

Practical ways to support dyslexic and dyscalculic learners with maths



Maths Difficulties

- Dyslexia?
- Dyscalculia?
- Maths Anxiety?

Dyslexia

- Phonological Awareness
- Processing Speed
- Memory
- Organisation

Mathematical Difficulties Dyslexics Experience

- Sequencing
- Processing Speed
- Poor short term memory
- Poor long term memory for retaining number facts and procedures, leading to poor numeracy skills
- Reading word problems

- Substituting names that begin with the same letter
e.g. integer/integral, diameter/diagram
- Remembering and retrieving specialised mathematical vocabulary
- Copying errors
- Frequent loss of place
- Presentation of work on the page
- Visual perception and reversals
E.G. 3/E or 2/5 or +/x

Strategies to help

- Prompt cards
- Aperture cards
- Arrows/Colour to highlight direction
- Encourage visualisation- CPA
- Limit copying
- More time
- Scaffolding
- Overlearning

Dyscalculia

Mathematics Disorder:

"as measured by a standardised test that is given individually, the person's **mathematical ability is substantially less than would be expected** from the person's age, intelligence and education. This deficiency materially **impedes academic achievement or daily living**" **DSM IV**

The National Numeracy Strategy DfES (2001)

Dyscalculia is a condition that affects the ability to **acquire** arithmetical skills. Dyscalculic learners may have **difficulty understanding simple number concepts, lack an intuitive grasp of numbers,** and have problems **learning number facts and procedures.** Even if they produce a correct answer or use a correct method, they may do so mechanically and **without confidence**

Indicators of Dyscalculia

An inability to subitise even very small quantities

Poor number sense

Inability to generalise

An inability to estimate whether a numerical answer is reasonable

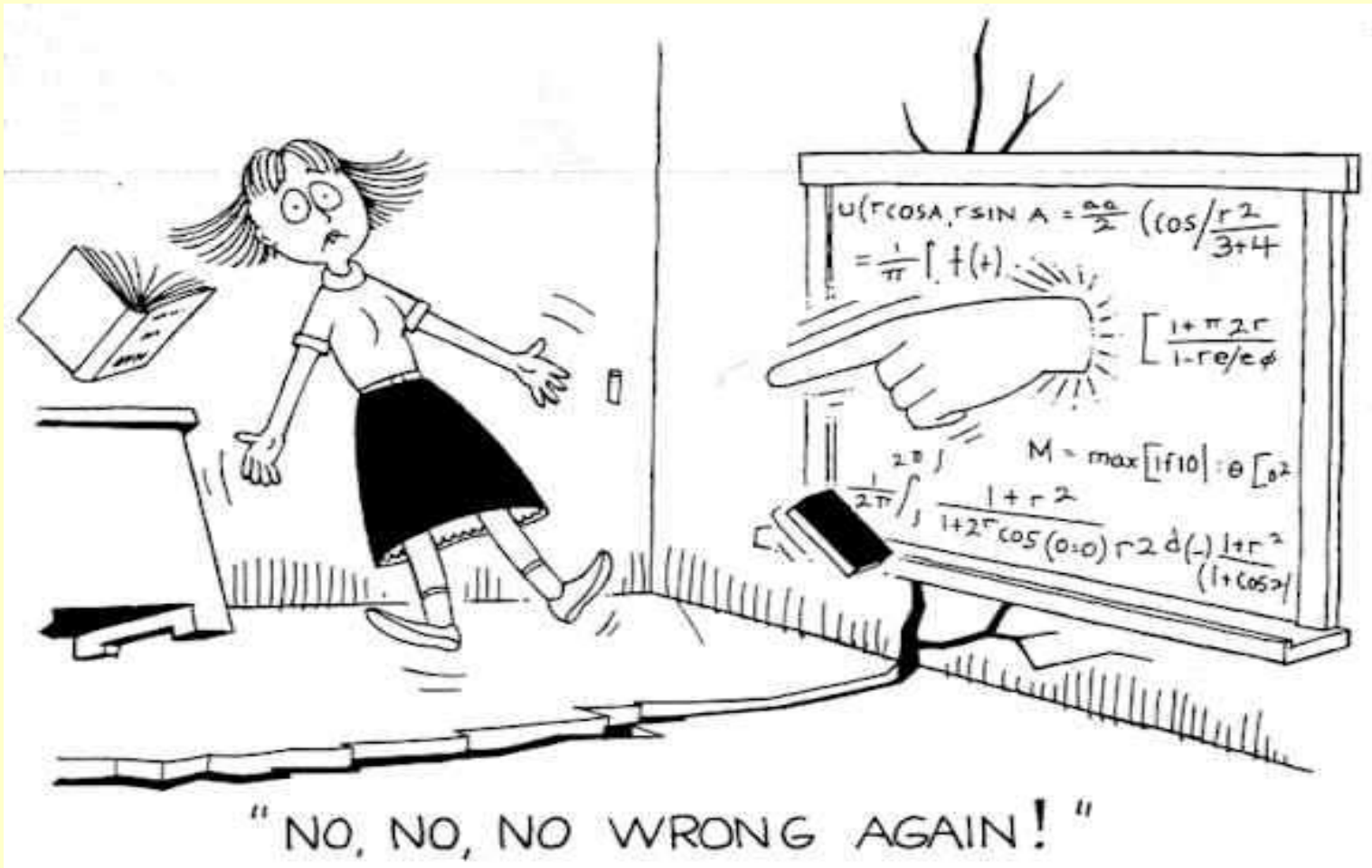
Immature strategies- for example counting all instead of counting on

