned communications. This region is also involved with "response flexibility," the ability to take in information, think about it, consider various options for responding and then produce an adaptive response. In other words, the prefrontal lobes are intimately involved with our ability to be mindful and to make intentional choices.

Emotions are crucial for our survival. The need to appraise and respond to a potential threat arises too fast to address consciously. Consequently, before we are aware of what we are responding to, we respond emotionally, priming the brain and body for action. In a real sense, we are always in the process of catching up with our emotions.

Here is where the amygdala becomes so important. For example, we see something stimulating fear - perhaps a shadowy figure coming toward us on a deserted street at night. The perception bypasses the cognitive centers of the brain and goes straight to the amygdala. The amygdala, operating as the brain's early-warning center, is a place of no words, no cognition and no consciousness. It sets off a full-body hormonal response that bypasses the conscious brain and is experienced physically as overwhelming and possibly uncontrollable fear. The reaction also prepares us to deal with the perceived danger - put simply, to fight or flee. In other words, the amygdala has triggered what I like to call the brain/body's "**alarm system**".

The amygdala, as the primary repository of emotional memory, is especially active in the first

years of our life when it is more fully formed than the higher regions of our brain. Emotional memories are imprinted in the amygdala during this time when we, as infants and toddlers, have experiences that are fearful, hurtful, threatening, etc. These emotional memories register with a high potency in the amygdala because the same neurochemical that initiates the fight-or-flight response stamps the moment in memory with vividness. The more intense the emotional arousal (think of an infant or young child who is very upset), the stronger the imprint of the emotional memory. This explains the lasting power of these early emotional memories, some of which are outside our conscious awareness because they were experienced prior to our developing verbal and higher cognitive abilities.

The alarm mechanism of the amygdala is often described as sloppy. When the amygdala receives a signal from our perception, it compares the present perception with past experience. When a key element of the present situation is associated with a past experience that was fearful or hurtful, it often makes a loose connection and finds a match. The amygdala then commands our body/mind to react with thoughts, emotions and reactions that were learned in connection with past events. At that point, it is as though a hypothetical pipeline opens up and powerful messages and energies from the past flood into the present moment, often dramatically affecting the nature and intensity of the individual's reaction to the present situation. The alarm system persuades us that all the dangerous conditions that existed in the past situation are again present, **when they are not**.

There is another aspect of the brain/body's alarm system that makes it even more challenging. There are two basic classes of memories. With **explicit** memories, we know we are remembering something; we are conscious of retrieving a memory of a past experience or event. With **implicit** memories, the information and powerful emotional components of a previous experience are activated, impacting our present-moment reaction, but we are not aware we are having a memory! We think our entire reaction is responding to the present situation when, in fact, a significant part of our reaction often is flooding us from the memory of the earlier experience, **a memory we are not aware we are having**.

When we know about implicit memories, we can make sense of repeating emotional reactions that have always been confusing. We are in a much better position to work skillfully with the emotions of fear, anxiety, anger and even depression when we realize that our perception of the present circumstances may be distorted and/or intensified by implicit memories of fearful experiences that were recorded in our brains at a much earlier time in our lives.

The brain's damper switch for the amygdala's surges is in the prefrontal lobes. This more evolved area has the capacity to analyze our perceptions more thoroughly, sort out the details of the situation and moderate the alarm signals of the amygdala if we are not really at risk. The problem is that the prefrontal lobe circuits actually fire after the amygdala has already begun to send out alarm signals and the analytical process in the prefrontal lobes, although more complete than the amygdala's "quick and dirty" analysis, is slower.

Consequently, an **emotional hijacking** often occurs because the amygdala's quick alarm response essentially short-circuits the prefrontal lobes' ability to more thoroughly process the situation. When we are caught in an emotional hijacking, we are neurologically impaired. We simply do not have the ability to think clearly because our reactions are dominated by the fear-based part of the brain. I am sure you have heard someone say, "I was so angry that I couldn't think straight!" They are absolutely right. They could not think straight because the fear-based emotional hijacking has disrupted the brain's sophisticated communication.

With an emotional hijacking, the mind and the body tend to become locked into a recurring pattern of the amygdala's emotional arousal, flooding us with stress hormones and irrational fear, anxiety or anger. These internal reactions often result in repeating old unhealthy and ineffective patterns of speech and action. The impact on our relationships can be harmful and even disastrous.

These recent developments in neuroscience dramatically underscore the importance of **mindfulness**. In order to work skillfully with our deeply-imprinted emotional memories and the brain's alarm system, we need to bring sharp awareness to our strong emotional risings before acting or speaking. We need to step back, breathe and settle ourselves a bit. In terms of brain operation, this gives the prefrontal lobes a chance to catch up with the alarm signals of the amygdala, make a more thorough analysis of the present situation and avoid an emotional hijacking that results in repeating old patterns from the past.

This practice of mindfulness gives us the best opportunity to act skillfully and creatively with the understandable and very human negative emotions that frequently arise in us. Mindfulness enables us to break the old emotional habits and replace them with more thoughtful and effective patterns. In a very real sense, the practice of mindfulness transforms the old brain circuits conditioned by fear as we gradually, with practice, replace them with new neural circuits created by awareness and our best intentions.