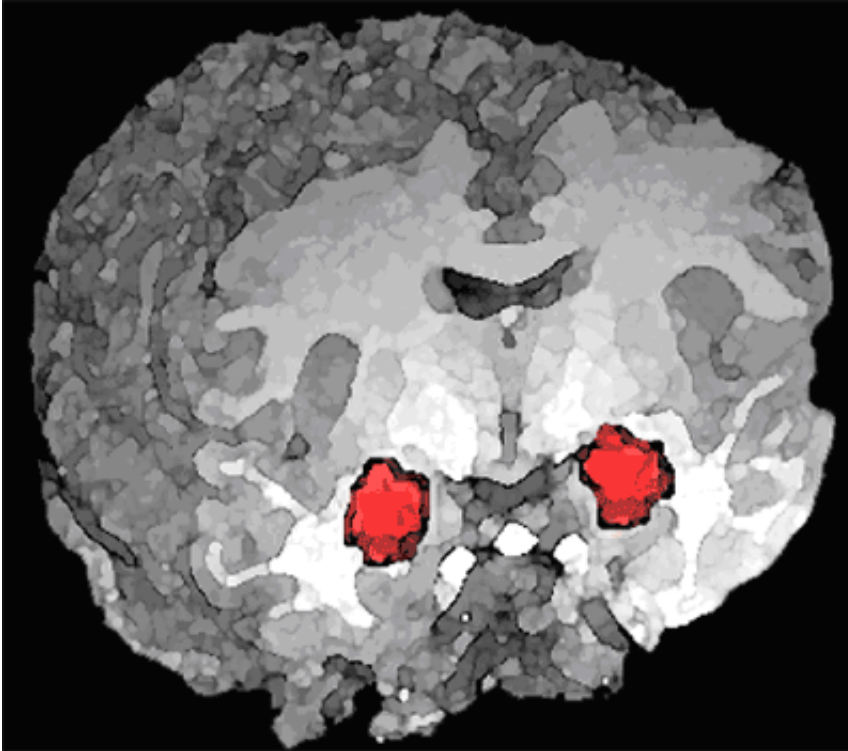


Fleeing the Brain's Fear Center

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Scientific “facts” often take on a life of their own. Scientists make legitimate and exciting new discoveries, with the best tools available to them in their time, and these findings get verified and modified and cited and, eventually, repeated without question. Over time, insights get simplified for non-scientists, and translated into the plain language of introductory textbooks. If they get repeated often enough, for long enough, some of these facts even seep into the popular culture.

So it is with the amygdala, otherwise known as the brain’s “fear center.” Whether it’s in newspapers or popular science books or Wikipedia, the amygdala is invariably described as a small, almond-shaped cluster of neurons buried deep within the brain’s limbic system. There are two of them, one on each side of the brain, and the dominant view is that their primary purpose is to govern the emotion of fear. That means both that we need these clusters of neurons in order to feel afraid, and conversely, that activity in the amygdala is a sure sign that we are scared or threatened.

This is not entirely wrong. But two psychological scientists are now arguing that this notion of a fear center is simplistic and incomplete. A more accurate view, say William Cunningham of Ohio State and Tobias Brosch of NYU, is that the amygdala appraises the world much more broadly, looking not just for threats but for anything that might be important to furthering one’s goals and motivations. Fearsome stimuli might indeed be relevant—almost certainly are—but so too might unusual, interesting, ambiguous and even positive stimuli, depending on the person and the situation. In short, uncertainty is more arousing than what’s familiar.

Cunningham and Brosch conducted a thorough review of the vast literature on amygdala function, and their analysis also reveals a lot of individual variation in amygdala activity. Some subjects respond more to positive and negative stimuli than to neutral stimuli; others mostly to negative stimuli; and still others to positive information. In other words, amygdala activation may not have the same meaning for everyone; it may instead reflect the psychological state of the individual. The amygdala appears initially to evaluate the relevance of stimuli, and then to tune the individual's overall cognitive and emotional response.

These varying responses may reflect personality to some degree. Some people see the world as a kind place, others as malevolent, and these biases shape the brain's appraisal and response. Obviously, if you see a world of opportunities where I see only danger, our evaluations of what's important will be quite different. Indeed, neuroticism—an emotionally volatile and negative world view—has been linked with a heightened amygdala response to negative stimuli. Similarly, extraverts—ebullient and sociable types—have a greater response to pleasant photographs and happy faces. Selfish people—compared to altruistic people—show a marked amygdala response to new opportunities for financial gain.

There is much more evidence for this emerging view of the amygdala as a motivational tool, much of it summarized in a forthcoming issue of the journal *Current Directions in Psychological Science*. But why does any of this matter to you and me? Well, consider this snippet of dialogue from the popular TV drama *Boston Legal* from a few years back. It's from expert witness testimony in an episode called "Attack of the Xenophobes":

"We can tell how someone is feeling, and we can specifically identify responses associated with sociopathic tendencies. Here we determined that the defendant was racist [with] extreme accuracy. In this case, we showed Mr. Bass pictures of people from various races, and then we measured the response in the part of the brain that controls fear. It's called the amygdala . . . Officer Bass perceives black men as threatening."



Not only is the amygdala depicted as the brain's fear center here, but this automatic fear response is connected to real-world racial prejudice, with moral and legal implications. According to Cunningham and Brosch, the notion of a neurological fear center has led to an entirely new field—the neuroscience of prejudice—and in turn to the conclusion that amygdala activity signals deep-rooted prejudice against people different than ourselves. Such evidence can easily be interpreted to mean that racial hatred is biologically engrained and therefore beyond individual control.

The new theory of the amygdala doesn't allow such an interpretive leap. If indeed the amygdala fires up in response to goal-relevant information rather than simply to threat, then it's more likely that the amygdala is responding to people, in-group or out-group, who have some kind of social value. Evidence supports this reinterpretation: Scientists put together mixed-race teams and used a brain scanner to see the brain's response to novel out-group and novel in-group members. The amygdala showed a more heightened response to novel in-groups members. This makes sense, the authors say: People enjoy all sorts of social advantages if they can recognize and cooperate with members of their own group.

All of these recent findings, taken together, call into question the whole idea of brain modules that govern specific, universal emotions like fear, sadness, disgust and surprise. The new and more dynamic view of the amygdala—and the brain—raises doubts about such an emotional taxonomy. In short, it may be more productive going forward to study how emotions are constructed from basic cognitive processes like motivation and appraisal of the complex world.

Wray Herbert's book, [*On Second Thought*](#), is now available in paperback. Excerpts from his two blogs—"We're Only Human" and "Full Frontal Psychology"—appear regularly in *Scientific American Mind* and [*The Huffington Post*](#).