Psychologists at Friedrich Schiller University Jena (Germany) can determine risk behaviour from specific brain activity

Anxious people take fewer risks – in itself this is not a surprising observation. However, a team of psychologists from the German Friedrich Schiller University Jena, together with partners from Würzburg in Germany and the Canadian city of Victoria have succeeded in making this decision process visible in the brain, allowing them to predict the behaviour of individuals. To this end, they conducted an experiment to measure the risk behaviour of participants while using electroencephalography (EEG) to observe their brain activity. They report on their work in the current issue of the specialist journal ‘Psychophysiology’.

“In preparation for the experiment, we used a questionnaire to select 20 very anxious and 20 less anxious people,” explains Dr Barbara Schmidt of the University of Jena, who led the project. “During the actual experiment, the participants had to turn over one of two cards, repeating this task a number of times. In each round, they could win a maximum of 11 cents. The important point was that they had to decide between two possibilities: a high-risk one in which they could win either 11 cents or zero cents, and a low-risk alternative in which the test person could win either five or six cents. The expected value of 5.5 cents was always the same.” In the experiment, the more anxious participants more often chose the lower-risk combination.

But the key finding of the study resulted from a glance at the EEG recorded during the experiment. While the participants were making their decisions, a specific type of brain activity – the Frontal Midline Theta Power – was especially high. “Previous research had already shown that this signal 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 the 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.

Possibility of predicting behaviour

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 situation, 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 and she is particularly interested in how hypnosis works in the brain. Here, too, she is investigating brain waves using EEG. “In subsequent studies I would like, for example, to find out whether people take greater risks if they are told under hypnosis that they feel safe,” she explains. “The new findings on the Frontal Midline Theta Power will be very helpful in that work.”


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URL for press release: https://www.uni-jena.de/en/start.html
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)