

Research shows infants are able to remember more than originally thought

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Jennifer Zosh, assistant professor of human development and family studies at Penn State Brandywine, and Rebecca Slomowitz, senior psychology major and undergraduate researcher, work with children at Penn State Brandywine. Credit: Penn State

If you were verbally given a list of random items at the grocery store to purchase, could you remember everything without writing it down?

In a recently published article, "Array Heterogeneity Prevents

Catastrophic Forgetting in Infants," published in *Cognition*, Jennifer Zosh, assistant professor of human development and family studies at Penn State Brandywine, and collaborator Lisa Feigenson, associate professor of psychological and brain sciences at Johns Hopkins University, found when infants are given an array of different (heterogeneous) objects they can remember up to their [working memory](#) capacity. This discovery is different from previous research that found an infant would experience "catastrophic forgetting" once their memory capacity is exceeded.

Using an experimental approach called the manual search paradigm, Zosh and Feigenson essentially played a hide-and-seek game with infants, where they hid a number of objects in an opaque box and measured when infants would reach for objects. Previous research repeatedly found infants would search for one, two and three objects but experienced a dramatic failure, dubbed "catastrophic forgetting," when presented with four objects. Zosh was curious about why this pattern happened with infants while adults do something very different.

"Research has shown that both infants and adults have a [working memory capacity](#) of about three to four objects," Zosh said. "But when an adult tries to remember a list of items, like a grocery list, he or she typically remembers most of these items even if they forget a few. But previous studies found that for infants, when more than three objects were hidden, infants seem to completely lose track of any of the objects, and wouldn't search the box when four objects were hidden and just one was retrieved."

Zosh sought out to find why infants behaved so differently from adults. She noticed one big difference between the studies with infants and adults is adults were often presented with an arrangement of objects that looked different from one another (heterogeneous arrays) while infants were often presented with an arrangement of objects that were similar

(homogeneous arrays).

Zosh and Feigenson explored this issue by showing 13-month-old infants a variety of objects in three different experiments. Some of the objects were familiar objects, such as toy figures of a cat, ball, car and spoon, while others were completely "novel" objects infants typically never see in everyday life, like a four-pronged piece of purple polka-dotted clay or a plastic crab claw. This presented the idea that perhaps infants need to have an experience with different objects to help them remember to continue to reach into the box.

In their first two experiments, they found that infants succeeded where they had always previously failed. When four of these different objects were hidden, they continued to reach in the box after only two objects were retrieved – even if these objects were completely novel. This was the first time infants didn't appear to be experiencing catastrophic forgetting.

In their last experiment, they asked whether infants' [memory capacity](#) actually expanded to four items or if they were simply like adults and remembering up to their memory limit. The latter was the correct hypothesis. They found that 13-month old infants would keep searching for remaining objects when four objects were hidden and two were retrieved but wouldn't continue searching when four objects were hidden and three were retrieved. Just like an adult at the [grocery store](#), infants appeared to remember most, but not all, of the items.

"This study allowed infants to succeed where they have always failed before," Zosh said. "This suggests that while we (adults) feel like our memory works in a very different way than infants, we aren't so different after all."

The working memory research continues at Penn State Brandywine.

Rebecca Slomowitz, a senior psychology major, is conducting follow-up research to Zosh and Feigenson's research. Slomowitz, a Schreyer Honors Scholar, is exploring how infants' working memory performs when remembering people versus objects, and if [infants](#) experience catastrophic forgetting when trying to remember people.

More information: Jennifer M. Zosh, Lisa Feigenson, "Array heterogeneity prevents catastrophic forgetting in infants," *Cognition*, Volume 136, March 2015, Pages 365-380, ISSN 0010-0277, [dx.doi.org/10.1016/j.cognition.2014.11.042](https://doi.org/10.1016/j.cognition.2014.11.042).

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