Brain-training to improve memory boosts fluid intelligence

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Brain-training efforts designed to improve working memory can also boost scores in general problem-solving ability and improve fluid intelligence, according to new University of Michigan research.

"Considering the fundamental importance of fluid intelligence in everyday life and its predictive power for a large variety of intellectual tasks and professional success, we believe that our findings may be highly relevant to applications in education," U-M psychology researchers Susanne Jaeggi and Martin Buschkuehl concluded.

The research is detailed in this week's *Proceedings of the National Academy of Sciences (PNAS).*

Many psychologists believe general intelligence can be separated into "fluid" and "crystalline" components. Fluid intelligence—considered one of the most important factors in learning—applies to all problems while crystallized intelligence consists of skills useful for specific tasks.

"Working memory and fluid intelligence both seem to rely on similar neural networks," Jaeggi said. "Our study does not permit us to know how long the training-gain persists. Longitudinal studies will be required to address that issue."

Previously, many psychologists believed the only way to increase fluid intelligence was through direct practice of the tests themselves, rather than by training. But the new findings show that multiple efforts designed to improve memory skills similarly improve fluid intelligence.

After initially giving subjects a standard test for fluid intelligence, the researchers gave subjects a series of training exercises designed to improve their working memory.

The training was given to four groups, who repeated the exercises for eight, 12, 17, or 19 days. After the training, the researchers re-tested the subjects' fluid intelligence.

Although the performance of untrained controls improved slightly, the trained subjects showed a significant performance improvement, which increased with time spent training.

"The more training, the more improvement in fluid intelligence," Jaeggi said.

The researchers suggest that the training exercises strengthened multiple "executive processes" in the brain that function in problem-solving, noting that fluid intelligence is usually seen as "robust against influences of education and socialization, and it is commonly seen as having a strong hereditary component."

Source: University of Michigan