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# It's better for memory to make mistakes while learning

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Making mistakes while learning can benefit memory and lead to the correct answer, but only if the guesses are close-but-no-cigar, according to new research findings from Baycrest Health Sciences.

"Making random guesses does not appear to benefit later memory for the right answer , but near-miss guesses act as stepping stones for retrieval of the correct information – and this benefit is seen in younger and older adults," says lead investigator Andrée-Ann Cyr, a graduate student with Baycrest's Rotman Research Institute and the Department of Psychology at the University of Toronto.

Cyr's paper is posted online today in the *Journal of Experimental Psychology: Learning, Memory, and Cognition* (ahead of print publication). The study expands upon a previous paper she published in Psychology and Aging in 2012 that found that learning information the hard way by making mistakes (as opposed to just being told the correct answer) may be the best boot camp for older brains.

That paper raised eyebrows since the scientific literature has traditionally recommended that older adults avoid making mistakes – unlike their younger peers who actually benefit from them. But recent evidence from Cyr and other researchers is challenging this perspective and prompting professional educators and cognitive rehabilitation clinicians to take note.

Cyr's latest research provides evidence that trial-and-error learning can

benefit memory in both young and old when errors are meaningfully related to the right answer, and can actually harm memory when they are not.

In their latest study, 65 healthy younger adults (average age 22) and 64 healthy older adults (average age 72) learned target words (e.g., rose) based either on the semantic category it belongs to (e.g., a flower) or its word stem (e.g., a word that begins with the letters 'ro'). For half of the words, participants were given the answer right away (e.g., "the answer is rose") and for the other half, they were asked to guess at it before seeing the answer (e.g., a flower: "Is it tulip?" or ro___ : "is it rope?").

On a later memory test, participants were shown the categories or word stems and had to come up with the right answer. The researchers wanted to know if participants would be better at remembering rose if they had made wrong guesses prior to studying it rather than seeing it right away. They found that this was only true if participants learned based on the categories (e.g., a flower). Guessing actually made memory worse when words were learned based on word stems (e.g., ro___). This was the case for both younger and older adults. Cyr and her colleagues suggest this is because our memory organizes information based on how it is conceptually rather than lexically related to other information. For example, when you think of the word pear, your mind is more likely to jump to another fruit, such as apple, than to a word that looks similar, such as peer. Wrong guesses only add value when they have something meaningful in common with right answers. The guess tulip may be wrong, but it is still conceptually close to the right answer rose (both are flowers).

By guessing first as opposed to just reading the answer, one is thinking harder about the information and making useful connections that can help memory. Indeed, younger and older participants were more likely to remember the answer if they also remembered their wrong guesses,

suggesting that these acted as stepping stones. By contrast, when guesses only have letters in common with answers, they clutter memory because one cannot link them meaningfully. The word rope is nowhere close to rose in our memory. In these situations, where your guesses are likely to be out in left field, it is best to bypass mistakes altogether.

"The fact that this pattern was found for older adults as well shows that aging does not influence how we learn from mistakes," says Cyr.

"These results have profound clinical and practical implications. They turn traditional views of best practices in memory rehabilitation for healthy seniors on their head by demonstrating that making the right kind of errors can be beneficial. They also provide great hope for lifelong learning and guidance for how seniors should study," says Dr. Nicole Anderson, senior scientist with Baycrest's Rotman Research Institute and senior author on the study.

Provided by Baycrest Centre for Geriatric Care