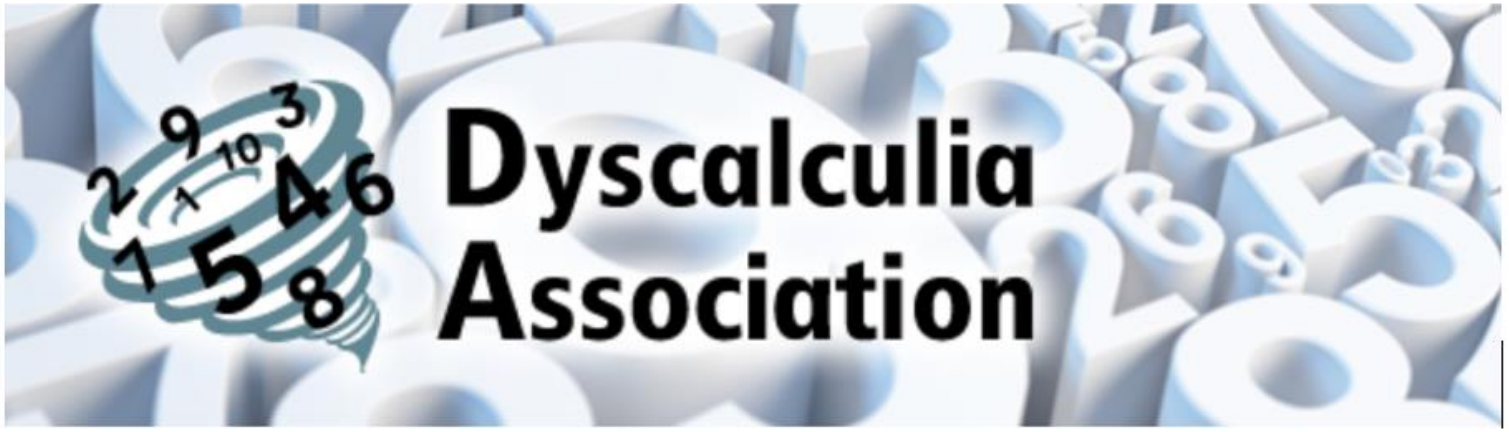


Level 3 and Level 5 Certificate in

Dyscalculia and Mathematical Learning Difficulties: Identification and Intervention

A Practical and Pragmatic Teacher Training Course.

ocn
Credit4Learning

Dyscalculia Association

Session 2

Definitions and Descriptions

Content Overview

- Maths Learning Difficulties and Dyscalculia.
- Definitions and descriptions.
- Co-occurring conditions

General Difficulties or Dyscalculia?

Where does one end and the other begin?

Line Rothmann

https://www.youtube.com/watch?v=rlPFv_EDnvY&t=47s

Definitions

BDA and SASC Dyscalculia Definition

Dyscalculia is a specific and persistent difficulty in understanding numbers which can lead to a diverse range of difficulties with mathematics. It will be unexpected in relation to age, level of education and experience and occurs across all ages and abilities.

Dyscalculia Definition continued

Mathematics difficulties are best thought of as a continuum, not a distinct category, and they have many causal factors. Dyscalculia falls at one end of the spectrum and will be distinguishable from other mathematics issues due to the severity of difficulties with number sense, including subitising, symbolic and non-symbolic magnitude comparison, and ordering. It can occur singly but can also co-occur with other specific learning difficulties, mathematics anxiety and medical conditions.

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**

American Psychiatric Association Definition (2013)

A specific learning disorder that is characterised by impairments in learning basic arithmetic facts, processing numerical magnitude and performing accurate and fluent calculations.

These difficulties must be quantifiably below what is expected for an individual's chronological age and must not be caused by poor educational or daily activities or by intellectual impairments.