Remembering number facts

An inability to count backwards reliably

Inability to notice patterns

Math Anxiety



Techniques to overcome Maths anxiety

David Sheffield , University of Derby

- Short targeted intervention- 20 minutes for 5 days
- Writing down your worries- based on Emotion Regulation Theory (Klein and Boals 2001)
- Reappraisal of anxiety- Beltzer, Nock, Peter and Jamieson (2014)

Deep breathing/Slow breathing

Imagining Safe place

Humour

Dyscalculia : Subitising



Using Dot Patterns

Dot patterns bridge the gap between concrete and abstract work

Will help develop a sense of number

Will help develop the concept of conservation of number

Can be linked to familiar patterns eg dice or dominoes

Key facts and Derived facts


- Consider the UK money system
- 1p, 2p, 5p and 10p
- Why have we chosen these amounts?





Key Facts

- Key Facts are the 'easy know' facts

The same for every times table

- $2 \times n =$ 

- $5 \times n =$ 

- $10 \times n =$ 

Key facts

Multiplication by repeated addition

The 'Key Facts' are: 1x 2x 5x 10x

$$3 \times 8 = 8 + 8 + 8$$

1 x8 and 2x8

$$6 \times 8 = 8 + 8 + 8 + 8 + 8 + 8$$

1x8 and 5x8

$$7 \times 8 = 8 + 8 + 8 + 8 + 8 + 8 + 8$$

2x8 and 5x8

$$12 \times 8 = 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8$$

2x8 and 10x8

Derived facts

If we know that $5+5=10$ then what else can we derive from this?

$$50+50=100$$

$$5+6=11$$

$$5+4=9$$

Derived Facts

72 students aged 7 – 13 years... addition

Above average:

