

# A Comprehensive Model for Specific Learning Disability Evaluations



**Using the *Building Blocks Brain Model of  
Development to Understand and Assess Learning  
Disabilities***

Peter Thompson, Ed.S., Ph.D.



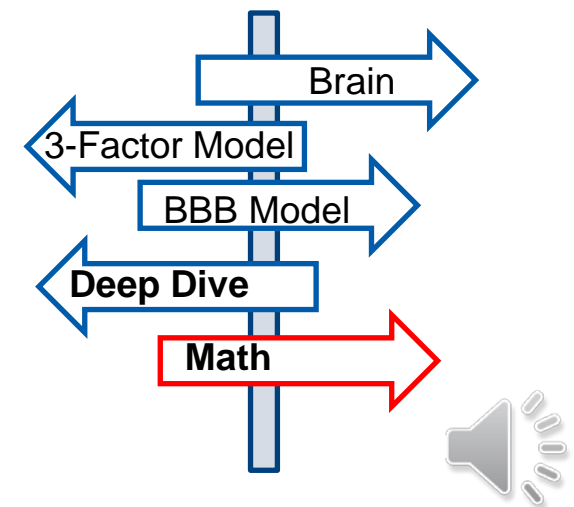


# Module: 6.2

## BBBM and Math Disorders

**Using the Building Blocks Brain Model**

**To Understand and Assess Reading Disorders**



# Learning Outcomes

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- What are the common Fundamental neurocognitive deficits related to math disorders
- What are the Higher Order blocks that are linked to math disorders



# Important Note

The information, concepts, and models provided in this presentation are intended to give practitioners a framework when conducting special education evaluations. It is emphasized that nothing in this presentation is meant to be directive or prescriptive. Professionals are free to use some, or all of the information presented, but they are not required to do so in their practice. **Always consult with your special education director for clarity around district policies and expectations for special education evaluations.**

