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PROVE TEACHERS AND EXPERTS WRONG!

JOSEPH KENNEDY

Dyslexia: Prove teachers and experts WRONG!

by

Joseph Kennedy

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Chapter 8. Five and six ... are nine?

Dyslexia and dyscalculia

“For goodness' sake, Lea! Four from 12 is 8! You *know* that, we've been practising subtraction the whole week! Now try and concentrate – we've already spent two hours doing this!”

Lea had been practising letters for months, and her reading and writing had really improved. However, the same could not be said of mathematics.

“But Mama, I really am trying!” Lea screamed back. “Can't I play with Hannah now?!” She burst into tears, crying uncontrollably.

Her mother back her own tears but, when she was alone, she sobbed as exasperation and a feeling of helplessness overcame her. “I really don't know what's happening here. Maybe dyslexia also occurs in mathematics!”

It never rains but it pours

Lea's mother is right. There really is a condition similar to dyslexia which is encountered in relation to mathematics. The term used for this is *dyscalculia*, and it frequently occurs *in addition to* dyslexia. My experience indicates that about 33 per cent of children with dyslexia also have dyscalculia. Dyscalculia is frequently overlooked, given that dyslexia is more noticeable and that better results can be achieved in mathematics through practising and memorising.

As with dyslexia, dyscalculia can occur in a weaker or more pronounced form, with children suffering from a more distinctive dyscalculia experiencing major difficulties right from the very first class. These children find it almost impossible to comprehend the numbers one to 10 in the first few weeks. For example, a child is unable to calculate 2 + 3 = 5 with any reliability and fails to identify the correlation with 5 – 3 = 2. At the other end of the spectrum, children manage to achieve *good* results over a longer period if they practise repeatedly at home to iron out any perceived “careless mistakes” which are, in reality, calculation errors. This strategy succeeds until the demands made on them increase. A child suffering from dyscalculia typically develops major problems with fractions at a later stage as the demands made on their mental calculating capacity become even more abstract. Despite this, very many children with dyscalculia manage to get through secondary school right up to about the seventh or eighth class before a calculator is no longer of help and expensive additional tuition becomes a necessity – if the money is there.

Many parents try to suppress or downplay this problem with comments such as “Well, my child's marks are better in maths than in German” (or in your case, English dear reader). However, this only means that your child is compensating for their dyscalculia through greater diligence and application. The dyscalculia may, of course, not be as pronounced as their dyslexia.

Warning Signs

Should you notice that your child needs an inordinate length of time for arithmetic during homework and makes numerous “careless mistakes”, you should consider the possibility that dyscalculia is “in play.”

Many our parents at the Kennedy-Schule say that they need to dedicate a lot of time to helping their children at home, repeatedly practising the four fundamental arithmetic operations (+ - x ÷) according to the same singular pattern. This strategy produces acceptable results for as long as the same sequence is employed. For example, let us assume that as usual, your child needs to complete a series of addition exercises, followed by subtraction problems and, finally, exercises involving multiplication.

Major problems then arise if these exercises are no longer tackled in this sequence. If, for example, these exercises are assigned in a mixed order during class work and, additionally, some are in text form to test flexible thinking, your child with dyscalculia will probably fail. This is particularly the case where mental arithmetic is involved.

The greater the demands on flexibility and abstract mathematical ability during this type of exercise, the greater the difficulty your child will experience when trying to compensate for an arithmetical disability through learning by heart.

These difficulties are possible indications of dyscalculia, but they are not automatically a sign that your child is actually suffering from this condition. However, they are reason enough for you to examine these phenomena more closely.

Why dyscalculia frequently remains undetected

Primary school teachers are not trained to recognise dyscalculia. Therefore, many who have not been informed of this condition or lack any further professional training in this respect tend to assume that your child is not intelligent enough to understand basic arithmetic.

