The trust game: Measuring social interaction

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If trust is a two-way street, then researchers at Baylor College of Medicine have mapped where in the brain that trust is formulated and how the decision to trust shifts with experience.
In a report in this week's issue of the journal Science, Dr. P. Read Montague Jr. and colleagues at the BCM Human Neuroimaging Laboratory and California Institute of Technology in Pasadena, Calif., describe where and when trust is formed between two anonymous people interacting via functional magnetic resonance imaging in machines more than 1,500 miles apart. They found that as the interaction continued, the trust response occurred earlier and earlier in the subjects' interchanges – until a decision about trust occurred even before the latest interaction was completed.

"This study has implications beyond economics or even interactions of this kind," said Montague, a professor of neuroscience at BCM. "We hope it can be used to better understand conditions such as schizophrenia and autism."

Eventually, the technique might give insights into all kinds of negotiations, from the economic to the social to the political – even go across geographical boundaries.

The study was made possible by hyperscanning or hyperscan-fMRI, a breakthrough that allowed Montague and his colleagues to synchronize the scanning of two interacting brains.

Without this, the researchers could not have looked at both brains at once, a factor that made the research possible. In fact, Montague and members of his team developed the software for hyperscanning and have made it freely available to the research community.

In this study, Montague and his colleagues, including the paper's first author, Brooks King-Casas, measured, via functional magnetic resonance imaging, the blood flow in the area of the brain where this intention-to-trust mechanism occurs. Blood flow to this area was measured by functional magnetic resonance imaging machines in each site of the experiment. This allowed the researchers to measure how and when trust decisions were made. The measurements were done on 48 pairs of subjects involved in the rounds.

Each subject was instructed separately in the rules of the game. One – the investor – received $20 during the first of the 10 rounds of the game. That person decided how much money to give the other subject. That sum was then tripled. The other subject, 1,500 miles away, decided how much of the money he or she kept and how much he or she left for the other subject. Each interaction of that type completed a round.

"What we map on are the changes in blood flow," said Montague. "Those tell us the amount of trust and trustworthiness, the degree of betrayal and benevolence."

In early rounds, Montague and his colleagues were able to identify a physical response in the brain of the trustee that correlated with the intention to increase their trust or investment on the next move. By later rounds, the timing of that response changed so that his or her intention to trust occurred before the completion of the previous round.

The technique holds promise for understanding diseases such as autism – in which the ability to form models of the actions of other people is impaired. Or it might help in the understanding of maladies such as schizophrenia.

Source: Baylor College of Medicine