Preschoolers prefer to learn from a competent robot than an incompetent human, study shows

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Anna-Elisabeth Baumann (left) and Elizabeth Goldman with Nao and Cozmo. Credit: Anna-Elisabeth Baumann

Who do children prefer to learn from? Previous research has shown that even infants can identify the best informant. But would preschoolers prefer learning from a competent robot over an incompetent human?

According to a new paper by Concordia researchers published in the *Journal of Cognition and Development*, the answer largely depends on age.

The study compared two groups of preschoolers: one of three-year-olds, the other of five-year-olds. The children participated in Zoom meetings featuring a video of a young woman and a small robot with humanoid characteristics (head, face, torso, arms and legs) called Nao sitting side by side. Between them were familiar objects that the robot would label correctly while the human would label them incorrectly, e.g., referring to a car as a book, a ball as a shoe and a cup as a dog.

Next, the two groups of children were presented with unfamiliar items: the top of a turkey baster, a roll of twine and a silicone muffin container. Both the robot and the human used different nonsense terms like "mido," "toma," "fep" and "dax" to label the objects. The children were then asked what the object was called, endorsing either the label offered by the robot or by the human.

While the three-year-olds showed no preference for one word over another, the five-year-olds were much more likely to state the term provided by the robot than the human.

"We can see that by age five, children are choosing to learn from a competent teacher over someone who is more familiar to them—even if the competent teacher is a robot," says the paper's lead author, Ph.D. candidate Anna-Elisabeth Baumann. Horizon Postdoctoral Fellow Elizabeth Goldman and undergraduate research assistant Alexandra Meltzer also contributed to the study. Professor and Concordia

University Chair of Developmental Cybernetics Diane Poulin-Dubois in the Department of Psychology supervised the study.

The researchers repeated the experiments with new groups of three- and five-year-olds, replacing the humanoid Nao with a small truck-shaped robot called Cozmo. The results resembled those observed with the human-like robot, suggesting that the robot's morphology does not affect the children's selective trust strategies.

Baumann adds that, along with the labeling task, the researchers administered a naive biology task. The children were asked if biological organs or mechanical gears formed the internal parts of unfamiliar animals and robots. The three-year-olds appeared confused, assigning both biological and mechanical internal parts to the robots. However, the five-year-olds were much more likely to indicate that only mechanical parts belonged inside the robots.

"This data tells us that the children will choose to learn from a robot even though they know it is not like them. They know that the robot is mechanical," says Baumann.

Being right is better than being human

While there has been a substantial amount of literature on the benefits of using robots as teaching aides for children, the researchers note that most studies focus on a single robot informant or two robots pitted against each other. This study, they write, is the first to use both a human speaker and a robot to see if children deem social affiliation and similarity more important than competency when choosing which source to trust and learn from.

Poulin-Dubois points out that this study builds on a previous paper she co-wrote with Goldman and Baumann. That paper shows that by age

five, children treat robots similarly to how adults do, i.e., as depictions of social agents.

"Older preschoolers know that robots have mechanical insides, but they still anthropomorphize them. Like adults, these children attribute certain human-like qualities to robots, such as the ability to talk, think and feel," she says.

"It is important to emphasize that we see robots as tools to study how children can learn from both human and non-human agents," concludes Goldman. "As technology use increases, and as children interact with technological devices more, it is important for us to understand how technology can be a tool to help facilitate their learning."

More information: Anna-Elisabeth Baumann et al, People Do Not Always Know Best: Preschoolers' Trust in Social Robots, *Journal of Cognition and Development* (2023). DOI: 10.1080/15248372.2023.2178435

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