

Study finds strategy shift with age can lead to navigational difficulties

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A Wayne State University researcher believes studying people's ability to find their way around may help explain why loss of mental capacity occurs with age.

Scott Moffat, Ph.D., associate professor of psychology and [gerontology](#) in the College of Liberal Arts and Sciences and Institute of Gerontology at WSU, said studies have demonstrated reliable differences in navigation and spatial learning tasks based on age. Younger adults tend to outperform their elders in [spatial navigation](#), Moffat said, and people seem to start switching navigational strategies with age.

Generally speaking, he said, younger subjects tend to use an allocentric, or map-based, strategy, in which they conceive what an entire environment looks like and where they are in it. Older ones prefer an egocentric, or route-based, strategy, using a series of steps to be taken to reach a destination.

Researchers believe the reason for the strategy shift may lie in the part of the brain called the [hippocampus](#), where neuroimaging studies have shown reduced or absent activation in [older adults](#) performing [navigation tasks](#).

Moffat's study, recently published in [Neurobiology of Aging](#), was an effort to identify which strategy people use to navigate and to measure differences between age groups.

"People have speculated that changing strategies is part of the reason older people have trouble navigating, but no one had come out and done a direct demonstration that it actually is the case," Moffat said.

"Navigation is an important cognitive skill that older people may be losing, and in severe cases it might be an early indicator of Alzheimer's disease."

Researchers assigned virtual tasks to 99 older (ages 55 to 85) metropolitan Detroit-area adults and 54 younger (ages 18 to 45) ones. Subjects were given a training task that revealed which strategy they were using in a simple maze. They then were asked to navigate in a large, nonsymmetrical [virtual room](#) to find a hidden location.

Older adults were much more likely to choose an egocentric strategy, while younger adults were more equally distributed between egocentric and allocentric strategies.

"This finding is the clearest demonstration to date that older adults have different strategy preferences or biases in approaching spatial navigational tasks," he said.

Older adults also took longer to solve the maze than younger ones, Moffat said, demonstrating that strategy may predict performance on that task. [Younger adults](#) who preferred allocentric strategy performed better on the second maze and showed more accurate cognitive mapping.

"We already knew before this study that older people have deficits in navigating," Moffat said. "We learned that it seems like one of the reasons behind this is that they start using a different, perhaps more inefficient strategy."

He said he is somewhat surprised at the degree to which older adults preferred an egocentric strategy; just 18 percent preferred an allocentric

strategy. Moffat cautioned, however, that while the tendency appears strong, there are a lot of individual differences. For example, while some older adults show decline in navigational ability, in others it is markedly preserved.

Moffat's team now will turn its attention to magnetic resonance imaging studies to note physical differences in brain regions of people using allocentric strategies and those using egocentric strategies.

"Using more controlled laboratory testing, we can measure navigation skills better than just asking someone's opinion about whether or not they get lost while they're driving," he said.

Moffat said his team's work ultimately could lead to studies of possible behavioral interventions — as opposed to treatment with drugs — in which people could improve allocentric strategy use even as they age. Effects of that training could generalize to some other cognitive areas, he said, noting that the brain's navigational areas are also important for memory, such as word recall.

"Eventually we could learn how to improve quality of life for [older people](#) by preserving their cognitive and mental functions," Moffat said.

Provided by Wayne State University

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