

# Sound stimulation during sleep can enhance memory

April 11 2013

---



Slow oscillations in brain activity, which occur during so-called slow-wave sleep, are critical for retaining memories. Researchers reporting online April 11 in the Cell Press journal *Neuron* have found that playing sounds synchronized to the rhythm of the slow brain oscillations of people who are sleeping enhances these oscillations and boosts their memory. This demonstrates an easy and noninvasive way to influence human brain activity to improve sleep and enhance memory. Credit: *Neuron*, Ngo et al.

Slow oscillations in brain activity, which occur during so-called slow-wave sleep, are critical for retaining memories. Researchers reporting online April 11 in the Cell Press journal *Neuron* have found that playing sounds synchronized to the rhythm of the slow brain oscillations of people who are sleeping enhances these oscillations and boosts their memory. This demonstrates an easy and noninvasive way to influence human brain activity to improve sleep and enhance memory.

"The beauty lies in the simplicity to apply auditory stimulation at low intensities—an approach that is both practical and ethical, if compared for example with electrical stimulation—and therefore portrays a straightforward tool for [clinical settings](#) to enhance sleep rhythms," says coauthor Dr. Jan Born, of the University of Tübingen, in Germany.

Dr. Born and his colleagues conducted their tests on 11 individuals on different nights, during which they were exposed to sound stimulations or to sham stimulations. When the volunteers were exposed to stimulating sounds that were in sync with the brain's slow oscillation rhythm, they were better able to remember word associations they had learned the evening before. Stimulation out of phase with the brain's slow oscillation rhythm was ineffective.

"Importantly, the sound stimulation is effective only when the sounds occur in synchrony with the ongoing slow oscillation rhythm during [deep sleep](#). We presented the [acoustic stimuli](#) whenever a slow oscillation "up state" was upcoming, and in this way we were able to strengthen the slow oscillation, showing higher amplitude and occurring for longer periods," explains Dr. Born.

The researchers suspect that this approach might also be used more generally to improve sleep. "Moreover, it might be even used to enhance other [brain rhythms](#) with obvious functional significance—like rhythms that occur during [wakefulness](#) and are involved in the regulation of

attention," says Dr. Born.

**More information:** Ngo et al.: "Auditory closed-loop stimulation of the sleep slow oscillation enhances memory." *Neuron*, 2013.

[dx.doi.org/10.1016/j.neuron.2013.03.006](https://doi.org/10.1016/j.neuron.2013.03.006)

Provided by Cell Press

Citation: Sound stimulation during sleep can enhance memory (2013, April 11) retrieved 26 April 2024 from <https://medicalxpress.com/news/2013-04-memory.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.