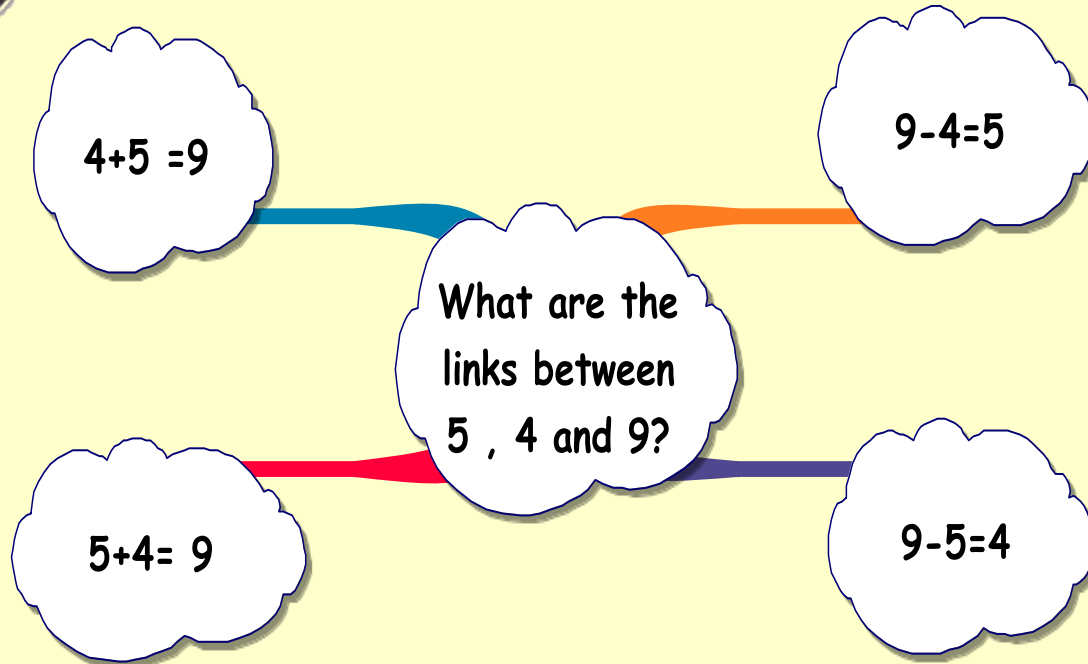
- 9% counted on
- 30% known facts
- 61% derived facts

Below average:

- 72% counted on
- 22% counted all
- 6% known facts
- 0% derived facts

Gray and Tall. 1994. University of Warwick

Making Links



Sharma

Four major principles for teaching

1. Use of Appropriate Concrete Models



2. Levels of Knowing Mathematical Ideas

3. The Three Components of a Mathematical Idea

4 The Questioning Technique

Professor Sharma Berkshire Mathematics



1. Use of Appropriate Concrete Models

For early mathematical concepts, it is important that a child experiences mathematics through appropriate and efficient learning models.

Cuisenaire rods, base 10 materials and the Invicta Balance provide appropriate models for these concepts.