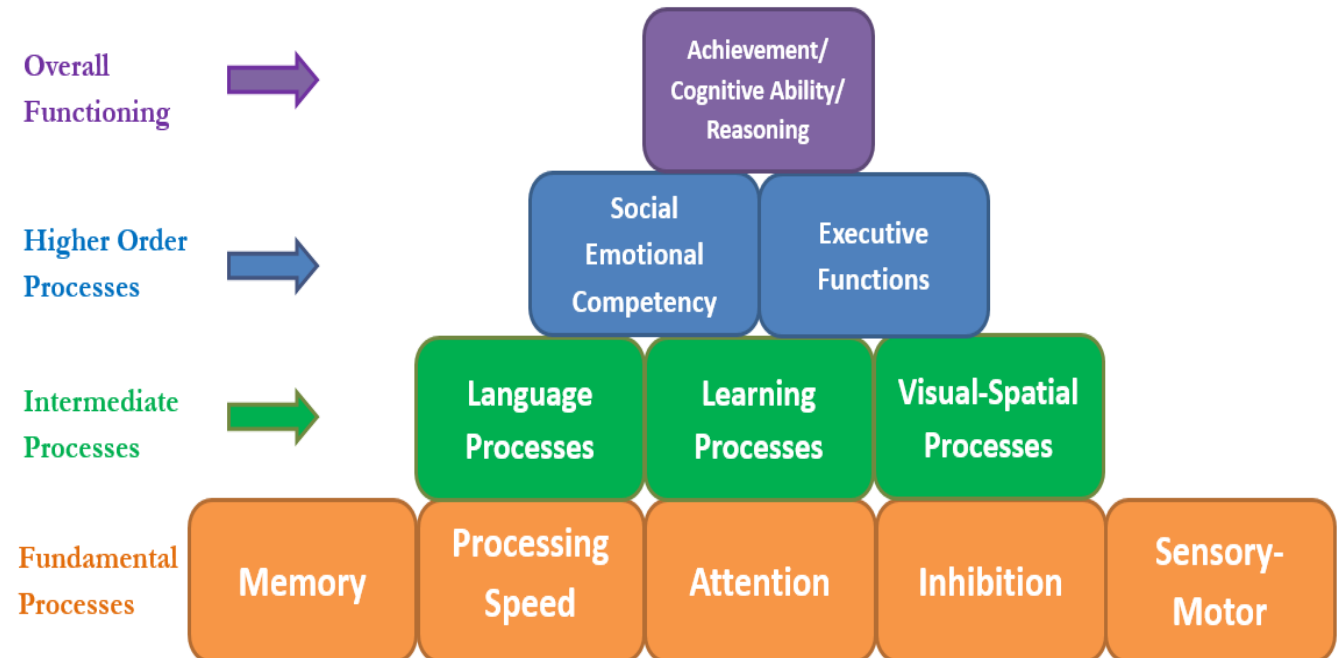


**IMPORTANT** 

## The BBBM-Review

- Each block represents a key neurocognitive function(s)
- Each level is dependent on the level below
- When all blocks are working together in seamless integration, a child makes age-appropriate progress in multiple domains of life

## Building Blocks of Brain Development and Function



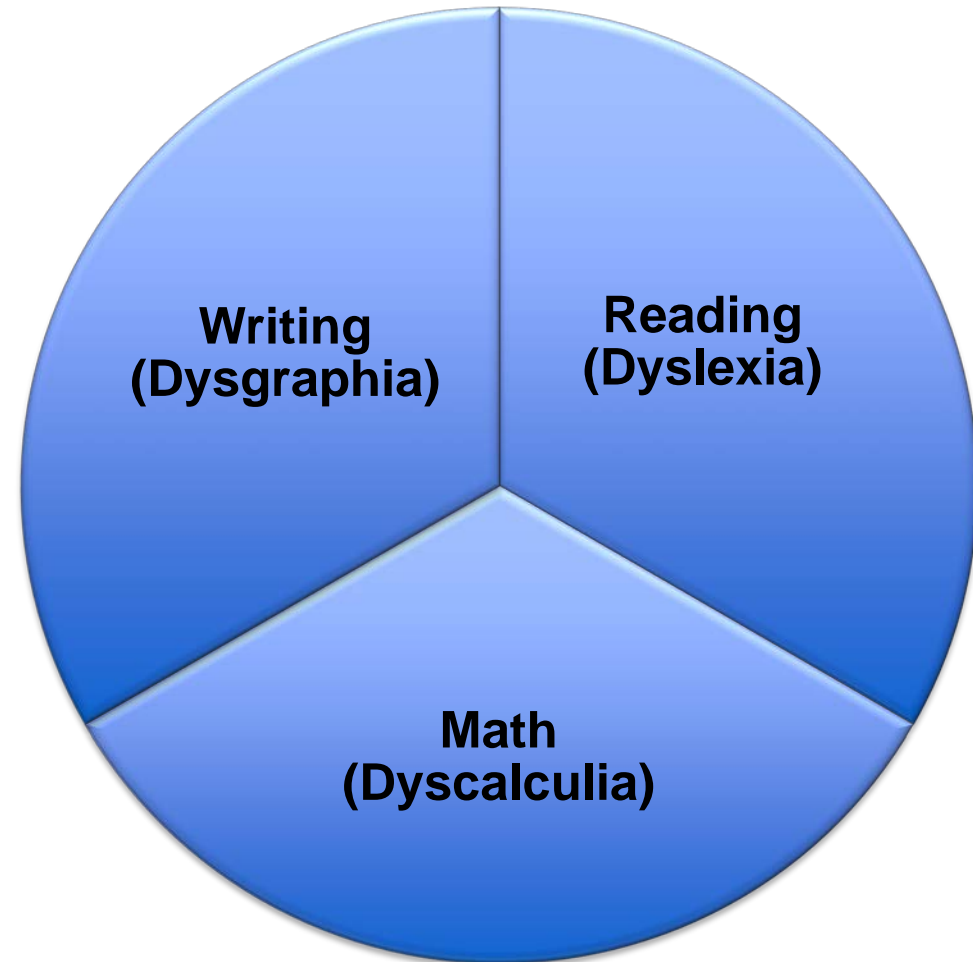
The Hierarchy of Neurocognitive Functioning © - created by Peter Thompson, Ph.D. 2013, adapted from the works of Miller 2007; Reitan and Wolfson 2004; Hale and Fiorello 2004.