The majority of teachers then recommend that parents practise more with their children at home "until they get the hang of it". Indeed, this can help to a certain degree – through rote learning. However, my practical experience shows that learning by rote (memorising) does not achieve any enduring success in the case of a child with dyscalculia, *when they must calculate using mental arithmetic only.*

Your child is incapable of retaining these rules or implementing them in full. They make mistakes, a great number of mistakes. A vicious circle begins: arithmetic exercises are practised – your child makes lots of mistakes – endless repetition follows to eliminate these mistakes – your child reacts with despondency and/or defiance ... Anxious parents are unsettled and unsure as to whether these problems might actually be a reflection of the child's level of intelligence, or whether they are incapable of concentrating or simply going through a rebellious phase. For the uninitiated, it is indeed difficult to differentiate between cause and effect in this vicious downward spiral.

Another factor which may disguise dyscalculia is the modern calculator. It is designed for higher-level mathematics in secondary school, enabling pupils to enter mathematical problems and obtain the correct solutions. A prerequisite for this is the inputting of exact information in the right order. Indeed, a good teacher engaged for additional tuition can easily show pupils how to do this. The only certainty here is that these intelligent pupils will not be able to *mentally* compute effectively, despite sitting mathematics in their final school examination!

A further difficulty in diagnosing dyscalculia is the fact that dyslexia on its own often leads to major problems in arithmetic. Dyslexic children frequently fail to identify numbers and arithmetic operators with any degree of reliability, often writing them down incorrectly. They may also transpose digits in many cases, examples being 56 instead of 65 or 235 instead of 532, etc. Their arithmetic calculation is then correct, but using the wrong numbers means that the results are invariably incorrect.

These children also have major difficulties when it comes to properly identifying the operators for addition (+), subtraction (–), multiplication (x) and division (÷). Naturally enough, dyslexia also plays a role here, as it can lead to significant problems when it comes to text exercises.

So how do you determine whether your child's difficulties with arithmetic are the result of dyslexia or dyscalculia?

If your child has a reading disability but, apart from possible difficulties with text exercises, transposed digits and confused arithmetic signs, is good at arithmetic calculations, their difficulties can be traced back to their dyslexia.

If your child is poor at arithmetic but reads well, the cause of their difficulties can then be found in dyscalculia. The probability that both conditions exist is high if your child's performance is poor in both reading *and* arithmetic (as described in this book).

Consequences of a failure to identify dyscalculia

If a child has difficulties in the first year with the number range from one to 10 and simultaneously, suffers from dyslexia (which is not always the case), here in Germany they are deemed a candidate for a special needs school for children with learning difficulties. Intelligence tests sometimes appear to confirm this classification – if the *wrong* tests are applied.

We still receive reports from parents who believe that an intelligence test examines reading, writing and arithmetic. In the case of children with dyslexia and dyscalculia, only the results of the *non-verbal* part of this test are valid. The danger being that children with learning disabilities with normal to high intelligence would be classified as less gifted and sent to special needs schools.

How a child in this situation feels is barely imaginable. They are filled with doubts about their own ability probably thinking they are stupid and, essentially, good for nothing. After all, they have received official confirmation in black and white that they are not intelligent. Depending on temperament, a child in this situation may react with resignation and accept their fate, or their frustration in school may lead them to seek recognition in other areas. This need can lead to unruly behaviour, drinking and drug abuse in extreme cases, and a descent into delinquency and crime cannot be ruled out.

For the majority of children with dyscalculia who are allowed to remain at a regular school, the daily schedule is an uninterrupted regime of very hard work – for both child and parents. The greater the demands encountered in mathematics, the more time you need to invest to ensure that your child fully grasps the material involved. That which has already been learnt needs to be continually revised, and exhausted mothers repeatedly tell us that they need to start again from the beginning the very next day.

