



# Using Variations & Comparisons to Assess Dyslexia

# Disclaimer!

**VARIATION & COMPARISON PROCEDURES ARE ONLY AS EFFECTIVE AS OUR UNDERSTANDING OF THE CONDITION(S) IN QUESTION**

**CHARACTERISTICS OF A TARGET CONDITION CAN BE USED TO GUIDE YOUR SELECTION OF WHICH VARIATIONS & COMPARISONS TO CONDUCT**

**VARIATION & COMPARISON PROCEDURES ARE ONLY ONE DATA POINT IN A COMPREHENSIVE EVALUATION**

# What are Specific Learning Disabilities?

- **UMBRELLA TERM FOR VARIOUS CONDITIONS WITH NEUROLOGICAL BASES**

*Examples:*

Dyslexia

Dysgraphia

Dyscalculia

- **CAN RESULT FROM:**
  - Perceptual disabilities
  - Brain injuries
  - Brain Dysfunction in certain areas of cognitive processing

- **EXCLUSIONARY FACTORS:**
  - Visual/Hearing/Motor Impairment
  - Intellectual Disability
  - Emotional Disturbance
  - SES/Cultural Factors
  - Environmental Factors

# Dyslexia: The Most Common Specific Learning Disability

- 20% OF HUMAN POPULATION HAS DYSLEXIA ([YALE](#))
- 80-90% OF THOSE IDENTIFIED WITH SLD'S HAVE DYSLEXIA ([YALE](#))
- 40% OF CHILDREN WITH DYSLEXIA HAVE ANOTHER AREA OF DISABILITY ([MOLL ET AL., 2020](#))



# What is Dyslexia?

- **DYS...LEXIA**  
“Impaired....Word”

- **DEFICITS MAY BE SEEN IN:**
  - Phonological processing
  - Decoding
  - Reading Fluency
  - Spelling
  - Inaccurate or effortful reading

- **DEFICITS ARE ASSOCIATED WITH:**
  - Brain-based phonological impairments

# Educational vs. Clinical Perspectives

## EDUCATIONAL

- “Dyslexia is a specific learning disability that is neurobiological in origin” ([IDA](#))
- Under federal law, students can be classified due to a disorder in processes related to reading and spelling.

## CLINICAL (DSM)

- Difficulties in reading accuracy
- Effortful/slow word reading
- Poor reading comprehension
- Spelling challenges