DSM-IV (2000)

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 V

Specific learning disorder

A neurodevelopmental disorder of biological origin manifested in learning difficulties and problems in acquiring academic skills markedly below age level and manifested in the early school years, lasting for at least 6 months; not attributed to intellectual disabilities, developmental disorders, or neurological or motor disorders

Specify if:

- 315.00 With impairment in reading.
- 315.2 With impairment in written expression
- **315.1 With impairment in mathematics**

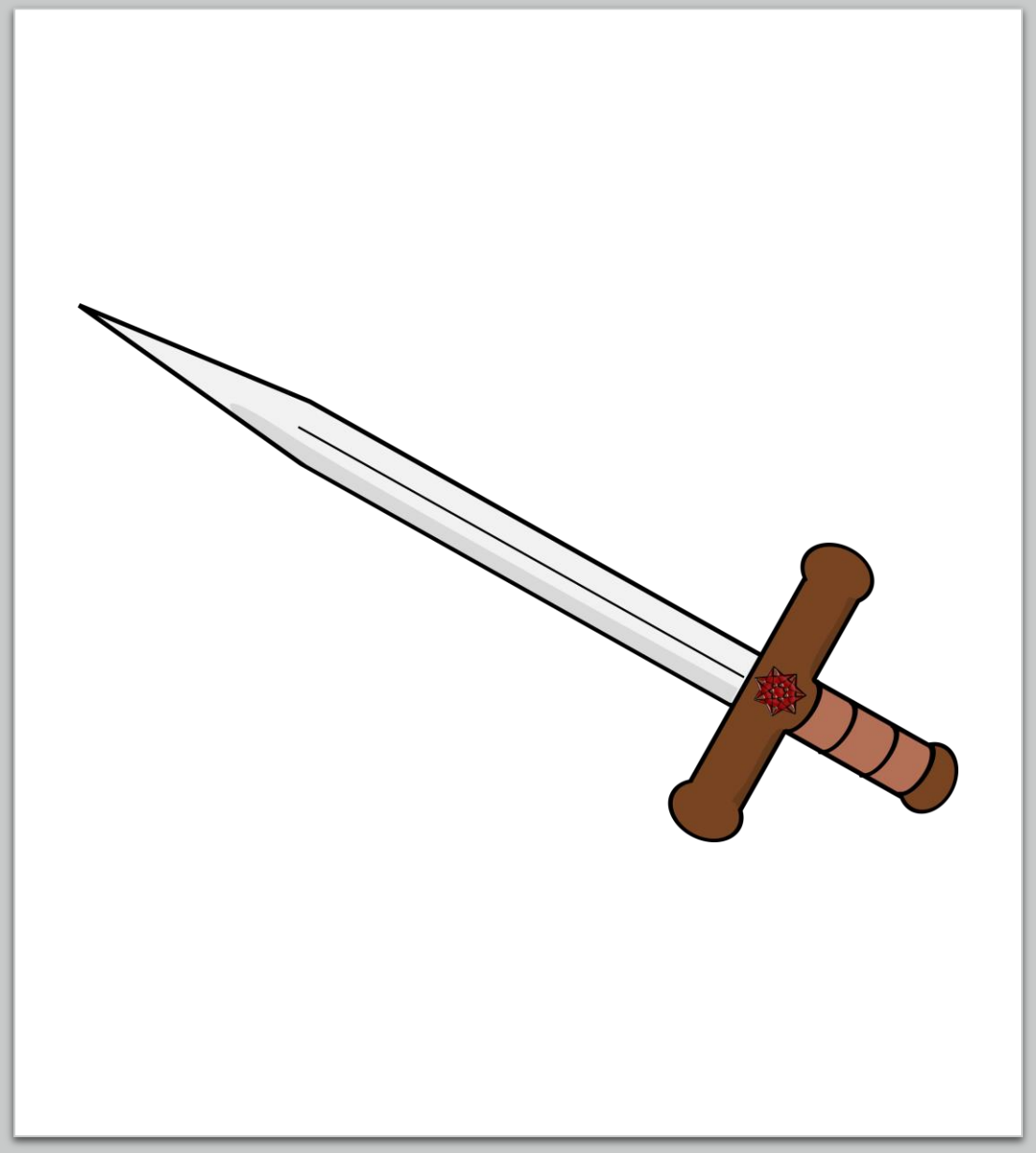
Specify current severity:

