

Neuroscientists investigate lotteries to study how the brain evaluates risk

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In this experiment, the patient chooses which lottery to play while their brain is imaged. Credit: JoVE

People are faced with thousands of choices every day, some inane and some risky. Scientists know that the areas of the brain that evaluate risk are the same for each person, but what makes the value assigned to risk different for individuals? To answer this question, a new video article in *Journal of Visualized Experiments (JoVE)* uses functional magnetic resonance imaging (fMRI) to characterize subjective risk assessment while subjects choose between different lotteries to play. The article, a joint effort from laboratories at Yale School of Medicine and New York University, is led by Yale's Dr. Ifat Levy. Dr. Levy explains, "This procedure allows us to examine all kinds of normal and pathological behaviors focusing on risk assessment. It could explain things like



substance abuse and over-eating from a different perspective than how it is usually characterized."

The research, funded by the National Institute on Aging, evaluates risk by having individuals choose one of two different lotteries to play. "Economists distinguish between risk, when probabilities are known, and ambiguity, when probabilities are unknown. In real life, most of the situations are a mix between risk and ambiguity. We know that people act differently if results are known than if they are unknown. This is why it is important to look at the decision-making process," Dr. Levy explains. <u>Risk assessment</u> plays into a wide variety of normal decisions and personal encounters. The brain has a consistent pathway to decide everything from "what to have for breakfast" or "where to get gas" to more <u>important decisions</u>, like "should I pay for this medicine," or "should I make this investment." This procedure is important because it allows scientists to characterize behavior and could be used to understand normal and pathological behaviors, and to prescribe behavioral or pharmacological treatment to at-<u>risk patients</u>.

In each round of the experiment, one lottery stays constant while the other changes three variables: probability of winning the lottery, payout amount for winning the lottery, and ambiguity of winning the lottery. As the subject's choice is recorded, fMRI is used to evaluate stimulation and activity in the risk centers of the brain for each choice. Using statistical analysis, the unique choice behavior of each subject can be identified and expressed.

More information: Levy et. al.: <u>www.jove.com/video/3724/measur ...</u> <u>s-using-experimental</u>

Provided by The Journal of Visualized Experiments



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