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## Most Typical SLD Areas

- Most typical disorders in school are reading, writing and mathematics
- “Why” a student is failing is typically answered by finding the crack in one or more blocks at the lower level(s) of the BBBM
- BBBM can be used with other models



# Evaluation Assumptions

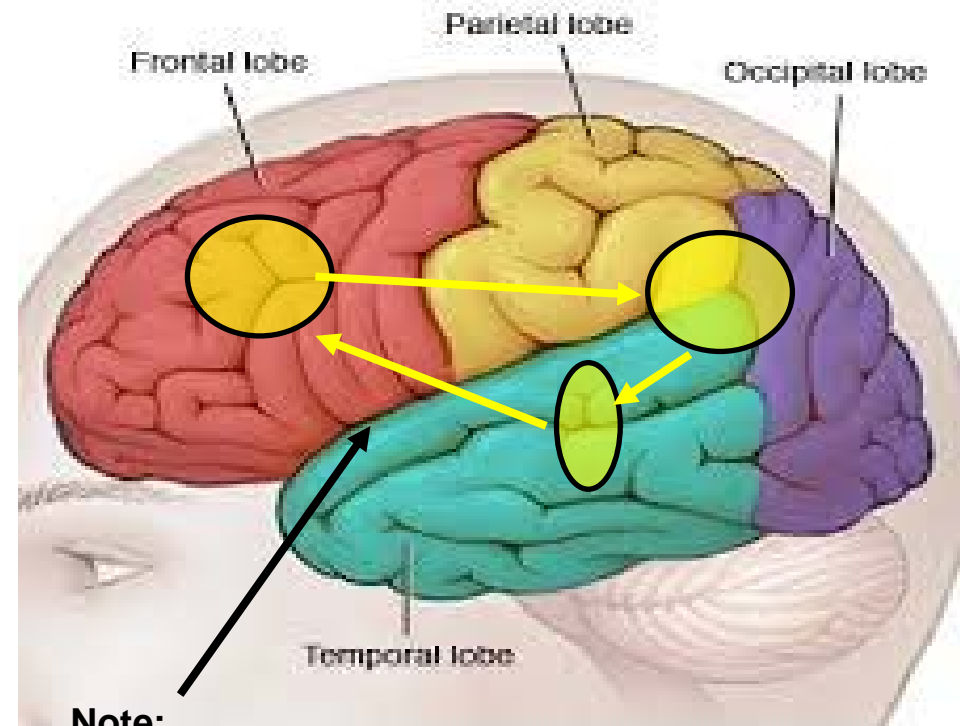
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- Student has been identified with poor achievement in math
- Student has not responded to interventions (RTI)
- Student performed below average on formal achievement / academic testing (e.g. WCJ, WIAT.)



