

Doing good so you don't feel bad: Neural mechanisms of guilt anticipation and cooperation

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On a daily basis, our social life places us in situations where we have to decide whether or not to cooperate with others. However, the motivation that encourages us to behave cooperatively is often not clear. Now, new research published by Cell Press in the May 12, 2011, issue of the journal *Neuron* suggests that anticipation of the feeling of guilt can motivate us to behave unselfishly and reveals a neural mechanism that may underlie this guilt aversion-driven cooperation.

"Imagine you order a drink in a coffee shop and, on receiving your bill, you notice a blank space provided to enter a tip. Though tipping in these circumstances is not necessarily the norm, many of us do so. What motivates this kind of behavior?" asks senior study author Dr. Alan G. Sanfey from the Donders Institute for Brain, Cognition and Behavior. "These informal situations are a mainstay of our social life, but there is surprisingly little experimental research examining what motivates this kind of cooperation and what brain structures underlie the behaviors of trust and reciprocity."

Some previous research has suggested that we cooperate and reciprocate because it makes us feel good, the so-called "warm-glow" hypothesis, but Dr. Sanfey and colleagues examined whether the anticipation of guilt, a negative [emotional state](#) caused by a failure to live up to another's expectations, could also play a role in motivating cooperation. The researchers combined a formal behavioral model of guilt aversion with

[functional brain imaging](#) to identify neural structures involved with a participant's decision to honor someone's trust and cooperate or the decision to violate trust for financial gain.

When participants' decisions indicated a willingness to cooperate, they exhibited increased activity in the anterior insula, dorsolateral prefrontal cortex (PFC), [anterior cingulate cortex](#), temporal parietal junction, and supplementary motor area. These areas have previously been shown to be involved in processing negative emotional states such as disgust or anger, as well as with the anticipation of pain or the experience of social rejection. In contrast, when participants chose to not cooperate in order to make more money, they exhibited increased activity in ventromedial and dorsomedial regions of the PFC and the nucleus accumbens, areas known to be involved in the processing of reward.

"Our results demonstrate that these kinds of decisions often involve competing motivations. On the one hand we want to maximize our financial reward, but on the other we do not want to let others down," concludes Dr. Sanfey. "To return to our original example, our study suggests that one reason why we tip when it is not required is because signals originating in the insula and SMA remind us that the possibility of disappointing someone's expectations will lead to future feelings of guilt, which in turn motivates us to do the right thing."

More information: Chang et al.: "Triangulating the Neural, Psychological, and Economic Bases of Guilt Aversion." *Neuron* May 12, 2011.

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