The brain science behind economics

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Neuroscience might seem to have little to do with economics, but over the last decade researchers have begun combining these disparate fields, mining the latest advances in brain imaging and genetics to get a better understanding of the biological basis for human behavior.

Paul Zak is a pioneer in this nascent field of neuroeconomics. In a recent paper published in the journal PLoS One, he examined genes that may predict success among traders on Wall Street. His forthcoming book, "The Moral Molecule," will explore how a chemical in the brain called oxytocin compels cooperation in society.

Zak, director of the Center for Neuroeconomic Studies at Claremont Graduate University, discussed this work with the Los Angeles Times.

Q: What does a neuroeconomist do?

A: Neuroeconomics measures brain activity while people make decisions. The reason for doing that is that people can't often clearly articulate why they're doing what they're doing.

About 12 years ago, I had this idea that economists really have the wrong view of the world. The stereotypical view is that human beings are highly rational and primarily motivated by self-interest. But we see people helping strangers all the time. We see people doing things that seem "irrational." So I don't think that's the right approach.

Q: What kinds of questions do you explore?

A: Why would two people ever trust each other if they're strangers? We do it all the time. We eat meals in restaurants, and we don't see the cooks prepare the food. We get on airplanes with pilots we've never met. We buy all kinds of things over the Internet. Countries with higher levels of trust are more prosperous. Countries with low levels of trust have very few economic transactions and don't create wealth.

If trust is kind of a social glue that sustains societies and economies, we need to understand why. That will help us improve life for the 2 (billion) or 3 billion people who live on less than $2 a day.

Q: How do you study the biological basis of trust?

A: My first focus was on a chemical in the brain called oxytocin. In humans, it was thought to be released only during childbirth and sex. But in rodents, it was known to allow animals to tolerate their burrowmates.

I said, "Gee, toleration of burrowmates and trusting a stranger - maybe that's the same mechanism." So I started taking blood samples to see whether your brain would release oxytocin if someone sent you money via computer in a lab experiment. I also wanted to explore whether the oxytocin effect would motivate you to reciprocate.

And that's what we found. When you trust someone, their brain releases oxytocin. When you give someone a hug, their brain will release oxytocin. If I'm trustworthy, generous, kind, compassionate and empathic, that makes me a nice person to be around, and it sustains me in my social group.

We have a biology for reciprocation. I call oxytocin "the moral molecule." It's a chemical that motivates us to engage and care about others - and that's the basis for moral behavior.

Q: You've also studied dopamine, a chemical that's released in the brain when you're doing something pleasurable.

A: Yes, in professional stock traders on Wall Street. We asked if there were particular genetic variants that made a trader successful on Wall Street. We collected saliva samples and other information from 60 professional traders and then compared those to MBA students at Claremont who were not trading stocks professionally.

We asked what differentiates the two groups, and whether there was some combination of genes that predicted how long the professional traders could survive on Wall Street. So we looked for genetic markers associated with dopamine, which modulates risk-taking and reward-seeking behaviors.

We found that indeed there was a difference between the traders and the MBA students, and that there was a particular combination of genes that made the traders successful. It was a Goldilocks result. Traders who were most successful had genes that gave them moderate levels of dopamine. They could take a risk when it seemed to have a good payoff and avoid a risk when it seemed likely to blow up in their face. This is what kept them successful on Wall Street.

Q: What other chemicals do you study?

A: Testosterone. We also know that high levels of testosterone inhibit the release of oxytocin, which in turn inhibits trust. When we have administered testosterone to men in experiments, they became more selfish - and also more likely to punish people for being selfish towards them. That can be useful because one way we sustain cooperation is by having people who will invest the resources to punish others who are not playing nice.

Q: Do you use brain imaging in your research?

A: We have a number of studies we've done using brain imaging. But brain imaging is a fairly blunt tool. There are a variety of ways that neuroscientists have to interrogate the brain. We look for a convergence of evidence.

Q: How is your research applied outside the laboratory?

A: We work with companies, government and the military to answer specific problems these institutions face. Some have to do with trust: How do I build a high-performance team that will work well under stress? How do I understand, if I go into a village in Afghanistan, which tribal leaders will be trustworthy and which won't?

We're looking at a variety of ways that human beings come together to motivate cooperation, including the role of ritual. I recently got back from Papua New Guinea, where we found that individuals in isolated tribes who take part in a ritual dance cause oxytocin to be released in other people's brains. That got them closer to their community. So it seems to be universal.

Q: Are economics and neuroscience complementary fields?

A: Scientists have wonderful measurement techniques and understand what the brain is doing, but they don't often ask relevant questions about what humans are really doing in their daily lives. Economists try to address what humans are doing, but their understanding of the reasons why amounts to a black box. They say, "We'll just assume people are always well informed and always make good decisions." But the brain is not developed that way.

By pairing these two disciplines, you get insight into real human

behavior that is relevant to understanding life outside the laboratory. I'm trying to connect the dots from molecules to behavior up to society and policy.

I think we're taking a real shot at understanding moral philosophy and social organization. Neuroeconomics gives us a new lens to understand how we've organized our world. It lets me embrace words like "morality" or "love" or "compassion" in a non-squishy way. It says, "These are real things, this is really part of our human nature, and we should embrace that."