It is not unusual for the father to pick up where the mother has just left off and continue labouring with the child when he comes home from work. Very soon, the entire family is at its wits' end, and all because the child is incapable of doing their homework alone. The consequences are additional stress and conflict – and a very unhappy child. Naturally enough, mathematics is even less fun under these circumstances. Children are filled with doubts concerning their ability, and uncertainty grows alongside a feeling of inferiority. This can be alleviated to a certain extent when the school is supportive and caring.

It is not difficult to imagine other consequences which this situation harbours, as your child is continually under stress and feels queasy and unwell. Sleep disturbances, nausea before school and a drop in general performance when it comes to school work are sadly the norm, as this vicious circle spirals further out of control.

The fact of the matter is, that the child is incapable of realising its full potential and, in addition to jeopardising their future career prospects, their personal development is also at risk. As an adult, dealing with figures on a daily basis is difficult and, indeed, frequently very embarrassing. Examining financial matters, making decisions about the purchase of a car or house and investments are all obstacles where there is a justifiable fear of making major mistakes.

Arguments are a frequent occurrence in the family of children affected by dyscalculia, simply because they take so long to do their mathematics homework. A rift in the entire family is practically inevitable, and the parents' marriage is frequently strained as a result. As nobody knows what is wrong with the child, the problem soon shifts from the actual situation and is personalised:

- “His teacher is moving too quickly. Tim simply needs a little longer to grasp the material being taught.”
- “We never had problems like this in our family, they must come from you!”
- “You just show too little patience with Anna. Shouting at her is not going to help! She came running to me as soon as I came home. What on earth are you doing with her all day?”

Last but not least, the daily practise with your *Kennedy Concept* for overcoming your child's dyslexia is also put at risk. How are you supposed to play alphabet games or type for 20 minutes every day if you are labouring over mathematical problems for hours on end?

Practical experience has shown me that the integrity of the family threatens to unravel if parents cannot master this challenge. *Do not despair, together we will prevail!*

So how exactly do you determine whether your child has dyscalculia?

Criteria for identifying dyscalculia

Your child needs too much time and makes too many mistakes

The demand for tuition in mathematics is by far the greatest for any subject in the *Kennedy-Schule.* All pupils have to sit an entrance test which consists of questions on the four basic arithmetic operations in the number range from one to 100. Practically all the pupils take too long at this (up to 10 minutes in individual cases) and often make 12 mistakes or more in a test consisting of 25 tasks. This includes advanced-level secondary school pupils who are studying to go to university. (At school in Germany, mathematics is always a compulsory subject).

The very same occurs during class. Addition and subtraction, multiplication and division are calculated mentally with the greatest of difficulty – and often little success. Your child can achieve passable results if it has enough time at its disposal. Where this is not the case, the number of "careless mistakes" increases considerably, these being in reality arithmetical errors, and a poor mark is often the only reward for a child under (time) pressure.

If a child makes more than 12 mistakes in a test consisting of 25 simple arithmetic exercises (so, half or more being incorrectly answered) and needs more than seven minutes, it is highly probable that they are suffering from dyscalculia.

Your child uses its fingers as an aid to counting

"Fabian, you must be able to add nine and four without using your fingers! You're in third class now. And apart from that, your teacher told you not to do that! You have to calculate it in your head now. Okay, how much is nine plus four?"

"Ehmm, just a minute ... twelve, Mama."

"No, no, no! Look, you've got a nine, so just take one from four and add it to it. Now, how much is that?"

"Ten"

"Exactly, and how much of the four do you have left now?"

"Three."

"Very good, that's right. And what is three plus ten?

"Eh, thirteen, Mama."

"You see? You *can* do it without your fingers! Let's try it again, this time with no fingers. Okay, how much is eight plus seven?"

"Thirteen?"

If your child uses their fingers regularly to count and still does so *after* the first class, you should take into consideration that your child has dyscalculia. This behaviour indicates that your child has difficulties with abstract numbers and arithmetic per se, and needs concrete objects to illustrate the task (fingers in this case).

