“Mind over movement”

https://www.newscientist.com/article/dn24576-all-in-the-mind-hone-movement-skills-just-by-thinking/

All in the mind: hone movement skills just by thinking

By Jessica Griggs in San Diego

Think your way to better playing

(Image: monochrome/selfportrait/Getty)

No practice required. Wouldn’t it be great if you could get better at playing sport or hone your piano skills simply by thinking about it? A small pilot study suggests that it might be possible.

In the last few years, brain training using computer games that provide neurofeedback – a real-time representation of your brain activity – has become a popular, if controversial, method of enhancing cognitive abilities such as spatial memory, planning and multitasking. It has even been used to help actors get into character.

Read more about brain training: "Fit for thinking: The best brain boosters"

Most of the games aim to enhance activation in a single part of the brain. But motor skills are known to involve two main areas – the premotor cortex and the supplementary motor cortex. Both are involved when people make movements or imagine moving.

Brain activity between these regions is known to be less synchronised in people who are poor at motor tasks than in those who excel at them.

Active imagination

So to see if brain training could target both areas and improve motor performance, Sook-Lei Liew and her colleagues from the National Institute of Neurological Disorders and Stroke in Bethesda, Maryland, recruited eight young adults. The researchers and asked the participants to watch a white circle on a screen while an fMRI machine scanned their brain.

When the circle turned into a red triangle, the volunteers were told to move their fingers. This movement caused activation in their premotor cortex and supplementary motor cortex, which in turn moved a bar on the screen. The higher the synchronisation of activity between the two brain areas, the higher the bar went.

The volunteers were then asked to imagine themselves performing a complicated action – whatever they liked, as long as imagining it increased the height of the bar. This enabled the participants to develop a way to enhance the synchronicity between the two brain regions using only their thoughts.

"Some later told us they thought about running, playing specific songs on the piano, even pipetting. Different things worked for different people," says Liew, who presented the work at the Society for Neuroscience meeting in San Diego, California, this week.

Synchronised thinking

Once the volunteers had developed a strategy, they repeated the technique twice more during the week – about an hour's practice in total.

They also performed a manual dexterity task before and after brain training. This involved putting small pegs of different shapes into corresponding holes as fast as they could.

Brain scans showed that five of the eight volunteers were able to increase the synchronisation between the two motor regions over the course of the training. The entire group were about 10 per cent quicker at the manual dexterity task at the end of the week of brain training.

Further study is needed to explore whether the improvements were due to the training or having done the movement task once before – or a combination of both.

However, scans hint that brain training is involved in the improvement, because those people who showed the greatest increase in speed also showed the greatest enhancement in synchronisation between motor areas of the brain.

Under the hood

"While still very preliminary, these results show that training connectivity between brain regions without specifically training to improve a certain task, might lead to improved motor control over all," says Liew.

The team is now conducting further work, which includes studying a control group who receive neurofeedback for different brain regions that aren't associated with motor skills. The researchers also plan to explore how long the observed improvements last.

This technique could be used to help people recovering from stroke. "It is a promising method for neurorehabilitation, where people cannot physically train and therefore the benefits of something like brain training are accentuated," says Liew.

"I think real-time neurofeedback and fMRI has a lot of promise" says David Eagleman from the Baylor College of Medicine in Houston, Texas, who is currently working on a neurofeedback project to help cocaine addicts reduce their cravings. "It enables participants to get direct access to what's happening under the hood in ways that they wouldn't normally see."

A shorter version of this article was published in *New Scientist* magazine on 23 November 2013 see below

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