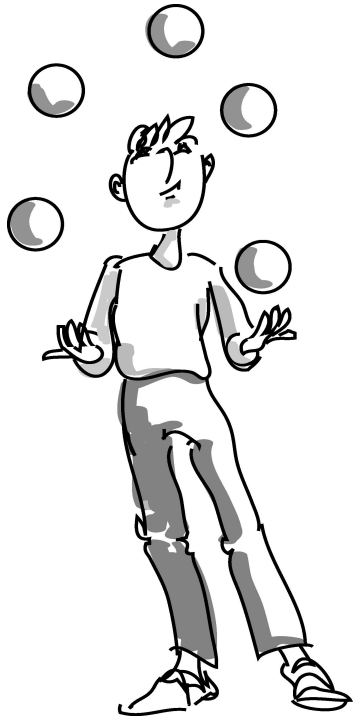# Working Memory and Dyslexia

Working Memory is a type of short-term memory that temporarily holds information 'in mind' when working on more complex tasks.

Too often it's missed as when troubleshooting why some teaching styles are 'hit' or 'miss'

Do you teach at a speed and in a way that students with all sizes of working memory can learn?

Working Memory and Dyslexia

Working Memory Overload happens when...

- Too much information is presented at once and it overwhelms any subsequent learning

- Use MULTISENSORY strategies, stories, and humor.

Working Memory and Dyslexia

What are some examples that students show when they are experiencing working memory overload?

- forget parts of a question or become confused about the order of what was said

- rarely volunteer in class because they may have forgotten what they wanted to say

- may seem to be distracted or daydreaming

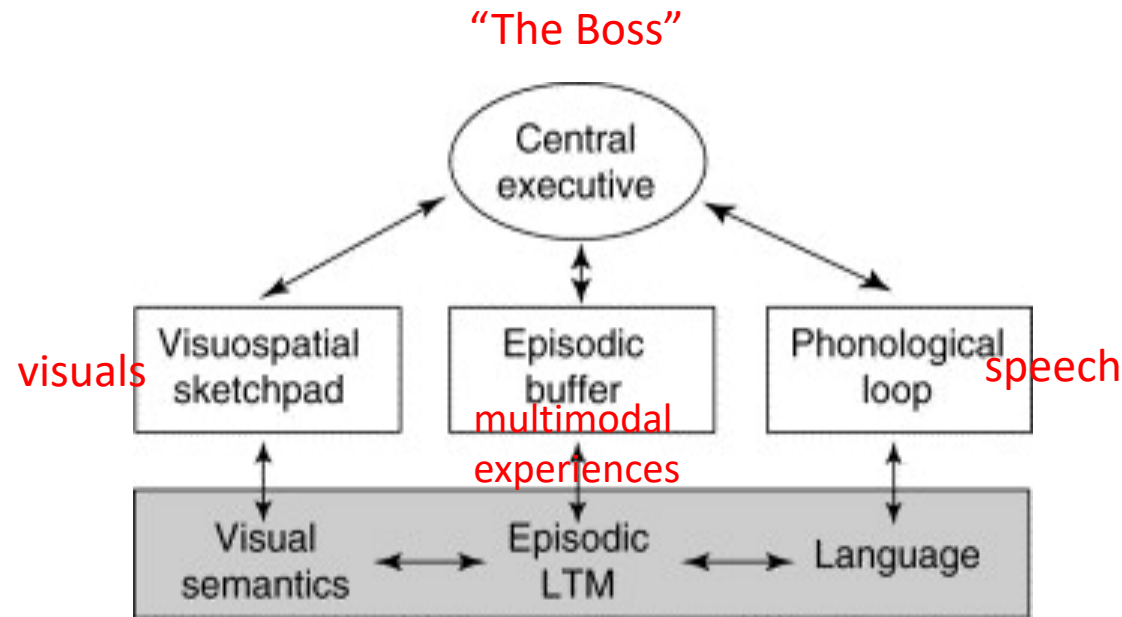- get lost with multi-stepped instructions or problem solving

