Why emotions capture our attention

Outcome: A brain pathway from the brain’s center for emotion talks directly to a region that controls attention. The work was conducted by Basilis Zikopoulos and Helen Barbas, members of CELEST, an NSF funded Science of Learning Center.

Impact/benefits: Understanding how emotions affect attention is necessary to understand psychiatric diseases that disturb attention, such as schizophrenia, depression, autism, attention deficit disorder, post-traumatic stress disorder and phobias.

Explanation/benefits: The amygdala, a thumb-size structure buried deep in the brain, talks directly and loudly to the brain’s center for attention, a structure called the thalamic reticular nucleus. Like a passport control center, the thalamic reticular nucleus gates what goes to the cortex, the brain’s thinking machine, allowing passage for some signals and vetoing others. This pathway can direct the mind where it needs to focus. Schizophrenic patients have trouble focusing attention, as do children with attention deficit disorder, which affects learning. On the other hand, people with phobias or post-traumatic stress disorder see danger everywhere in the environment and are constantly anxious. Depressed patients focus excessively inward on negative thoughts. Future research may help pinpoint which part of this pathway is affected in these distinct and devastating mental diseases.

Legend for Figure: Nerve cells from the brain’s emotional center, the amygdala (green) send messages to the brain’s center for attention, the thalamic reticular nucleus (TRN, blue). Nerve fibers from the posterior orbitofrontal cortex (red), which gauges the emotional value of signals and events, also sends fibers to the reticular nucleus. The figure shows in 3D the rhesus monkey brain and the position of these structures. Adapted from: Zikopoulos, B. and Barbas H, 2012. Journal of Neuroscience 32(15): 5338-5350.