

# Dyslexia independent of IQ

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A new brain-imaging study suggests that reading difficulties are the same regardless of overall intelligence. Photo: Patrick Gillooly

About 5 to 10 percent of American children are diagnosed as dyslexic. Historically, the label has been assigned to kids who are bright, even verbally articulate, but who struggle with reading — in short, whose high IQs mismatch their low reading scores. On the other hand, reading troubles in children with low IQs have traditionally been considered a byproduct of their general cognitive limitations, not a reading disorder in particular.

Now, a new brain-imaging study challenges this understanding of dyslexia. “We found that [children](#) who are poor readers have the same brain difficulty in processing the sounds of language whether they have a high or low IQ,” says John D. E. Gabrieli, MIT’s Grover Hermann

Professor of Health Sciences and Technology and Cognitive Neuroscience, who performed the study with Fumiko Hoeft and colleagues at the Stanford University School of Medicine; Charles Hulme at York University in the U.K.; and Susan Whitfield-Gabrieli, also at MIT. “Reading difficulty is independent of other cognitive abilities.”

The study, which is forthcoming in the journal *Psychological Science*, could change how educators diagnose dyslexia, opening up reading support to more children who could benefit from it.

## Rhymes and results

The researchers recruited 131 children, from 7 to 17 years old. According to a simple reading test and an IQ measure, each child was assigned to one of three groups: typical readers with typical IQs; poor readers with typical IQs; and poor readers with low IQs. All were shown pairs of words and asked to judge whether the words rhymed. (Rhymes are an effective way to probe dyslexics’ reading performance, since dyslexia is thought to entail difficulty connecting written words to sounds.) For some pairs, the researchers used words that rhyme but don’t share the same final letters — such as “bait” and “gate,” or “night” and “bite” — so that rhyme couldn’t be inferred simply from spelling. Using functional magnetic resonance imaging (fMRI), the researchers observed the activity in six brain regions known to be important for reading.

The results? Neural activity in the two groups of poor readers was indistinguishable. “The brain patterns could not have been more similar, whether the child had a high or low IQ,” Gabrieli says. Poor readers of all IQ levels showed significantly less brain activity in the six observed areas than typical readers, suggesting that reading difficulty is due to the same underlying neural mechanism, regardless of general cognitive ability.

## Ditching diagnostic discrimination

The findings could have an important impact on both diagnosis and education for kids who struggle to [read](#). Currently, Gabrieli says, many public school systems still require that a child have an otherwise normal IQ score to receive a diagnosis of dyslexia — essentially, that the label be reserved for children with a “reading difficulty that can’t be explained by anything else,” he says. But the new study suggests that even children with low IQ scores might benefit from treatment specific to dyslexia.

Jack Fletcher, a professor of psychology at the University of Houston Texas Medical Center Annex, says the study “adds to the evidence against” the notion that reading difficulty should be chalked up to general intellectual limitations in children with lower-than-average IQs. “Poor reading is poor reading,” he says. “IQ discrepancy doesn’t make much difference.”

Gabrieli, who says he hopes the new results will encourage educators to offer reading support to more struggling students, stresses the importance of diagnosing dyslexia and other behavioral disorders sooner rather than later. “Now, you basically diagnose [dyslexia](#) when a child seems miserable in school,” he says. “Maybe you could intervene before they ever get that way.”

Provided by Massachusetts Institute of Technology

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