



## WORKING MEMORY & LEARNING DISABILITIES

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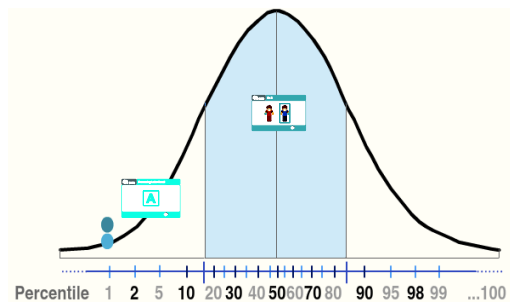
Working Memory is the  
FOUNDATION of Learning



### WM & Learning Disabilities

- WHAT is the Core Deficit?
- WHY is Working Memory is involved?
- HOW to support Working Memory?

### DYSLEXIA (READING)



### DYSLEXIA (READING)

GENERAL STRATEGIES

- Reduce working memory processing in activities
  - History timelines

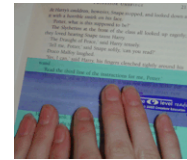
– 45 + 98  
 45  
 +98

### DYSLEXIA (READING)

GENERAL STRATEGIES

- Keep track of their place in complex activities

Rulers: reading & math problems



### DYSLEXIA (READING)

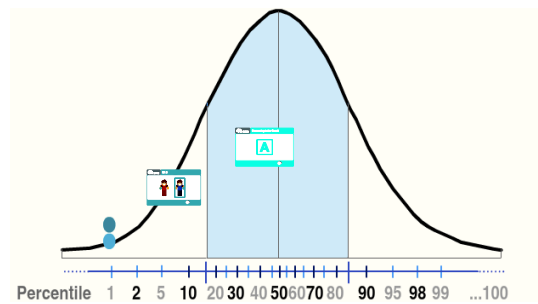
SPECIFIC STRATEGIES

- Shorten activities to reduce WM load
  - Sam worked with only 5 flowers
  - Repeated instructions just for him



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### MATH (DYSCALCULIA)



## Math (Dyscalculia)

### GENERAL STRATEGIES

- Use visual representation to support working memory

$$x^{-4} = \frac{1x^{-4}}{1} = \frac{1}{x^4}$$

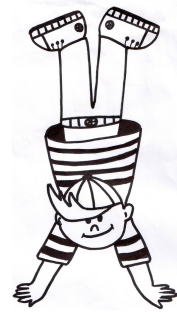
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## Math (Dyscalculia)

### GENERAL STRATEGIES

- Use visual representation to support working memory

- Algebra: negative exponents



## Math (Dyscalculia)

### SPECIFIC STRATEGIES

- Model the use of memory aids

- Number lines

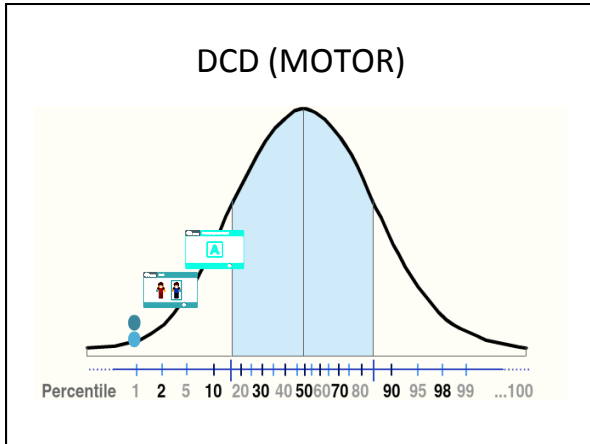


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## DCD (Motor)

- **Gross motor skills (large movements):**
  - Poor balance: Riding a bicycle
  - Poor hand-eye co-ordination: Catching a ball & batting
- **Fine motor skills (small movements):**
  - Lack of manual dexterity: using cutlery, craft work, playing musical instruments
  - Poor manipulative skills: Typing, handwriting and drawing, fastening clothes & tying shoelaces

Alloway (2006) Working Memory & Neurodevelopmental Disorders. Psy Press




- ### DCD (Motor)
- Motor skills or Working Memory = Learning difficulties?
  - Two groups:
    - High Visual-Spatial Memory
    - Low Visual-Spatial Memory
  - Motor skills: Both groups will have low learning scores
  - Working Memory: Low VS Memory group will have lower learning scores
  - Low Visual-Spatial Memory group performed worse in Reading & Math
    - Even after accounting for IQ
- Alloway (2007) J. of Experimental Child Psychology*

### DCD (Motor)

**GENERAL STRATEGIES**

- Use visual representation to support working memory
  - 5 yr old and lunchbox
  - Coloured dots to mark textbooks

