Infants can't distinguish between large and small groups: study

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Human brains process large and small numbers of objects using two different mechanisms, but infants have not yet developed the ability to make those two processes work together, according to new research from the University of Missouri.

"This research was the first to show the inability of infants in a single age group to discriminate large and small sets in a single task," said Kristy vanMarle, assistant professor of psychological sciences in the College of Arts and Science. "Understanding how infants develop the ability to represent and compare numbers could be used to improve early education programs."

The MU study found that infants consistently chose the larger of two groups of food items when both sets were larger or smaller than four, just as an adult would. Unlike adults, the infants showed no preference for the larger group when choosing between one large and one small set. The results suggest that at age one infants have not yet integrated the two mental functions: one being the ability to estimate numbers of items at a glance and the other being the ability to visually track small sets of objects.

In vanMarle's study, 10- to 12-month-old infants were presented with two opaque cups. Different numbers of pieces of breakfast cereal were hidden in each cup, while the infants observed, and then the infants were allowed to choose a cup. Four comparisons were tested between different combinations of large and small sets. Infants consistently chose

two food items over one and eight items over four, but chose randomly when asked to compare two versus four and two versus eight.

"Being unable to determine that eight is larger than two would put an organism at a serious disadvantage," vanMarle said. "However, ongoing studies in my lab suggest that the capacity to compare small and large sets seems to develop before age two."

The ability to make judgments about the relative number of objects in a group has old evolutionary roots. Dozens of species, including some fish, monkeys and birds have shown the ability to recognize numerical differences in laboratory studies. VanMarle speculated that being unable to compare large and small sets early in infancy may not have been problematic during human evolution because young children probably received most of their food and protection from caregivers. Infants' survival didn't depend on determining which bush had the most berries or how many predators they just saw, she said.

"In the modern world there are educational programs that claim to give children an advantage by teaching them arithmetic at an early age," said vanMarle. "This research suggests that such programs may be ineffective simply because infants are unable to compare some numbers with others."

More information: VanMarle's research was published in the *Journal of Experimental Child Psychology*.

Provided by University of Missouri-Columbia

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