# Terms...Terms...Terms...

**DYSLEXIA**

**SPECIFIC LEARNING  
DISABILITY**

**SPECIFIC LEARNING  
DISORDER**

**READING DISABILITY**

**SPECIFIC READING  
DISABILITY**

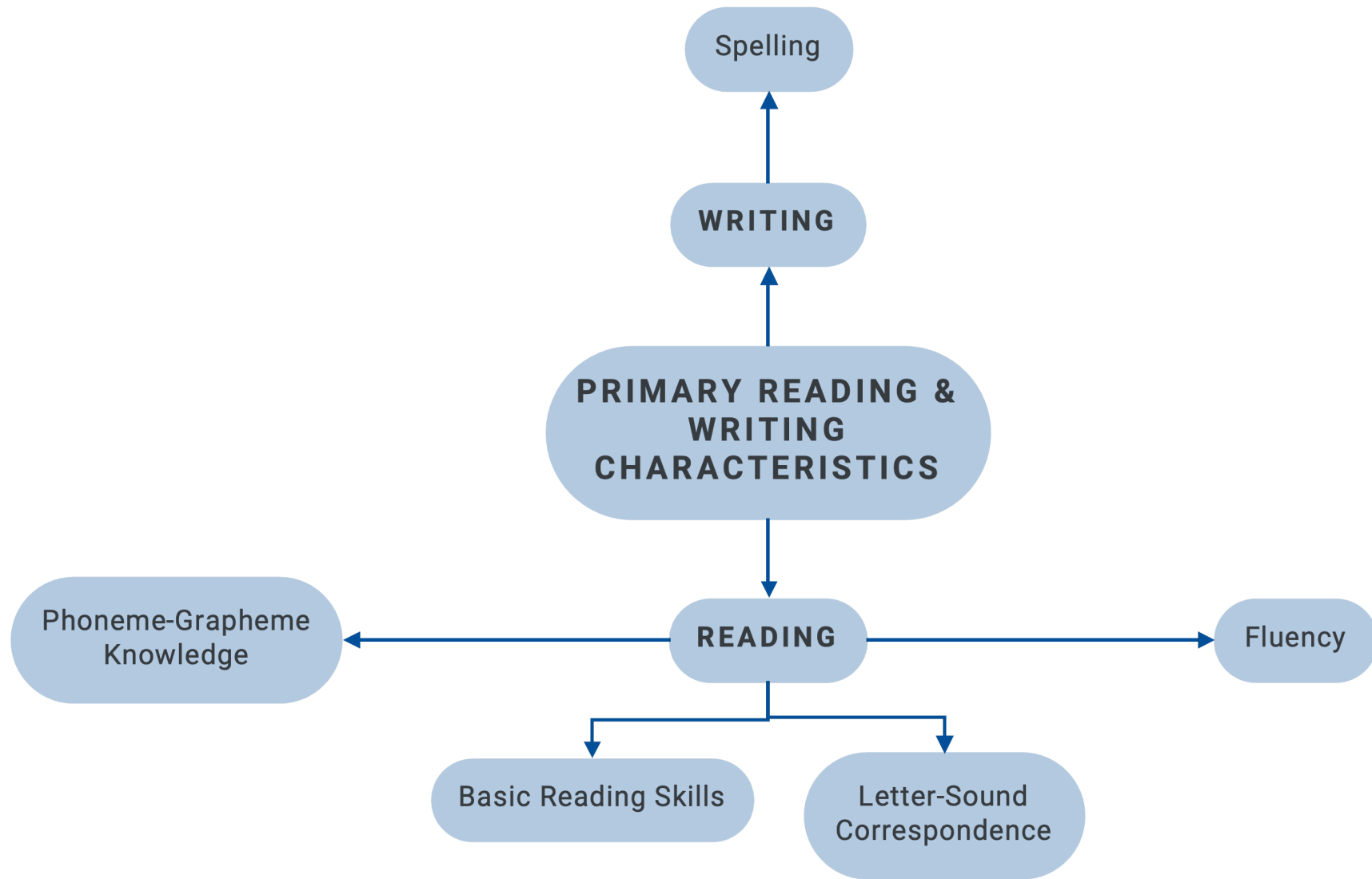
**SPECIFIC DEVELOPMENTAL  
DYSLEXIA**

# Commonalities Across Terms

All terms aside, the core features of dyslexia include:

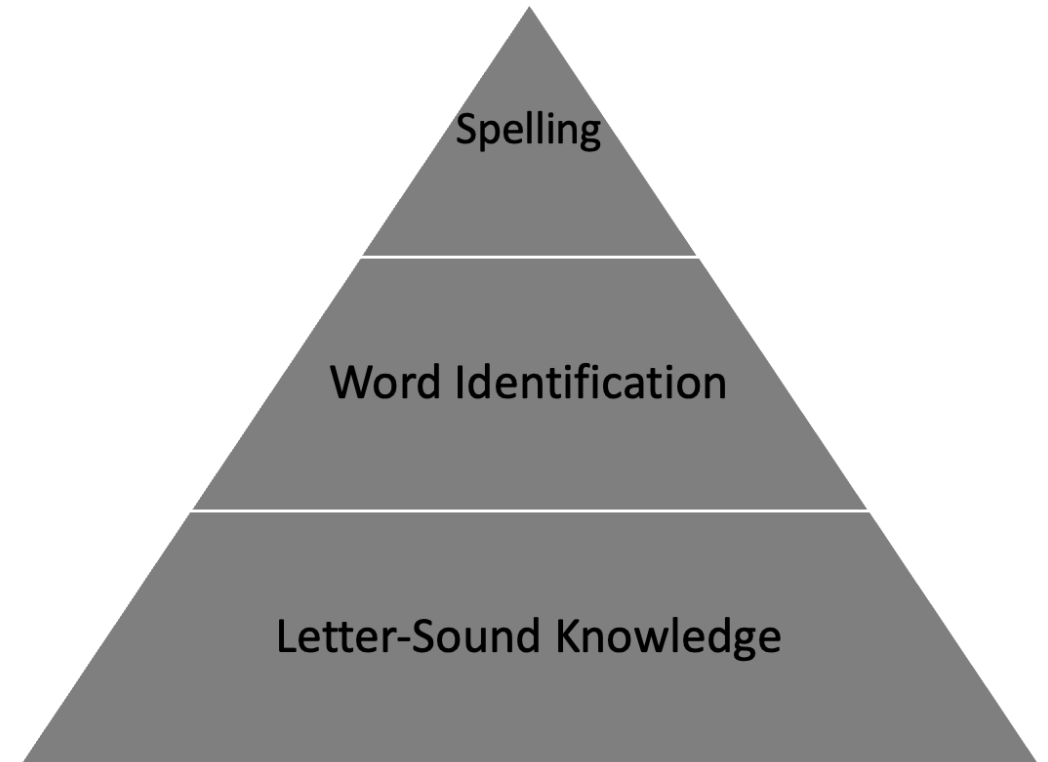
- **NEUROBIOLOGICAL DISORDER IMPACTING**
  - Foundational reading skills
  - Spelling
  - Speed and accuracy for letter-sound relationships
- **RELATED DEFICITS IN COGNITIVE AREAS RELATED TO READING AND SPELLING (i.e., Cognitive Correlates)**
- **STRENGTHS OFTEN ARE PRESENT DESPITE AREAS OF WEAKNESS**
- **ENDURING NATURE MAKES IT LIFELONG CONDITION**

# Primary Characteristics of Dyslexia



# Letter-Sound Correspondence

Relationship between written letters & the sound they represent



# Phoneme-Grapheme Knowledge

According to Mather & Wendling (2012): [Essentials of dyslexia: Assessment and intervention.](#)

