Why a Healthy Amygdala is the Key to Your Emotional Health & Happiness

The amygdala is one of the most versatile parts of the brain. It is responsible for tasks that are far more important to our survival than those of the neocortex or thinking brain. It requires more brain structures and systems, its functions are more complex and interconnected, and the implications of that are more critical to our well-being. The amygdala reflects the genius of Mother Nature. Its purpose is no less than to keep us joyful and alive. Unlike behavior – or even thoughts – that might be right or wrong, the sensations and emotions that come from the amygdala that may be misunderstood, but are *never* wrong. They are messages from Mother Nature that contain vital information which, if understood and followed, will help ensure our well-being. *Emotions happen **to** us, they are not something we **do**.* The Amygdala is designed to

SAVE OUR LIVES

The amygdala is our internal guardian angel, the source of instincts, intuition and the "fight or flight" response. Like an alert sentry, the amygdala is continually evaluating the environment in terms of its benefit or danger to us and signaling pre-programmed responses – emotions – that help us thrive, survive, prevail or escape. Its primary function is to keep us safe. The importance of the warning function of the amygdala to survival cannot be overstated. Arthur Kling from the University of Chicago reports that *within seven hours of releasing seven monkeys with amygdala lesions into the wild, all but one had vanished to predators*.

The amygdala sends out powerful signals that instantaneously focus our attention on stimuli that may be threatening. For example, when shown pictures of snakes and spiders, fields and flowers, trees and birds, human beings innately perceive snakes and spiders more rapidly than non-fear-invoking objects. Subjects who look at pictures of faces can pick out the one angry face among smiling ones faster than they are able to pick out the one happy face among a group of angry faces.

SENSE DANGER

A healthy amygdala is critical to survival: damage can and often does have grim consequences. In *The Feeling of What Happens*, Antonio Damasio documents the case of S., a woman whose amygdalae were calcified from Urgach-Wieth disease. S. displayed a predominantly positive attitude regardless of the circumstances, was excessively friendly, and often taken advantage of. Negative emotions appeared to be absent. Though she learned new facts easily, she could not be taught to respond appropriately to unpleasant stimuli. When tested using pictures of faces to determine if she could accurately and consistently identify facial expressions, S. was able to recognize some emotions, but she was unable to discern the expression of fear. Interestingly, while

she was a passable artist, she was also unable to draw a fearful face. Nor was she able to mimic the emotion of fear through her own facial expressions, though she could do so for all others that she was asked to mimic.

LET US KNOW WHEN NOT TO TRUST

Studies of other people with bi-lateral amygdala damage show similar results. When shown pictures of faces that had been assessed as trustworthy by those *without* amygdala damage, patients with amygdala damage likewise considered them to be people they could safely approach. But they also judged as trustworthy faces that normals had deduced to be suspicious and dangerous. The patients with amygdala damage were, in essence, unable to accurately evaluate the amount of danger in the environment and protect themselves from it.

TELL US WHEN SOMEONE IS LYING

The intuitive sensations we receive from the amygdala also protect us from being used – and let us know when we are being lied to. In a study by Etcoff, et. al., aphasic (inability to use or understand language) patients with left-brain damage and a group of controls with no brain damage were shown a film of a woman describing a beautiful scene. Unbeknownst to them, however, she was watching either the beautiful and relaxing scene or a scene depicting images of burn victims and amputees. Participants were then asked to judge whether or not the woman was lying. The results with the control group – those without brain damage – were 50/50, no better than chance. But the aphasic patients did quite well. They were able to detect lying almost 75% of the time. Those who were unable to understand the meaning of words were better able to focus on and interpret the facial expressions and body language of those who were lying.

SHOW US THE PATH

The amygdala provides essential guidance and answers the question: Who am I and why am I here? Life without the amygdala, according to studies that have been done on those in whom it has been damaged, is a life without knowing why you are here or who you are supposed to be. Since the amygdala is the source of all emotions both pleasant and unpleasant, it draws us to some activities and away from others. Without these positive or negative sensations, all options would have equal value. We would feel lost, without direction. When the sensations differ, they provide a detailed road map of where we should go.

The left amygdala in particular, appears to be the source of the "ahhhhh" feeling, guiding us like the North Star to those activities that are biologically and emotionally right for us. "I am an artist at heart," one person might say. "Taking photographs interests me," another comments. "I have a camera with me wherever I go." "The number one thing that turns me on is the ocean," says a third. "I love the breeze, the salty air, and the sound of the waves breaking."

MAKE DECISIONS

The amygdala is designed to help us to make efficient decisions in keeping with our purpose. Though most of us in Western society have bought into Descartes' belief in the superiority of reason and like to think that we make logical decisions devoid of that old bugaboo, emotion, we in fact do not. The way our brains are wired makes it virtually impossible to reach decisions without emotions. Like the "sort" function on a computer, the amygdala puts the alternatives that are generated in the hippocampus – the processing plant for facts – and the left brain in priority order, allowing us to assign values to and feel differently about each alternative and ultimately to choose one over the others. It is the amygdala that allows us to make complex yet quick and efficient decisions, not the so-called "rational" neocortex. It is the amygdala that motivates us to *act*.

