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Distractions Cause Memory Loss

By OMEED ELBOUDWAREJ
Contributing Writer
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UC Berkeley researchers have used brain imaging to confirm that, contrary to popular opinion, short-term memory loss common in older adults is not associated with a lack of focus on relevant information. Rather, short-term memory loss lies with an inability to filter out surrounding distractions.

Although previous studies have used neuropsychological tests to investigate how aging changes memory patterns, this study is the among the first of its kind to use functional magnetic resonance imaging (fMRI) to assess the impact of normal aging on the enhancement and suppression of sensory processing in the brain.

"The degree that older patients suppressed unnecessary information correlates with the degree that they remembered the relevant information," Adam Gazzaley, UC Berkeley professor of neuroscience, said.

"So what we are seeing is that they have a deficit in suppression and this seems to let in information that is irrelevant and cause interference with the information that they have to remember," Gazzaley said.

The findings suggest that drugs aimed at reducing the suppression deficit rather than trying to improve the memory may ultimately prove more effective.

Gazzaley and his colleagues compared young adults aged 19 to 30 with older adults aged 60 to 77 to see how short term or "working" memory was affected by irrelevant information. They developed a memory test whose purpose was two-fold: to measure the brain's ability to focus on a visual stimulus of interest, and its ability to suppress extraneous stimuli.

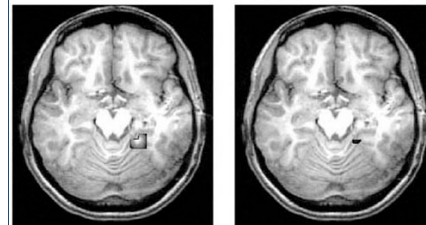
The brain activity was captured using an fMRI scanner. Upon pinpointing the regions in each subject's brain that dealt with faces and scenes, the researchers presented a set of four images that contained two natural scenes and two human faces.

The subjects were told to focus on either the faces or the natural scenes. They were then asked to remember whether a particular face or scene appeared among the four images for up to nine seconds.

The results were then compared to a passive viewing baseline in which subjects

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Remember Scenes

Ignore Scenes

COURTESY/ADAM GAZZALEY

As adults try to remember visual stimuli, the brain engages selective attention. However, only younger adults show suppression of brain activity when trying to filter distractions.

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were asked to observe the same visual stimuli without trying to remember them. While both younger and older adults were equally able to enhance brain activity when trying to remember a relevant face or scene, only the younger adults were able to effectively suppress brain activity in areas that processed the irrelevant visual information.

"Although the results are what would have been expected based on the behavioral literature, this notion hasn't really been shown quite as clearly with brain activity," Gazzaley said. "By using brain activity measurements, we were able to show that the deficit was selective for suppression and enhancement was preserved."

Interestingly, six of the 16 older adults had no trouble blocking out task-irrelevant representations and their brain activity patterns resemble those of young adults.

"What we are doing now is investigating that sub-group to see if there are other characteristics of the structure of their brains that might tell us what allows them to exhibit successful aging," Gazzaley said.

Researchers believe that the reason as to why some people can avoid memory loss lies in the frontal lobe of the brain, a region that is involved in a variety of higher cognitive functions, including selective attention.

"We are not exactly sure if this suppression deficit is the result of a structural or neurochemical change in the frontal lobe, or if it is just a difference in strategies being used by people as they age," Gazzaley said. "If we understand it we will be better able to develop interventions to remedy it."

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