Why Too-Short Practice Breaks Could Undermine Your Learning

Description

Getting myself to practice was always a real challenge.

I'd almost always find some excuse to do almost anything else, whether it was playing with the cat, rearranging things in my room, or trying out all the different vacuum cleaner attachments.

So whenever I finally did get around to starting, I'd try to do all of my practicing in one big block of time. To just get it all done and out of the way, so I wouldn't have to worry about practicing again until the next day.

There are lots of problems with this approach, of course. I mean, if practicing is already at the bottom of your list of things you want to do, knowing that you're going to be doing it for the next 2 or 3 hours in a row does *not* help with motivation.

It's also really easy for your brain to zone out when you're practicing for this long, and for you to end up just going through the motions as fatigue sets in.

Obviously, the smarter approach would have been for me to take more practice breaks, so I could stay fresher from one practice session to the next. But research suggests that the benefits of practice breaks might actually go waaaay deeper than that.

As in, there may be some important differences on a *neurological* level, in terms of how information is encoded when we take longer practice breaks. Where longer breaks could help you retain more of what you're trying to learn.

How so?

Spaced learning?

Researchers have known for many years that we tend to remember things better if the learning of new material is spaced out over time, as opposed to being crammed into a single block of time.

But a German team of researchers (Glas et al., 2021) wanted to explore this more deeply. To better understand what is going on in the brain that contributes to the benefit of spaced practice or learning. And to see if they could even identify a length of time that optimized retention.

Mice and chocolate!

The researchers took 20 mice, created a maze, buried chocolate in one of two wells of sand, and let them loose to find and dig up the chocolate.

Each mouse was given 3 practice repetitions with the same configuration of sandwells and chocolate. And then, 24 hours later, they were tested again – but with 4 additional decoy sandwells added to the maze (with no chocolate in them) – to see if the mice would still remember which sandwell the chocolate was located in (click here to see one of the mice in action).

The key variable that the researchers manipulated over the course of the study was how long of a practice break the mice were given between practice repetitions. The researchers tested 30-second breaks between repetitions, as well as 10-min breaks, 30-min breaks, and 60-min breaks.

So…if you had to guess, which practice break length do you think led to the best performance?

Results

Well, the correct answer depends on whether you look at the mice's performance during their *practice* repetitions, or their performance on the *retention* test 24 hours after training.

Performance during practice

During practice, the shorter the practice breaks, the better the mice were at remembering where the chocolate was hidden. As the practice breaks became longer, the mice were slower to find the chocolate.

But 24 hours later, it was a very different story.

Performance on the retention test

When the mice were tested on how much they remembered from the day before, the results flipped. The shorter the mice's practice breaks, the worse their memory seemed to be, and the slower they were to find the chocolate. Whereas the *longer* the mice's practice breaks were, the better the mice's memory, and the *faster* the mice were at finding the chocolate.

Hmm…and why might this be?

Differences in neural activation

Well, the researchers measured neural activity in the mice's pre-frontal cortex as the mice navigated the maze. And what they found kind of surprised them.

They thought that doing practice repetitions spaced closely together might activate the same set of neurons. Whereas spacing repetitions out over a longer span of time might lead the brain to see these

repetitions as different events, and therefore use a different set of neurons.

Totally makes sense, right? Absolutely – but they actually found the opposite to be true.

When the mice had short practice breaks, there wasn't a lot of overlap in the neurons that were activated from one practice repetition to the next.

Whereas the longer practice breaks actually led to more of the same neurons being activated in each practice run.

So oddly, it seems that longer pauses actually led to stronger reinforcement of the neurons needed for effective recall. While shorter pauses led to a more random set of neurons being activated from one practice repetition to the next.

Caveats

Mice navigating a maze in search of hidden chocolate, and humans navigating a Bach partita in hopes of arriving at the final chord without taking a wrong turn are slightly different challenges, of course.

And it's actually kind of tricky to extrapolate from this study what the optimal length of a practice break might be too. Because I suspect that the optimal break length is not a fixed length of time, but depends on how much time needs to pass for your brain to start forgetting what you're trying to teach it. So that it has to struggle a little bit to try to retrieve the information or skill that you're trying to reinforce (as in this study which compared the effect of different-sized stacks of flash cards on learning).

Takeaways

For me, there are two main takeaways. For one, even if it's kind of a logistical/scheduling pain in the butt, spacing out one's practice (or studies) into multiple sessions over the course of a day does seem like it could be worth experimenting with.

And I also think this study speaks to the importance of making sure that we judge the effectiveness of our practice not necessarily by how quickly we improve in the moment, or by how good we sound at the end of the day. But instead, by how good we sound at the *beginning* of *tomorrow's* practice session, and how much of our improvements are still there the next day. And to remind yourself that some things do take time to sink in, so if you're having one of those discouraging practice sessions where it doesn't seem like things are improving as quickly as you'd like, maybe that's ok. Do your best, take a break, come back to it later, and maybe tomorrow, you'll surprise yourself by sounding better than expected!

References

Glas, A., Hübener, M., Bonhoeffer, T., & Goltstein, P. M. (2021). Spaced training enhances memory and prefrontal ensemble stability in mice. *Current Biology*, *31*(18), 4052–4061.e6. https://doi.org/10.1016/j.cub.2021.06.085

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