

Losing money, emotions and evolution

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Financial loss can lead to irrational behavior. Now, research by Weizmann Institute scientists reveals that the effects of loss go even deeper: Loss can compromise our early perception and interfere with our grasp of the true situation. The findings, which recently appeared in the *Journal of Neuroscience*, may also have implications for our understanding of the neurological mechanisms underlying post-traumatic stress disorder.

The experiment was conducted by Dr. Rony Paz and research student Offir Laufer of the Neurobiology Department. Subjects underwent a learning process based on classic conditioning and involving <u>money</u>. They were asked to listen to a series of tones composed of three different notes. After hearing one note, they were told they had earned a certain sum; after a second note, they were informed that they had lost some of their money; and a third note was followed by the message that their bankroll would remain the same. According to the findings, when a note was tied to gain, or at least to no loss, the subjects improved over time in a learned task – distinguishing that note from other, similar notes. But when they heard the "lose money" note, they actually got worse at telling one from the other.

Functional MRI (fMRI) scans of the brain areas involved in the learning process revealed an emotional aspect: The amygdala, which is tied to emotions and reward, was strongly involved. The researchers also noted activity in another area in the front of the brain, which functions to moderate the emotional response. Subjects who exhibited stronger activity in this area showed less of a drop in their abilities to distinguish



between tones.

Paz: "The evolutionary origins of that blurring of our ability to discriminate are positive: If the best response to the growl of a lion is to run quickly, it would be counterproductive to distinguish between different pitches of growl. Any similar sound should make us flee without thinking. Unfortunately, that same blurring mechanism can be activated today in stress-inducing situations that are not life-threatening – like losing money – and this can harm us."

That harm may even be quite serious: For instance, it may be involved in <u>post-traumatic stress disorder</u>. If sufferers are unable to distinguish between a stimulus that should cause a panic response and similar, but non-threatening, stimuli, they may experience strong emotional reactions in inappropriate situations.

This perceptional blurring may even expand over time to encompass a larger range of stimuli. Paz intends to investigate this possibility in future research.

Provided by Weizmann Institute of Science

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