

# Monkeys seem to recognize their reflections

Trained macaques studied themselves in mirrors, fuelling debate over animals' capacity for self-recognition.

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Neng Gong and colleagues/Current Biology

Macaques learned to recognize their own reflections with the help of laser markings.

Mirror, mirror on the wall, who's the smartest animal of them all?

The ability to recognize oneself in a mirror has been touted as a hallmark of higher cognition — present in humans and only the most intelligent of animals — and the basis for empathy. A study published this week in *Current Biology* controversially reports that macaques can be trained to pay attention to themselves in a mirror, the first such observation in any monkey species<sup>1</sup>.

Yet the finding raises as many questions as it answers — not only about the cognitive capacity of monkeys, but also about mirror self-recognition as a measure of animal intelligence. “Simply because you’re acting as if you recognize yourself in a mirror doesn’t necessarily mean you’ve achieved self-recognition,” says Gordon Gallup, an evolutionary psychologist at the State University of New York in Albany, who in 1970 was the first to demonstrate mirror self-recognition in captive chimpanzees<sup>2</sup>.

When most animals encounter their reflections in a mirror, they act as if they have seen another creature. They lash out aggressively, belt out loud calls and display other social behaviours. This is how chimps first acted when Gallup placed a full-length mirror next to their cages. But after a couple of days, their attitudes changed and they started examining themselves, says Gallup. “They’d look at the inside of their mouths; they’d watch their tongue move.”

This convinced him that the chimps recognized themselves in the mirror. He knew other scientists would be sceptical, so he developed a test of mirror self-recognition. After chimps started acting as if they saw themselves in the mirror, after about 10 days, he anaesthetized them and applied an odour-free red mark to a location on their faces they could not see, such as above the brow ridge.

When presented with a mirror again, the marked chimpanzees touched the mark and then sniffed their fingers. Apes that hadn’t been

first exposed to a mirror acted as if they were seeing another chimp. Gallup's findings have been replicated in dozens of chimpanzees and extended to other great apes, most convincingly in orang-utans<sup>3</sup>. Other researchers have reported that dolphins<sup>4</sup>, elephants<sup>5</sup> and even magpies<sup>6</sup> can recognize themselves in mirrors. However, many of these reports have not been replicated and are often limited to a single individual.

### A second look

Study after study has, however, shown that monkeys do not recognize themselves in mirrors<sup>7</sup>. For instance, Gallup reared two macaques in the presence of a mirror for 15 years. They learned to ignore the 'other monkey' in the mirror, even as they took advantage of the reflected view. "If we had entered the room and they had seen our reflection, they would immediately turn to confront us directly," Gallup says. "But they were oblivious to the source or significance of what they were seeing when they looked at themselves in the mirror."

In the latest study, neuroscientist Neng Gong and his team at the Shanghai Institutes for Biological Sciences in China wondered if monkeys could instead be trained to recognize themselves in the mirror. His team restrained macaques right in front of a mirror and delivered a low-powered, but still painful, laser beam to their faces. When the monkeys touched the source of irritation on their faces, they received a food reward.

After 12–38 days of this regimen, 5 of 7 monkeys passed a version of Gallup's original mark test, using the mirror to touch an odourless mark applied to their faces. With a mirror in their cages, some of these monkeys seemed to use the mirror to explore parts of their bodies they couldn't otherwise see, the team reports. Neng says that monkeys possess the neural "hardware" for self-recognition, "but need appropriate training to acquire the 'software' to achieve self-recognition".

But other scientists are sceptical. "I think a far more parsimonious interpretation is that the monkeys are merely doing what they were trained and forced to do over thousands of trials," says Gallup. "If I were to teach someone the correct answers to an IQ test and their IQ went up as a consequence, would they be more intelligent?" Diana Reiss, a comparative psychologist at Hunter College in New York City who was involved in the dolphin and elephant mirror self-recognition studies, draws a distinction between animals using a mirror spontaneously and monkeys that do so after extensive training.

The significance of any animal's behaviour in front of a mirror is even more fraught. Gong says that it is "difficult to resolve" whether monkeys are self-aware. Gallup considers mirror self-recognition in chimpanzees to be the beginnings of self-awareness and the ability to imagine the mental states and perspectives of others, whereas Reiss sees it as "an emergent property of sophisticated brains".

Other scientists are more tentative. A 1999 critique of primate mirror self-recognition studies in the journal *Animal Behaviour* said that differences between species could be due to the conditions in which they were reared, and that it was premature to speculate as to how the skill relates to other cognitive abilities, such as inferring the mental states of others<sup>8</sup>. "Mirror self-exploration," the review soberly concluded, "provides evidence for mirror self-recognition."

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