Snails show that variety is the key to success if you want to remember more

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A change is as good as a rest when it comes to remembering more, according to new research by neuroscientists at the University of Sussex.

Dr. Michael Crossley, Senior Research Fellow in Neuroscience, used pond snails to study the factors impacting on memory interference.

He found that, when tasked with learning two similar things, snails were only able to store and recall the first memory.

Conversely, when faced with learning two totally unrelated tasks, the snails were able to retain all the information and successfully store both memories.

Dr. Crossley said: "The brain of a snail is much simpler than ours but there are some key parallels which mean studying them can help us to understand more about our own abilities for learning and memory.

"We know that multiple learning events occurring in quick succession can lead to competition between memories. This is why, when introduced to multiple people in one go, we can't usually remember every name.

"Up until now though, we weren't sure which factors were causing a memory to be remembered or forgotten."

With colleagues from Sussex Neuroscience, Dr. Crossley trained snails using food-reward and aversive conditioning .

Using brain recording, they realised that the same neuron was used when snails tried to learn two similar things. This prompted an overlapping mechanism, which caused only one memory (the first one) to survive, known as proactive interference.

In contrast, when two different tasks were learnt, two separate neurons were used, resulting in no competition, no overlap and the successful storing of both memories.

Dr. Crossley explained: "We realised that there is an overlapping or non-overlapping mechanism which plays a key role in determining which memories survive.

"So if we want to learn multiple things quickly, we should try learning different rather than similar topics."

For students, this means that they should practice interweaving—switching between multiple different subjects in one day—to retain the most information.

However, in the study published in the Nature group journal *Communications Biology*, Dr. Crossley and his colleagues also found that the timing of new learning can play a big role in the interference of memories.

When they introduced new learning to a snail during a memory lapse (the stage at which information is temporarily forgotten as it is transferred from short to longer term memory) researchers found that an older memory was always lost. This is known as retroactive interference.

Dr. Ildiko Kemenes, senior author on the paper, said: "In effect, we think the brain is deciding to replace the older learning, which hasn't yet been committed to long-term memory, for a newer one which it thinks might be more relevant.

"Interestingly, it's only when trying to learn something new during a memory lapse that this interference happens.

"This suggests that the older memory was only vulnerable due to new memories being formed. This makes sense when we think about humans as we wouldn't want a system where our memories are vulnerable if someone bumps into us at the wrong time!"

Scientists believe that the findings of their research, funded by BBSRC, gives us useful information about how memory is stored and how best we can learn and retain information.

More information: 'Proactive and retroactive interference with associative memory consolidation in the snail Lymnaea is time and circuit dependent' *Communications Biology*, DOI: 10.1038/s42003-019-0470-y

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