Incidentally, "finger counters" are not only restricted to primary school level. There are enough pupils in the eighth grade (in Germany age 13 -14) who still count on their fingers.

Mental arithmetic demands great effort and is defective

Mental arithmetic is, in a manner of speaking, the litmus test for your child's numeracy, as it exclusively involves abstract thought. Even children who suffer from concentration disorders are capable of mental arithmetic if the prerequisites for arithmetic are given. In extreme cases of attention deficiencies, your child can, depending on how they feel, perform well when solving mixed arithmetic problems. Some even excel at mathematics. However, this is impossible in the case of dyscalculia.

A gradation can be applied in this respect to arithmetic tasks which cause difficulties for children tormented by dyscalculia. Following lots of regular practise, they can also generally solve addition exercises in their heads with a *relatively* high degree of reliability. However, 'careless mistakes' which, in reality, are arithmetical errors are encountered time and again.

Subtraction exercises require greater effort, being more abstract. Your child can achieve good results on paper when they have enough time, but the level of performance is often considerably poorer when it comes to mental arithmetic.

Exercises involving multiplication can be challenging, and children with dyscalculia almost always fare badly when faced with mental tasks involving division. As always, your child performs better with a lot of practice, using a pen and paper and having adequate time to complete the exercises. Problems always arise when they have to calculate for division in their head, and this is compounded by the unsuitability of fingers as an aid.

Last but not least? these children often fail when it comes to doing fractions. The level of abstraction involving fractions is even greater, and the fact that they involve addition, subtraction and multiplication often overwhelms these children. The introduction of fractions from the fifth class onwards (in Germany) requires that a child is competent in dealing with the four basic arithmetic operations.

In addition to this, again in Germany, children are not yet allowed to use a calculator until the seventh grade. Please note: your child's failure to understand the *arithmetic process* is not always the problem. Indeed, the numerous arithmetic mistakes they make, increasing uncertainty and the resulting confusion are the factors that condemn a child to failure when dealing with fractions. Again: it is not their ability to understand the mathematical process involved.

Failure in transitional exercises involving the 10 and 100 thresholds

Not all children with dyscalculia count on their fingers. Many endeavour to use mental arithmetic and succeed to a greater or lesser degree, depending on the severity of their disability and the amount of time at their disposal.

These children can cope to an adequate degree when working in the lower number range, but difficulties arise, as always, when abstract demands increase. Many children can cope to a greater or lesser degree with exceeding of 10 (say, 5 + 6) by counting on their fingers or through mental arithmetic, despite the significant additional effort involved in this process.

The difficulties arise if your child needs to calculate up to and over 100. Mistakes typical of exercises of this nature include 8 + 8, 19 + 7, 23 + 9 or 77 – 14. Your child can conceal these difficulties on paper if you “train” them regularly and intensively prior to class work, but they may well forget how to do these problems two days later. Forcing your child to calculate these type of transitional addition exercises mentally is almost always a recipe for failure.

Difficulties with multiplication tables

Many children suffering from dyscalculia, but not all, cannot retain multiplication tables. Parents, let your child write out and memorise a multiplication table from one to 10, then develop a question-and-answer game from this which can include practical examples. “Look, Maria, this bag contains six apples. How many bags do I need to buy for our family if I need 18 apples?”

Both the parents and child make enormous efforts to memorise multiplication tables through continuous repetition – but it is all in vain. Typically, after two weeks the process has to be repeated.

However, not all children suffering from dyscalculia find it difficult to retain multiplication tables. Many can recite every row mechanically right up to10 x 10 – but only *mechanically*! It is highly probable that a talented parrot could also manage this task. Children are unable to *apply* this knowledge flexibly and fluently, and division in particular leads to major difficulties.

Major difficulties with text exercises

Children with dyscalculia tend to fail when it comes to text exercises. Having learnt the solutions of standard calculations by heart, they then try to apply these according to a fixed pattern. This strategy is suddenly thwarted when they need to solve questions in a text format and endeavour to decide what is being asked and what needs to be calculated.

