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Breakthrough discerns normal memory loss from disease

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(Medical Xpress)—Cornell researchers have developed a reliable method to distinguish memory declines associated with healthy aging from the more-serious memory disorders years before obvious symptoms emerge. The method also allows research to accurately predict who is more likely to develop cognitive impairment without expensive tests or invasive procedures.

Their results hold promise for detecting cognitive impairment early and monitoring treatment, but also have implications for healthy adults, said Charles Brainerd, professor of human development and the study's lead co-author with Valerie Reyna, director of the Institute for Human Neuroscience and professor of human development, both in the College of Human Ecology.

Their research, "Dual-retrieval models and neurocognitive impairment," appears online in the *Journal of Experimental Psychology: Learning, Memory and Cognition*, Aug. 26.

The memory abilities affected by cognitive impairment differ from those affected by healthy aging, the authors say, resulting in unique error patterns on neuropsychological tests of memory. Their theory-driven mathematical model detects these patterns by analyzing performance on such tests and measuring the separate memory processes used.

"With 10 or 15 minute recall tests already in common use worldwide, we can distinguish individuals who have or are at risk for developing

cognitive impairment from healthy adults, and we can do so with better accuracy than any existing tools," said Brainerd.

The notion that memory declines continuously throughout adulthood appears to be incorrect, they say. "When we separated out the cognitively impaired individuals, we found no evidence of further memory declines after the age of 69 in samples of nationally representative older adults and highly educated older adults," said Reyna.

To develop their models, the team used data from two [longitudinal studies](link) of older adults – a nationally representative sample of [older adults](link), the Aging, Demographics and Memory Study, and the Alzheimer's Disease Neuroimaging Initiative – that include brain and behavioral measures as well as diagnoses for cognitive impairment and dementia.

Specifically, the researchers found that declines in reconstructive memory (recalling a word or event by piecing it together from clues about its meaning, for example, recalling that "dog" was presented in a word list by first remembering that household pets were presented in the list) were associated with mild cognitive impairment and Alzheimer's dementia, but not with healthy aging. Declines in recollective memory – recalling a word or event exactly – were a feature of normal aging.

Over a period of between one and a half to six years, declines in reconstructive memory processes were reliable predictors of future progression from healthy aging to mild [cognitive impairment](link) and Alzheimer's dementia, and better predictors than the best genetic marker of such diseases.

"Reconstructive memory is very stable in healthy individuals, so declines in this type of memory are a hallmark of neurocognitive impairment," Reyna said.

Younger adults rely heavily on recollection, Brainerd said, but this method becomes increasingly inefficient throughout mid-adulthood. "Training people how to make better use of reconstructive recall as they age should assist healthy adult memory function," he said. "Our analytical models are readily available for research and clinical use and could easily be incorporated into existing neuropsychological tests."

More information: psycnet.apa.org/psycinfo/2013-30441-001/

Provided by Cornell University

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