

Learning, In the Stroke Of a Pen

By MARIA KONNIKOVA

Does handwriting matter?

Many educators call for teaching legible writing, but only in kindergarten and first grade. After that, the emphasis quickly shifts to proficiency on the keyboard.

But psychologists and neuroscientists say it is too soon to declare handwriting a relic. New evidence suggests the links between handwriting and educational development run deep.

Children not only learn to read more quickly when they first learn to write by hand, but they are better able to generate ideas and retain information.

"When we write, a unique neural circuit is automatically activated," said Stanislas Dehaene, a psychologist at the Collège de France in Paris. "And it seems that this circuit is contributing in unique ways we didn't realize."

A 2012 study led by Karin James, a psychologist at Indiana University, supports that view. Children who didn't know how to read and write were presented with a letter or a shape on an index card and asked to reproduce it. The children were then placed in a brain scanner and shown the image again.

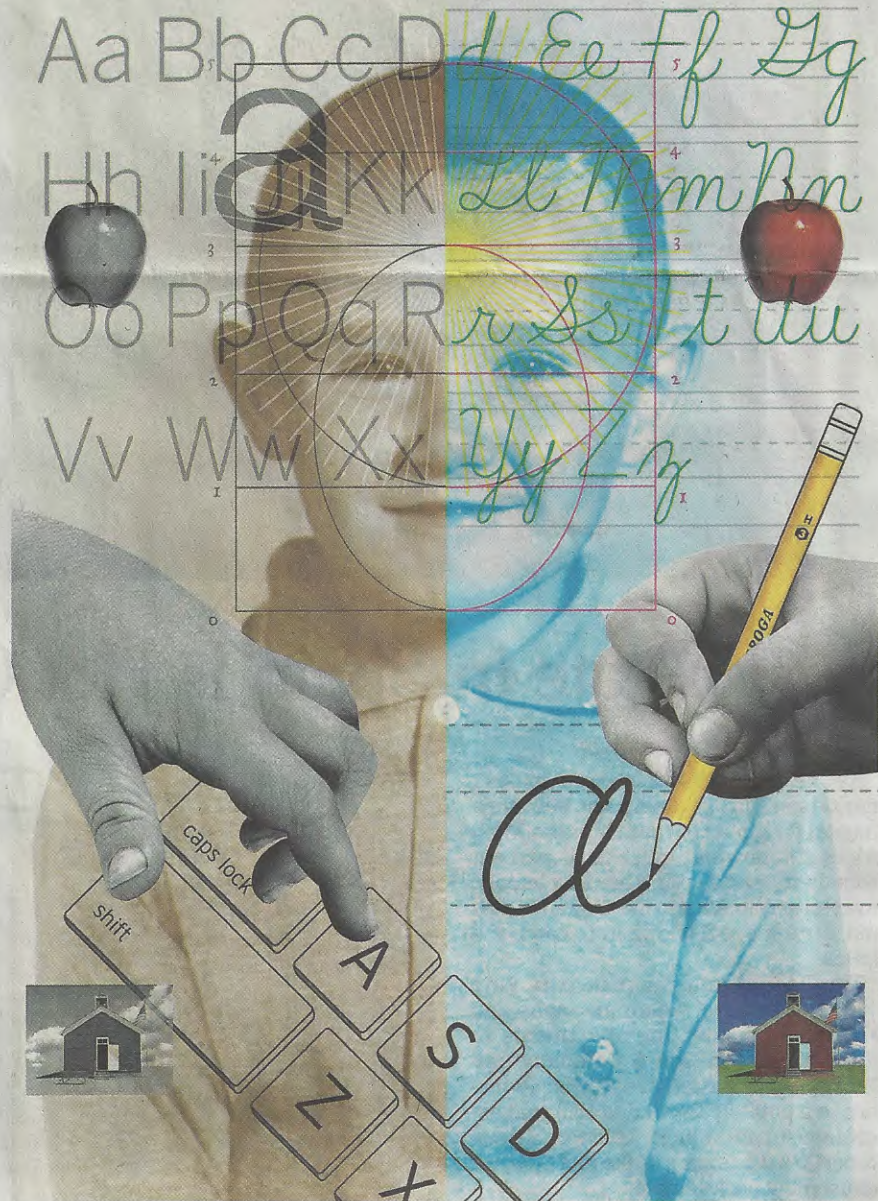
The researchers found the initial duplication process mattered a great deal. When children had drawn a letter free-hand, they exhibited increased activity in areas of the brain that are activated in adults when they read and write. The activation was significantly weaker in children who typed or traced the letter.

Dr. James attributes the differences to the messiness inherent in free-form handwriting: We are likely to produce a result that is highly variable.

"When a kid produces a messy letter," Dr. James said, "that might help him learn it." Being able to decipher each messy letter may be more helpful than seeing the same result.

In another study, Dr. James is comparing children who physically form letters with those who only watch others doing it. Her observations suggest that it is only the actual effort that engages the brain's motor pathways and delivers the learning benefits of handwriting.

The effect goes beyond letter recognition. In a study that followed children in grades two through five, Virginia Berninger, a psychologist at the University of Washington, demonstrated that printing, cursive writing, and typing on a keyboard are all associated with separate brain patterns — and each results in a distinct end product. When the children wrote by hand, they not only produced more words more quickly than they did on a keyboard, but expressed more ideas. The children



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Some researchers believe that writing by hand, instead of on a computer, improves learning and memory skills in children.

The use of cursive may have some advantages over the keyboard.

with better handwriting exhibited greater neural activation in areas linked with working memory — and increased overall activation in the reading and writing networks.

It now appears that there may even be a difference between printing and cursive writing. In dysgraphia, a condition where the ability to write is impaired, something unusual happens sometimes: cursive writing remains relatively unimpaired in some people, while in others, printing remains unimpaired.

In alexia, or impaired reading ability, some individuals who are unable to

process print can still read cursive, and vice versa — suggesting the two writing modes engage separate brain networks, and therefore more cognitive resources.

Dr. Berninger even suggests cursive writing may train self-control ability in a way that other modes of writing do not, and some researchers argue that it may even be a path to treating dyslexia.

The benefits of writing by hand go beyond childhood. For adults, typing may be efficient, but it may diminish the ability to process new information.

While not every expert is convinced the long-term benefits of handwriting are that significant, Paul Bloom, a Yale University psychologist, says the new research is thought-provoking.

"With handwriting, the very act of putting it down forces you to focus on what's important," he said. After pausing to consider, he added, "Maybe it helps you think better."