Eliminating Visual Clutter Helps People with Mild Cognitive Impairment

Georgia Institute of Technology

New study suggests memory impairment tied to object perception

A new study from Georgia Tech and the University of Toronto suggests that memory impairments for people diagnosed with early stage Alzheimer's disease may be due, in part, to problems in determining the differences between similar objects. The findings also support growing research indicating that a part of the brain once believed to support memory exclusively – the medial temporal lobe - also plays a role in object perception. The results are published [1] in the October edition of Hippocampus.

Mild cognitive impairment (MCI) is a disorder commonly thought to be a precursor to Alzheimer's disease. The study's investigators, partnering with the Emory Alzheimer's Disease Research Center [2], tested MCI patients on their ability to determine whether two rotated, side-by-side pictures were different or identical.

In the high-interference trials, many photos of the same thing (a blob-like object) were shown. The photos varied only slightly when they weren't a perfect match, either by shape, color or fill pattern. As expected, MCI patients struggled greatly to identify identical pairings.

In the low-interference trials, these blob-like objects were interspersed with trials in which non-matches were more extreme and varied widely. For example, a picture of a butterfly was shown next to a photo of a microwave. Interspersing the very similar blob-like objects with photos of dissimilar objects greatly reduced the amount of interference.

"Minimizing the degree of perceptual interference improved patients' object perception by reducing the number of visually similar features," said project leader Rachel Newsome, a University of Toronto Ph.D. student and Georgia Tech graduate.

The findings suggest that, under certain circumstances, reducing "visual clutter" could help MCI patients with everyday tasks. For example, buttons on a telephone tend to be the same size and color. Only the numbers are different – a very slight visual difference for someone who struggles with object perception. One solution could be a phone with varying sized buttons and different colors.

People diagnosed with MCI weren't the only ones to struggle in the study. The researchers performed the same tests on candidates at-risk for MCI, people who had previously shown no signs of cognitive impairment. They performed the same

as those with MCI, suggesting that the perception test could be used as an early indicator of cognitive impairment.

“People often associate MCI and dementia solely with memory impairment,” said Georgia Tech Psychology Assistant Professor Audrey Duarte, one of the study’s authors. “Memory and perception appear to be intertwined in the same area of the human brain.”

Duarte and her colleagues are among the growing number of researchers studying Alzheimer’s who believe damage to a small area of the medial temporal lobes, the perirhinal cortex, affects object perception.

“Not only does memory seem to be very closely linked to perception, but it’s also likely that one affects the other,” said Toronto’s Morgan Barense, the final member of the team. “Alzheimer’s patients may have trouble recognizing a loved one’s face, not only because they can’t remember it, but also because they aren’t able to correctly perceive its distinct combination of features to begin with.”

Related Links

- Audrey Duarte Research Website [3]
- College of Sciences [4]
- School of Psychology [5]
- Published Article [1]

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