

Humans could have an innate sense of probability, research shows

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Credit: Carlos Sardá/public domain

(Medical Xpress)—Is a sense of probability learned or innate? To find out whether probability is a subject that people must learn in school, Vittorio Girotto and colleagues at University IUAV of Venice tested rural Mayan villagers, with no formal education, on their knowledge of probability. They found that the villagers performed just as well on probability-related tasks as Mayan schoolchildren and Italian adults. The

research appears in the *Proceedings of the National Academy of Sciences*.

Some research suggests that an understanding of [probability](#) requires formal schooling. When asked questions that involve probability, children in western cultures aren't able to give correct answers until they're five or six years old. That's around the age at which they start school, so it's possible that a sense of probability requires exposure to counting tasks and other activities associated with formal education. In addition, people without formal training in the basic rules of probability sometimes make incorrect predictions.

However, babies seem to have an intuitive sense of probability. When 12-month-olds see a container with one blue and three yellow bouncing balls, they show surprise when the blue ball exits the container. Nonhuman primates also seem to have some understanding of the likelihood that an event will occur.

To determine whether knowledge of probability is innate and shared by all human beings, Girotto's team gave adult Mayans, with no formal education, living in remote Guatemalan villages, tasks that involved betting on the likelihood of drawing chips of particular shapes and colors from pools of chips.

In one task, the researchers showed subjects four chips, three of one color and one of another. Subjects had to bet on the color of the chip the experimenter would draw. Later, the team showed subjects eight chips, four round and four square. Five of these were one color and three were another color. The subjects had to bet on the color of the chip to be drawn. The experimenter then drew a chip and indicated its shape; the subjects had to bet on its color.

Another task required subjects to choose which of two sets of chips would be more likely to contain a winning chip. Subjects also had to

predict whether two randomly chosen chips from a set of chips would be the same or different colors.

The adult Mayans with no [formal education](#) performed as well as 7 to 9-year-old Mayan schoolchildren and Italian adults given the same tasks. This suggests the existence of an innate sense of probability.

More information: Probabilistic cognition in two indigenous Mayan groups Laura Fontanari, *PNAS*, [DOI: 10.1073/pnas.1410583111](https://doi.org/10.1073/pnas.1410583111)

Abstract

Is there a sense of chance shared by all individuals, regardless of their schooling or culture? To test whether the ability to make correct probabilistic evaluations depends on educational and cultural guidance, we investigated probabilistic cognition in preliterate and prenumerate Kaqchikel and K'iche', two indigenous Mayan groups, living in remote areas of Guatemala. Although the tested individuals had no formal education, they performed correctly in tasks in which they had to consider prior and posterior information, proportions and combinations of possibilities. Their performance was indistinguishable from that of Mayan school children and Western controls. Our results provide evidence for the universal nature of probabilistic cognition.

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