- ABILITY TO APPLY KNOWLEDGE OF SPEECH SOUNDS WHEN READING WORDS AND SPELLING
- COMMON DEFICIENCY IN THOSE WITH DYSLEXIA



# Basic Reading Skills

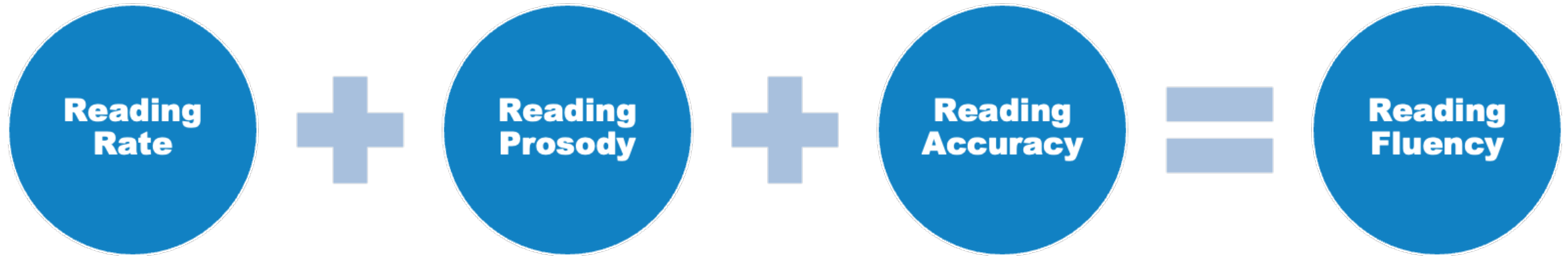
- **SIGHT-WORD READING**

- Ability to recognize words quickly and accurately
- No need to analyze sounds/parts of the word to read them

- **PHONICS**

- Application of letter-sound knowledge
- Used for decoding & spelling unfamiliar words

# Reading Fluency



# Spelling

Mather & Wendling (2012). [Essentials of dyslexia: Assessment and intervention.](#)

- **DEMANDS SIMILAR KNOWLEDGE TO READING**

- Knowledge of letter-sound correspondence
- Knowledge of orthography (spelling system used in language)

- **INVOLVES THE FOLLOWING STEPS:**

- Mental segmentation of word into speech sounds
- Retrieving letter that matches each speech sound
- Using fine motor skills to write word

# Secondary Reading & Writing Characteristics

# Reading Comprehension

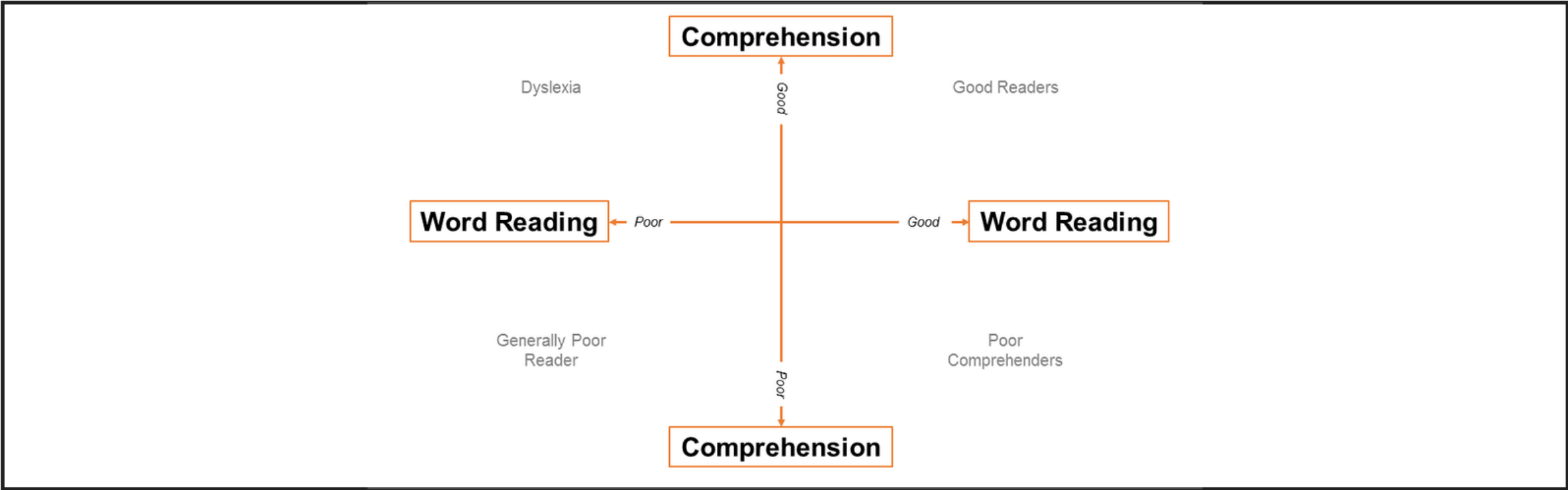
- **ABILITY TO UNDERSTAND *AND* INTERPRET WHAT'S READ**

- **READING COMPREHENSION REQUIRES**

- Decoding skills
- Ability to form connections within the text
- Ability to connect text to prior knowledge
- Ability to make inferences

# Simple View of Reading (Gough & Tunmer, 1986)

Photo sourced from Breadmore et al. (2019)



# Written Expression

- **ABILITY TO EXPRESS THOUGHTS/IDEAS THROUGH WRITING**

- **COMPLEX FUNCTION REQUIRING:**

- Phoneme-Grapheme Knowledge
- Spelling
- Knowledge of Syntax
- Vocabulary
- Reading Comprehension
- Planning and Organization

# WJ IV Intra-Achievement Variations

## WJ IV ACH

**Requires At Minimum:  
Tests 1-6**

Analyze variability within an examinee's academic profile

Can be used to identify clinically and statistically significant personal strengths and weaknesses across primary and secondary areas of dyslexia



