

Why bigger is better when it comes to our brain and memory

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The hippocampus is an important brain structure for recollection memory, the type of memory we use for detailed reliving of past events. Now, new research published by Cell Press in the December 22 issue of the journal *Neuron* reveals characteristics of the human hippocampus that allow scientists to use anatomical brain scans to form predictions about an individual's recollection ability. The new research helps to explain why this relationship has been hard to find in the past and provides evidence for a possible underlying mechanism.

The hippocampus, a deep [brain structure](#) named for its curving seahorse shape, can be divided into anterior and posterior portions. Although research has generally linked smaller hippocampi with worse recollection in neuropsychological patients and during aging, this relationship has not held up among healthy [young adults](#). "There is some evidence that extensive [spatial memory](#) acquisition leads to enlargement of the posterior hippocampus and a decrease in the anterior hippocampus," explains lead study author, Dr. Jordan Poppenk who conducted the study at Baycrest's Rotman Research Institute. "This suggested to us that the crucial predictor of individual differences in recollection ability might not be the overall size of the hippocampus but the separate contributions of the posterior and anterior segments of the hippocampus."

Dr. Poppenk and coauthor Dr. Morris Moscovitch analyzed high-resolution [magnetic resonance imaging](#) brain scans of healthy adults who had participated in recollection memory tests. Better recollection was

associated with a larger posterior hippocampus and a smaller anterior hippocampus. The overall size of the hippocampus did not predict recollection, as larger posterior hippocampi were offset by smaller anterior hippocampi. The researchers went on to show that the link between the posterior hippocampus and recollection depended on interactions with other parts of the brain between the times that memories were learned and retrieved, particularly regions involved in perception which form the basis of recollected experience.

"Our results show for the first time that the size of the posterior hippocampus, especially when expressed as a ratio to the size of the anterior hippocampus, reliably predicts recollection in healthy adults. This finding explains the longstanding failure to correlate the overall size of the hippocampus with memory," concludes Dr. Poppenk. "We also provide evidence that it is the functional connections, possibly related to memory consolidation, between the posterior hippocampus and other [parts of the brain](#) that may underlie enhanced memory recollection."

Provided by Cell Press

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