Working Memory and Dyslexia
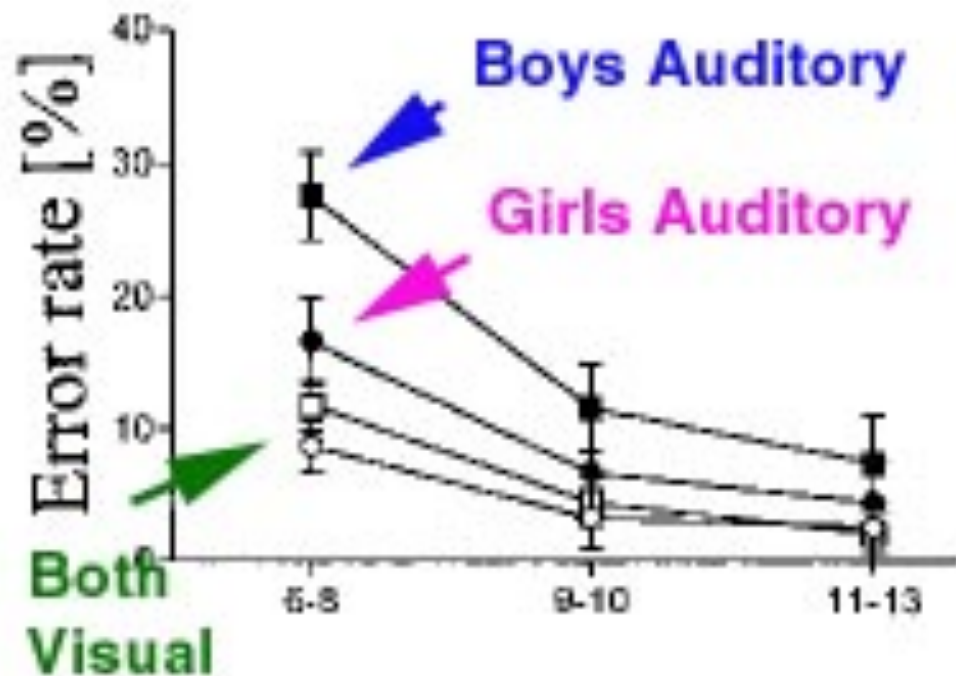
- In the elementary school years, boys in general have weaker auditory working memory than girls – although visual working memory seems to be about the same in 5-8 year olds.
- By the age of 11-12, boys are similar to girls, but they still make more auditory working memory errors compared to visual

Another reason why MULTISENSORY Instruction is so beneficial for all.

4 Component Model of Working Memory

"The Boss"

Central executive

Visuospatial sketchpad — visuals

Episodic buffer — multimodal experiences

Phonological loop — speech

Visual semantics ↔ Episodic LTM ↔ Language

trends in Cognitive Sciences

Working Memory

Long Term Memory
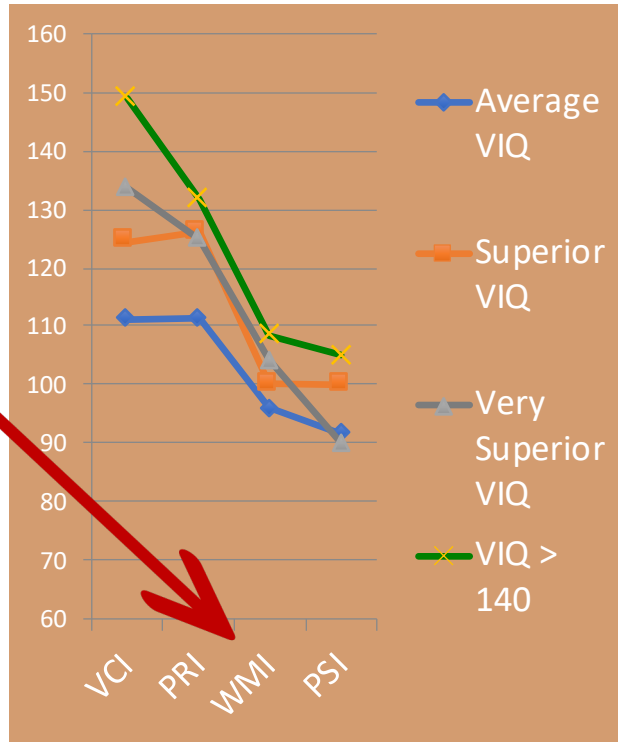
In General, Working Memory Overload is Common with Dyslexia

Working Memory Index is a relative weakness for most dyslexics

So is the Processing Speed Index.