The order of individual components in the problem is hardly recognisable. What exactly should be calculated, and how should this be done? A child who has achieved good results in standard exercises but fails in text exercises is clearly exhibiting signs of dyscalculia, if you can rule out a reading disability.

Your child cannot work independently

“Mama, how do you do this?” – This is a question heard all over the country and probably the entire world! Children continually ask their parents to help with arithmetic because they just cannot cope on their own. And as your child does not have the prerequisites for this task, you as a parent need to provide assistance. Day in, day out.

“My child suffers from dyscalculia – what can I do?”

Practising for hours on end with your child is precisely what you should *not* do

It is essential that you change your approach and jettison all the old practices! Any attempt to improve your child's numeracy through continuous repetition of the four basic arithmetic operations and multiplication tables is in the long run, doomed to failure from the outset.

Help of this nature may require you to invest hours of your time and, in a vain attempt to finish early, you ultimately end up giving your child the solutions to the problems. We continually hear from exhausted parents seeking support that they do exactly this.

This ‘assistance’ simply offers your child repeated confirmation of their inability to do arithmetic as it should be done. Your child also sees clearly that other children are better without help. As a result, your child becomes unsettled and doubts their own ability. They believe they are stupid and, as I have already described, react with everything from tears and resignation to depression, defiance, aggression or buffoonery. This enormous investment of time in mathematics homework and the associated failures can then lead to major upset and discord in the family.

Our search for the best solution

On determining that children at our *Kennedy Tutorial School* were not improving to any noticeable degree in arithmetic, we reduced the size of groups from six pupils to three. The didactic principles underlying our efforts were:

- the stimulation of attention to the task at hand
- familiarisation with problem-solving techniques

  and
- the promotion of working independently.

The ulterior motive behind this was the premise that each child had their own very individual problems with mathematics. Therefore, each child and teacher had more time in the smaller group to solve these difficulties on an individual level. We then trained the four basic arithmetic operations with the children during tuition, followed by mathematical topics which were being covered at school. We then allowed each child practise these extensively.

The method achieved a degree of success where the pupil was allowed to continue practising without interruption right up to the school test. Once they stopped practicing so intensively (two 90-minute sessions every week) performance dropped dramatically.

One special case springs readily to mind. The boy in question, whom I will call Peter, was experiencing major difficulties, and a transfer to a special needs school for children with learning disabilities seemed inevitable in the near future if his performance in arithmetic did not improve.

We were simultaneously working with our dyslexia concept to improve Peter's performance in German. Peter was receiving individual assistance in mathematics from a primary teacher who worked intensively and extremely conscientiously with him, but to no avail. Despite all these efforts, Peter was sent to the special needs school. The conventional approach of providing additional tuition in mathematics to familiarise Peter with numbers and arithmetical processes had failed in his case.

Nevertheless, I thought, an understanding of numbers is unquestionably of significant importance and, indeed, a prerequisite for learning mathematics! As with *letters* in the case of dyslexia, *numbers* should be imprinted through the senses of sight, hearing and touch by children suffering from *dyscalculia*.

So we got down to work and introduced arithmetic games into our lessons. The children played with colourful pictures, game templates and number cubes. Fractions and percentage calculations were illustrated using media such as the segments of a circle. The children employed the same principle to assemble geometric shapes. Numbers themselves were taken apart and reassembled, added, subtracted, multiplied and divided in a playful manner. Flashcards were used in an attempt to help the children learn their multiplication tables.

The children played and played with numbers and the four basic arithmetic operations, visibly enjoying this form of "tuition" very much indeed. Parents supported our efforts and were relieved to see that their offspring was finally having fun with maths.