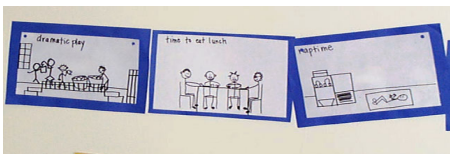


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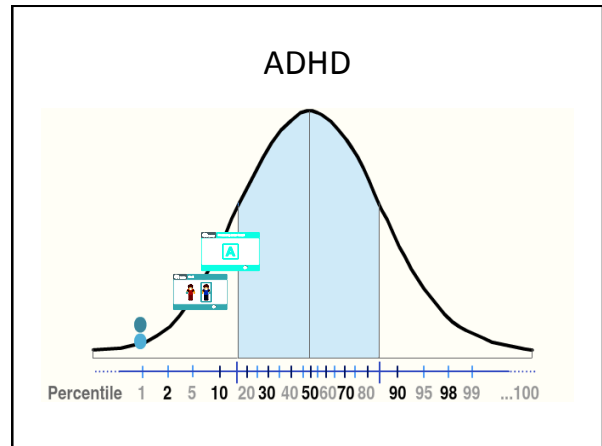
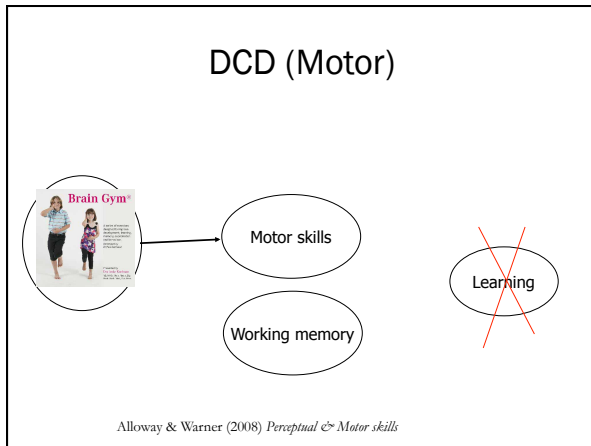
### DCD (Motor)

**GENERAL STRATEGIES**

- Use visual representation to support working memory
  - Class schedule: 3x5 cards on the desk
  - Class schedule with pictures of the textbook



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### ADHD

#### GENERAL STRATEGIES

- Shorten study periods/activities to reduce the working memory load
  - The 'U' of Memory

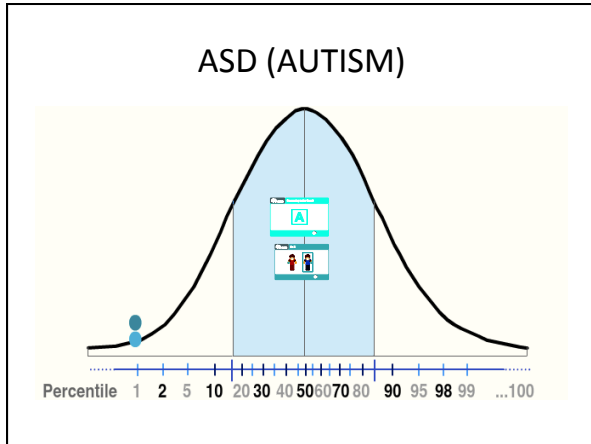
A large, light gray graphic of a U-shaped arrow that starts pointing down and then curves around to point up, symbolizing the 'U' of Memory concept.

### ADHD

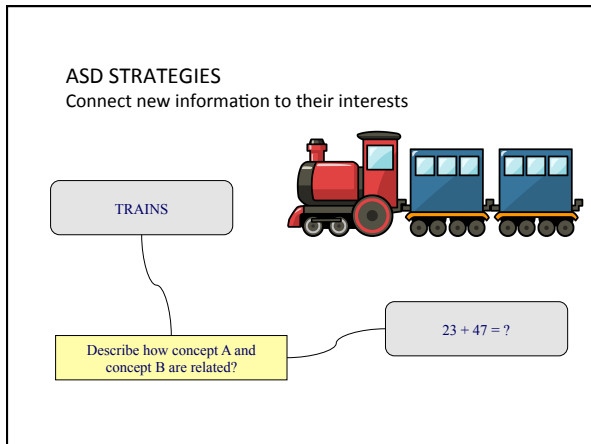
#### SPECIFIC STRATEGIES

- Reward frequently and intermittently
  - Delayed Gratification

A photograph of a small, square gift box wrapped in dark blue paper with a red and yellow ribbon tied in a bow.



- ### ASD
- Average WM yet struggle in the classroom. WHY?
  - ASD STRATEGIES
  - Minimize distractions so working memory is not overloaded
    - Move them to quiet area of classroom
    - Noise-cancelling headphones



- ### ASD
- #### ASD STRATEGIES
- Break down information to reduce working memory processing
- 1324
- Drury Lane
- Argleton
- Massachusetts

### Workshop 1:

*Do these students have a working memory problem?*

#### Adam: 12 years old

His teacher views him as a problem student. He is often restless and fidgety and has broken classroom equipment on several occasions.

His work is of a low average standard, with its' quality varying considerably from day to day. His teacher is not sure whether he will reach national average levels in assessments, although she feels sure that he has the abilities to do so.

#### George: 16 years old

He is well-behaved and popular. His IQ is in the normal range. However, his academic performance is poor in all areas and he is in the lowest ability group in literacy.

He often becomes frustrated by difficulties that he experiences, especially in writing. He does not usually participate in class discussions, and forgets what he wants to say even after he has raised his hand.

#### Olivia: 7 years old

She is outgoing and is well-liked by her classmates. Her IQ is in the high average range. She has a mature and responsible attitude, and is often chosen by her teacher to run errands.

She is in high-ability groups in both literacy and numeracy, and often helps out less able children within the group, occasionally misguiding them.

At times she is forgetful, and appears to be distracted from work. The teacher often asks her to help organize classroom activities, such as putting out art materials.