MedicalXpress

Children learn smart behaviors without knowing what they know

June 16 2008

Young children show evidence of smart and flexible behavior early in life – even though they don't really know what they're doing, new research suggests.

In a series of experiments, scientists tested how well 4- and 5-year-olds were able to rely on different types of information to choose objects in a group. In some situations, they were asked to choose objects based on color and in some cases based on shape.

Results showed children could be trained to choose correctly, but still didn't know why shape or color was the right answer in any particular context.

The findings go against one prominent theory that says children can only show smart, flexible behavior if they have conceptual knowledge – knowledge about how things work, said Vladimir Sloutsky, co-author of the study and professor of psychology and human development and the director of the Center for Cognitive Science at Ohio State.

"Children have more powerful learning skills than it was thought previously," he said. "They can show evidence of flexible learning abilities without conceptual knowledge and without being aware of what they learned."

Sloutsky conducted the study with Anna Fisher, a former graduate student at Ohio State now an assistant professor of psychology at

Carnegie Mellon University. The study appears in the current issue of the journal *Child Development.*

Sloutsky gave an example of how children can show flexibility in thinking and behavior.

In a previous study by other researchers, 3- and 4-year-olds were found to be more likely to group items on the basis of color if the items were presented as food, but on the basis of shape when they were presented as toys.

"The argument has been that children couldn't do this without understanding the properties of food and the properties of toys. So in order to be flexible you really need to understand what things are.

"But what we demonstrated is that children can acquire this flexibility without this deeper knowledge, and without realizing how they are being flexible."

In their study, Sloutsky and Fisher had several groups of 4- and 5-year-olds participate in several experiments. In all of these experiments, children played a guessing game involving choosing objects on a computer screen. The game was played either in the upper right corner on the computer screen (with a yellow background) or in the lower left hand corner of the computer screen (with a green background).

They were shown one object and told it had a smiley face behind it. They then guessed which of the other two objects also had a smiley face behind it. In each case, one of the other objects had the same color but different shape as the original, while the other had the same shape but a different color.

The key was that when the game was in the upper right corner of the

computer screen, the smiley face was always hidden behind the same-shaped item. When the game was presented in the lower left corner, the smiley face was hidden behind the item with the same color.

Some children were given training: after making a guess, they were told whether they were correct or not. These children soon learned where to find the smiley face.

Later, during testing, these children had no trouble correctly guessing where the smiley face was hidden, even though no feedback was given during the actual test.

But, Sloutsky said, "these children were not aware of what they learned. They didn't know how they were making the correct choices."

In several related experiments, the researchers tested whether children discovered the "rules" of this game – that shape was important when the game was played in the upper-right corner of the screen, and color was important when it was played in the lower-left corner– and whether they could follow the rule on their own.

The answer was that they did not figure out the rule or know how to use it.

Sloutsky said children in the experiments didn't know the rules, but simply used associative learning – they figured out that in certain areas of the computer screen, they were better off choosing by shape, and in other areas by color.

"Children developed a running statistic about where they should choose color and where they should choose shape," he said.

This type of learning goes on all the time with children, Sloutsky

explained. For example, children learn that larger animals are generally stronger and more powerful than smaller animals, even though they know nothing about the biological reasons behind this.

The findings have implications for theories of how children learn and develop their cognitive abilities, he said.

"Children learn implicitly. They don't need complex conceptual knowledge to show evidence of smart, flexible behavior."

Source: Ohio State University