

Individual primates display variation in general intelligence

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Scientists at Harvard University have shown, for the first time, that intelligence varies among individual monkeys within a species - in this case, the cotton-top tamarin.

Testing for broad cognitive ability, the researchers identified high, middle, and low performing monkeys, determined by a general intelligence score. General intelligence, or "g," is a hallmark of human cognition, often described as similar to IQ. The effect of "g" in [primates](#) may offer insight into the evolution of human general intelligence.

The study, published this week in the journal *PLoS One*, is the first to examine differences of broad cognitive ability in primates within a single species. Previous studies of general intelligence in primates primarily concerned variation between species.

The research was led by Konika Banerjee, a research assistant in the Department of Psychology at Harvard University. Banerjee's co-authors are Marc Hauser, professor of psychology, and James J. Lee all of Harvard, along with Christopher Chabris of Union College, Fritz Tsao of Hillsdale College, and Valen Johnson of the University of Texas Medical School at Houston.

"We found that there was substantial individual variation in performance on these tasks," says Banerjee. "A significant proportion of that variation can actually be accounted for by something that looks very similar to the general intelligence, or 'g' factor, in humans. It appears to be the case

that tamarins have something very similar to our general intelligence."

General intelligence, or "g," refers to the positive correlation of an individual's performance on various subtasks within an intelligence test. Banerjee and her colleagues found that "g" accounted for 20 percent of the monkeys' performance on the tasks in the study. The remaining 80 percent of the variation in performance was due to task-specific or environmental circumstances in testing the monkeys.

While not a direct comparison, human "g" accounts for 40 to 60 percent of the variation in an individual's performance on the various subtasks of an IQ test. It may be that an increase in the magnitude of "g" was integral to the evolution of the human brain.

"General intelligence is an important component of human intelligence, but it is also possible that it relies upon ancient neural substrates," says Banerjee. "If different primate taxa differ in the magnitude of 'g,' with humans standing out from the rest of the pack, this might help explain how we, uniquely, can combine thoughts from different domains of knowledge to create new representations of the world. This cognitive domain general ability, captured by 'g,' is something that you might see to varying degrees in other primate taxa."

This study was conducted among 22 cotton-top tamarins, who were administered 11 unique tasks designed to assess different cognitive functions including working memory, executive control, information processing speed, and inhibitory control. For some tasks, the monkeys' goal was to obtain a piece of food, but this was not the case for all of the tasks. Monkeys with higher "g" scores tended to outperform [monkeys](#) with lower scores across the various subtasks in the cognitive task battery.

This particular set of tasks was developed for this study, but Banerjee

hopes that it or other similar task batteries might be applied to future studies of primate general intelligence, to develop a standardized test for cognitive ability that could be administered to many species.

"We called our cognitive task battery the 'monkey IQ test' very crudely," says Banerjee. "It's a fun way to think about it, but to be more accurate, I would say that we are looking at global cognitive ability across an array of tasks that span multiple cognitive domains."

Source: Harvard University ([news](#) : [web](#))

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