

Children do not understand concept of others having false beliefs until age 6 or 7

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A child decides whether Maxi will look for the chocolate bar in the blue, red or green box. When there are two possible locations of the chocolate bar, children can answer correctly without understanding how other people think. When there are more than two locations, children must understand how Maxi can have a false belief to answer correctly. Research shows that children do not reliably understand others' false beliefs until they are 6 or 7 years old. Credit: Robert Ewing/ASU

New developmental psychology work has upended decades of research

suggesting that children as young as 4 years old possess theory of mind.

Having theory of mind means understanding how others think, including the ability of someone else to have a [false belief](#).

In a famous theory-of-mind experiment that includes false beliefs, children watch scenes involving a character named Maxi, his mother and a [chocolate](#) bar. Maxi places the chocolate bar into a blue box and then leaves. Unbeknownst to Maxi, his mother shows up and moves the chocolate from the blue box into a green box. After Maxi's mother leaves, Maxi returns and then the child is asked where Maxi will look for the chocolate.

By 4 years old, children can answer correctly: Maxi will look in the blue box.

But do [young children](#) really understand that because Maxi did not see his mother move the chocolate, he falsely believes it is still in the blue box?

The answer is no, according to William Fabricius, associate professor of psychology at Arizona State University. For more than a decade, Fabricius and his collaborators have carried out new experiments and have also analyzed previous experiments that collectively show children do not actually understand false beliefs until they are 6 or 7 years old. This work was published in *Monographs of the Society for Research in Child Development* on September 21.

"When we overestimate what young children understand about the mind, and thus how others think, we can expect too much from them in terms of social behavior or performance in school," said Fabricius, who is the lead author of the paper.

Three locations to hide the chocolate bar

One of the first ways the research team tested what children actually understand about Maxi's false belief was to add a third possible location of the chocolate bar.

In these experiments, there is a blue box, a green box and a red box. Maxi again places his chocolate bar in the blue box. His mother again moves the chocolate bar into the green box.

When young children are asked where Maxi will look for the chocolate, they answer the blue box 50% of the time and the red box 50% of the time.

"When there are only two locations, 4- and 5-year-old children can answer correctly without truly understanding that Maxi has a false belief about the location of the chocolate bar," Fabricius said. "Adding a third location results in them guessing at chance between the two empty locations. Because young children can pass the two-option false-belief task without understanding Maxi's thought processes, this experiment does not test theory of mind."

The random choices children make when there are three possible locations of the chocolate bar suggest they rely on their rudimentary understanding of seeing and knowing. This research team has named this process "perceptual access reasoning."

Children use perceptual access reasoning in the following way:

- Seeing leads to knowing
- People who cannot see something do not know about it
- People who do not know will always do the wrong thing

Based on these rules, 4- and 5-year-old children reason that when Maxi returns, he cannot see that the chocolate is in the green box, so he does not know that the chocolate is in the green box. Therefore, children reason that Maxi will make the wrong choice and will look in an empty location.

When there is only one empty location (the blue box), children answer correctly by default. When there are two empty locations (blue and red boxes), they guess.

What happens when Maxi has a true belief, and his mother leaves the chocolate bar alone

Another way the research team tested what young children understand about others' thoughts was to have the chocolate bar remain where Maxi put it. When Maxi returns, he has a true belief about where the chocolate is.

In this experiment, Maxi again puts the chocolate bar in the blue box and leaves. This time when Maxi's mother comes in, she leaves the chocolate bar where it is.

Even with just two options—the blue and green boxes—young children fail the true-belief task. They incorrectly answer that Maxi will make the wrong choice and look in the green box.

"Perceptual access reasoning users have an immature concept of knowing as tied to the present situation, and do not yet understand that people have memories that persist across situations. They do not understand that Maxi might remember putting the [chocolate bar](#) into the blue box," Fabricius said. "The evidence from this series of experiments is consistent that children do not understand mental representation until

they are 6 or 7 years old."

What perceptual access reasoning means for preschoolers

The finding that young children do not understand true or false beliefs and instead rely on perceptual access reasoning is relevant for how they are taught.

"There are strong correlations between theory of mind and a child's ability to share, be socially appropriate and be able to problem solve and plan," said Anne Kupfer, director of ASU's Child Study Lab (CSL) and co-author of the Monograph paper.

The CSL partners with developmental psychology faculty to put research findings into practice and has implemented the findings from the Monograph paper into its preschool curriculum.

"It is important for educators to know at what age a child can finally realize that how they feel, how they think or what they want are not necessarily what everyone else feels, thinks or wants," Kupfer said.

Sharing a toy is a common situation that requires CSL staff to leverage how young children use perceptual access reasoning. Kupfer described a scenario in which a child wants a toy, but another classmate is playing with it. The child takes the toy and because they are happy holding the toy, they think everyone is happy. But the child who just lost the toy starts to cry, and the child who took the toy is puzzled.

"That's where we come in. In this situation we narrate what is happening and role model responses that are based on what the kids understand from perceptual access reasoning," Kupfer said. "We say to the child

who is crying, 'I can see you are upset and saw that Johnny took the toy away from you. Is that why you are upset?' We then role model and ask the crying child to tell Johnny why they are upset, because he took their toy. Then we direct Johnny to look at the sad child's face and say, 'She just told you she is upset. Why is she upset?' Johnny can then answer, 'Because I took her toy'."

This example demonstrates how educators can help [children](#) learn about others' mental representations. The child who took the toy begins to understand why they feel happy but the other child does not—a precursor to having theory of mind.

More information: William V. Fabricius et al, Perceptual Access Reasoning (PAR) in Developing a Representational Theory of Mind, *Monographs of the Society for Research in Child Development* (2021). [DOI: 10.1111/mono.12432](https://doi.org/10.1111/mono.12432)

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