Results achieved at the proper school improved somewhat, but unfortunately still left a lot to be desired! The "harvest" was disappointing, even though we had taken apart, combined and reassembled numbers in a descriptive and playful manner with the children. When the children stopped attending extra tuition at our school, their results deteriorated either immediately or by degrees. Again, it seemed that the children had failed to gain a firm grasp of numbers.

The causes of dyscalculia

I continued my research, once again consulting Dr Held's paper on the developmental phases of childhood. Motor skills, speech and the ability to read and write are all biological functions whose efficiency depends on the maturity of the individual brain region responsible for the execution of the specific activity.

We knew that, in the case of dyslexia, that the brain's reading and writing center needs to be continually fed with the simplest unit of writing (that is letters) through the senses of sight, hearing and touch if this region is to develop and mature completely.

The real problem associated with dyscalculia is similar to that encountered in relation to dyslexia: numerous mistakes – despite the child's improved knowledge! It therefore stands to reason that dyscalculia must also relate to immaturity of the center for computation in the brain. The next question was obvious.

If tackling numbers in itself cannot ensure numeracy, what exactly is *behind* the numbers? The answer: quantities!

A specific *quantity* is to be found behind every number (or, more precisely, every digit), and this value is an abstract representation of this quantity.

Having thought this through, I was convinced we were on the right track. The next question I posed addressed the failure of children with dyscalculia to relate to abstract numbers which, depending on the culture involved, are illustrated by a variety of symbols. The Romans used a capital X to represent the number 10.

So: associating the figures 1 and 0 with the quantity 10 is by no means obvious or self-evident. This connection must first be established in a child's brain. In other words: The prerequisite for establishing this connection is that center for computation has to be biologically mature!

Matters become extremely difficult for these children if playing or working with quantities is only sporadically addressed or, indeed, never offered in the first class. In this case a child with pronounced dyscalculia is immediately at a grave disadvantage. A clear indication of this is the instinctive tendency of these children to use their fingers as an aid when transforming abstract numbers sequentially into quantities. This enables them to count correctly.

Dyscalculia: Cause and Resolution

A biologically "immature" center for computation in the brain is underdeveloped. This functional weakness prevents it from linking *quantities* to abstract *numbers*. The numerous arithmetic mistakes made by these children reflect the severity of this immaturity.

Conclusion: The calculating center of the child's brain will only mature if it is fed with individual quantities via the senses of sight, hearing and touch. Children will only learn to calculate without continually making mistakes subsequent to this brain region maturing. In other words, tuition should consist exclusively of quantity counting games.

The solution: games linking quantities with numerals

"Thinking techniques" are of no help, as the problem results from a lack of maturity of the brain's center for computation. A "curative" educational method is required that employs suitable materials which ensure that children can count and calculate in the entire number range from one to 100.

We therefore introduced quantity games such as Ludo to lessons. When it came to the four basic arithmetic operations, the children had to count the quantity in each case, repeating this continually. The response was extremely good, as all the children seemed to instinctively sense that these games could help them. We also introduced many other games which involved the children linking quantities to numbers using all their senses.

The results achieved were immensely gratifying for us, the children and their parents, because the children were finally able to *learn arithmetic properly*. Even after dyscalculia training ended at the *Kennedy Tutorial School*, the children continued to perform very well over an extended period of time. Many of them managed to make it to lower and even higher-level secondary schools. It is not unusual for former pupils to register their children with us for the same course(s).

How children can practise games with quantities

The approach is very easy – for both you and your child. You merely have to allow your child to count freely selected quantities up to one hundred. You can also do this in the form of a game, using dice as in, for example, Ludo. If, for example, your child throws a six, it moves its token forward six squares, counting as it does so: 1, 2, 3, 4, 5, 6. But what happens during this? Let's slow things down and take a closer look at the procedure, step by step.

Sight

On throwing a six, your child *visually* registers the six dots on the dice. These impulses are transmitted via the visual center to the center for numerical calculations where they are memorised.