Antonio Damasio tells the story of Elliot, who underwent brain surgery primarily to the frontal lobe, to remove a benign tumor. Prior to the surgery he had been a successful lawyer and a husband and father. Though every bit as intelligent after brain surgery as before, Elliot was unable to make decisions, even one as mundane as when to make his next appointment with his therapist. He was unable to manage his time, unable to decide on categories into which he could sort his work, and unable to stick to a task when he was distracted. Every option was neutral to him, lacking positive and negative qualities. Though able to list the pros and cons of his alternatives, he was unable to assign priority values to any of them and was therefore unable to choose between them.

Elliot had particular difficulty making personal and social decisions, but seemed unperturbed by his dilemma. He no longer had any feelings about himself or his situation, no strong emotions one way or another. When tested on his moral judgment, his responses were flawless, but in the everyday world, where decisions needed to be made constantly, he was unable to make appropriate choices. In time, as might be expected, he lost his job and family, engaged in risky business ventures, married and divorced a number of times, and went bankrupt. Elliot lacked a "sense" of things, he lacked gut feeling. He did not know in his heart what direction was right for him.

FORM RELATIONSHIPS

The amygdala provides the feelings and passion necessary to form meaningful relationships. The amygdala is the source of our connection to others, enables us to have meaningful relationships, and to appreciate the contributions of our fellow human beings. In cases where the human amygdala has been removed or damaged, patients might recognize their family and friends, but will ignore them. The importance of the relationship has been lost. A stranger or a hospital worker has the same level of meaningfulness to the patient as does his or her spouse or child. Interactions with *things* are just as interesting as those with *people.*

Amygdala damage has a similar effect in other animals as well. Mother chimps whose amygdala was destroyed, reports Kling, "behave as if their infant is a strange object to be mouthed, bitten and tossed as if it were a rubber ball." Monkeys released into the wild after the connections between the amygdala and cortex were severed, according to Brothers, were able to perform simple tasks like feeding themselves and climbing trees but could not interact appropriately with other monkeys. When they were approached by other monkeys, they often ran away and avoided social interaction even with their own group.

R. Joseph describes a young man whose amygdala was removed to control seizures. After surgery he was disinterested in people, even indifferent to close friends and relatives, and, to their dismay, unmoved by their distress at his indifference.
Gary, a bright, accomplished 35-year-old surgeon with no apparent brain damage is characterized by researcher Hillel I. Swiller as being superficially friendly, but he had difficulty expressing his emotions. He, like many of us in the "rational age," didn't know what he was feeling. Gary was cut off from all powerful emotions and lacked self-awareness. Though married and professing love for his wife, he experienced little empathy for her, had virtually no fantasy life, and was unable to share his feelings or his internal desires. His emotional life was a mystery to him, his relationship with his wife Ellen was frustrating to them both, and he was often perplexed as to why she was angry with him.

Gary lacked what psychologists call emotional "prosody," the ability to detect the emotional meaning in spoken language. With such a person, the phrase "thanks a lot!" said with deep appreciation is the same as "thanks a lot!" uttered with dripping sarcasm. These individuals hear the words, but are unable to detect the nuances of the intended meaning. This "disorder" has its own name – alexithymia. Males with the disorder outnumber females 4 to 1.

FEEL EMPATHY

Empathy, another critical component of successful relationships, is also an important task of the amygdala. At the University of California, Berkeley, Robert Levenson investigated the connection between empathy and successful marriages by videotaping and measuring the physiological responses of couples as they argued about an important issue in their marriage. After the argument, each of the partners reviewed the tape twice. In the first review, they told the researchers what they were feeling during the argument; in the second, they tried to read the feelings of their partner. Those who were best at discerning their partners' feelings were also those whose physiological reactions were most similar to their partners during the second viewing of the tape. In other words, if their partner's blood pressure went up, so did theirs. If their partner sweated, so did they. If, on the other hand, their physiological reactions in the second review were only a repeat of what they themselves had felt during the original argument, they were very poor

at perceiving their partner's feelings. As the researchers reported, "only when their bodies were in sync was there empathy."

Empathy also lays the foundation for a moral society. Very early in life, children respond to other baby's cries, feel distress when others fall, and soothe others when they are distressed. In fact, the earliest study of what is called a "reactive cry" was established by Sagi and Hoffman in 1976. They found that as early as 1-day-old, newborns will react to the cry of another infant by crying themselves. Simner studied empathy in 2 and 3-day-old infants and found that this response is not caused by distress at a loud, intrusive noise; a computer simulated cry did not produce empathy on the part of the infant. Nor did infants cry as much if they heard the cry of a chimpanzee or even their own cry played back to them.

