

Electrical jolts to brain restored memory of elderly to that of 20-year-old

Enlarge / A patient wearing an electrical cap similar to the one used in the study.

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Gentle jolts of alternating current to the brain restored the waning working memories of older adults (aged 60 to 76 years old) to performance levels seen in younger adults (aged 20 to 29)—at least for a little under an hour.

The scalp-delivered electrical bursts appeared to resync brain waves across areas of the noggin important for high-level thinking and memory—the prefrontal and temporal cortex—which appeared to have fallen out of step over the years. The results, published Monday in *Nature Neuroscience*, support the idea that out-of-sync ripples of electrical activity from neurons firing in different areas of the brain may help spark gradual declines in working memory during aging, as well as memory deterioration associated with dementias, such as Alzheimer's. Moreover, the finding generates some early buzz that such non-invasive brain stimulation may one day, in the distant future, be used as a therapy for such memory issues.

The authors of the study, Boston University researchers Robert Reinhart and John Nguyen, concluded that “by customizing electrical stimulation to individual network dynamics it may

be possible to influence putative signatures of intra- and inter-regional functional connectivity, and rapidly boost working-memory function in older adults.”

In their exploratory trial, Reinhart and Nguyen had 42 older adults flex their working memories—that is, their short-term recall involved in processing and planning. The researchers used a spot-the-difference-style memory test in which subjects saw a high-quality picture of an object, texture, or color, then got a flash of a blank image for a fraction of a second, then another image, which was either identical to the first image or slightly altered.

Before the brain stimulation, older adults could spot differences with an 80-percent accuracy rate. A separate group of 42 younger people had an accuracy rate around 90 percent. The researchers then stimulated the brains of the older adults for 25 minutes, while the younger group got a sham treatment—they wore an electrode cap but received no brain-zapping current. The brain stimulation that the older adults experienced, meanwhile, was tuned specifically to their individual brains’ rhythms.

After around 10 minutes of stimulation, the older group saw an improvement in accuracy rate on the test, reaching the younger group’s 90-percent accuracy rate. That improvement lasted through the 50-minute memory test.

In a subsequent experiment, the researchers tried to reverse the finding: they used brain stimulation designed to *desynchronize* waves in young participants, which caused the subjects to do worse on the memory test.

While the authors are encouraged that zaps to sync brain waves could potentially be used as a therapy, other experts called for caution, noting that the study was small and needed to be replicated. Also, it remains unclear if such small gains on a memory game would translate to clinical or “real world”

benefits for those suffering memory issues.

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