

Quick learners remember more over time

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Credit: Washington University in St. Louis

Healthy adults who learn information more quickly than their peers also have better long-term retention for the material despite spending less time studying it, a new study from psychologists at Washington University in St. Louis finds.

"Quicker learning appears to be more durable learning," said Christopher L. Zerr, lead author and doctoral student in psychological & brain sciences in Arts & Sciences. "Even though people who learned the material in less time had less actual exposure to the material they were trying to learn, they still managed to demonstrate better retention of the material across delays ranging from minutes to days."

The study, published in the journal *Psychological Science*, tested a novel measure to gauge differences in how quickly and well people learn and retain information. The research team wanted to gain a clearer understanding of how individual variations in rate of learning relate to long-term memory.

Learning and memory tests are often designed for use in neuropsychological settings, such as detecting cognitive impairments or aging-related deficits. Most existing tests are not sensitive enough to detect individual differences in a neurologically healthy population, and young, healthy adults tend to score near or at maximum performance on these tests.

Results from a previous study indicated that while participants were learning Lithuanian-English word pairs, those with relatively less neural activity in the default mode network—a network that is suppressed while directing attention to external information—tended to show better retention later on. This suggests that more effective word-pair learning is associated with a better allocation of attentional resources.

But is this learning ability stable or does it vary from day to day? Zerr and colleagues used this word pair task to observe individual differences in learning speed and retention over multiple days, and even years.

In the first experiment, almost 300 participants learned two lists of 45 equally difficult Lithuanian-English word pairs over two days for a total

of 90 word pairs. The participants studied 45 pairs each day, which were displayed for four seconds each, and then completed an initial learning test where they typed the English equivalent for the Lithuanian prompt word. After responding, the participants viewed the correct pairing as feedback, and their response accuracy was collected as a measure of initial learning.

In this activity, participants had to respond correctly to all 45 word pairs in a test once—as soon as the participant gave a correct response for a pair, that pair would drop out of future tests. The researchers measured participants' learning speed, or the number of tests an individual needed to answer a word pair correctly. Participants then played a distractor game of Tetris and completed a final test of all 45 word pairs without feedback. They repeated this procedure on the second day with a new set of 45 word pairs.

The results showed that participants varied significantly in their learning curves for the initial test, learning speed and the final test. Individuals who scored better on the initial test also tended to learn more quickly, meaning they needed fewer tests to correctly answer all 45 pairs. Those who learned faster also had better scores on the final test, and subjects who scored higher on the initial test remembered more on the final one.

Because performance on the initial test, learning speed and final test were intercorrelated, the researchers combined the scores to create a "learning-efficiency score" for each person.

"In each case, initial learning speed proved to be a strong predictor of long-term retention," said senior author Kathleen B. McDermott, professor of psychological & brain Sciences at Washington University.

In a second study, the researchers tested reliability of the learning-efficiency measure over time. Ninety-two participants completed the

same learning-efficiency task, and the researchers measured their neural activity in an MRI scanner as they learned the word pairs.

Forty-six of the original [participants](#) returned for a follow-up three years later. They completed a word pair test, as well as measures of processing speed, general memory ability and intellectual ability.

The researchers observed stable performance at the three-year follow-up: Learning speed in the initial session predicted long-term retention, meaning that subjects who learned the word pairs more quickly in the first encounter also learned new word pairs more quickly three years later. Processing speed, general memory ability and intellectual ability were also related to initial learning-efficiency scores and scores at follow-up, indicating that the measure was highly valid.

The researchers suggest that individual differences in learning efficiency may be due to certain cognitive mechanisms. For example, people with better attentional control can allocate attention more effectively while learning material and avoid distraction and forgetting. Another explanation could be that efficient learners employ more effective learning strategies, like using a keyword to relate the two words in a pair.

This study's findings raise the question of whether learning efficiency is specific to certain skills like learning [word pairs](#), or if it's a more general measure of learning capacity. Future research on learning efficiency has implications for educational and clinical settings, such as teaching students to be efficient learners and mitigating the cognitive effects of disease, aging and neuropsychological disorders.

More information: Christopher L. Zerr et al. Learning Efficiency: Identifying Individual Differences in Learning Rate and Retention in Healthy Adults, *Psychological Science* (2018). [DOI: 10.1177/0956797618772540](https://doi.org/10.1177/0956797618772540)

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