



Dyscalculia



Lateral surface of left cerebral hemisphere, viewed from the side. (Intraparietal sulcus visible at upper right, running horizontally.)

Dyscalculia or **math disability** is a specific learning disability or difficulty involving innate difficulty in learning or comprehending mathematics. It is akin to dyslexia and can include confusion about math symbols. Dyscalculia can also occur as the result of some types of brain injury.

Dyscalculia is a lesser known disability, similar and potentially related to dyslexia and developmental dyspraxia. Dyscalculia occurs in people across the whole IQ range, and sufferers often, but not always, also have difficulties with time, measurement, and spatial reasoning. Current estimates suggest it may affect about 5% of the population. Although some researchers believe that dyscalculia necessarily implies mathematical reasoning difficulties as well as difficulties with arithmetic operations, there is evidence (especially from brain damaged patients) that arithmetic (e.g. calculation and number fact memory) and mathematical (abstract reasoning with numbers) abilities can be dissociated. That is (some researchers argue) an individual might suffer arithmetic difficulties (or dyscalculia), with no impairment of, or even giftedness in, abstract mathematical reasoning abilities.

Diagnosis

Dyscalculia can be detected at a young age and measures can be taken to ease the problems faced by younger students. The main problem is understanding the way mathematics is taught to children. In the way that dyslexia can be dealt with by using **a slightly different approach** to teaching, so can dyscalculia. However, dyscalculia is the lesser known of these learning disorders and so is often not recognized.

Presentation

- Frequent difficulties with arithmetic, confusing the signs: +, -, ÷ and ×.
- Difficulty with everyday tasks like checking change and reading analog clocks.
- Inability to comprehend financial planning or **budgeting**, sometimes even at a basic level; for example, estimating the cost of the items in a shopping basket or balancing a checkbook.
- Difficulty with multiplication-tables, and subtraction-tables, addition tables, division tables, mental arithmetic, etc.
- May do fairly well in subjects such as science and geometry, which require logic rather than formulae, until a higher level requiring calculations is obtained.
- Many of those who suffer from dyscalculia may have parents who perform well to excellent in Mathematics-related fields (such as architects, engineers, or math teachers), though this connection has yet to be genetically linked.
- Difficulty with conceptualizing time and judging the passing of time. May be chronically late or early.
- Particularly problems with differentiating between left and right.
- Might do exceptionally well in a writing related field- many authors and journalists have this disorder
- Difficulty navigating or mentally "turning" the map to face the current direction rather than the common North=Top usage.
- Having particular difficulty mentally estimating the measurement of an object or distance (e.g., whether something is 10 or 20 feet (3 or 6 metres) away).

- Often unable to grasp and remember mathematical concepts, rules, formulae, and sequences.
- An inability to read a sequence of numbers, or transposing them when repeated, such as turning 56 into 65.
- Difficulty keeping score during games.
- Difficulty with games such as poker with more flexible rules for scoring.
- Difficulty in activities requiring sequential processing, from the physical (such as dance steps or sports) to the abstract (signaling things in the right order). May have trouble even with a calculator due to difficulties in the process of feeding in variables.
- The condition may lead in extreme cases to a phobia or durable anxiety of mathematics and mathematic-numeric devices/coherences.
- Low latent inhibition, i.e., over-sensitivity to noise, smell, light and the inability to tune out, filtering unwanted information or impressions. Might have a well-developed sense of imagination due to this (possibly as cognitive compensation to mathematical-numeric

Information on the diagnosis and treatment of Dyscalculia, a specific learning disability in the area of mathematics.

Dyscalculia is a specific learning disability in the area of mathematics. It has also been termed number blindness. This, much like dyslexia, is a neurological problem. Symptoms of Dyscalculia include:

- Difficulty working with numbers
- Confused by math symbols
- Difficulty with basic facts (adding, subtracting, multiplying and dividing)
- Often will reverse or transpose numbers (36: 63)
- Difficulty with mental maths
- Difficulty telling time
- Difficulty with directions (as for playing a game)
- Difficulty grasping and remembering maths concepts
- Poor memory for layout of things (for example, numbers on a clock)
- Limited strategic planning skills (like used in chess)

A child with dyscalculia will have average or above average intelligence but cannot achieve to that degree in the area of mathematics.

How is Dyscalculia Diagnosed?

An awareness of the problem by either the teacher or parent brings this disability to light. The family physician will likely refer the child to a specialist. This specialist will administer a battery of tests to determine the presence of a disability. Often a special educator and a school psychologist will also be involved in the testing and diagnosis.

What Is Dyscalculia?

Think "maths dyslexia" and you're most of the way there

Dyscalculia is defined by a person's difficulty with numbers and arithmetical concepts. It's estimated (by people who are good at that sort of thing) that between 4% and 6% of the world's population has dyscalculia, but that only 1% has even heard of the disorder.

People with dyscalculia struggle to perform everyday tasks, such as remembering addresses and phone numbers, figuring a tip at a restaurant, or determining exactly what that "10% OFF!" sale will get them. We tend to transpose digits (reading 67 for 76), invert digits (reading 6 for 9), or just get plain confused (3 and 8 might look like the same symbol to a dyscalculic). All that, and we haven't even got to using numbers to do actual maths!

Does Dyscalculia End at Maths?

Dyscalculia is a maths disorder, but the problems it causes do not stop at numbers. Dyscalculics often have difficulty when reading maps or trying to follow street directions. We generally don't get along well with the formal aspects of music education, such as sight-reading and theory. We're likely to have trouble with physical coordination, and as if that didn't make gym class hard enough, a lot of us can't remember the rules to games.