Mild
Moderate
Severe

Understanding Dyscalculia

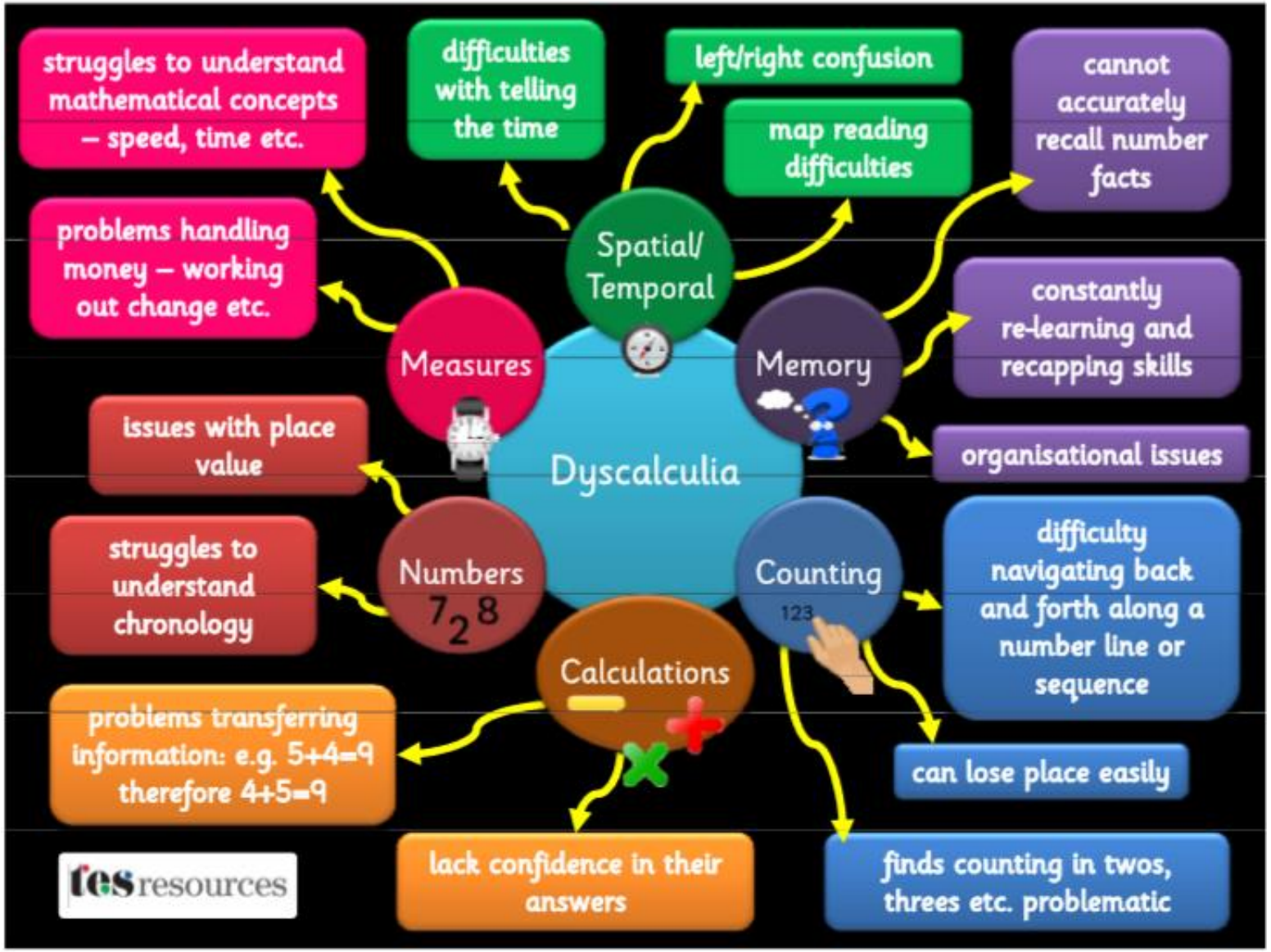
- Increased understanding/awareness?