# Academic Skills/Academic Fluency/Academic Applications

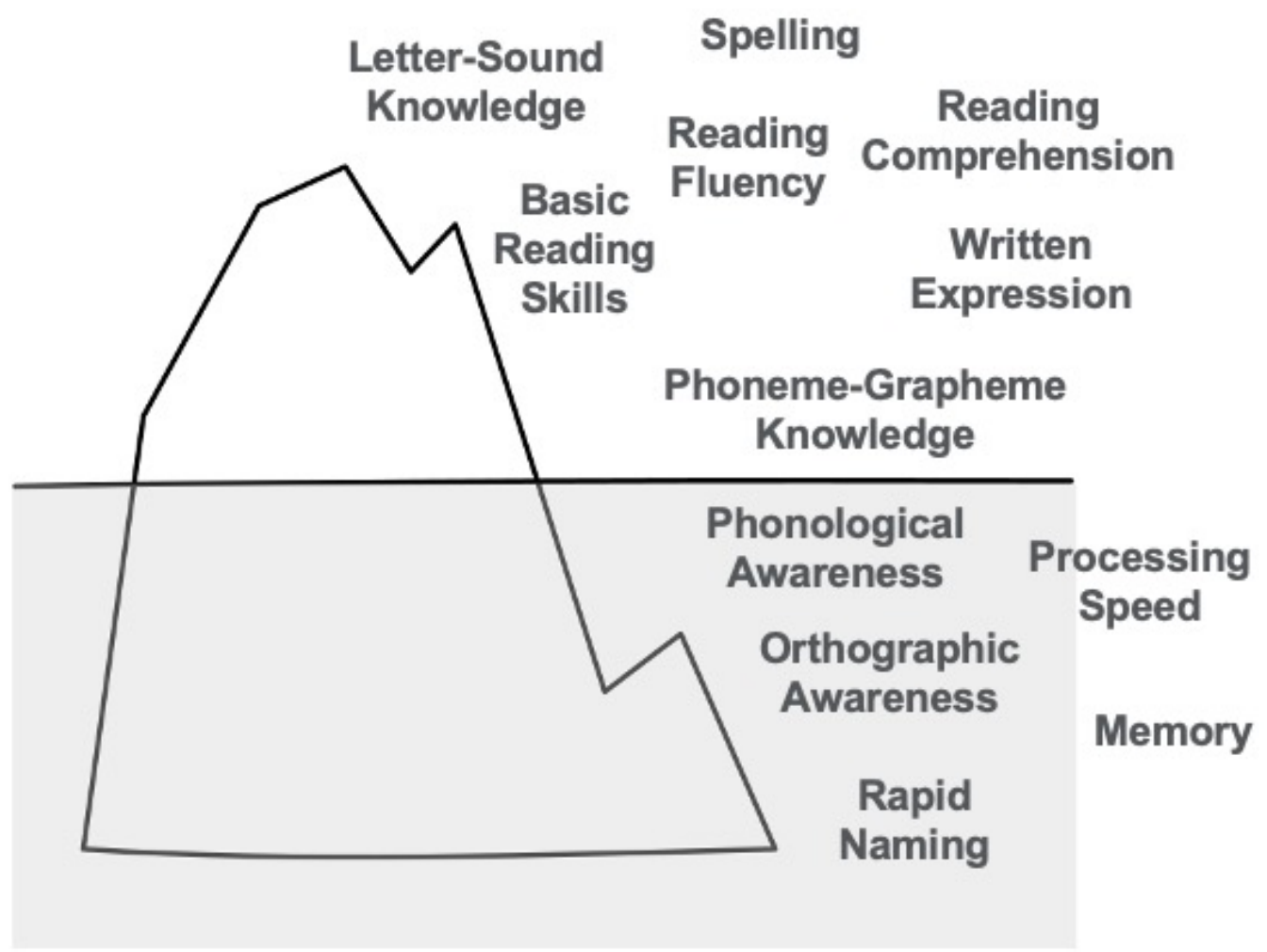
## WJ IV ACH

**Requires the Tests that  
comprise the Academic Skills,  
Academic Fluency, &  
Academic Applications  
Clusters**

A common profile of performance for individuals with dyslexia include performance from highest to lowest in the following domains:

Academic Applications  
Academic Fluency  
Academic Skills

# Cognitive Correlates of Dyslexia



# Phonological Processing & Reading Achievement

Ability to perceive & manipulate speech sounds

## PERCEPTION

- Understanding of speech sounds

## MANIPULATION

- How you apply your understanding of speech sounds.
- May involve segmenting, blending, etc.

# Segmentation & Sound Blending

Two significant skills related to early reading and spelling success ([Mather, 2020](#))

- **BLENDING**

- Foundation for phonics skills development (e.g., ability to decode unfamiliar words)

- **SEGMENTATION**

- Foundation for spelling skills (e.g., ability to sequence sounds to spell words correctly)

# Deletion & Substitution: Phoneme Manipulation Tasks

Deletion and Substitution are related to later literacy success ([Kilpatrick, 2015](#))

- **PHONEME MANIPULATION TASKS ARE MORE SENSITIVE MEASURES OF READING DEVELOPMENT**
- **LIKELY BECAUSE TASKS REQUIRE MULTIPLE INTACT SKILLS:**
  - Segmentation
  - Blending
  - Isolation