Relative strengths are Verbal Comprehension Index and Perceptual Reasoning Index

WISC-IV Dyslexic Students Our Clinic

Chart legend:
- Average VIQ
- Superior VIQ
- Very Superior VIQ
- VIQ > 140

X-axis: VCI, PRI, WMI, PSI

- Working Memory often 1-2 SD Below Fund of Knowledge or Conceptual Ability

- OVERLOAD reading challenging texts following multi-stepped instructions, writing, spelling, grammar, math

- GO SLOW! Doing one thing at a time will result in greater success.

- Although working memory may be weak, long term memory can be strong.

How Working Memory Affects Reading

- Learning how to read is a working memory-intensive activity
- Many people make more progress if the parts of reading are learned and mastered separately before they are put together
- As a result, learning sounds within words, learning letters, then putting them together bit by bit will work for people with low working memory as well as all others.

HOW TO HELP – Minimize Working Memory Overload for Reading

- PREVIEW BOOK

- PRELEARN NEW VOCABULARY

- WATCH A MOVIE, READ BOOKS IN A SERIES

- MIND MAP THE BOOK

HOW TO HELP – Minimize Working Memory Overload for Everything Else

- SIMPLIFY

- ONE STEP AT A TIME

- USE KEY WORDS and ACRONYMS to help memory

- USE PICTURES and DIAGRAMS

- SOME STUDENTS MAY BE ABLE TO USE VISUALIZATION

- HELP STUDENTS TO BREAK DOWN WORK

- USE ROUTINES for similar assignments over the school year

The Special Case of Spelling and Visual Memory for Letters

"I can seldom call to mind even a single letter of the alphabet in purely retinal terms. I must trace the letter by running my mental eye over its contour in order that the image of it shall have any distinctness at all'. He considered himself a 'motor' type, meaning that he used , in memory, reasoning and all intellectual activities, images derived from movement."

- William James, Father of Psychology
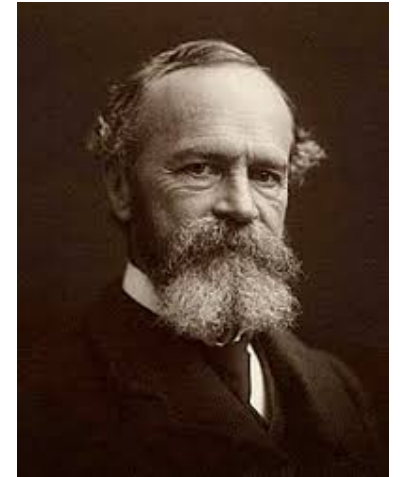
If some people can't 'see' the spelling of words in their minds. How can they remember it? William seemed to have discovered his spatial and probably episodic buffer!

Multisensory Strategies to Support Memory

See – Say – Listen – Move

Click to play video.

Slingerland Classroom
First & Second Grade

Personal Memory and Procedural Memory
(large body movement)

Air writing and choral chants can be added to any curricula to help the students who have difficulty remembering word spellings by sight alone.

Many dyslexia programs like this Slingerland classroom use air writing, chanting, and repetition to make the process of learning spelling multisensory rather than a single modality (visual).

Teach with Multisensory Memory

Allow work with an alphabet strip at desk.

Touch memory can also be boosted by using carpet, velvet, or sand.

Personal Memory
Procedural Memory
Impersonal Memory

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

Flashcards – digital or paper.

Free Phonics Genius

Could Would Should
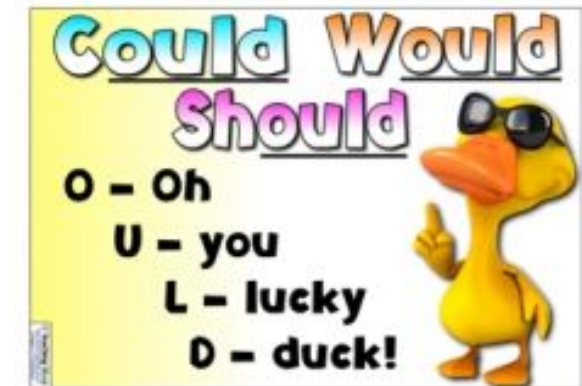O – Oh
U – you
L – lucky
D – duck!