- Double edged sword?



Dyscalculia Spectrum

Extreme	Serious	Moderate	Mild
Ordering and Comparing whole numbers under 10. Judging time and direction	Everyday tasks involving simple time and money computations and judgements, even with a calculator	Slightly more abstract concepts, such as area, volume and weight. Understanding of simple fractions and decimals	Negative numbers fractions, decimals, especially comparison. Problems with algebra


Dyscalculia
Spatial/ Temporal
Memory
Measures
Numbers
Counting
Calculations
struggles to understand mathematical concepts – speed, time etc.
difficulties with telling the time
left/right confusion
map reading difficulties
cannot accurately recall number facts
problems handling money – working out change etc.
constantly re-learning and recapping skills
organisational issues
issues with place value
struggles to understand chronology
difficulty navigating back and forth along a number line or sequence
can lose place easily
problems transferring information: e.g. 5+4=9 therefore 4+5=9
lack confidence in their answers
finds counting in twos, threes etc. problematic
resources

Identification Dyscalculia

Indicators of Dyscalculia

- An inability to subitise even very small quantities
- Poor number sense
- Magnitude processing difficulty
- Poor memory for facts and procedures
- Inability to generalise
- Immature strategies- for example counting all instead of counting on
- Working memory

Indicators of Dyscalculia (cont'd)

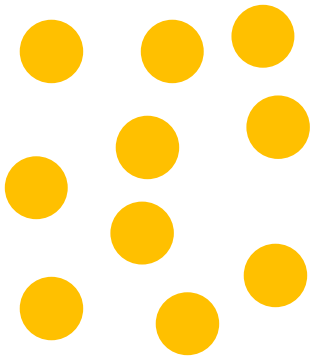
- Inability to notice patterns
- Poor estimation
- Slow processing speed
- Difficulty sequencing
- Difficulty with language
- Difficulties in word problems and multi step calculations

Key Factors in Dyscalculia

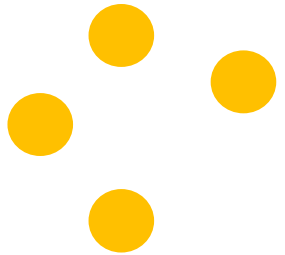
Subitising

Numerical stroop.

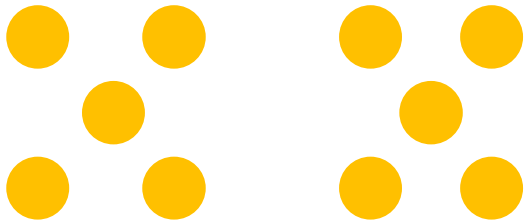
Subitising (and ….)