Judy Hornigold



2. Levels of Knowing Mathematical Ideas

Intuitive

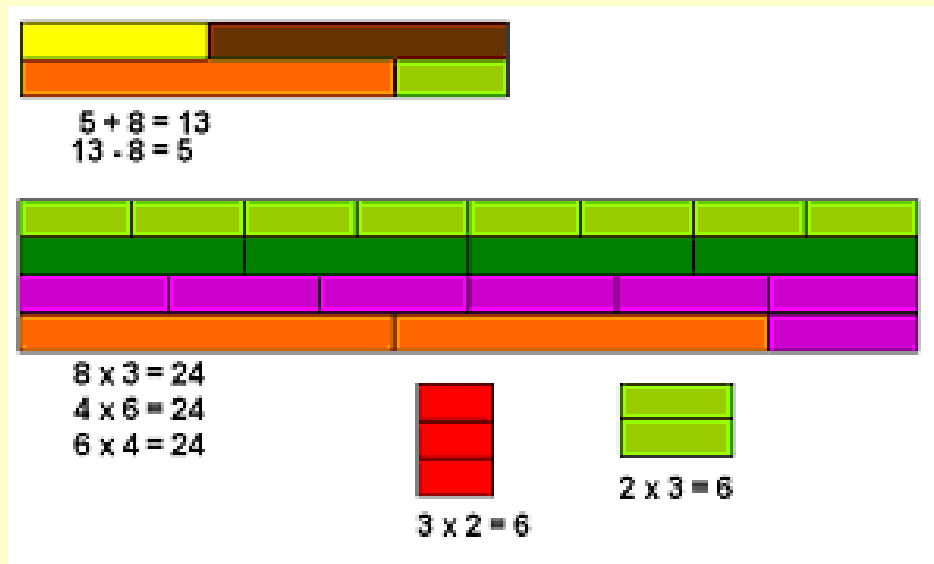
Concrete

Pictorial

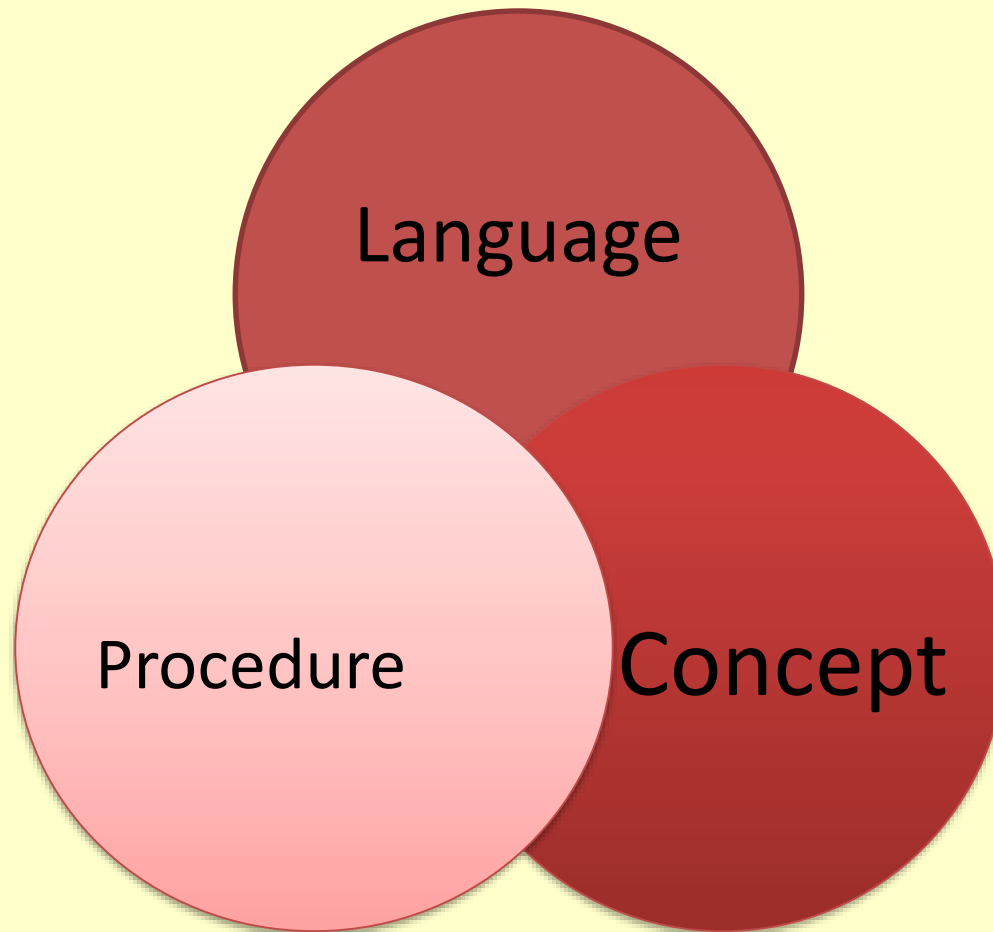
Abstract

Applications

Communication



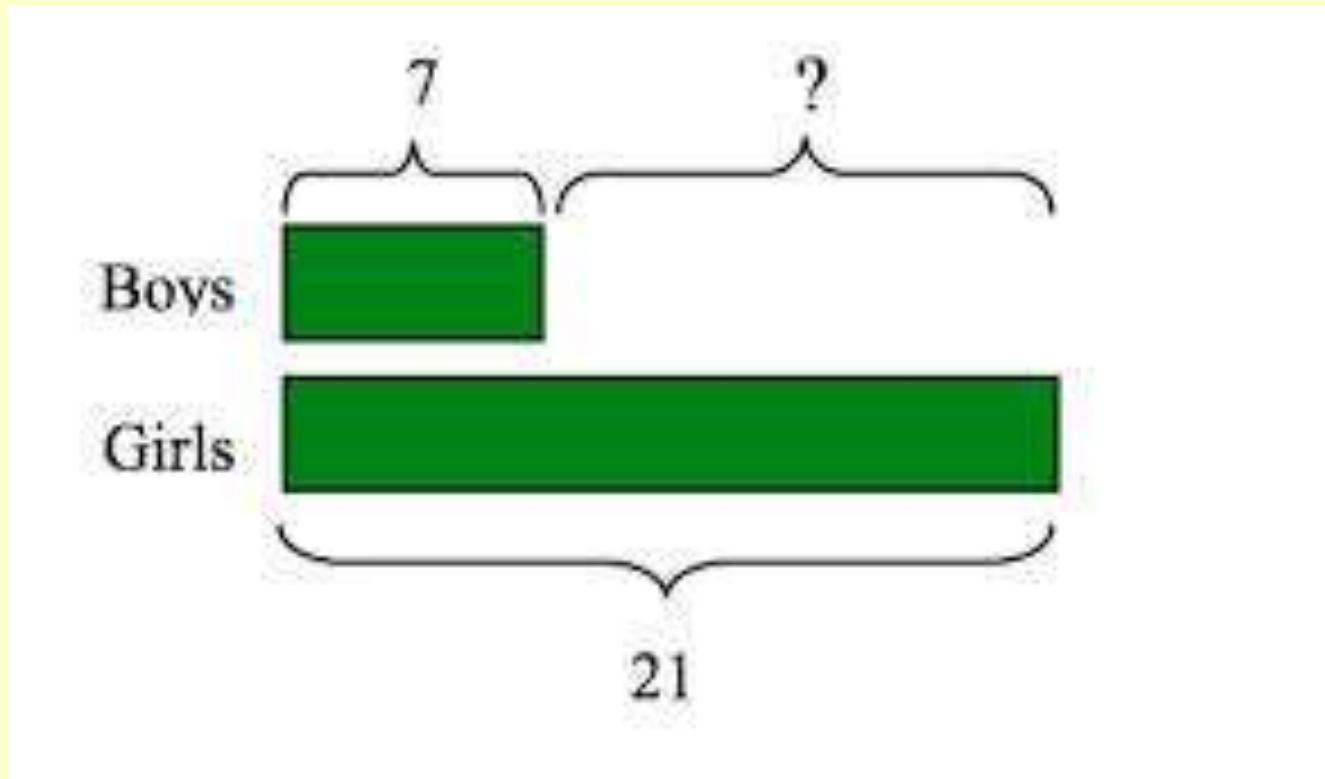
3. The Three Components of a Mathematical Idea



Using mathematical language

- Can we translate from Maths into English?
- Can we translate from English into Maths?

Bar Modelling



When solving word problems, it is often not the calculation that children can't do – rather they are not sure which calculation they need to do.

(NCETM, 2013)

Larry and Mary Problem

