

Memory Training Shown to Turn Up Brainpower

A new study has found that it may be possible to train people to be more intelligent, increasing the brainpower they had at birth.

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Until now, it had been widely assumed that the kind of mental ability that allows us to solve new problems without having any relevant previous experience — what [psychologists](#) call fluid intelligence — is innate and cannot be taught (though people can raise their grades on tests of it by practicing).

But in the new study, researchers describe a method for improving this skill, along with experiments to prove it works.

The key, researchers found, was carefully structured training in working [memory](#) — the kind that allows memorization of a telephone number just long enough to dial it. This type of memory is closely related to fluid intelligence, according to background information in the article, and appears to rely on the same brain circuitry. So the researchers reasoned that improving it might lead to improvements in fluid intelligence.

First they measured the fluid intelligence of four groups of volunteers using standard tests. Then they trained each in a complicated memory task, an elaborate variation on Concentration, the child's card game, in which they memorized simultaneously presented auditory and visual stimuli that they had to recall later.

The game was set up so that as the participants succeeded, the tasks became harder, and as they failed, the tasks became easier. This assured a high level of difficulty, adjusted individually for each participant, but not so high as to destroy motivation to keep working. The four groups underwent a half-hour of training daily for 8, 12, 17 and 19 days, respectively. At the end of each training, researchers tested the participants' fluid intelligence again.

To make sure they were not just improving their test-taking skills, the researchers compared them with control groups that took the tests without the training.

[The results](#), published Monday in The Proceedings of the National Academy of Sciences, were striking. Although the control groups also made gains, presumably because they had practice with the fluid intelligence tests, improvement in the trained groups was substantially greater. Moreover, the longer they trained, the higher their scores were. All performers, from the weakest to the strongest, showed significant improvement.

“Intelligence has always been considered principally an immutable inherited trait,” said Susanne M. Jaeggi, a postdoctoral fellow in [psychology](#) at the [University of Michigan](#) and a co-author of the paper. “Our results show you can increase your intelligence with appropriate training.”

Why did the training work? The authors suggest several aspects of the exercise relevant to solving new problems: ignoring irrelevant items, monitoring ongoing performance, managing two tasks simultaneously and connecting related items to one another in space and time.

No one knows how long the gains will last after training stops, Dr. Jaeggi said, and the experiment’s design did not allow the researchers to determine whether more training would continue to produce further gains.