counting

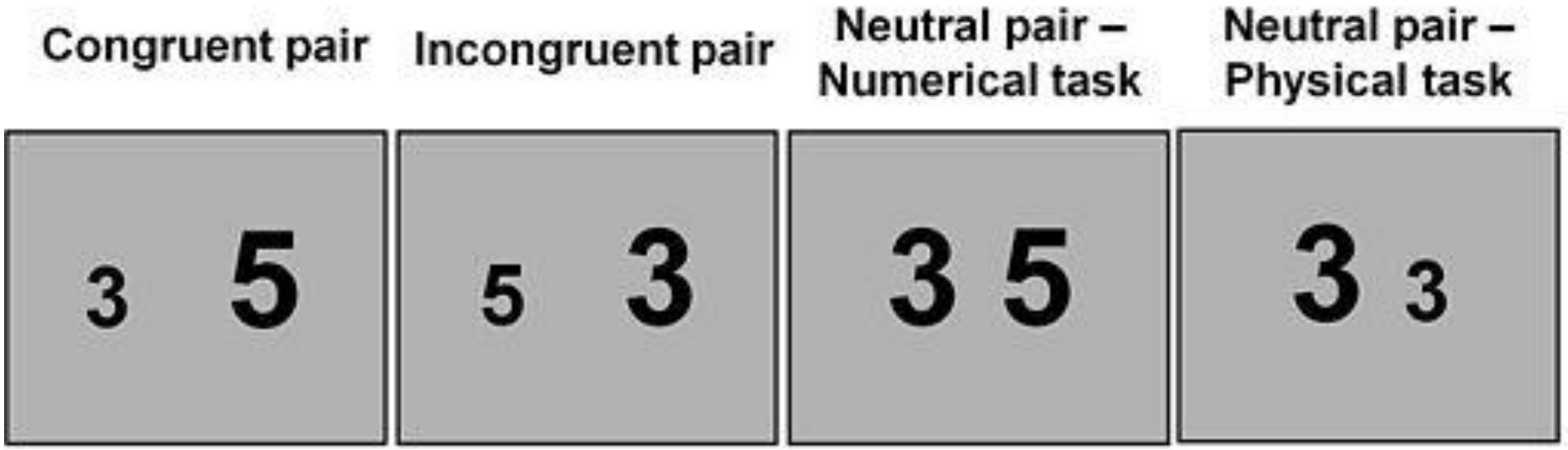


Perceptual subitising



Conceptual subitising

Numerical stroop



How many children are dyscalculic?

4-6% of the population are dyscalculic.

At least one in every class- affects boys and girls the same.

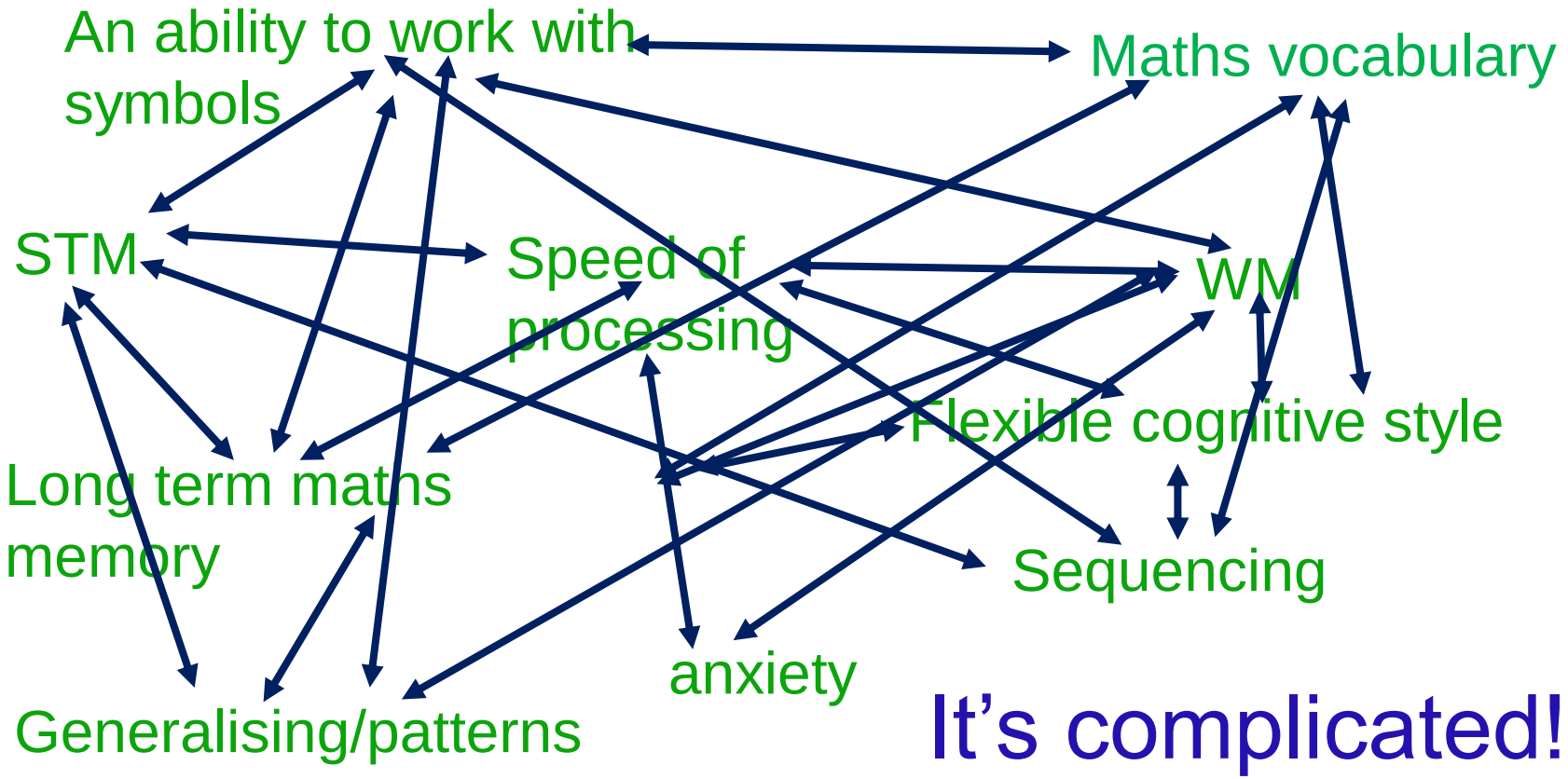
Around 6% of children in the UK have severe difficulties with numeracy

