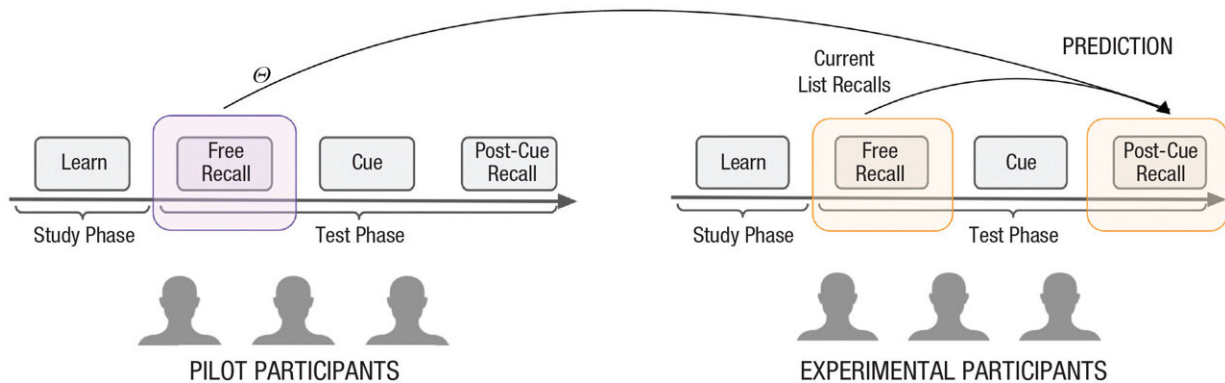# Researchers develop reminder system to enhance memory recall

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An illustration of the model fitting and prediction process. We first fitted context maintenance and retrieval to pilot data to obtain a parameter set Θ that could capture pilot participants' free-recall patterns. We preregistered these parameters and then used them in our live experiment in combination with the experimental participants' recalls to predict post-cue recall behavior, that is, demonstrating the ability of the model to generalize over (1) a different group of subjects and (2) a different period of recall. Credit: *Psychological Science* (2024). DOI: 10.1177/09567976231215298

A computer model developed by Rutgers University–New Brunswick researchers may have cracked the code on helpful memory cues, similar to how recounting shared experiences with friends can trigger memory recall, according to a study published in *Psychological Science*.

"People often use cues from their environment when trying to remember something," said Qiong Zhang, an assistant professor of psychology and [computer science](link) at Rutgers–New Brunswick who also directs the Memory Optimization Lab. "For example, when a person is grocery shopping and forgets their list at home, they may use signs in the store to remind them which groceries to get. But previous research on how we search our memories has not found memory cues to be beneficial."

Zhang, who sought to develop an automated way of selecting helpful reminders when memory recall becomes challenging, said external reminders are crucial for memory support because they can unlock information that was previously hard to access.

The system can predict how memories are organized and select cues that target unrecalled memories, facilitating memory recall, explained Charlotte Cornell, a first-year psychology graduate student who conducted the experiments.

In the study, the researchers configured their computer model to arrange a list of items into a cohesive memory space or "map." Items that share similarities were positioned closer together, while dissimilar items were located farther apart. For instance, "pear" and "apple" would be proximate, whereas "pasta" would be more distant.

The model, according to the researchers, operates similar to a GPS system, considering where a person already has "been" in their memory—the information they have recalled—and where their remaining memories are. It then plans the routes a person would take to access those memories.

The researchers instructed participants to study a list of items and then later recall them, similar to how someone might review a shopping list before going to the store. Participants clicked a "remind me" button on

their computer screen whenever they needed help remembering more items from the list. This action triggered the [computer model](#) to simulate [human memory](#) and determine the most effective reminders. Within seconds, the participant received a reminder predicted by the model to either be the most helpful or least helpful for their memory recall.

The effective reminders were items located nearby the unsearched areas of memory, directing the search toward the remaining destinations and aiding memory recall. In contrast, the ineffective reminders were items farther away, diverting the search away from the remaining destinations and hindering memory recall.

The researchers said effective "cueing strategies" can enhance learning and memory retention in education, benefiting both teachers and students. People can improve memory performance in everyday tasks such as studying, work projects or remembering appointments with effective cues.

Additionally, the research informs the design of memory aids for people with memory impairments, potentially enhancing their overall quality of life.

"The model opens up new directions for how to go about creating memory interventions, like training courses for people with memory deficits, as well as a theoretical foundation for designing reminder systems that enhance human recall," said Zhang.

The researchers have developed the model to further explore human [memory recall](#). However, Zhang said, its current scope is limited. The goal is to enhance its versatility and applicability.

  More information: Charlotte A. Cornell et al, Improving Memory Search Through Model-Based Cue Selection, *Psychological Science*

(2024).

Provided by Rutgers University