

Electrical brain stimulation improves math skills

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A volunteer wearing the electric stimulation equipment

By applying electrical current to the brain, researchers reporting online on November 4 in *Current Biology*, have shown that they could enhance a person's mathematical performance for up to 6 months without influencing their other cognitive functions. The findings may lead to treatments for the estimated 20 percent of the population with moderate to severe numerical disabilities (for example, dyscalculia) and for those who lose their skill with numbers as a result of stroke or degenerative disease, according to the researchers.

"I am certainly not advising people to go around giving themselves electric shocks, but we are extremely excited by the potential of our findings," said Roi Cohen Kadosh of the University of Oxford. "We've shown before that we can temporarily induce dyscalculia [with another

method of brain stimulation], and now it seems we might also be able to make someone better at maths. [Electrical stimulation](#) will most likely not turn you into Albert Einstein, but if we're successful, it might be able to help some people to cope better with maths."

The researchers used a method of brain stimulation known as transcranial direct current stimulation (TDCS). TDCS is a [noninvasive technique](#) in which a weak current is applied to the brain constantly over time to enhance or reduce the activity of neurons. The technique has gotten attention in the last decade for its potential to improve various functions in people with neurological deficits, for instance in those who have suffered a [stroke](#).

In the new study, the researchers applied TDCS specifically to the [parietal lobe](#), a portion of the brain that is crucial for numerical understanding. The study participants had normal mathematical abilities but were asked to learn a series of artificial numbers—symbols that they had never seen before that they were told represented numbers—while they received the noninvasive brain stimulation. The researchers then tested participants' ability to automatically process the relationship of those artificial numbers to one another and to map them correctly in space using standard testing methods for numerical competence.

The results of the tests showed that the [brain stimulation](#) improved study participants' ability to learn the new numbers, and that those improvements lasted 6 months post training.

Now that they know the TDCS treatment can improve number processing in people with normal mathematical ability, the researchers plan to test its use in those with severe numerical disabilities. If it works, that could have important consequences, Cohen Kadosh said, as people with severe numerical disabilities often cannot manage basic tasks like understanding food labels or counting change in a supermarket. Poor

numerical ability has also been linked to unemployment and low income, depression, low self-esteem, and other problems, he said.

More information: The paper ‘Modulating neuronal activity produces specific and long lasting changes in numerical competence’ by Roi Cohen Kadosh and colleagues is published in *Current Biology* on 4 November 2010.

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