Dyscalculia

Affects a person's ability to understand, remember, and/or manipulate numbers and/or number facts

Causes:

- caused from damage to specific regions of the brain
- lesions between the temporal and parietal lobes of the cerebral cortex
- deficits in working memory
- short term memory being disturbed or reduced and congenital or hereditary disorders
- weakness in visual processing

Consequences:

- difficulty with time, measurement and spatial reasoning
- difficulty with everyday tasks:
 - checking change
 - reading clocks
 - financial planning
 - budgeting
- difficulty differentiating left and right
- poor sense of direction

- poor mental maths ability
- when writing, reading and recalling numbers, these common mistakes are made:
 - number additions
 - substitutions
 - transpositions
 - omissions and reversals
- inability to grasp and remember maths concepts, rules, formulas, sequence and basic addition, subtraction, multiplication and division facts
- understand material when being shown it but when they must retrieve the information they become confused and are unable to do so.

Strategies:

- encourage to work hard to 'visualise' maths problems
- ask students to read problems out loud and listen very carefully. This allows them to use auditory skills (which may be a strength)
- provide examples to try to relate problems to real life situations
- provide with graph paper and encourage them to use it to keep
- repetition is very important
- allow extra time for tests and exams
- assign extra problems for practice
- when presenting new material, make sure the student is able to write each step down and talk it through until they can teach it back to you
- use calculators

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Strategies

1. Encourage students to work extra hard to "visualize" mathematics problems. Make sure that they take the time to look at any visual information that is provided (picture, chart, graph, etc.)
2. Have the student read problems out loud and listen very carefully. This allows them to use their auditory skills (which may be strength).
3. Provide examples and try to relate problems to real-life situations.
4. Provide students with graph paper and encourage them to use it in order to keep the numbers in line.

5. Provide uncluttered worksheets so that the student is not overwhelmed by too much visual information (visual pollution). Especially on tests, allow scrap paper with lines and ample room for uncluttered computation.
6. Dyscalculia students must spend extra time memorizing mathematics facts. Repetition is very important.
7. Many students need one-on-one attention to fully grasp certain concepts. Have students work with a tutor, a parent, or a teacher after school in a one-on-one environment.
8. If possible, allow the student to take the exam on a one-to-one basis in the teacher's presence.
9. The student might like a chance to do the problem again if he is wrong. Often their mistakes are the result of "seeing" the problem wrong.
10. In early stages, design the test problems "pure," testing only the required skills. In their early learning, they must be free of large numbers and unnecessary destructive calculations.
11. Allow more than the "common" time to complete problems and check to see that student is not panicking (mind frozen).
12. Most importantly, be PATIENT! Never forget that the student WANTS to learn and retain. Realize that mathematics can be a traumatic experience and is highly emotional because of past failures. The slightest misunderstanding or break in logic can overwhelm the student and cause emotional distress. Pity will not help, but patience and individual attention will. It is typical for students to know the material well and then get every problem wrong on the test. Then 5 minutes later, they can perform the test with just the teacher, on the whiteboard, and get all problems correct. **Patience** is essential.
13. Assign extra problems for practice and maybe a TA (teacher aide) to assist the student.
14. When presenting new material, make sure the student with dyscalculia is able to write each step down and talk it through until they understand it well enough to teach it back to you.
15. Go over the upcoming lesson so that it is more of a review.

Quick test

The simplest way to check if a child is dyscalculic is to look at these points below.

1. I sometimes see a number written down, but when I copy it, I write the numbers in the wrong order.
2. When using a phone I dial numbers in the wrong order.
I can't remember numbers – even when I use them often – such as telephone numbers that I dial a lot.
3. I always find adding up and taking away difficult.
4. I can't understand what fractions are all about.
5. When someone mentions odd and even numbers I don't understand what they mean.
6. When someone mentions odd and even numbers I have to think very carefully to work out which is which.
7. I could never work in a shop because I could never work out how much change to give someone.
8. The 24 hour clock always confuses me totally.
9. I have never been able to subtract larger numbers.
10. I have never been able to do "times tables".
11. Sometimes I see signs like + or \div but I can't remember what they are called. If someone says "divide" I can't think of the symbol.
12. I know that everyone else in my class understands what "square root" means but I really have no idea.
13. I find it really hard to copy a stream of numbers from a board onto paper.
14. Most of the people I work with can use a calculator, but I never get the right answer.
15. When I get into a maths problem I often forget where I have got to, and can't finish it off.

16. Sometimes I forget the names of shapes like a triangle or a semi-circle.
17. When I work out a maths question on the page, the working is always very messy
18. Sometimes I know the answer to a maths problem, but can't explain how I got to that answer.
19. I get really confused between the meaning of high numbers such as 10,000 and 9,999 and I can't work out which one is higher.
20. When I go abroad I can never get the hang of foreign currency and always let someone else sort out the money. I never know what the equivalent is in British money.
21. I don't understand percentages at all.
22. I know there are problems which say "if it takes a man 5 minutes to drive 10 miles, how long does it take him to drive 12 miles?" But I never have any idea how to do them even though other people in my class can.
23. Maths frightens me. I really don't understand it at all.
24. Sometimes when I am faced with a question that has to do with numbers I just cannot cope and become very anxious.

If the answer is "yes" to half or more of these points (or in the case of a child, the points that are relevant to the child's age) there is every chance that the person taking it is dyscalculic.