

# Brain stimulation affects compliance with social norms

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Camera views of a group test session involving transcranial direct current stimulation at the Laboratory for Social and Neural Systems Research, Department of Economics, University of Zurich. Credit: Marc Latzel

Neuroeconomists at the University of Zurich have identified a specific brain region that controls compliance with social norms. They discovered that norm compliance is independent of knowledge about the norm and can be increased by means of brain stimulation.

How does the human brain control compliance with [social norms](#)? The biological mechanisms that underlie norm compliance are still poorly understood. In a new study, Christian Ruff, Giuseppe Ugazio, and Ernst Fehr from the University of Zurich show that the lateral prefrontal cortex plays a central role in norm compliance.

## **Prefrontal cortex controls norm behavior**

For the study, 63 participants took part in an experiment in which they received money and were asked to decide how much of it they wanted to share with an anonymous partner. A prevalent fairness norm in Western cultures dictates that the money should be evenly split between the two players. However, this contrasts with the participants' self-interest to keep as much money as possible for themselves. In another experiment, the participants were faced with the same decision, but knew in advance that they could be punished by the partner for an unfair proposal.

By means of a technique called "transcranial direct current stimulation," which sends weak and painless electric currents through the skull, the excitability of specific brain regions can be modulated. During this experiment, the scientists used this technique to increase or decrease [neural activity](#) at the front of the brain, in the right lateral prefrontal cortex. Christian Ruff, Professor of Neuroeconomics and Decision Neuroscience at the University of Zurich, said: "We discovered that the decision to follow the fairness norm, whether voluntarily or under threat of sanctions, can be directly influenced by neural stimulation in the [prefrontal cortex](#)."



Group testing involving transcranial direct current stimulation at the Laboratory for Social and Neural Systems Research, Department of Economics, University of Zurich. Credit: Marc Latzel

### **Brain stimulation affects normative behavior**

When neural activity in this part of the brain was increased via stimulation, the participants' followed the fairness norm more strongly when sanctions were threatened, but their voluntary norm compliance in the absence of possible punishments decreased. Conversely, when the scientists decreased neural activity, participants followed the fairness norm more strongly on a voluntary basis, but complied less with the norm when sanctions were threatened. Moreover, neural stimulation influenced the participants' behavior, but it did not affect their perception of the fairness norm. It also did not alter their expectations about whether and how much they would be punished for violating the norm.

"We found that the [brain](#) mechanism responsible for compliance with social norms is separate from the processes that represent one's knowledge and beliefs about the social norm," says Ernst Fehr, Chairman of the Department of Economics at the University of Zurich. "This could have important implications for the legal system as the ability to distinguish between right and wrong may not be sufficient for the ability to comply with social norms." Christian Ruff adds: "Our findings show that a socially and evolutionarily important aspect of human behavior depends on a specific neural mechanism that can be both up- and down-regulated with [brain stimulation](#)."

**More information:** Christian C. Ruff, Giuseppe Ugazio und Ernst Fehr. Changing Social Norm Compliance With Noninvasive Brain Stimulation. *Science*. Oktober 3, 2013.

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