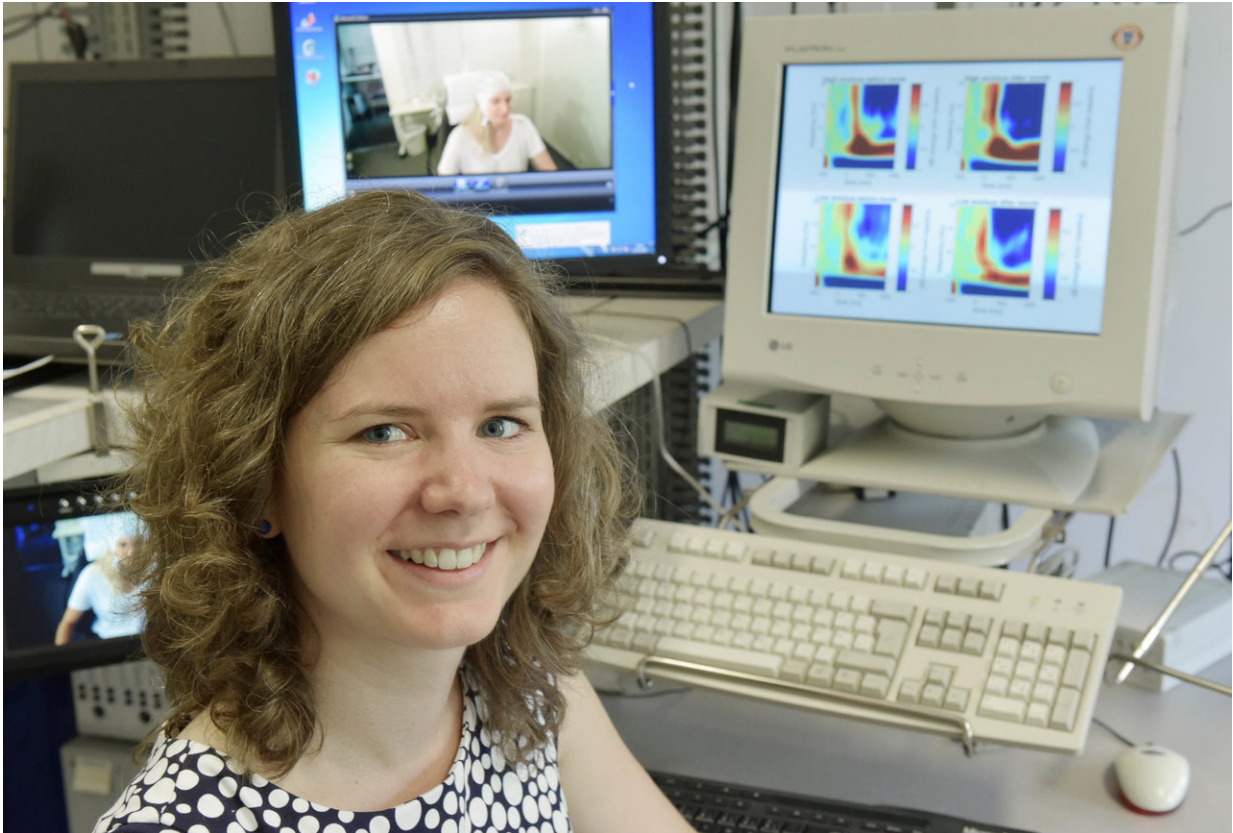


# Reading risk behavior in the brain

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The experiments of Dr. Barbara Schmidt and the team show how to use the EEG data to predict the decisions a person will make in specific situations. Credit: Jan-Peter Kasper/FSU Jena

Anxious people take fewer risks—this is not surprising. However, a team of psychologists from the German Friedrich Schiller University Jena, together with partners from Würzburg in Germany and the Canadian

University of Victoria have succeeded in making this decision process visible in the brain, allowing them to predict the behaviour of individuals. They conducted an experiment to measure participants' risk behaviour while using electroencephalography (EEG) to observe their brain activity. They report on their work in the current issue of the scientific journal *Psychophysiology*.

"For the experiment, we used a questionnaire to select 20 high-anxiety and 20 low-anxiety participants," explains Dr. Barbara Schmidt of the University of Jena, who led the project. "During the actual experiment, the participants had to turn one of two cards in each trial of a risk game. In each trial, they could win a maximum of 11 cents. The important point was that they had to decide between two risk options: a high-risk option in which they could win either 11 cents or zero cents, and a low-risk option in which the subject could win either five or six cents. The expected value of 5.5 cents was always the same." In the experiment, high-anxiety participants chose the low-risk option more often.

But the key finding of the study resulted from a glance at the EEG recorded during the experiment. While the participants decided which of the two risk options they want to choose, a specific type of [brain activity](#)—frontal midline theta power—was especially high. "Previous research had already shown that this brain activity is particularly pronounced in [anxious people](#), but until now, we did not know what effect it had on [behaviour](#)," said psychologist Schmidt. "With our study, we have now been able to demonstrate that higher frontal midline theta power shows heightened cognitive control—weighing up the options more intensively—during the decision-making process." This is a pivotal finding for behavioural research.

Psychologists often examine correlates in the brain that indicate a certain psychological concept, but it is not always possible to draw conclusions about a person's behaviour. "In our results, everything just fits together

very well," says Barbara Schmidt. "We have the initial psychological disposition, the appropriate brain activity that represents the decision-making process, and the resulting behaviour. The link between anxiety and the associated behaviour is therefore completely explained."

With this knowledge, the researchers can even use the relevant EEG to predict the decisions a person will make in specific situations. Higher frontal midline theta power indicates a low-risk decision.

Barbara Schmidt would now like to use these findings in her further research. Her specialist field is hypnosis. Here, too, she is investigating [brain](#) waves using EEG. "In subsequent studies, I would like to find out whether people take greater risks if they are told under hypnosis that they feel safe," she explains. "The new findings on frontal midline theta power will therefore be very helpful."

**More information:** Barbara Schmidt, Hannah Kanis, Clay B. Holroyd, Wolfgang H. R. Miltner, Johannes Hewig (2018): Anxious Gambling: anxiety is associated with higher frontal midline theta predicting less risky decisions, *Psychophysiology*, [DOI: 10.1111/psyp.13210](https://doi.org/10.1111/psyp.13210)

Provided by Friedrich Schiller University of Jena

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