

Don't get math? Researchers home in on the brain's problem

October 5 2011, By Sharon Noguchi

Can't calculate a tip or even balance your checkbook? Take heart; maybe you can blame your brain - specifically, the parietal cortex in the top back part of the head. And it could be a problem that has roots not in a failed arithmetic or "new math" lesson, but even earlier.

Recent findings indicate that how well 3-year-olds estimate quantities predicts their [math ability](#) in elementary school. Another study funded by the National Institutes of Health showed that the innate capacity to estimate is impaired in children who have a [math](#) learning disability.

The findings are so new that there's no widely accepted way to diagnose what's known as [dyscalculia](#) (dis-cal-KOO-lia), nor any set strategies for coping with it - even though 5 percent to 8 percent of the population is thought so suffer from math [learning disability](#). Consider it the mathematical partner to dyslexia, which impairs [reading ability](#).

But while researchers have explored causes of dyslexia and developed strategies for compensating, the study of dyscalculia lags about 30 years behind. As a result, many people remain stymied by math. And math dysfunction is socially accepted.

"I hate math so much," said Juan Mendoza, 21. He has taken intermediate algebra six times at San Jose City College but has always dropped out part way. Finally, a teacher explained formulas in an understandable way. Just like he's overcome his dyslexia, he said, maybe researchers will find a way to better teach differently wired brains.

The ability to estimate is an oft-tapped skill that, for example, helps waiting shoppers determine which checkout line is likely to move faster at the grocery store. And understanding the cause of the disability could lead to identifying children at risk of failing math and developing ways to help them.

"Children are being considered lazy or unmotivated, or not to have potential, when in fact they have a disability in processing numbers," said Michele M.M. Mazzocco, the lead researcher on the studies. "We need to learn how this can be overcome."

Mazzocco and colleagues at the Kennedy Krieger Institute in Baltimore began tracking 249 kindergartners in public schools in 1997. She found large differences in children's estimation skills. Even as ninth-graders, some who viewed a set of colored dots flashed briefly on a screen found it difficult to consistently estimate the number, or to distinguish quantities, such as 20 dots from 15 dots.

To tell how many dots we see or to compare quantities, the brain taps into its "approximate number system." Mazzocco found that students in the bottom 10 percent of math achievement lagged in those estimation skills. But that doesn't apply to everyone who "doesn't get" math; the study found that children in the bottom 11 percent to 25 percent had no problem with estimation.

What dyscalculic children lack is "number sense," something that most people take for granted but is a construct that can't always be taught. "You can't just tell somebody that 8 is more than 4," Mazzocco said. "It's not like memorizing states and their capitals."

Just like dyslexics, children suffering from dyscalculia may be intelligent, she said. "They are processing information differently."

More research could lead to ways to help people who struggle with math, said Daniel Ansari, an associate professor of psychology at the University of Western Ontario.

Ansari's studies have shown that children with dyscalculia don't activate the [parietal cortex](#), which is critical for number processing, in the same way that other children do. Researchers still don't know why, nor whether inactivity in that lobe of the brain causes the math problem or is a symptom of the disability.

"It's a severely underinvestigated disorder," Ansari said.

But what happens as children fail in arithmetic, he said, is that some develop math anxiety and then want to shun the subject.

A survey released last month seems to bear that out. The for-profit Sylvan Learning reports that about one-third of 400 [children](#) surveyed would sacrifice a month of video gaming or going on Facebook if they could never have to do algebra again, and 71 percent of 534 parents surveyed think helping kids with algebra is harder than teaching them to drive.

On a recent Wednesday at Bancroft Middle School in San Leandro, math teacher Mike Mandel was trying to explain negative numbers to a sixth-grader. "She didn't understand the concept that -6 is less than zero," he said. "I could tell she was trying her hardest, and it just wasn't clicking for her."

At Gunderson High in San Jose math teacher Chuck Vacari is convinced that all students can learn - even algebra. "But they have to want to," said Vacari, who teaches algebra and catch-up classes. He believes that students fall behind in their early teens not so much because of a disability, but because of distractions like Facebook. And once they get

off track, it's hard to catch up.

Mazzocco said that "people have a perception that because math can be hard, either you're good at it or not. But even if you have to exert effort, that doesn't mean you should give up on it."

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Citation: Don't get math? Researchers home in on the brain's problem (2011, October 5)
retrieved 26 April 2024 from

<https://medicalxpress.com/news/2011-10-dont-math-home-brain-problem.html>

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