

How to Get Your Brain to Automatically Learn More BETWEEN Practice Sessions

Description

You've undoubtedly heard the old adage "practice makes perfect." And you've probably also heard the saying "*perfect practice makes perfect*" too.

That's all fine and dandy, but both imply that motor learning occurs only *during* practice. That *how* we practice – our practice strategies, methods, and techniques – is the primary determinant of how quickly we improve.

Understanding how to practice effectively in the practice room is indeed incredibly important, of course. But it turns out that there are other factors that contribute to motor learning too (wait...what?!).

For instance, researchers have found that learning actually continues for at least 24 hours *after* you've stopped practicing. In fact, a number of studies have found significant gains in performance 24 hours later – *even with no further practice*.

Heh? What's the deal with that? And what are the implications? Is this something we can optimize? Like, is there something we can do to maximize the learning that appears to take place *between* practice sessions?

Let's take a look.

Why does this happen?

So first of all, how is it that we continue to improve even when we're not practicing? Do things simply settle in with time? Or does sleep have something to do with it?

A team of neurophysiologists at Harvard ([Walker et al., 2002](#)) conducted a study to see if they could answer this question.

A finger-tapping task

They trained 62 participants in a finger tapping task. Each participant received 12 30-second training trials, and then were tested to see how effectively (based on speed and accuracy) they could reproduce this sequence.

Group A received their training at 10am, and were re-tested every 4 hours (at 2pm, 6pm, and 10pm). There was no meaningful change to speak of. Basically just some minor improvement likely resulting from

the continued repetitions at each re-test.

Group B was also trained at 10am, and tested 12 hours later at 10pm, and again at 10am the next day. They showed a non-significant 3.9% improvement in performance when tested at 10pm. But when tested at 10am after a night of sleep, they demonstrated an **18.9%** improvement relative to their scores 24 hours prior (with no decrease in accuracy), and **14.4%** relative to their scores the night before.

A 20.5% improvement in 12 hours

To make sure it was actually the sleep that contributed to this improvement in scores, and not simply the extra time, another group was trained and tested at 10pm, then 10am, and 10pm the following day. These participants demonstrated a **20.5%** improvement from 10pm to 10am. And only a **2%** improvement from 10am to 10pm.

Sleep wins!

So it's not just the passage of time, but actual sleep, that seems to have an impact on the learning of motor skills.

Of course, there's a difference between learning a contrived motor skill task in a lab and performing a real-life task. So is this finding really applicable to musicians?

A piano study

Amy Simmons and Robert Duke (btw, you can learn more about Dr. Duke via [this violinist.com article](#)) conducted a study of 75 music majors at the University of Texas – Austin, all with 2 years of experience in piano class ([2006](#)).

Each learned to play a tricky 12-note melody, and were instructed to play the melody as “quickly and accurately” as possible, using the fingerings specified in the music.

Like the Harvard study, there were multiple groups, some which were tested after periods of sleep, and others which were tested without sleeping in between.

The results were consistent with the other research in this area – and a little more illustrative of how this relates to musicians.

Sleep = fewer mistakes

Unlike the Harvard study, where gains were made primarily in speed, *accuracy* was the factor that

improved most in the musician study.

Participants made fewer errors when tested after having had a period of sleep between tests. And no, they didn't just play slower in order to make fewer mistakes.

But why didn't speed improve?

The researchers noted that participants appeared to find a particular tempo that made sense to them given the particular way in which the melody was written, and didn't seem that intent on playing the passage above that tempo – even when accuracy no longer seemed to be an issue.

Makes sense, right? As music majors, they all probably had a pretty good sense of what the “right” tempo for a particular passage ought to be.

How much sleep is enough?

So how much sleep do we need to see benefits?

A study by researchers at Brown ([Tamaki et al., 2013](#)) gives us some clues.

The team set out to identify what exactly happens in the brain during sleep that contributes to this performance improvement.

One group of participants were trained in a finger tapping task (somewhat akin to typing or playing a keyboard). Then they were allowed to sleep for 3 hours, at which point researchers woke them up.

An hour later, they were tested on the tapping task.

A control group did not get to sleep after learning the task, but were simply tested 4 hours after the training.

And what happened?

As in the other studies, those who slept performed the task faster and more accurately.

There are several cool things about the study, but two takeaways are:

1. Three hours seems to be enough to observe the beneficial effect of sleep on motor skill improvement. Might more than 3 hours be more helpful? It's not certain what the optimal “dose” of sleep might be.
2. However, the researchers were able to identify the exact phase of sleep that seems to be responsible for the associated performance improvements. Namely, [deep sleep](#). That's the phase of sleep when you're totally zonked out and it's really difficult to wake you up (and is, interestingly, the phase when sleepwalking occurs). It takes some time to get into deep sleep, so a quick 20 minute

nap is probably not long enough to produce these performance improvements.

Take action

So is the big takeaway that we should sleep? I know. It seems pretty basic. But I've had enough students share stories with me about how much of a difference sleeping made in their learning, that it definitely seems to be worth making time for.

For instance, a student once told me a story about a time when he had only 7 days left to prepare for a concert, and was getting really stressed out about it until he realized he could turn 7 days into 14 days.

How?

He practiced in the morning for 3 hours (which was a normal day's worth of practice for him). Then he slept for 3 hours. And then he did 3 more hours of practicing later in the day. In essence, turning each day into two days. ?

He was half-joking when he said this, but given the research above, perhaps there's something to this strategy after all!

Wait...but what if you have difficulty getting to sleep?

A life-changing sleep hack?

Well, I posted about [this rather unusual, and slightly trippy sleep hack](#) some time back, and heard from a lot of folks in the weeks afterward that it was truly life-changing.

For me, this has helped eliminate the problem I was having of waking up at 4am, and not being able to get back to sleep. And for some others, it helped with the issue of not being able to get to sleep in the first place.

There are a lot of different reasons why you could be having difficulty with sleep, so this is not a cure-all for everyone in every situation, but if you've had any difficulty with sleep, do [give it a try](#) and see what you think!

References

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