# WJ IV Intra-Oral Language & Intra-Cognitive Variations for Phonological Processing

## WJ IV OL

**Requires At Minimum:  
Tests 1-4**

**Consider Significant Personal Weaknesses in:**

Test 3: Segmentation  
Test 7: Sound Blending

## WJ IV COG

**Requires At Minimum:  
Tests 1-7**

**Consider Significant Personal Weaknesses in:**

Test 5: Phonological Processing  
Test 12: Nonword Repetition

# Intra-Cognitive and Intra-Oral Language *Extended* Variations for Phonological Processing

## WJ IV COG

**Requires At Minimum:  
Tests 1-7**

**Can Include:  
WJ IV OL  
Tests 3 & 7  
Phonetic Coding**

## WJ IV OL

**Requires At Minimum:  
Tests 1-4**

**Can Include:  
WJ IV COG  
Tests 1, 5, & 12  
Vocabulary & Auditory  
Processing**



# *Gf-Gc*/Other Ability Comparisons

**Gf-Gc Composite**

**WJ IV COG:  
Tests 1, 2, 8, & 9**



**Auditory Processing  
(COG)**

**Phonetic Coding  
(OL)**

# Phonology & Orthography

Both domains can be impaired in dyslexia. Both are needed for spelling success.

## PHONOLOGY

- The sounds within language

## ORTHOGRAPHY

- The writing system that represents the sounds in language

# Orthographic Processing

## **ABILITY TO READ & WRITE SYMBOLS**

Symbols can include letters, letter patterns, numbers, and punctuation.

## **DEMANDS MEMORY**

1. You must picture or recall the symbol (letter)
2. Hold it in immediate awareness
3. Use retrieved information to either read a letter/word or spell a letter/word

# WJ IV Intra-Achievement & Intra-Cognitive Variations for Orthographic Processing

## WJ IV ACH

**Requires At Minimum:  
Tests 1-6**

**Test 1: Reading letters/words**

**Test 3: Writing letters/words**

**Test 7: Reading nonsense words**

## WJ IV COG

**Requires At Minimum:  
Tests 1-7**

**Also include Test 11**

**Consider Significant Personal Weaknesses in:**

Test 4: Reading letters/letter groups

Test 11: Reading numbers

# *Gf-Gc*/Other Ability Comparisons

## Gf-Gc Composite

**WJ IV COG:  
Tests 1, 2, 8, & 9**



## Perceptual Speed

**Comprised of  
WJ IV COG  
Tests 4 & 11**

# Rapid Naming

- **ABILITY TO RECALL NAMES OF OBJECTS OR SYMBOLS QUICKLY & ACCURATELY**
- **REQUIRES QUICK INTEGRATION OF VISUAL AND VERBAL DATA (JUST LIKE READING)**
- **EARLY RAPID NAMING DEFICITS PREDICTIVE OF LATER READING CHALLENGES (WOLF & STOODLEY, 2008)**

# Short-Term Working Memory

- 1 | HOLD INFORMATION IN IMMEDIATE AWARENESS**
- 2 | MANIPULATE OR TRANSFORM INFORMATION**
- 3 | USE STEPS 1 & 2 TO ACHIEVE A GOAL OR MEET DEMANDS**

# Auditory Memory Span

Narrow Ability of Short-Term Working Memory

- **HOW MANY INFORMATION CAN YOU HOLD IN YOUR AWARENESS?**
- **LIMITED SPAN CAN IMPACT RETENTION OF WHAT'S READ**



# Cognitive Processing Speed

- **ABILITY TO PERFORM COGNITIVE TASKS QUICKLY AND ACCURATELY**
- **WEAKNESSES CAN IMPACT:**
  - Reading accuracy
  - Reading speed (rate)
  - Reading Comprehension

# Cognitive Efficiency ( $Gs + Gwm$ )

Diagnostic index comprised of  $Gs + Gwm$

- **FUNCTIONS CAPTURED BY INDEX INCLUDE**

- Controlling/honing attention
- Capacity to hold information in immediate awareness
- Ability to mentally manipulate information to achieve a goal
- Ability to perform automatic tasks fluently with accuracy and speed

