Monkey 'Pay-Per-View' Study Could Aid Understanding of Autism

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Researches have found that monkeys will 'pay' juice rewards to see images of high-ranking monkeys or female hindquarters. They say their research technique offers a rigorous laboratory approach to studying the "social machinery" of the brain and how this machinery goes tragically awry in autism -- a disease that afflicts more than a million Americans and is the fastest growing developmental disorder.

In an article published early online by the journal Current Biology, Duke University Medical Center neurobiologists Michael Platt, Robert Deaner and Amit Khera describe experiments in which they gave male rhesus macaque monkeys juice rewards for glancing at either a neutral target on a computer screen or images of other monkeys. By systematically varying the juice rewards and the images -- including a gray square, higher-ranking or lower-ranking monkeys and female hindquarters -- the researchers could precisely measure how much reward a monkey would "pay" to see which images.

The researchers found that the monkeys would forego a significant amount of reward to see an image of a higher-ranking monkey or of female hindquarters. In contrast, the monkeys had to be "paid" more juice to view lower-ranking monkeys.

The research was sponsored by The National Institute of Mental Health and the Cure Autism Now Foundation. It will be published in the March 2005 issue of Current Biology

The aim of the study, said Platt, was to bring into a controlled laboratory setting the kinds of social judgments that monkeys were observed to make in the wild.

"Decades of studies of monkeys in the wild have indicated that they act as if they make judgments about dominance rankings and of the importance of other individuals for their own reproductive success," said Platt. "But there have been no real quantitative experimental demonstrations that monkeys actually process this information and use it in decision-making.

"More broadly, it's important to understand how the brain processes social information and uses it to make decisions," said Platt. "Historically, the problem of understanding social cognition, social evaluation and its neural basis has been a slippery one. And in part that's because scientists haven't been able to bring to bear the methods of experimental psychophysics to understand these phenomena.

"So, our approach, in which we ask the monkeys to, in a sense, put a number on how much juice they'd be willing to 'spend' to see a particular individual gives us an invaluable experimental system to explore the neural wiring that underlies social cognition."

Intriguingly, said Platt, the monkeys were not living in a colony where physical interactions could contribute to establishing dominance hierarchies or sexual relationships. "So, somehow, they are getting this information by observation -- by seeing other individuals interact," he said.

Such findings indicate that the researchers' methods could offer rich scientific dividends in understanding perception and the brain's social machinery, said Platt. This knowledge can likely be applied to human neural social machinery, he said.

"At the moment, it's only a tantalizing possibility, but we believe that similar processes are at work in these monkeys and in people. After all, the same kinds of social conditions have been important in primate evolution for both nonhuman primates and humans. So, in further experiments, we also want to try to establish in the same way how people attribute value to acquiring visual information about other individuals."

If such parallels exist, said Platt, electrophysiological, genetic and molecular studies of monkeys in such laboratory situations could yield important insight into the social machinery of the brain. Platt and his colleagues have already begun exploring the neural pathways in monkeys that govern the decision about shifting gaze to look at a target assigned a specific reward value.

Such studies could prove extremely important in understanding how the brain's social machinery malfunctions in autism, said Platt.

"One of the main problems in people with autism is that they don't find it very motivating to look at other individuals," he said. "And even when they do, they can't seem to assess information about that individual's importance, intentions or expressions.

"So, what we now have with these monkeys is an excellent model for how social motivation for looking is processed in normal individuals. And, it's a model that we can use to explore the neurophysiological mechanisms of those motivations in a way we can't do in humans. For example, we can use drugs that affect specific neural processes to explore whether we can mimic some of the deficits found in autism in these animals."

Source: Duke University Medical Center