Electrical stimulation helps stroke patients learning to use brain-controlled robot arm

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Magnetoencephalography technology (top) was used to track brain activity in healthy subjects thinking about hand movement. This was translated into real movement via the orthosis (bottom). Credit: Surjo R. Soekadar

Patients suffering from paralysis may soon be able to control a robot arm with the electrical activity in their brains using a brain-machine interface. Considerable training is required before a person can use the system reliably – particularly difficult for stroke victims or patients with other brain damage.

But now scientists at the University of Tübingen have found a way to overcome some of the difficulties of that training. In a recent study in cooperation with the US National Institutes of Health (NIH), the researchers demonstrate how subjects receiving electrical brain stimulation took considerably less time to learn to control the neuroprosthetic robot arm.

In the study, more than 30 healthy people practiced using the brain-machine interface every day for a week. They used a hand orthosis to help them imagine moving their hand in order to translate the thought into real movement. The subjects whose primary motor cerebral cortex received electrical stimulation learned much faster than the control group who received none. Their greater ability to control the robot arm was ascertainable even a month later.

A follow-up study now aims to test the procedure in stroke patients. The scientists expect that a combination of electrical brain stimulation and the brain-machine interface will play an important role in treating neurological and psychiatric disorders.

More information: Soekadar S, Witkowski M, Birbaumer N, Cohen LG: "Enhancing Hebbian Learning to Control Brain Oscillatory Activity." *Cerebral Cortex* (2014). DOI: 10.1093/cercor/bhu043

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