- **POOR COGNITIVE EFFICIENCY CAN IMPACT FLUENCY AND PERFORMANCE ON COMPLEX READING TASKS**

# *Gf-Gc*/Other Ability Comparisons

## Gf-Gc Composite

**WJ IV COG:  
Tests 1, 2, 8, & 9**



**Speed of Lexical Access**

**Short-Term Working  
Memory**

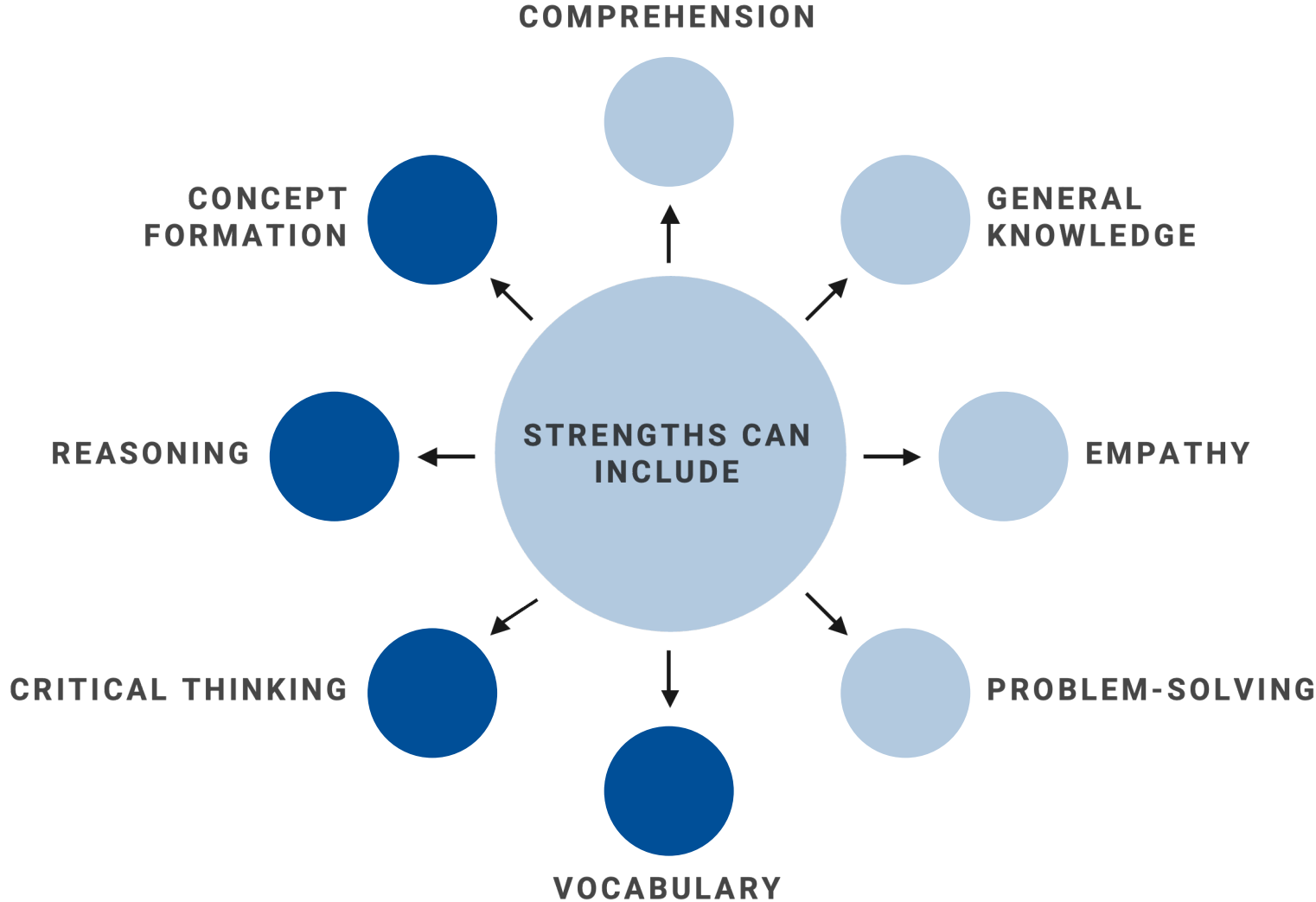
**Auditory Memory Span**

**Cognitive Processing  
Speed**

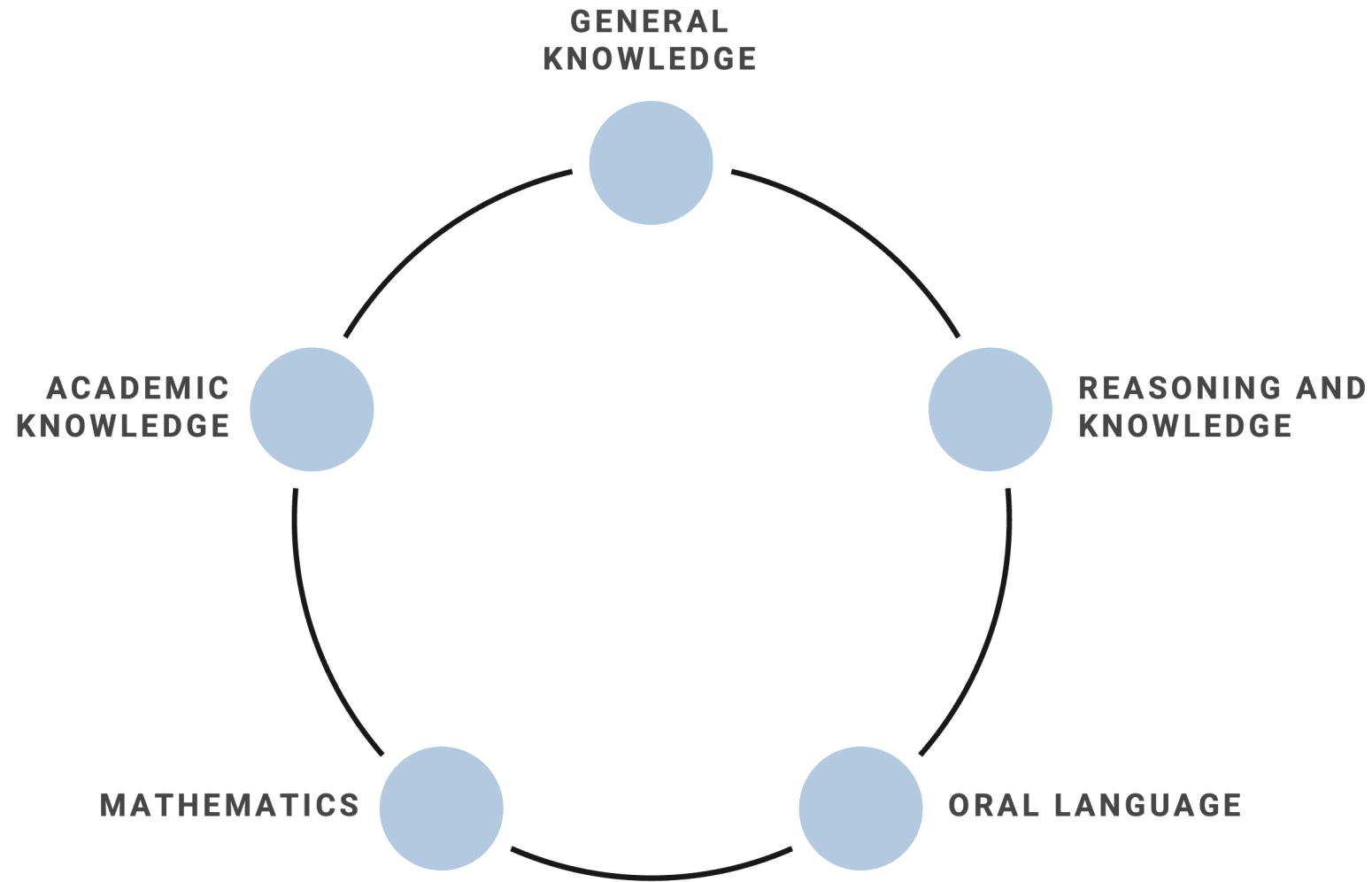
**Cognitive Efficiency**

Ability to Learn  
Independent of Reading

# Sea of Strengths Model for Dyslexia ([Shaywitz, 2020](#))



# Possible Strengths: Scores Independent of Reading



# General Intelligence- General Intellectual Ability (GIA)

- **ESTIMATE OF GENERAL INTELLIGENCE**

- Based on WJ IV COG Tests 1-7
- Differentially weighted

- **EACH TEST MEASURES DISTINCT ABILITY RELATED TO OVERALL INTELLIGENCE**

- **DYSLEXIC INDIVIDUALS MAY SHOW WEAKNESSES IN:**

- Short-Term Working Memory
- Cognitive Processing Speed
- Auditory Processing
- Long-Term Retrieval

# GIA/Achievement Comparisons

**GIA**

**WJ IV COG:  
Tests 1-7**



**Academic Achievement**

**Reading**  
**Broad Reading**  
**Basic Reading Skills**  
**Reading Comprehension (Ext)**  
**Reading Fluency**  
**Reading Rate**  
**Basic Writing Skills**  
**Broad Written Language**  
**Written Language**  
**Written Expression**



# Measuring Reasoning & Knowledge using *Gf-Gc*

- **ESTIMATE OF IQ BASED ON TWO SKILLS MOST RELATED TO GENERAL INTELLIGENCE**

- **INCLUDES GF + GC**

- **Test 1: Oral Vocabulary (Comp-Knowledge)**
- **Test 2: Number Series (Fluid Reasoning)**
- **Test 8: General Information (Comp-Knowledge)**
- **Test 9: Concept Formation (Fluid Reasoning)**

# *Gf-Gc/Achievement Comparisons*

*Gf-Gc*

**WJ IV COG:  
Tests 1, 2, 8, & 9**



**Academic Achievement**

**Reading  
Broad Reading  
