

Monkeys also believe in winning streaks, study shows

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Benjamin Hayden and his group study decision making in Rhesus monkeys at the University of Rochester and at a field site in Puerto Rico, where this photo was taken. Credit: Benjamin Hayden, University of Rochester

Humans have a well-documented tendency to see winning and losing streaks in situations that, in fact, are random. But scientists disagree about whether the "hot-hand bias" is a cultural artifact picked up in

childhood or a predisposition deeply ingrained in the structure of our cognitive architecture.

Now in the first study in non-human primates of this systematic error in [decision making](#), researchers find that monkeys also share our unfounded belief in winning and losing streaks. The results suggests that the penchant to see patterns that actually don't exist may be inherited—an evolutionary adaptation that may have provided our ancestors a selective advantage when foraging for food in the wild, according to lead author Tommy Blanchard, a doctoral candidate in brain and cognitive sciences at the University of Rochester.

The [cognitive bias](#) may be difficult to override even in situations that are truly random. This inborn tendency to feel that we are on a roll or in a slump may help explain why gambling can be so alluring and why the stock market is so prone to wild swings, said coauthor Benjamin Hayden, assistant professor brain and cognitive sciences at the University of Rochester.

Hayden, Blanchard, and Andreas Wilke, an assistant professor of psychology at Clarkson University, reported their findings in the July issue of the *Journal of Experimental Psychology: Animal Learning and Cognition*.

To measure whether monkeys actually believe in winning streaks, the researchers had to create a computerized game that was so captivating monkeys would want to play for hours. "Luckily, monkeys love to gamble," said Blanchard. So the team devised a fast-paced task in which each monkey could choose right or left and receive a reward when they guessed correctly.

The researchers created three types of play, two with clear patterns (the correct answer tended to repeat on one side or to alternate from side to

side) and a third in which the lucky pick was completely random. Where clear patterns existed, the three [rhesus monkeys](#) in the study quickly guessed the correct sequence. But in the random scenarios, the monkeys continued to make choices as if they expected a "streak". In other words, even when rewards were random, the monkeys favored one side.

The monkeys showed the hot-hand bias consistently over weeks of play and an average of 1,244 trials per condition. "They had lots and lots of opportunities to get over this bias, to learn and change, and yet they continued to show the same tendency," said Blanchard.

So why do [monkeys](#) and humans share this false belief in a run of luck even when faced over and over with evidence that the results are random? The authors speculate that the distribution of food in the wild, which is not random, may be the culprit. "If you find a nice juicy beetle on the underside of a log, this is pretty good evidence that there might be a beetle in a similar location nearby, because beetles, like most food sources, tend to live near each other," explained Hayden.

Evolution has also primed our brains to look for patterns, added Hayden. "We have this incredible drive to see patterns in the world, and we also have this incredible drive to learn. I think it's very related to why we like music, and why we like to do crossword puzzles, Sudoku, and things like that. If there's a pattern there, we're on top of it. And if there may or may not be a pattern there, that's even more interesting."

Understanding the hot-hand bias could inform treatment for gambling addiction and provide insights for investors, said Hayden. "If a belief in winning streaks is hardwired, then we may want to look for more rigorous retaining for individuals who cannot control their gambling. And investors should keep in mind that humans have an inherited bias to believe that if a stock goes up one day, it will continue to go up."

The results also could provide nuance to our understanding of free will, said Blanchard, who was drawn to the study of decision making during prior graduate training in philosophy. "Biases in our decision-making mechanisms, like this bias towards belief in winning and losing streaks, say something really deep about what sorts of creatures we are. We often like to think we make decisions based only on the information we're conscious of. But we're not always aware of why we make certain decisions or believe certain things.

"We're a complex mix of biases and heuristics and statistical reasoning. When you put it all together, that's how you get sophisticated behavior. We don't know where a lot of these biases come from, but this study—and others like it—suggest many of them are due to cognitive mechanisms we share with our primate relatives," said Blanchard. This research was supported by grants from the National Science Foundation and the Brain and Behavior Research Foundation to Hayden.

Provided by University of Rochester

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