

New study sheds light on brain's response to distress, unexpected events (w/ Video)

November 10 2009

In a new study, psychologists at the University of Alabama at Birmingham (UAB) are able to see in detail for the first time how various regions of the human brain respond when people experience an unexpected or traumatic event. The study could lead to the creation of biological measures that could identify people with post-traumatic stress disorder (PTSD) or identify PTSD sufferers who would benefit from specific treatments.

In the study, UAB researchers used <u>functional magnetic resonance</u> <u>imaging</u> (fMRI) to see how activity in the parts of the brain associated with fear, learning and memory respond when research participants were startled by a loud static sound and when they were able to correctly predict when the sound would occur.

"When the noise is unexpected, the brain's response is larger," said UAB psychologist David Knight, Ph.D., principal investigator on the study, which is currently in press online and will appear in the January 2010 issue of the journal NeuroImage. "But when participants are able to predict when they are going to hear the unpleasant static noise, you can see the regions of the brain quiet down so that a smaller emotional response is produced.

"While past studies have looked at this startle phenomenon behaviorally, this is the first look at what is actually happening in these regions of the brain when someone is exposed to an unpleasant, unpredictable event," Knight said.



In the study, UAB psychologists placed 15 healthy adults in an fMRI scanner and asked them to listen to a series of low- and high-pitched tones. Some tones predicted a loud static sound would follow, while other tones predicted that the static sound would not occur. During the study, participants were asked to rate the tones between zero and 100; zero if they did not expect to hear the static sound, 100 if the static sound was expected and 50 if they could not make a prediction.

In addition, the researchers measured the participants' skin responses such as sweaty palms to determine how much the participants were physically bothered by the static noise. The researchers then correlated the skin and brain responses to evaluate how brain activity influences emotional expression.

An analysis of the brain scans showed that unpleasant events produced activity within the frontal lobe of the brain. The amount of activity was reduced when participants expected the unpleasant event, but not when the event was unexpected. Further, the amount of activity within these brain regions controlled the emotional response that was expressed.

"These findings are a first step in identifying techniques and procedures that will allow us in future studies to go in and look at patient populations and better understand how their brains respond to negative or unpleasant stimuli," Knight said.

"Those studies will hopefully lead to other studies in which we can perhaps try different medications with these individuals and see if that alters their brains to aversive stimuli," he said. "With that information, we can start to develop biological markers using fMRI that may help us better identify and treat different types of disorders."

Source: University of Alabama at Birmingham (news : web)



Citation: New study sheds light on brain's response to distress, unexpected events (w/ Video) (2009, November 10) retrieved 5 May 2024 from <u>https://medicalxpress.com/news/2009-11-brain-response-distress-unexpected-events.html</u>

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