Basic Reading Skills  
Reading Comprehension (Ext)  
Reading Fluency  
Reading Rate  
Basic Writing Skills  
Broad Written Language  
Written Language  
Written Expression**

# Scholastic Aptitude/Achievement

			Target Tasks for Scholastic Aptitude/Achievement Comparisons														
			Reading					Mathematics				Writing					
			Reading	Broad Reading	Basic Reading Skills	Reading Comprehension	Reading Fluency	Reading Rate	Mathematics	Broad Mathematics	Math Calculation Skills	Math Problem Solving	Written Language	Broad Written Language	Basic Writing Skills	Written Expression	
Standard Battery	COG 1	Oral Vocabulary	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	COG 2	Number Series						■	■	■							
	COG 3	Verbal Attention			■									■			
	COG 4	Letter-Pattern Matching															
	COG 5	Phonological Processing	■	■	■	■	■	■				■	■	■	■	■	
	COG 6	Story Recall										■	■		■		
	COG 7	Visualization						■	■	■	■						
	COG 8	General Information															
	COG 9	Concept Formation	■	■		■	■	■									
	COG 10	Numbers Reversed									■						
Extended Battery	COG 11	Number-Pattern Matching	■	■	■	■	■	■				■	■	■	■	■	
	COG 12	Nonword Repetition															
	COG 13	Visual-Auditory Learning															
	COG 14	Picture Recognition															
	COG 15	Analysis-Synthesis								■							
	COG 16	Object-Number Sequencing															
	COG 17	Pair Cancellation						■	■	■							
	COG 18	Memory for Words															

## Academic Achievement

**Reading**  
**Broad Reading**  
**Basic Reading Skills**  
**Reading Comprehension**  
**Reading Fluency**  
**Reading Rate**  
**Basic Writing Skills**  
**Broad Written Language**  
**Written Language**  
**Written Expression**

# Oral Language

These skills tend to be intact when thinking about a traditional dyslexia profile.