# I. Math Brain *Circuitry*

1. **Bi-lateral** activation--Math activates multiple brain areas on both right and left side of the brain
2. **Frontal lobe**—executive functions, working memory and control information input:
3. **Crossroads** of brain—Occipital-Parietal-Temporal lobes plays key role—angular gyrus
4. **Memory** circuit—Medial Temporal Lobe

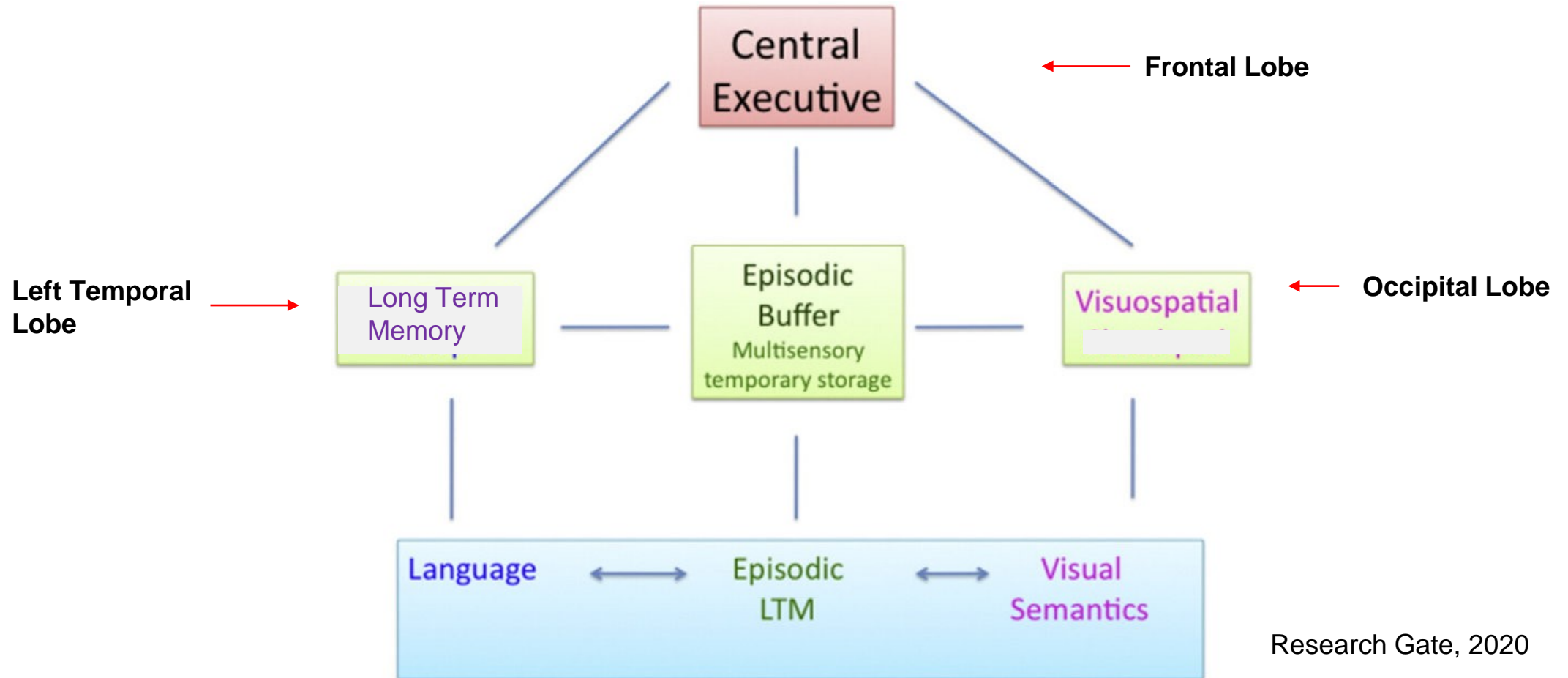


Note:  
Processing  
Speed





