

Anxious people more apt to make bad decisions amid uncertainty

March 2 2015, by Yasmin Anwar



New brain evidence provides insight into why highly anxious people are worst at making decisions when things get unpredictable Credit: Illustration by Ian Smiley

Highly anxious people have more trouble deciding how best to handle life's uncertainties. They may even catastrophize, interpreting, say, a lovers' tiff as a doomed relationship or a workplace change as a career threat.

In gauging people's response to unpredictability, scientists at the University of California, Berkeley, and the University of Oxford found that people prone to high anxiety have a tougher time reading the environmental cues that could help them avoid a bad outcome.

Their findings, reported today (Monday, March 2), in the journal *Nature Neuroscience*, hint at a glitch in the brain's higher-order decision-making circuitry that could eventually be targeted in the treatment of [anxiety disorders](#), which affect some 40 million American adults.

"Our results show that anxiety may be linked to difficulty in using information about whether the situations we face daily, including relationship dynamics, are stable or not, and deciding how to react," said study lead author Sonia Bishop, an assistant professor of psychology at UC Berkeley and principal investigator of the study.

"It's a bit like being Alice in Wonderland, trying to work out if the same rules apply or if everything is different and if so, what choices you should make," she added.

For example, a friend may suddenly lash out for no discernible reason. That friend's behavior could reflect a typical variation in their day-to-day mood or interactions or, more dramatically, an underlying change in their [relationship](#) with you. The challenge for a person prone to anxiety is assessing the situation in context of what else has happened recently and responding appropriately.

Bishop and fellow researchers used decision-making tasks, behavioral and physiological measurements and computational models to gauge the probabilistic decision-making skills of 31 young and middle-aged adults whose baseline anxiety levels ranged from low to extreme. Probabilistic decision-making requires using logic and probability to handle uncertain situations, drawing conclusions from past events to determine the best

choice.

"An important skill in everyday decision-making is the ability to judge whether an unexpected bad outcome is a chance event or something likely to reoccur if the action that led to the outcome is repeated," Bishop said.

The researchers' measures also included eye-tracking to detect pupil dilation, an indicator that the brain has released norepinephrine, which helps send signals to multiple brain regions to increase alertness and readiness to act.

Participants were asked to play a computerized "two-armed bandit-style" game in which they repeatedly chose between two shapes, one of which, if selected, would deliver a mild to moderate electrical shock.

To avoid getting shocked, participants needed to keep track of the shape that most frequently delivered electrical jolts. During one part of the game, the shock-delivering shape did not change for a long stretch of time. However, during another part of the game, it changed more frequently. Highly anxious people had more trouble than their less anxious counterparts adjusting to this and thus avoiding shocks.

"Their choices indicated they were worse at figuring out whether they were in a stable or erratic environment and using this to make the best choices possible," Bishop said.

Also weaker in highly anxious participants was their pupil response to receiving a shock (or not) during the erratic phase of the game. Typically, our pupils dilate when we take in new information, and this dilation increases in volatile environments. Smaller pupils suggested a failure to process the rapidly changing information that was more prevalent during the erratic phase of the game.

"Our findings help explain why [anxious individuals](#) may find decision-making under uncertainty hard as they struggle to pick up on clues as to whether they are in a stable or changing situation," Bishop said.

More information: *Nature Neuroscience*, [DOI: 10.1038/nn.3961](https://doi.org/10.1038/nn.3961)

Provided by University of California - Berkeley

Citation: Anxious people more apt to make bad decisions amid uncertainty (2015, March 2)
retrieved 24 April 2024 from
<https://medicalxpress.com/news/2015-03-anxious-people-apt-bad-decisions.html>

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