(Gross 2007)

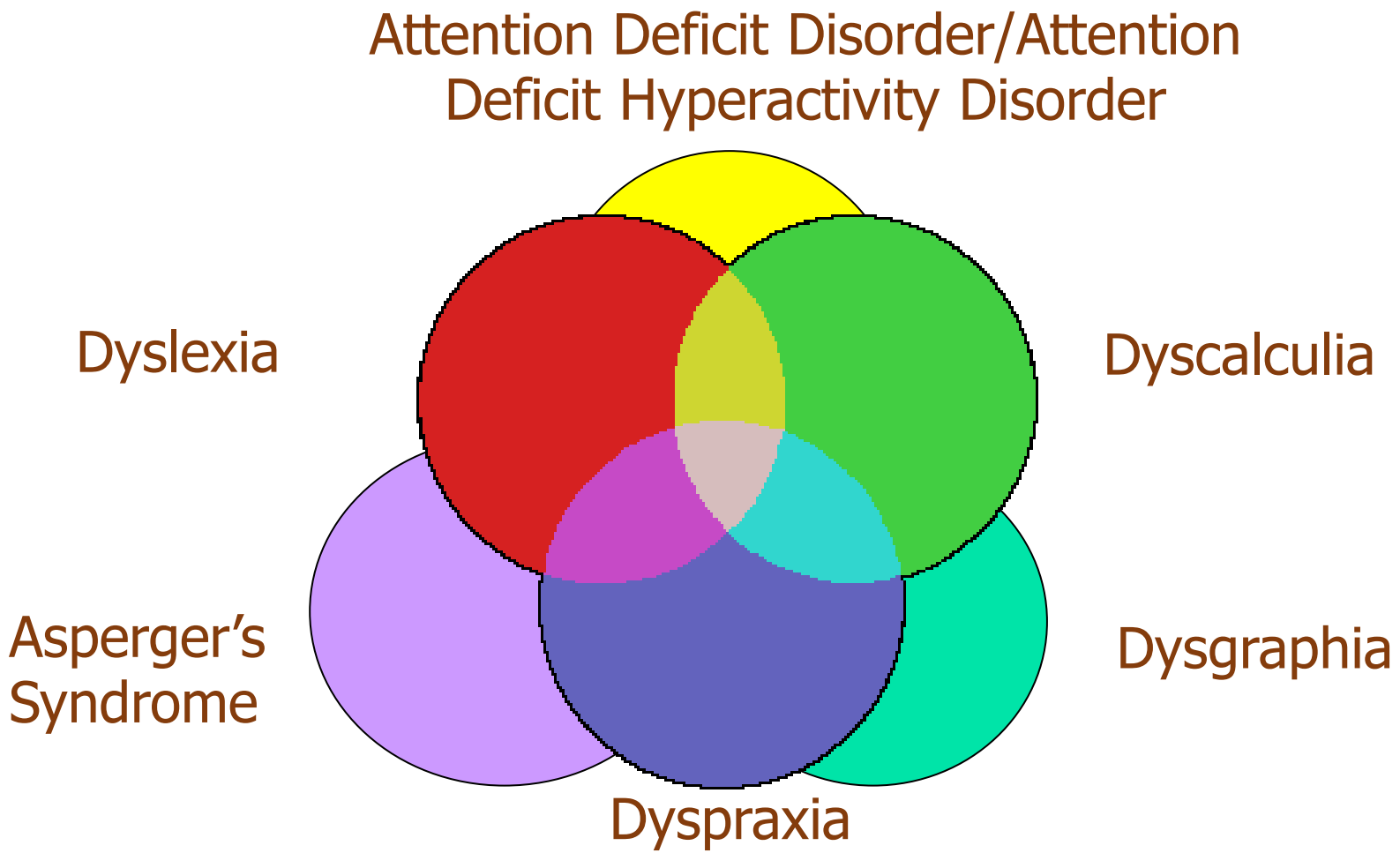
Equates to 180,000 primary school children