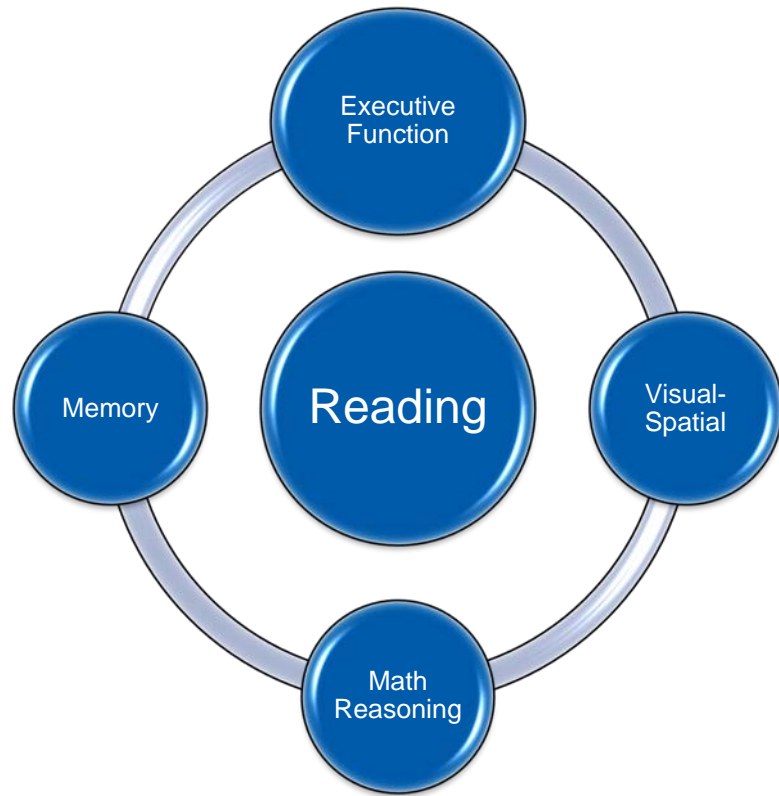
# Baddeley's Model: Explains Some Disabilities



Research Gate, 2020



# Neurocognitive Areas (BBBM Blocks) of



1. Executive Function
2. Attention
3. Memory (WM, STM, LTM, VM)
4. Processing Speed
5. Visual-Spatial
6. Learning Process (Nonverbal)

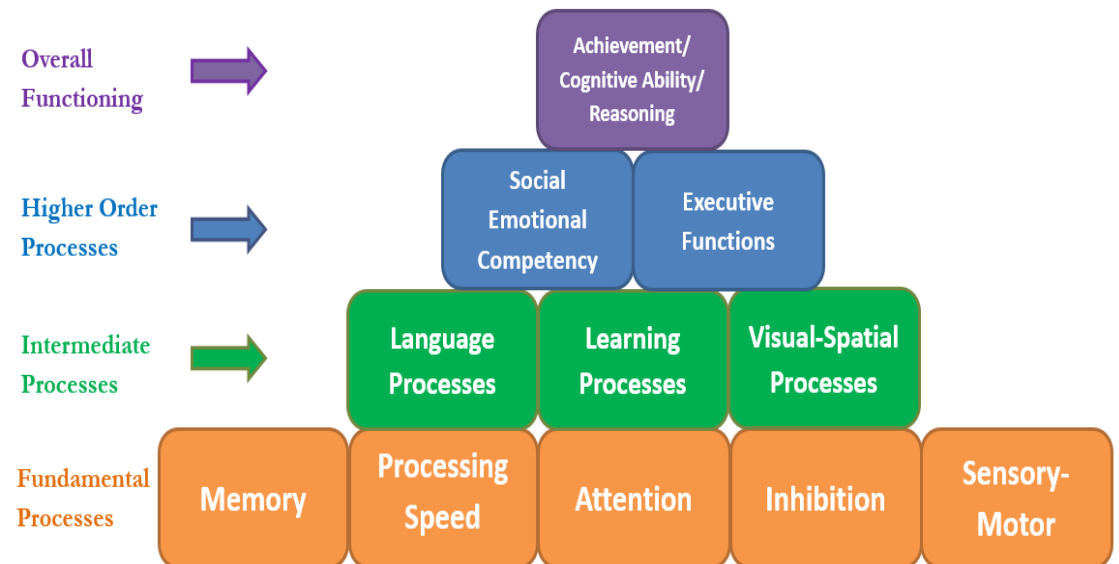


# Math: Key Deficits Mapped onto the BBBM

✓ Starts with low “achievement”  
in math (RTI / achievement data)

