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MENTAL HEALTH/PSYCHOLOGY

Why Dyslexia Is More Than a Reading Disorder

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People with dyslexia have difficulty reading letters and words; it's a learning disability that has nothing to do with their intelligence. Until recently, researchers assumed the challenge could be traced to language difficulties, including problems processing printed words, and they focused their attention on the language parts of the brain.

But in the latest research published in the journal *Neuron*, scientists led by John Gabrieli, a professor of brain and cognitive sciences at Massachusetts Institute of Technology, found that dyslexia may be due to a much broader difference in brain function. After analyzing functional MRI brain scans of people with and without dyslexia, they found that those with dyslexia were less adept at something called adaptive learning. When the brain sees something new, whether it's a word, object, voice or experience, it expends a lot of neural energy to gather as much information about the novel stimulus as possible. But if it does this every time it hears the same voice, or encounters the same dog barking, for example, that wouldn't be efficient. It's therefore able to adapt and quickly triage new encounters from familiar ones.

Gabrieli found that in the brains of dyslexics, this process wasn't occurring when they heard the same person speak different words. Nor did it occur in other tests of the brain's plasticity, or ability to adapt. That suggests that the trouble with reading has less to do with language specific problems but rather broader issues with adaptivity. In other words, the issues with adapting to new things may compromise skills like reading.

"We think this is the first step in longer term learning," says Gabrieli. "If this first step in quick changes in the brain's response to experiences is different, then that can undermine big learning—like learning to read."

What Gabrieli found surprising was that he recorded the same problems in the brain scans of dyslexics when they looked at the same faces. But people with dyslexia aren't known to have trouble recognizing people. That may be because other brain circuits or processes have developed, evolutionarily, to compensate for the brain's less efficient ability to adapt to familiar faces. Reading, on the other hand, is a relatively modern development, and Gabrieli speculates that the brain hasn't had time yet to evolve compensatory mechanisms.

“We believe this is the first study to provide direct evidence of reduced plasticity in the brain in dyslexia,” he says. It’s supported by evidence from other studies of brain differences found in children with dyslexia even before they enter school and before they learn to read.

These results may help educators better understand what dyslexia is, so that they can develop more effective ways to help students who have the disorder read. Appreciating that dyslexia is not just a deficit in language and reading, but something broader, should point them in the right direction. “We need to figure out a curriculum or approach that matches the differences they have,” says Gabrieli.

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