

Unraveling 'math dyslexia'

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Although school has been back for less than a month, it is likely that many children are already experiencing frustration and confusion in math class. Research at The University of Western Ontario in London, Canada could change the way we view math difficulties and how we assist children who face those problems.

Daniel Ansari is an assistant professor and Canada Research Chair in Developmental Cognitive Neuroscience in the Department of Psychology at Western. He is using brain imaging to understand how children develop math skills, and what kind of brain development is associated with those skills.

Research shows that many children who experience mathematical difficulties have developmental dyscalculia – a syndrome that is similar to dyslexia, a learning disability that affects a child's ability to read. Children with dyscalculia often have difficulty understanding numerical quantity. For example, they find it difficult to connect abstract symbols, such as a number, to the numerical magnitude it represents. They can't see the connection, for instance, between five fingers and the number '5'. This is similar to children with dyslexia who have difficulty connecting sounds with letters. In a recent study Ansari and graduate student Ian Holloway showed that children who are better at connecting numerical symbols and magnitudes are also those who have higher math scores. A report of this research is forthcoming in the *Journal of Experimental Child Psychology*.

Ansari says parents and teachers are often not aware that developmental

dyscalculia is just as common as developmental dyslexia and is frequently related to dyslexia. There is a great need to increase public awareness of developmental dyscalculia.

"Research shows that many children have both dyslexia and dyscalculia. We are now exploring further the question of exactly what brain differences exist between those who have just math problems and those who have both math and reading difficulties," says Ansari.

Using functional Magnetic Resonance Imaging (fMRI) to study the brains of children with math difficulties, Ansari says that it becomes clear that children with developmental dyscalculia show atypical activation patterns in a part of the brain called the parietal cortex.

This research holds tremendous promise for people who, in the past, had simply accepted that they are 'not good at math.' Understanding the causes and brain correlates of dyscalculia may help to design remediation tools to improve the lives of children and adults with the syndrome.

"We have some cultural biases in North America around math skills," says Ansari. "We think that people who are good at math must be exceptionally intelligent, and even more dismaying and damaging, we have an attitude that being bad at math is socially acceptable. People who would never dream of telling others they are unable to read, will proclaim publicly they flunked math."

Ansari says that math skills are hugely important to life success and children who suffer math difficulties may avoid careers that, with help, might be a great fit for them.

Ansari is the recipient of an Early Researcher Award grant from the Ontario government and a CIHR grant. Ansari recently reviewed existing

research in this field for the April edition of the journal *Nature Reviews Neuroscience*, and he hopes that news of this important research will also reach parents, teachers and individuals.

An article by Ansari entitled "The Brain Goes to School: Strengthening the Education-Neuroscience Connection," will be published in the upcoming *Education Canada*, the magazine of the Canadian Education Association. In the article Ansari says technological advances such as fMRI have provided unprecedented insights into the working of the human brain.

"A teacher who understands brain structure and function will be better equipped to interpret children's behaviours, their strengths and weaknesses, from a scientific point of view, and this will in turn influence how they teach," says Ansari.

Source: University of Western Ontario

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