(DfE 2010)

Learner skills



The Overlapping Nature of Specific Learning Difficulties



Thanks to Dr Amanda Kirby, Medical Director of the Dyscovery Centre, University of Wales, Newport

Subtypes of Developmental Dyscalculia

Karagiannakis and Cooreman (2014) have identified four areas or subtypes.

Core Number

Reasoning

Memory

Visual Spatial

Core Number

Difficulties with:

- Basic number sense
- Estimating
- Assessing difference in numerical quantity
- Understanding and using mathematical symbols
- Understanding place value
- Placing numbers on a number line

Reasoning

Difficulties with:

- Understanding mathematical concepts and relationships, eg inverse operations
- Generalising and transferring information.
- Understanding multiple steps in complex procedures/algorithms
- Problem solving and decision making.

Memory

Difficulties with:

- Remembering and retrieving numerical facts.
- Understanding and recalling mathematical terminology.
- Understanding word problems .
- Performing mental calculations accurately.
- Remembering and carrying out procedures as well as rules and formulae
- Keeping track of the steps in problem solving

Visual Spatial

Difficulties with:

- Recognising and understanding symbols
- Interpreting visual representations of mathematical objects.
- Placing numbers on a number line.
- Visualising geometric figures, such as 3 D shapes
- Interpreting graphs and tables.

Dyslexia

- starts to **talk** late
- difficulty with **blending** and **segmenting** sounds
- **rhyme patterns** are hard
- reads **letter by letter** or **word by word** slowly
- forgets **sight words**
- struggles with **grammar**
- copies **letters** out of order
- forgets/loses info: **dates, names, addresses**

Dyscalculia

- starts to **count** late
- difficulty with **composing** and **decomposing** numbers
- **number patterns** are hard
- counts **tally marks** or **one by one** slowly
- forgets **math facts**
- struggles with **algorithms**
- copies **numbers** out of order
- forgets/loses info: **log ins, numbers, deadlines**

Before you go to session 3…..

Videos

- Numberphile https://www.youtube.com/watch?v=p_Hqdqe84Uc
- Daniel Ansari https://www.youtube.com/watch?v=GRJS-jeZ7Is
- https://www.youtube.com/watch?v=MM4dQ2AS3bY&t=4s

Quiz- Try the session 2 quiz.

Readings -5 suggested articles

Podcast:https://www.learningsuccessblog.com/podcast/episode-4-dyscalculia-and-fundamental-skills-needed-math

Reflect- Think about some of the learners that you work with. Do you think their difficulties are due to dyscalculia or are they more general in nature?