Larry has 3 times as much money as Mary.
Together that have £120. How much money does
Larry have?

Common Misconception

Do we need to divide 120 by 3 ?

Do we need to divide 120 by 4? Why?

Before and After Problem

Sam had 5 times as many marbles as Tom. If Sam gives 26 marbles to Tom, the two friends will have exactly the same amount.

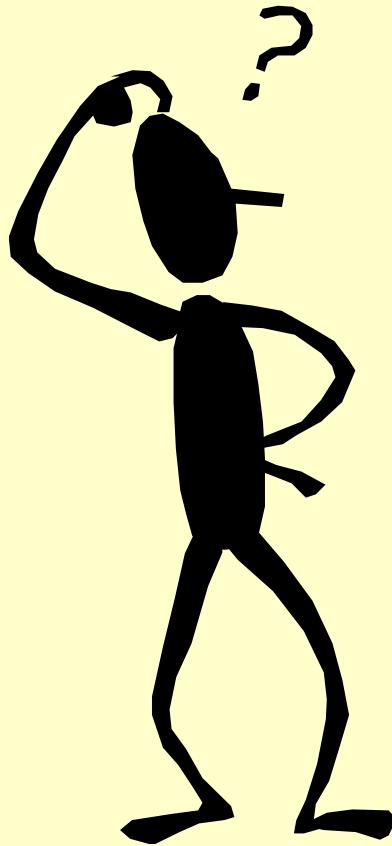
How many marbles do they have altogether?



Summary

- Multisensory
- Visualisation
- Concrete Pictorial Abstract
- Language
- Overlearning
- Key facts and derived facts
- Bar Modelling

Any Questions?



Judy Hornigold