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Inside story: dyscalculia

Doing maths had Hilary Freeman's head in a spin; then she did a series of psychological tests ... For more than 30 years I believed that when it came to maths I was just plain stupid. Numbers never made any sense to me; they were just shapes floating in the air, unattached to real meanings. I knew that two plus two equals four because that's what I was told, and I memorised my times tables as if they were nursery rhymes, chanting them rhythmically until they stuck.

The only way I could do addition or subtraction was to visualise each number as domino dots on a screen, which I pictured in my mind. At school I'd be repeatedly told off for trying to work out the answer to a maths problem my way, or for tapping out the calculation with my hand or foot.

"Stop looking at the ceiling; the answer isn't written up there!" the teacher would cry. How could I tell her that it was? My method also had its limitations. Counting dots is time-consuming. And, if each number is a dot — an object — how does multiplying it by zero make it disappear? It didn't seem logical.

When I was 10 years old I took the entrance examination for an independent girls' school. At my interview I discovered that I'd come top in the English paper and — wait for it — 292nd in maths. A total of 300 girls sat the exam that year. The headmistress said that I was the most "lopsided" girl ever to be admitted to the school.

This academic asymmetry blighted me throughout my education. While I sailed through the arts, I failed at the sciences. I had no problem with the classics, but algebra and geometry were, literally, all Greek to me. I didn't know my isosceles from my hypotenuse and, however hard I tried, I couldn't give a xxxx (or is that yyyy) for equations. Unsurprisingly, despite extracurricular tuition, I failed my maths O level, managing to scrape through on my second attempt.

And then, earlier this year, I discovered that I might not be stupid after all. Rather, I might have a condition called dyscalculia, a kind of number blindness, similar to dyslexia, which was recognised as a distinct developmental problem in 1974 but is still little known.

According to Brian Butterworth, a professor of neuropsychology at University College London, dyscalculia is a neurological condition which affects about 6.5 per cent of the population (see panel below). Those who have it — dyscalculics — do not and cannot understand what numbers mean. Their brains have no concept of "three-ness" or "four-ness". Dyscalculics may also have trouble telling the time, counting change and managing their financial affairs. Bank manager, please take note.

Before you scoff and say "there's no such thing, you're just a spendthrift and not very good at maths",

consider that 20 years ago people with dyslexia were viewed as slow and/or lazy. Earlier this year, research published in a US scientific journal revealed that a separate part of the brain used for counting had been isolated. Professor Butterworth believes this part of the brain, within the parietal lobe, may be abnormal in dyscalculics.

He agreed to screen me for dyscalculia, putting me through a series of tests, many of which were designed to show whether under-performing schoolchildren have the condition. I was filmed during the tests so that the researchers could check how I reacted to the questions and whether I had to count on my fingers. A series of sums was fired at me: basic addition and subtraction; multiplication and division questions; plus tests involving counting dots and some to see whether I could do calculations using coloured tokens to represent money.

I was asked to answer some text problems, the sort of maths questions you get in IQ tests, and I had to fill in a multiplication table grid. A computer test designed for 6 to 14-year-olds measured my reaction times and my ability to count dots and to compare numbers. I was also tested on my ability to tell left from right, which is often a problem for people with dyscalculia.

The final tests were designed to see if I had a rare condition called Gerstmann's syndrome, in which dyscalculia is linked to a deficit in the mental representation of fingers (agnosia). Blindfolded, I had to say which and how many of my fingers were being touched. My fingers were then hooked up to an electronic buzzing machine and, using a computer, I had to estimate how many of my fingers were buzzing at any one time.

Having sworn, 19 years ago, that my maths O level would be the last maths exam I'd ever subject myself to, Professor Butterworth's tests brought me out in a cold sweat, instilling the same feelings of anxiety and panic that I had experienced as a child in class. I was alarmed to discover that I have entirely forgotten my 11 and 12 times tables and that I can no longer do long division without a calculator. For some reason seven times nine utterly befuddled me; I kept wanting to say 54, but knew it didn't sound right.

The professor says that during testing I appeared to use my pen or finger to count imaginary dots, or to tap out numbers, suggesting a weakness in my grasp of basic number concepts. Apparently, I frequently showed a lack of confidence in my answers, even when they were correct. I managed to come in the bottom 4 per cent — and this is a test designed for 14-year-olds — for one of the capacity tests. However, in the graded-difficulty arithmetic test, which measures mental arithmetic ability, I came in the bright average range. I do not have Gerstmann's syndrome.

According to Professor Butterworth, my problems with maths are mild compared with most dyscalculics. I do, however, have a weakness in my grasp of simple number concepts, which is why I did so badly at maths at school. I've compensated for it through imaginative counting strategies and I appear to cope satisfactorily with every-day numerical problems. Do you think it's too late to get my O level paper re-graded?

Number-crunching for kids

“We’re developing a method for helping kids with dyscalculia,” says Brian Butterworth, a professor of neuropsychology at University College London. “The principle we’re working on is that you have to help the child to understand what numbers mean; what ‘three-ness’ or ‘four-ness’ is. Such children don’t have any intuition about it. They have to work it out logically. People with dyscalculia will always have trouble with maths, but they can compensate, just as people with colour-blindness learn to manage. We have to educate dyscalculic children to grasp maths in a different way.”

Dealing with dyscalculia

According to Professor Brian Butterworth of University College London, we encounter about 1,600 numbers an hour and more if we do a job involving numbers. “So,” he says, “It is important to address difficulties in understanding numbers in a practical way.”

Children with dyscalculia

Adults with dyscalculia

These guidelines are based on best practice in specialist schools such as Emerson House in London and Mark College in Somerset