

Your left hand knows what your right hand is doing

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The saying goes that "your left hand doesn't know what your right hand is doing," but actually, your left hand is paying more attention than you'd think. Researchers at Tel-Aviv University found that when people practiced finger movements with their right hand while watching their left hand on 3D virtual reality headsets, they could use their left hand more efficiently after the exercise. The work, appearing December 13 in

Cell Reports, provides a new strategy to improve physical therapy for people with limited strength in their hands.

"We are tricking the brain," says lead author Roy Mukamel, a professor of psychology at Tel Aviv University in Israel. "This entire experiment ended up being a nice demonstration about how to combine software engineering and neuroscience."

After completing baseline tests to assess the initial [motor skills](#) of each hand, 53 participants strapped on [virtual reality headsets](#), which showed simulated versions of their hands. During the first experiment, the participants completed a series of finger movements with their right hand while the screen showed their virtual left hand moving instead. Next, the participants put a motorized glove on their left hand, which moved their fingers to match the motions of the right hand. While this occurred, the headsets again showed their virtual left hand moving instead of their right.

After analyzing the results, the researchers discovered that the left hand's performance significantly improved (i.e., had more precise movements in a faster amount of time) when the screen showed the left hand. But the most notable improvements occurred when the [virtual reality](#) screen showed the left hand moving while the motorized glove moved the right hand in reality.

The researchers also used fMRI to track which brain structures were activated during the experiments in 18 of the participants. The scientists noted that one section of the brain, called the superior parietal lobe, was activated in each person during training. They also discovered that the level of activity in this brain region was correlated to the level of improved performance in the left hand—the more activity, the better the left hand performed.

"Technologically these experiments were a big challenge," says Mukamel. "We manipulated what people see and combined it with the passive movement of the hand to show that our hands can learn when they're not moving under voluntary control."

The researchers are optimistic that this research can be applied to patients in [physical therapy](#) programs who have lost the strength or control of their hands. "We need to show a way to obtain high-performance gains relative to other traditional types of therapies," says Mukamel. "If we can train one hand without voluntarily moving it and still show significant improvements in the motor skills of that hand, then that's the ideal."

More information: [DOI: 10.1016/j.celrep.2016.11.009](https://doi.org/10.1016/j.celrep.2016.11.009)

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