- Executive Function
  - **Attention** and **Inhibition** →
- Memory (WM, STM, LTM, VM)
- Processing Speed
- Learning Processes
  - Nonverbal reasoning
- Visual-Spatial

## Building Blocks of Brain Development ©



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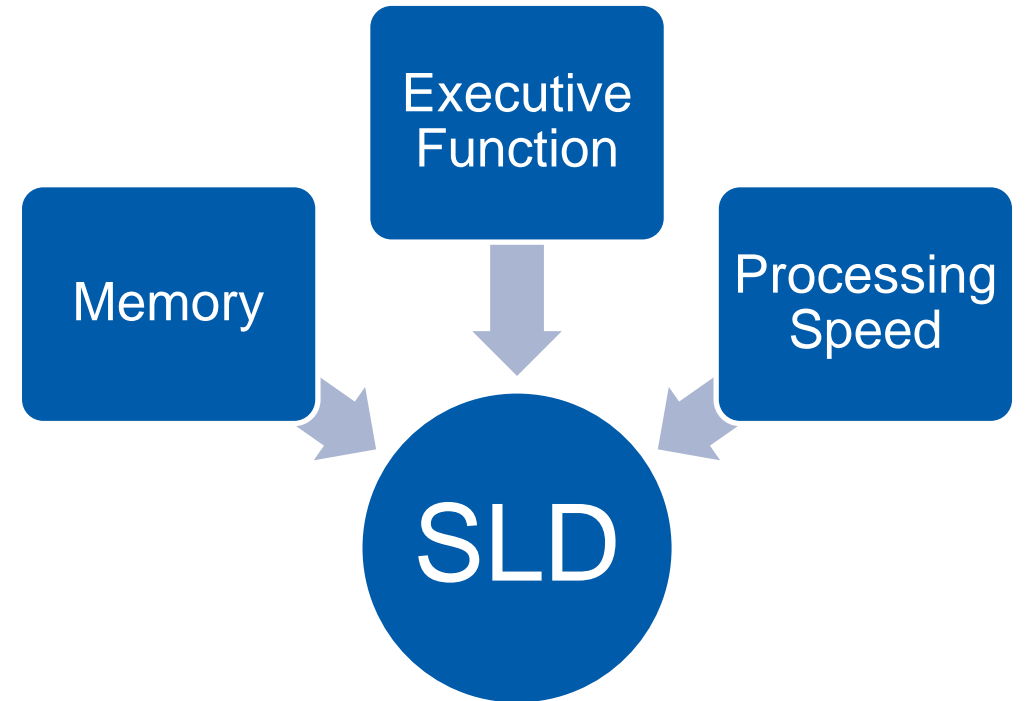
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# Common Blocks for all SLD Evaluations (Necessary, but Not Sufficient)

## Fundamental Blocks

- Executive Function
  - Attention
  - Inhibition
- Memory (WM, STM, VM)
- Processing Speed
  - Rapid Naming
  - Vis-motor speed



# Typical SLD and BBBM Profile



- All SLD evaluations typically include at least three major fundamental areas (and subblocks)-Executive Function, Memory, Processing Speed.
- Plus one Higher-Order Area related to the suspected disability area
  - Reading → Higher Order Block → Language Processes
  - Math → Higher Order Block → New Learning and
  - Writing → Higher Order Block → Visual Spatial and Sensor-Motor

