

Research provides new view of the way young children think

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For parents who have found themselves repeating the same warnings or directions to their toddler over and over to no avail, new research from the University of Colorado at Boulder offers them an answer as to why their toddlers don't listen to their advice: they're just storing it away for later.

Scientists -- and many parents -- have long believed that children's brains operate like those of little adults. The thinking was that over time kids learn things like proactively planning for and understanding how actions in the present affect them in the future. But the new study suggests that this is not the case.

"The good news is what we're saying to our kids doesn't go in one ear and out the other, like people might have thought," said CU-Boulder psychology Professor Yuko Munakata, who conducted the study with CU doctoral student Christopher Chatham and Michael Frank of Brown University. "It also doesn't go in and then get put into action like it does with adults. But rather it goes in and gets stored away for later."

A paper on their study titled "Pupillometric and Behavioral Markers of a Developmental Shift in the Temporal Dynamics of [Cognitive Control](#)" will appear in the [Proceedings of the National Academy of Sciences](#) the week of March 23.

"I went into this study expecting a completely different set of findings," said Munakata. "There is a lot of work in the field of [cognitive](#)

[development](#) that focuses on how kids are basically little versions of adults trying to do the same things adults do, but they're just not as good at it yet. What we show here is they are doing something completely different."

During the study, the CU-Boulder researchers used a [computer game](#) designed for children, and a technique known as pupillometry -- a process that measures the diameter of the pupil of the eye to determine the [mental effort](#) of the child -- to study the cognitive abilities of 3-and-a-half-year-olds and 8-year-olds.

The computer game involved teaching children simple rules about two cartoon characters -- Blue from Blue's Clues and SpongeBob Squarepants -- and their preferences for different objects. In the directions for the game, children were told that Blue likes watermelon, so they were to press the happy face on the computer screen only when they saw Blue followed by a watermelon. When SpongeBob appeared, they were told to press the sad face on the screen.

"The older kids found this sequence easy, because they can anticipate the answer before the object appears," Chatham said. "But preschoolers fail to anticipate in this way. Instead, they slow down and exert mental effort after being presented with the watermelon, as if they're thinking back to the character they had seen only after the fact."

Using pupillometry to determine the time at which children exerted mental effort, the speed of their responses for each type of sequence and the relative accuracy of those responses, the researchers found that children neither plan for the future nor live completely in the present. Instead, they call up the past as they need it.

"For example, let's say it's cold outside and you tell your 3-year-old to go get his jacket out of his bedroom and get ready to go outside. You might

expect the child to plan for the future, think 'OK it's cold outside so the jacket will keep me warm,' " said Chatham. "But what we suggest is that this isn't what goes on in a 3-year-old's brain. Rather, they run outside, discover that it is cold, and then retrieve the memory of where their jacket is, and then they go get it."

Munakata doesn't claim to be a parental expert, but she does think their new study has relevance to parents' daily interactions with their toddlers.

"If you just repeat something again and again that requires your young child to prepare for something in advance, that is not likely to be effective," Munakata said. "What would be more effective would be to somehow try to trigger this reactive function. So don't do something that requires them to plan ahead in their mind, but rather try to highlight the conflict that they are going to face. Perhaps you could say something like 'I know you don't want to take your coat now, but when you're standing in the yard shivering later, remember that you can get your coat from your bedroom.'"

Munakata said the findings have broader implications for research in the field of cognitive development.

"Further study could help people figure out why kids are doing poorly or well in different educational settings," she said.

Source: University of Colorado at Boulder

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