Monkeys taught to pass mirror self-awareness test

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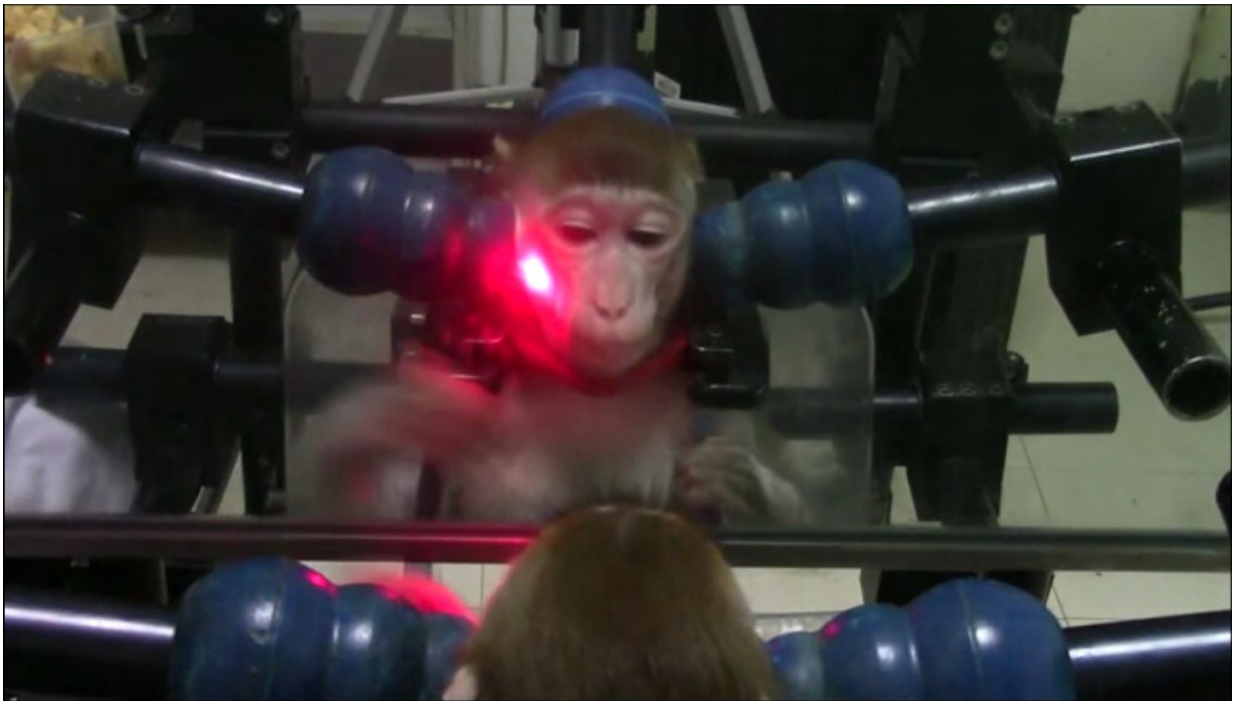

(Phys.org)—A team of researchers at the Shanghai Institutes for Biological Sciences has found that rhesus monkeys can pass the mirror self-awareness test if they are first taught how mirrors work. In their paper published in *Proceedings of the National Academy of Sciences*, the team describes how they taught the monkeys to understand how mirrors

work and how the monkeys behaved once they had it down.

For many years, cognitive researchers have relied on the mirror self-recognition test as a means for determining if an animal is capable of self-awareness. A dye mark is made on the face of an individual being tested and then that individual is allowed to look at itself in the mirror—if it see the mark and touches it, then it passes the test. But more recently, some in the field have begun to question the validity of the test, suggesting that an inability to pass the test might be more of an indication that an animal simply does not understand how a mirror works. In this new effort, the researchers sought to see if that might be the case by training a group of male rhesus monkeys on how a mirror works before giving it the test.

The training involved placing a monkey in front of a mirror and rewarding him each time he correctly placed his hand on a spot in its cage lit up by a laser pointer on the wall behind the animal. Over time, as the monkeys got the idea, the pointer was eventually directed to its face, at which point, a given monkey would touch its face where the mark was—a close approximation of the self-recognition test.

The team then placed a dye mark on each of the monkeys' faces without them knowing it and then allowed them to look at a mirror—at that point, all of the monkeys individually noticed the mark and directed their hand to it, wiping at it and sniffing it. All of the test monkeys eventually passed the test, even while control monkeys continued to misidentify their own faces in the mirror as belonging to another monkey. This, the team suggests, indicates that the monkeys are clearly capable of passing the self-recognition test, and thus have self-awareness. Their claims were further bolstered by continued monitoring of the trained monkeys as they sat in front of a mirror with no direction. They used the mirror to check out normally unseen body parts, such as their genitals and to preen themselves. This, the team suggests, clearly

shows that having learned how a mirror works, the monkeys truly demonstrated that they were aware of themselves.

More information: Liangtang Chang et al. Spontaneous expression of mirror self-recognition in monkeys after learning precise visual-proprioceptive association for mirror images, *Proceedings of the National Academy of Sciences* (2017). DOI: 10.1073/pnas.1620764114

Abstract

Mirror self-recognition (MSR) is generally considered to be an intrinsic cognitive ability found only in humans and a few species of great apes. Rhesus monkeys do not spontaneously show MSR, but they have the ability to use a mirror as an instrument to find hidden objects. The mechanism underlying the transition from simple mirror use to MSR remains unclear. Here we show that rhesus monkeys could show MSR after learning precise visual-proprioceptive association for mirror images. We trained head-fixed monkeys on a chair in front of a mirror to touch with spatiotemporal precision a laser pointer light spot on an adjacent board that could only be seen in the mirror. After several weeks of training, when the same laser pointer light was projected to the monkey's face, a location not used in training, all three trained monkeys successfully touched the face area marked by the light spot in front of a mirror. All trained monkeys passed the standard face mark test for MSR both on the monkey chair and in their home cage. Importantly, distinct from untrained control monkeys, the trained monkeys showed typical mirror-induced self-directed behaviors in their home cage, such as using the mirror to explore normally unseen body parts. Thus, bodily self-consciousness may be a cognitive ability present in many more species than previously thought, and acquisition of precise visual-proprioceptive association for the images in the mirror is critical for revealing the MSR ability of the animal.