Researchers have also found the brain patterns that represent empathy. Stanford researcher Sean Mackey studied the brain patterns of subjects as they watched videos of people who were being injured in a variety of situations, including car crashes. Their brains were again scanned as researchers put a hot instrument on their arms. The parts of the brain that were activated were the same in both scenarios, indicating that the feelings they had for others who were suffering were the same as those they felt when they themselves were in pain.
Leslie Brothers, a psychiatrist at the California Institute of Technology, provides a perspective of the process of empathy which is evident even in lower primates. In this study, Rhesus monkeys were conditioned to fear a tone by pairing it with a shock. The monkeys could prevent the shock from occurring by pushing a lever in their cages. After conditioning, the monkeys were put into separate cages but were able to see each other through closed circuit TV. One monkey only then heard the tone that he had learned to associate with a painful shock. When the second monkey saw the first monkey's face, he pushed the lever and saved the first from experiencing the shock.

In an early study of altruism in adults, Berger asked subjects to watch a person who was completing a task that involved a shock and compared them with a control group watching someone who did not receive a shock. All subjects understood that they themselves would not at any time be receiving a shock. As predicted, those watching the person being shocked responded with empathic emotions – they were more aroused, physiologically, than those in the control condition. Berger concluded that we generally respond emotionally when we believe someone else is suffering, even if we are not or will not be experiencing the same fate.

HELP US LEARN FROM EXPERIENCE, AVOID FUTURE HARM

From our earliest days, our bodies help us retain memories that have the most significant emotional meaning for our survival. When faced by imminent threat, the amygdala turns on numerous bodily processes, including the autonomic nervous system, which in turn releases adrenaline, cortisol, and other hormones into the bloodstream. These chemicals

synthesize new proteins in the neurons, locking the emotions, or implicit memories, that are associated with that experience into the amygdala; and storing explicit memories, the facts of the experience, in the hippocampus, a separate part of the brain.

If you were involved in an automobile accident, for example, the facts – that you were driving a blue car, that it was noon on Saturday, that you were at the intersection of Shea and Tatum – would be stored in the hippocampus. The feelings you had when you saw the oncoming vehicle, the panic and terror would be stored in the amygdala. If one of your parents was violent, the fact that he or she struck you with a black leather belt with a silver buckle is stored in the hippocampus, the feeling of fear, anxiety and anger in the amygdala.
The emotional, implicit memories – literally, protein stored in the amygdala – serve to increase our vigilance and attract our attention to certain stimuli that we associate with discomfort, so that we can take the extra time to check them out and determine if the environment is safe. By processing and storing memories of unpleasant experiences, the amygdala enables us to adapt to different environmental conditions and avoid circumstances and events we have learned are dangerous.

Conversely, the amygdala also guides us to circumstances and events that it has learned are safe. Roger Zajonc and his colleagues at Stanford University showed subjects a series of Chinese ideograms, then later presented patterns that contained both those ideograms as well as a number of new ones. Consistently, subjects preferred the patterns they had previously seen. The experiment was then replicated with different subjects who were shown the first set of ideograms subliminally – that is, in such a short period of time that the participants were not consciously aware they had seen them. When they were asked to choose the patterns they preferred, however, they still selected the patterns they had previously seen. Human beings appear to biologically prefer neutral things we have been exposed to over novel stimuli, even when we are not aware that we have seen them before. Called the "mere exposure effect," this psychological phenomenon makes sense: experiencing an event that does not have a bad or painful result implies that that event is safe.

Learning about and remembering things that are dangerous doesn't need to involve conscious thought either. In 1911, French physician Edouard Claparede studied a female patient who had such severe damage to her factual memory system that she could not recognize him if he re-entered her room after an absence of just a few minutes. When he conducted an experiment to see if she could still recall emotional events, he made a startling discovery. On one visit, Claparede held out his hand to shake hers – part of his normal routine with her – but this time, he hid a tack in the palm of his hand. His patient immediately withdrew her hand. But would she remember the incident? Well, yes and no. Upon subsequent visits, though she could never explain why, she refused to shake Claparede's hand. She had an emotional memory of the incident, but no factual memory of it.

More recently, Tranel and Damasio conducted a study they dubbed the "good guy – bad guy" experiment with a similar patient, one who couldn't learn or remember new facts or even recognize people. David was exposed to three individuals – one who was very pleasant, one neutral, and one who was brusque. After interacting with these three people for a week, he was asked to select from sets of 4 photographs (which included at least one of the individuals in the experiment) the person to whom he would go for help. If the person who had been pleasant was among the photos, David chose it more than 80% of the time. If the neutral person was included, he chose it 25% of the time. He chose the bad guy virtually never. When he was subsequently shown a set of pictures of the three individuals in the experiment and asked to tell the researchers what he knew about them, he denied ever having met them.

Clearly, we can be afraid without knowing what we are afraid of or why. In fact, recent brain scans have uncovered the biology behind this process. In studies using fMRI's, simply being exposed to stimuli that are associated with old traumatic events has been shown to trigger the proteins that were stored in the amygdala during the original fearful experience and to recreate precisely the same emotions in the here and now.

CONCLUSION

In short, all of these functions of the amygdala are absolutely essential to a productive, happy life. But, because we store memories of past trauma in the form of a protein, we need to get rid of that protein and those emotional memories before we can become emotionally healthy.