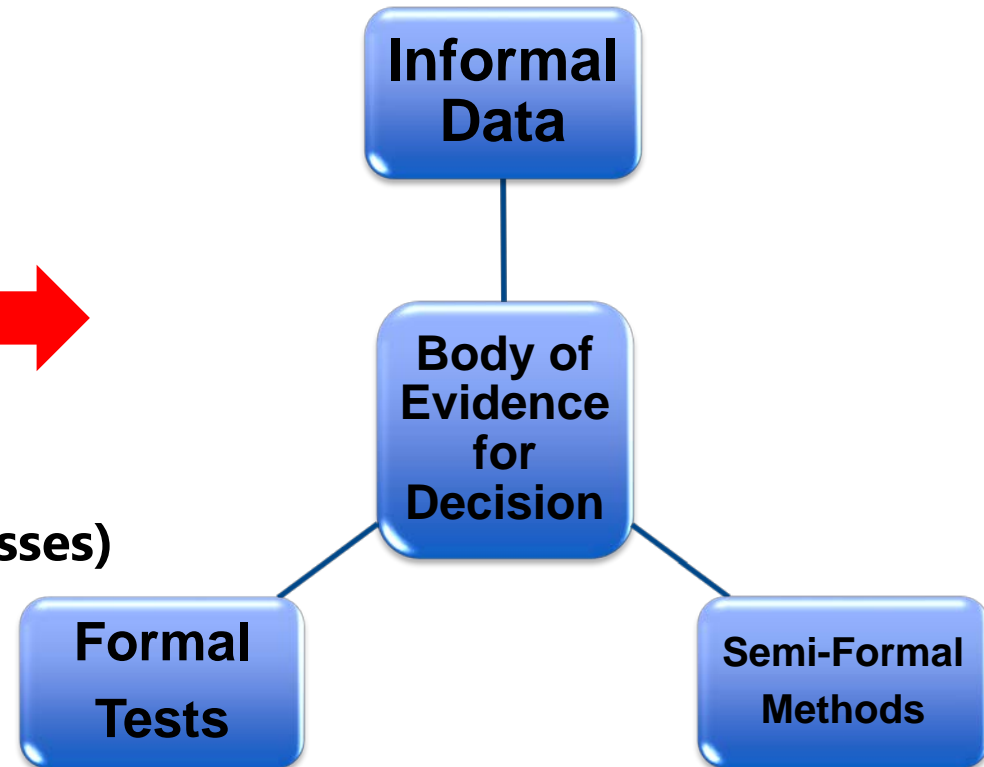


# Typical Evaluation: Math Disorder

I. Starts with RTI information and Achievement testing data

II. BBBM and 3 Factor Model

- Attention
- Processing Speed
- Memory (Multiple Types)
- Nonverbal reasoning (Learning Processes)
- Visual-Spatial



# Identifying SLD in Mathematics

- RTI and standardized math test scores are below average
- 3-Factor Model of assessment utilized—ensures a comprehensive eval
- At least 3 fundamental cognitive blocks assessed commonly associated with most SLDs—determine the “**why**” and the “**extent**” of problem
- **Math**-working memory, nonverbal, spatial reasoning (Higher order)
- Gather several perspectives from stakeholders (rating scales- semi-formal)
- Account for exclusionary factors
- One or more cognitive deficit(s) confirmed



# Special Considerations for Math Disorders

- **Different subtypes of math disorders**
- **Math disorders may have multiple dysfunctional brain areas**
  - **Double Deficit—more significant SLD**
- **ADHD and math disorders have high correlation**
- **Students with MDs may struggle in other subjects because nonverbal reasoning is associated with “broader” learning probl**






# Summary

- All learning disabilities involve a neurocognitive deficit in one or more of the BBBM blocks. If more than one neurocognitive area is dysfunctional, the more severe the LD case.
- Typically, SLD evaluations should assess at least 3 major fundamental blocks, such as *Attention, Memory, Processing Speed*.
- In SLD evaluations, at least one higher order building block will be examined. In the case of a math disorder, the higher order blocks of Visual-Spatial processes and Learning Processes are assessed.





# End of Module 6.2

## BBBM and Math Disorders



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Comprehensive SLD Evaluation**

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