

## Scientists Predict Crime Knowledge States in the Human Brain



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A multi-institutional research team has discovered that brain imaging can reveal whether someone is acting in a state of knowledge about a crime. The discovery will not have a bearing on court proceedings, but it is an inroad in the emerging field of "neurolaw," which connects neuroscience to legal rules and standards. The research is published in the Proceedings of the National Academy of Sciences.

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The researchers, led by computational neuroscientist Read Montague of the Virginia Tech Carilion Research Institute, provided the first neurobiological evidence of a detectable difference between the mental states of knowledge and recklessness, an exploration that historically has been confined to the courtroom.

In the study, scientists scanned the brains of 40 subjects and asked them to decide whether to carry a suitcase across the border, varying the probability that the suitcase contained drugs. Using noninvasive functional brain imaging and machine-learning techniques, in which a computer learns to find patterns in data, the scientists accurately determined whether the research subjects knew drugs were in the case, which would make them guilty of knowingly importing drugs, or whether they were uncertain about it, which would make them innocent.

While this prediction technique is useful, the researchers cautioned that the assessment of the mental state of a defendant should not be reduced to the classification of brain data.

"In principle, we are showing these brain states can be detected when the activity is taking place," Montague said. "Given that, we can start asking questions like, which neural circuits are engaged by this? What does the distribution look like across 4,000 people instead of 40 people? Are there conditions of either development, states of mind, use of pharmacological substances, or incurred injuries that impinge on these networks in ways that would inform the punishment?"

The research was conceived under the direction of the MacArthur Foundation Research Network on Law and Neuroscience at Vanderbilt University and carried out by researchers at Virginia Tech Carilion Research Institute and Yale University.

Source: [Virginia Tech](#)

Image Credit: David Hungate/Virginia Tech

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