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Team develops better understanding of memory retrieval between children and adults

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Neuroscientists from Wayne State University and the Massachusetts Institute of Technology (MIT) are taking a deeper look into how the brain mechanisms for memory retrieval differ between adults and children. While the memory systems are the same in many ways, the researchers have learned that crucial functions with relevance to learning and education differ. The team's findings were published on July 17, 2012, in the *Journal of Neuroscience*.

According to lead author Noa Ofen, Ph.D., assistant professor in WSU's Institute of Gerontology and Department of Pediatrics, cognitive ability, including the ability to learn and remember new information, dramatically changes between childhood and adulthood. This ability parallels with dramatic changes that occur in the structure and function of the brain during these periods.

In the study, "The Development of Brain Systems Associated with Successful Memory Retrieval of Scenes," Ofen and her collaborative team tested the development of neural underpinnings of memory from childhood to young adulthood. The team of researchers exposed participants to pictures of scenes and then showed them the same scenes mixed with new ones and asked them to judge whether each picture was presented earlier. Participants made retrieval judgments while researchers collected images of their brains with magnetic resonance imaging (MRI).

Using this method, the researchers were able to see how the brain remembers. "Our results suggest that cortical regions related to attentional or strategic control show the greatest developmental changes for memory retrieval," said Ofen.

The researchers said that older participants used the cortical regions more than younger participants when correctly retrieving past experiences.

"We were interested to see whether there are changes in the connectivity of regions in the brain that support memory retrieval," Ofen added. "We found changes in connectivity of memory-related regions. In particular, the developmental change in connectivity between regions was profound even without a developmental change in the recruitment of those regions, suggesting that functional brain connectivity is an important aspect of developmental changes in the brain."

This study marks the first time that the development of connectivity within memory systems in the brain has been tested, and the results suggest that the brain continues to rearrange connections to achieve adult-like performance during development.

Ofen and her research team plan to continue research in this area, focused on modeling brain network connectivity, and applying these methods to study abnormal brain development.

Provided by Wayne State University