

# Money motivates -- especially when your colleague gets less

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The feelings an individual has on receiving his paycheque depend critically on how much his colleague earns. Hard evidence for this comes from an experiment conducted by economists and brain scientists at the University of Bonn. They tested male subjects in pairs, asking them to perform a simple task and promising payment for success. Using magnetic resonance tomographs, the researchers examined the volunteers' brain activity throughout the activities.

Participants who got more money than their co-players showed much stronger activation in the brain's "reward centre" than occurred when both players received the same amount. Details of the study are published on Friday, November 23rd, in the renowned academic journal *Science*.

The publication of these findings is the first outcome of a new line of research being established at Bonn University. A group of scholars around the epileptologist Professor Dr. Christian Elger and the economist Professor Dr. Armin Falk want to find out just how the mind of "Homo oeconomicus" works. To this end, they are using modern imaging techniques to look into the brains of their volunteers being tested in the lab.

In the experiment now published the participants had to lie down next to each other in parallel brain scanners. They were asked to perform the same task simultaneously. Dots appeared on a screen and they had to estimate the number being displayed. They were then told whether their

answer was correct. If they had solved the task correctly, they received a financial reward, which might range from 30 to 120 euros. Each participant also learnt how his partner in the game had performed and how much he would pocket in return.

Throughout this procedure the tomograph monitored the changes in blood circulation in the different regions of the subject's brain. High blood flows indicate that the nerve cells in the respective part of the brain are particularly active. A total of 38 men took part in the experiment. "We registered enhanced activity in various parts of their brains during the test," explains the Bonn neuroscientist Dr. Bernd Weber. "One area in particular, the ventral striatum, is the region where part of what we call the 'reward system' is located."

The reward system is activated when an individual has an experience he considers worth aspiring to. "In this area we observed an activation when the player completed his task correctly," says Bernd Weber, who heads the NeuroCognition Imaging group at the Life&Brain Institute. By contrast, when the subject got his estimate wrong, activity in his ventral striatum would subside. For us, however, the exciting finding here was the role played by another factor: the performance of the player in the other scanner. Weber's colleague Dr. Klaus Fließbach sums up the outcome, "Activation was at its highest for those players who got the right answer while their co-player got it wrong."

The researchers then took a closer look at those cases in which both players estimated the number of points correctly. If the participants received the same payment there was relatively moderate activation of the reward centre. But if player one was given, say, 120 euros, while his partner received only 60, the activation turned out to be much stronger for player one. For player two, on the other hand, the blood flow into the ventral striatum actually decreased – even though he had performed the task successfully and had been rewarded for his efforts.

## Men like competing

"This result clearly contradicts traditional economic theory," explains Bonn-based economist Professor Dr. Armin Falk. "The theory assumes that the only important factor is the absolute size of the reward. The comparison with other people's rewards shouldn't really play any role in economic motivation." It is the first time that this hypothesis has been challenged using such an experimental approach. It does not mean, of course, that the absolute size of the reward has no impact on the "reward centre": more excitement was registered in response to 60 euros than 30. "But the interesting point to emerge from our study is that the relative size of one's earnings plays such a major role," Armin Falk insists.

"Men, at least, do appear to draw a great deal of their motivation from competition," Dr. Bernd Weber concludes. The researchers now want to find out if that goes for women, too. Moreover, the team are planning a series of experiments with Asian subjects to see how far competitive thinking may be influenced by cultural factors.

Source: University of Bonn

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