

## Forget White Noise. There May Be a Better Type of Noise That Could Potentially Enhance Memory While You Sleep.

### Description

We all know sleep is important. And that whether it's getting through a long day of rehearsals, studying for a music history final, or making the most of our practice time, a good night's sleep is essential for maximizing our ability to *encode* the information or skills we are trying to learn.

But effective learning requires that new concepts not only be encoded into our brains, but *consolidated* as well. Which is essentially the process of transferring the new stuff from short-term memory to more reliable, stable, long-term memory.

This is a process that occurs during sleep, and there's a very specific component of our sleep – slow wave sleep – that seems to be linked to successful consolidation of certain types of memories. In particular, declarative memory, or memory of facts – like, when was Schubert born, or what the heck was the chord progression in the opening of the new piece I just started learning...?

The problem of course, is that there are a lot of things that can interfere with our ability to get slow wave sleep. Folks who suffer from insomnia, for instance, tend to experience less slow wave sleep at night. And even if you're not an insomniac, chances are you're still not getting the same amount of slow wave sleep as you once did, because slow wave activity tends to decrease as we get older. Older being defined – believe it or not – as age 30+.

Urgh...so is there anything we can do about this?

### Inducing slow wave sleep

Researchers have found some ways to increase slow wave sleep, but they tend to be more invasive and not the sort of thing you and I can do easily at home. So a team of researchers at Northwestern University ([Papalambros et al., 2017](#)) ran a study to see if it might be possible to induce more slow wave activity and enhance memory consolidation through “acoustic stimulation.” Which is a fancy way of saying that they played pink noise while participants were sleeping, to see if that might boost the amount of slow wave sleep they experienced.

Eh? *Pink* noise?

I'm guessing that you're familiar with white noise, as there are a bunch of white noise apps and generators that many folks use to obscure background noise while trying to get to sleep, or while studying. But apparently, pink, brown, and blue noise are a thing too.

Umm...and what's the difference?

Well, white noise presents all the frequencies of sound we can hear at the same decibel level. But because we're more sensitive to high frequencies than low frequencies, it can sound a bit "hissy" and be more annoying than soothing to some.

Pink noise, on the other hand, is more bass-heavy, and the treble is reduced. Which for many, is more calming and soothing.

Here are some quick samples:

- [white noise](#)
- [pink noise](#)

So does pink noise really have the capacity to enhance memory consolidation?

## A memory test

The researchers recruited 13 older adults (60-84) to spend two nights in a sleep lab, spaced about two weeks apart.

Each time, they arrived around 6pm, and 90 minutes before their normal bedtime, they went through a word pair learning task. Essentially, they were asked to sit in front of a computer screen, where a list of word pairs (like tropics-heat) would be presented to them, one at a time, for a few seconds each.

After seeing all of the word pairs, they were tested on how many they could remember. Where they'd be prompted with the first word in each pair, and they'd have to write in the second word of that pair.

Then, they were hooked up to an EEG, to measure brain wave activity during sleep, and given 8 hours to sleep as they normally would.

The next morning, an hour after waking up, they repeated the recall test, just with the prompts scrambled up in a different order.

## Two different conditions

The key difference between their two visits, is what happened *during* their night of sleep.

On one of their visits (the **stimulation condition**) the researchers played short pulses of pink noise when they detected indicators of slow wave sleep, in order to boost or enhance the participants' slow wave activity. The researchers were careful to make sure the sounds didn't awaken them of course, keeping the volume low, and pausing if it seemed like they were beginning to shift to a different sleep stage.

And on their other visit (the **placebo condition**), the participants were still hooked up to an EEG to measure brain wave activity, but *no* sounds were played during their night of sleep.

So did the pink noise have any impact on slow wave activity and memory performance?

## Results

In terms of slow wave activity, the short answer is yes. The pink noise did seem to enhance the participants' slow wave activity on their stimulation condition visit to the lab as compared with their placebo condition visit.

And, in terms of memory performance, there was a statistically significant boost here as well!

On average, participants were able to correctly recall **43.8%** of the word pairs on their nighttime test, right after the study session. And their scores improved with sleep in both conditions, with an average recall rate of about 50% the next morning.

*However*, on their **stimulation** visit, when pink noise was played during the night, they improved their scores by about **9.2%**. Whereas on their **placebo** visit, when no sounds were played during their sleep, they improved by just **3.1%**.

Pretty intriguing, right?

And does this mean we should be downloading pink noise apps, swapping out our white noise generators, and asking Alexa to play pink noise during the night?

## Caveats and takeaways

Well...before you go too pink noise crazy, there are a couple things to keep in mind about this study.

First off, the sample size of this study is on the small size, and it followed an older adult population. Also, the pink noise didn't play continuously during the night, but was targeted to activate at specific points in their sleep. Plus, their memory performance was tested only over the course of a single night, rather than over a longer period of days or weeks.

All this to say, there were a number of little details that make it tricky to generalize these results more broadly to all people, and all types of learning.

However, previous and subsequent studies in this area do paint a reasonably consistent picture of the relationship between pink noise, slow wave activity, and memory consolidation. And studies on younger adults in their 20's have found similar results, so this doesn't seem to be an effect that's limited just to older adults.

So at the end of the day, especially if you're in the habit of using white noise to get to sleep anyhow, replacing that with pink noise might be an interesting thing to try.

After all, learning and memory does become a little more challenging as we age, so if this little change could give us an edge in our ability to retain more from day to day, that would be pretty cool!

## Additional reading

If you're in the mood to do some more sleep/study hacking, there's another strategy you could try that might complement the pink noise finding rather nicely. Essentially, it's about optimizing when you learn new material, and when you review that material, to accelerate learning: [A Simple Practice Scheduling Hack That Couldn't Possibly Be as Effective as It Seems](#)

If you want to geek out about this slow wave sleep thing some more, here's a nice review article, by Matthew Walker: [The Role of Slow Wave Sleep in Memory Processing](#)

And there's also this great video on sleep and learning by violist and brain enthusiast Molly Gebrian: [What Musicians Can Learn About Practicing from Current Brain Research Part IV: Sleep](#)

And no, I don't have any specific recommendations for pink noise apps, but here's a really clean-looking noise generator for your desktop/laptop that'll generate white, pink, and even brown noise: [Noise Generator](#)

## ...and a quick reminder for educators

### Registration ends TODAY for Performance Psychology Essentials for Educators

Whether you teach beginners or advanced students, young children or adults, nerves are a pretty universal experience for most.

So if you've been searching for some new tools to help your students overcome nerves and be a tad more excited about practicing (and performing), TODAY is the last day to register for the 6-week Performance Psych Essentials for Educators course which begins on Wednesday. Check out the details, to see if this might be the right class at just the right time:

[Performance Psych Essentials for Educators](#)

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