Touch

Allow your child to count the six dots on the dice by running their index finger over them. They will also memorise these in the calculating center via the motor function. Quite a few children cannot visually memorise and recognise the six dots in a single attempt, so counting the individual dots is necessary. When your child then moves their token on six squares, counting these individually as they do so, the motor-center of the brain transmits these six impulses to the center for computation where they are then memorised and over time *imprinted*.

Sound

When your child counts 1, 2, 3, 4, 5, 6 out loud the six separate sound impulses are transferred via the center for hearing onto the center for computation

In other words, you are ensuring that your child *imprints* the quantity six completely over time using the senses of sight, hearing and touch *and* then links this automatically to the name of the number symbol – which is six in this case.

Please note that this memorising process is not a passive procedure. These impulses stimulate the brain cells, leading to stimulation of the synapses (nerve endings). These in turn then develop and grow further according to the (genetic) extent intended by nature until, eventually, the brain center matures fully.

All other participants profit whilst playing. They also memorise the six via their sense of sight and hearing – not of touch because it’s not their turn. But they also see the dots on the dice and the six moves on the board, and they hear the numbers one to six when they are called out individually by another player.

The game Yahtzee also ensures that your child repeatedly sees quantities and can count also using his finger, out loud.

On the other hand, Monopoly is less useful in this regard and should be avoided. Although children play with dice and tokens, much of the game also involves paper banknotes. A one-hundred-dollar note (or any other currency) is just *one* banknote that represents the abstract value of 100. It is best to put this game to one side for the moment, as there is a definite risk of slipping from concrete counting into abstract symbols. *Beware!* This will only divert you from concentrating on the quantities that your child desperately needs!

The crucial point here is to achieve targeted stimulation of the brain center for computation via the senses until this center (biologically) matures. Perhaps the better term for dyscalculia is the scientific one: *Developmental Dyscalculia*.

As with dyslexia, your child should practise for *20 minutes every day without exception*. The reward for this effort is that your child can carry out the four basic arithmetic combinations reliably and independently; and do his or her homework without your help. This we know.

Your child can also imprint quantities *without* a board game and dice, practising arithmetic in a wholly *concrete* fashion.

Exercises and games with pebbles for counting up to 100

In order to do this, you will need a quantity of pebbles, buttons or Lego bricks. Only quantities are counted here – nothing else.

This means that your child should lay down the appropriate quantity of pebbles in horizontal rows and groups, and in rows and columns for multiplication and division, all the while calling out the names of the numbers.

They place the pebbles together or *divide* the groups for every arithmetic operation, speaking out the names of the numbers during this. This anchors the respective quantities firmly in the brain via the senses, namely sight, hearing and touch.

A few examples clearly demonstrate how this works. In these, each x represents a pebble, Lego brick or button.

1. Addition 4 + 9:

xxxx + xxxxxxxxx = 13

Your child should therefore add 9 pebbles to the 4.

2. Subtraction 15 – 8:

xxxxx xxxxx xxxxx – xxxxx xxx = 7

Your child should subtract 8 pebbles from the 15 with his hand.

3. Multiplication 4 x 3:

xxxx xxxx xxxx = 12

4. Multiplication rows (for example multiplication table for 5)**:**

xxxxx

xxxxx xxxxx

xxxxx xxxxx xxxxx

In this example, have your child place pebbles representing the multiplication table for 5 from the one to the 10, each row below the other – as shown above.

After completion, ask questions such as, what is 3 x 5?

- ✓ Allow your child to count rows one to three first (from top to bottom)
- ✓ And in the third row then count from left to right.

5. **Division 15 ÷ 3**

xxxxxxxxxxxxxxx

Your child counts out 15 pebbles then forms three groups from this quantity, each consisting of five pebbles:

xxxxx xxxxx xxxxx

A tip for you: Always have your child form *rows of 10* if they need to lay down the answer to addition tasks. This will make crossing the ten's boundary visible. For example, take 19 + 5. The solution is then as follows:

xxxxxxxxxx

xxxxxxxxxx

xxxx

You can enhance the attractiveness of this quantity exercise further if you use gummy bears or jelly babies – which your child can then eat at the end of the 20-minute exercise time!