## **VERBAL COMPREHENSION**

Interpret & reason using words

## **LEXICAL KNOWLEDGE**

- Vocabulary
- Word Knowledge

## **LISTENING ABILITY**

- Ability to understand spoken language

# Oral Language/Achievement Comparisons

Broad Oral  
Language/Amplo  
language oral

**WJ IV OL (English):  
Tests 1, 2, & 6**

**WJ IV OL (Spanish):  
Tests 10-12**



**Academic Achievement**

**Reading  
Broad Reading  
Basic Reading Skills  
Reading Comprehension (Ext)  
Reading Fluency  
Reading Rate**

# General Academic Knowledge

Measure of comprehension-knowledge

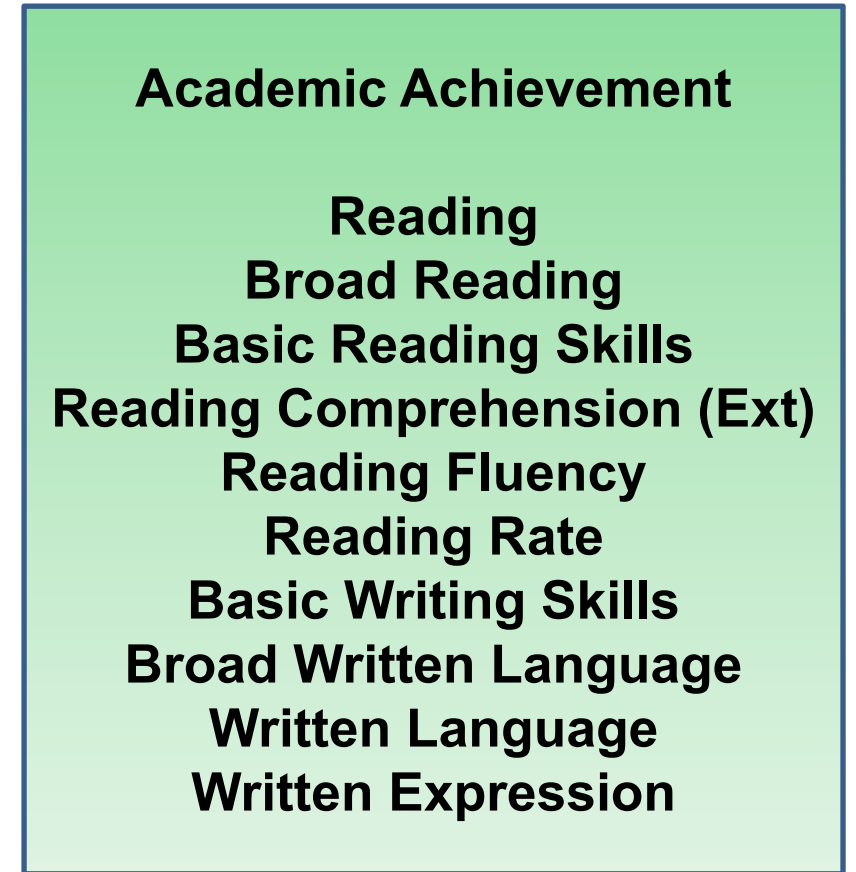
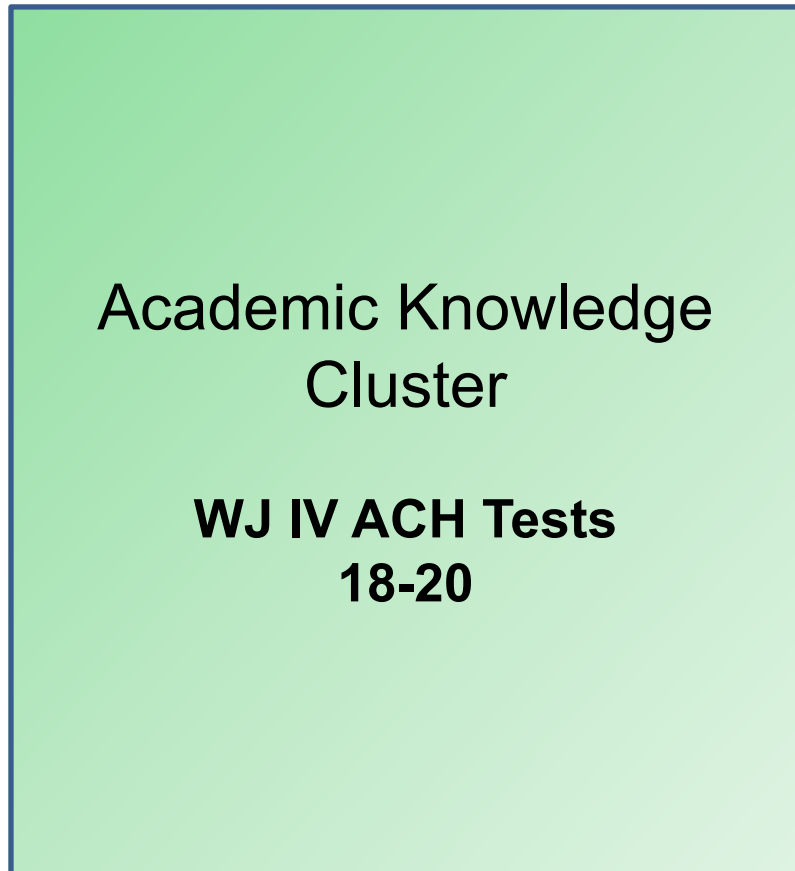
- **SPECIFIC FOCUS:  
LANGUAGE-BASED  
ACADEMIC  
KNOWLEDGE**

- **ESTIMATE BASED ON  
WJ IV ACH  
EXTENDED BATTERY  
TESTS**

- Test 18: Science
- Test 19: Social Studies
- Test 20: Humanities

- **CAN BE COMPARED  
TO READING  
ACHIEVEMENT**

# Academic Knowledge/Achievement Comparisons



# Questions?



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