

It's not always as easy as 1-2-3

Kids with dyscalculia have trouble deciphering numbers, in the same way dyslexics have trouble with letters, researchers say

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It may look like arts and crafts, but when Nicolas Lafreniere plays with balls of clay, he's actually learning the basics of math.

As the Vancouver child moves a clay rope up and down a grid of balls under the watchful eye of his tutor, he's adding sets of the same number in order to understand multiplication tables. It's a remedial method that is working for a number of children like Nicolas, 9, who have trouble reading numbers.

Most of us understand that dyslexia impairs a child's ability to read. But few of us have even heard of dyslexia's math-challenged sibling, dyscalculia, which researchers believe affects 3 to 11 per cent of the population.

As with dyslexia, the causes and underpinnings of the disorder remain mysterious, but experts say understanding dyscalculia faces an additional hurdle: Flunking math isn't considered as serious as failing to read.



Therapist Susan Hall helps Nicolas Lafreniere, 9, use bits of clay to make math concepts more concrete. *(LAURA LEYSHON FOR THE GLOBE AND MAIL)*



"It's socially acceptable to be useless at math," says Nicolas's tutor, Susan Hall.

From diagnosis and remediation of the disorder to research and public awareness, dyscalculia lags far behind dyslexia.

As it happens, about two-thirds of children with dyscalculia also have dyslexia. So the possibility that a similar dynamic is at work is an idea that increasingly intrigues researchers. Using brain scans, they have already found that the region called the parietal cortex is affected in children with both disorders.

Some, including dyscalculia expert Daniel Ansari, believe children with the condition have a specific problem interpreting numeric symbols and the quantities they represent - much like a child with dyslexia will have trouble accessing the sound of a letter of the alphabet.

When presented with two numbers, most people can easily distinguish which number is higher.

"Children with dyscalculia might find this more challenging because they lack a basic sense of quantity," he says.

Now, Dr. Ansari, an assistant professor at the University of Western Ontario and holder of the Canada Research Chair in Developmental Cognitive Neuroscience, and his colleague Ian Holloway think they are one step closer to understanding how dyscalculia works - and doesn't work.

In a new study appearing in the *Journal of Experimental Child Psychology*, 87 children aged 6 and 8 were tested in two ways. In the first test, they looked at touch-screen monitors and were asked to indicate which quantities were larger between two numbers, such as 8 and 9. They also compared sets of dots of different quantities. The children then completed two standardized math tests to measure their abilities.

Children who found it easier to distinguish between the values of the numbers on the touch screens scored higher on the written math tests. Those who had the most trouble scored lower on the tests. (No effect was found in the non-symbolic tests using dots.)

"We think this is one of the first pieces of evidence that links this basic sense of quantity to a high level of achievement," he says.

It certainly rings true to the families dealing with math disorders. For Nicolas's mother, Natrisha Sagris, it became clear in kindergarten that both reading and math concepts just weren't sticking with him. "He had nowhere to hook them onto, no meaning."

Remediation for reading problems came first, then he started a math program with Vancouver facilitator Susan Hall (postivedyslexia.com) this past summer.

"I already see a huge difference," says Ms. Sagris. "With the clay, he now knows what we're asking. He needed weight behind what the numbers meant."

Ms. Hall teaches the Davis method, which is named for creator Ron Davis, himself a dyslexic and the founder of California-based Davis Dyslexia Association International. Ms. Hall's programs cost about \$3,000 for a week of intense classes and about a dozen follow-up sessions.

Using the clay ball system to learn basic concepts such as adding, they mash together individual balls to create new, bigger sums. "They're giving themselves an image they have created," says Ms. Hall.

For parents who may recognize some elements of dyscalculia in their own children, Dr. Ansari urges them not to worry immediately. "Some difficulties are very transient," he says. "We're talking about very persistent problems."

Still, he says, parents should balance their focus on reading with a nod to math.

"Use things such as laying the dinner table as an opportunity to count or compare quantities," he says. "I don't have any hard evidence to suggest that this is beneficial, but I think focusing children's attention on quantities and quantities of relationship is a huge step forward."

What to watch for

Delay in counting. Dyscalculic children aged 5 to 7 show less understanding of basic counting principles than their peers.

Delay in using counting strategies for addition. Dyscalculic children use inefficient strategies for calculating addition facts much longer than their peers.

Difficulty in memorizing arithmetic facts. Dyscalculic children have great difficulty memorizing simple addition, subtraction and multiplication facts (eg. $5 + 4 = 9$).

Source: aboutdyscalculia.org