Combine this exercise over and again with the other games. Continue practising multiplication tables like this until your child knows these by heart, and alternate between laying quantities and learning by rote. The emphasis should always be on *laying out* quantities.

How to introduce quantity games and exercises

Understandably enough, you may face some resistance from your child during this process. The older your child is, the more they will feel compromised. After all, no child likes to hear that they need to start right from the beginning again and count quantities with their index finger every day!

React in a positive manner to any objections:

“I know you think these exercises are for babies. But the goal is to imprint the *quantities* behind the numbers even deeper and more firmly in your memory-bank. This has nothing to do with your intelligence or your age. If you play these games regularly, you'll be able to count well and you'll get better marks! Come on, we can do it together. Let's get started!”

This style of reasoning is particularly effective with pro-actively motivated children. Another approach should be adopted for defensively motivated kids:

“You Know, Claire, you’re like a beautiful tree – the problem is that your roots are just not growing down deep enough into the soil. These games and exercises will help your math-roots grow better and anchor you deeper in the earth, then you'll reach up to the heavens and be covered in pretty blossoms, just the way your spirit is meant to be.”

Our experience shows that your child will cooperate if you and your family are all committed to this approach.

How to master your child's dyslexia and dyscalculia at home

You will need to practise for 20 minutes every day laying quantities and linking these to numbers to achieve good results. Together with typing training and alphabet games, this means 40 minutes at least five times a week (daily is optimal). This may sound like a lot, but the pay-off is that *you can save time* elsewhere.

Up until now, maths homework has meant you spending a lot of time laboriously “solving” problems together with your child. Despite this, your child continually fails to grasp the subject, so really the whole exercise is a waste of time, entirely ineffective and frustrating for all involved. Or: your child learns by rote and, as soon as they stop, down go the grades!

The best approach is to show your child how to solve the problems right at the beginning of homework! They then write down the solutions, or copy *your* solutions which *you* have arrived at in *discussion* with your child. This allows you to kill *three* birds with the same stone. Firstly, the homework is done and the teacher is happy. Secondly, you gain time to do the quantity and alphabet exercises and, thirdly, your child has time to play afterwards.

Find out if a regulation relating to “equalisation of advantage” for dyscalculia applies where you live and, if so, request that it be applied to your child at school. This rule ensures that caution is exercised when assessing marks for your child in mathematics if a school transfer is being considered.

Contact the school and try to convince the teacher through a motivational dialogue to use this method for your child so that he can support you and urge your child to continue with quantity games and exercises at home.

How you know your child is improving

In the case of severely pronounced dyscalculia, children frequently cannot identify the six dots on a dice in a single attempt. However, their ability to achieve this improves increasingly over time. We have also observed that children who always use their fingers to count gradually desist from relying on this aid, simply because their ability to do mental arithmetic improves.

Their success at crossing the “tens boundary” becomes increasingly better, even where higher numbers are involved.

The number of mistakes is a sure indication. The number made usually decreases small step by step and, also over time, they become increasingly confident in using multiplication tables. While reliably retaining and reciting sequences, they also know how to apply tables correctly, including for division and calculating fractions.

Last but not least, children improve at solving text exercises (provided they do not suffer from a reading disability).

But this (developmental) training requires time and, as with dyslexia, children should practise regularly for at least a year. Our experience shows that initial improvements are evident after four weeks. It is important for both you and your child that you take note of even the slightest progress and point this out to your child.

“Mama, I got a 6 again in mathematics!”

“That's a pity, you've been working so hard lately. But it's not all bad. Look, you solved the first two problems correctly. Well done!! You'll see that if you keep at it things will get even better!”