Talk out loud

smile
small
smart

Barton Tiles

Apps with color coding & families

Color, funny picture, mnemonic using letters (acronym)

Spelling Curricula for Dyslexic Students

- Most Structured Literacy Orton-Gillingham programs for dyslexic students include spelling

- Good systematic spelling programs have placement tests.

- Free spelling resources Spellzone and Spelling City

Placement Test - Part 3
Determine If Your Student Can Write Phonograms from Dictation

Follow the script below to determine if your student knows how to write the phonograms from dictation. You will find a worksheet on the next page for your student to fill out as you dictate the phonograms.

Note: If needed, go to blog.allaboutlearningpress.com/phonograms#app to hear the sounds of the phonograms.

"I am going to dictate a sound and you will write the letter that makes that sound. You can write the letter on any circle on your worksheet."

Dictate the following sounds:

/m/	Student writes _m_.
/p/	Student writes _p_.
/w/	Student writes _w_.
/b/	Student writes _b_.

"Some letters have two or more sounds. I'll dictate the sounds and you write the letter or letter combination."

/ĭ/–/ī/–/ē/	Student writes _i_.
/s/–/z/	Student writes _s_.
/y/–/ĭ/–/ī/–/ē/	Student writes _y_.
/ch/–/k/–/sh/	Student writes _ch_.
/c/–/s/	Student writes _c_.
/ð/–/ō/–/o͞o/–/ŭ/	Student writes _o_.

Placement Test - Part 6
Test Ability to Write Sentences from Dictation

Dictate the following sentences and have your student write them.

1. The map can help us.
2. Hand me the red backpack.
3. Stick a stamp on the box.
4. Fill six cups with milk.

Examples from a spelling placement test from All About Spelling.

Working Memory is Often Under Attack – Assign Less Work

- **In one of the largest surveys of the parents of dyslexic children in the US, 76% parents said their students were routinely assigned work that they could not possibly complete**

"It took at least 3x as long to complete her work."
"Even busy work worksheets that were supposed to take 15 minutes took hours of tears and frustration"
"The teachers have no understanding of processing speed."
"His anxiety and frustration is so high."

Dyslexia is associated with difficulty AUTOMATIZING skills that are important for reading, writing by hand, spelling, and retrieving words.

MORE BREAKS – ONE THING AT A TIME

Processing Speed and Automaticity are Impaired for Dyslexic Students
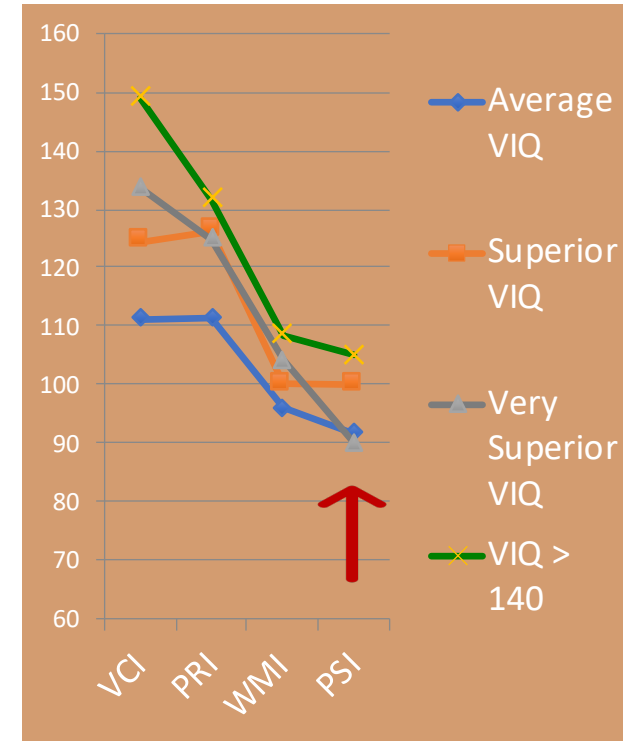
PROCESSING SPEED is usually the LOWEST Index on the WISC IQ Tests for Dyslexic students

Dyslexic Students Usually Need Extra Time

EXTRA TIME IS NEEDED TO COMPENSATE FOR:

- Visual skips and sequence errors
- Need to re-read problems and instructions
- Slower naming and word and fact retrieval
- Working Memory overload and losing place
- Executive function issues affecting focus, organization, decision-making
- Word substitutions, false associations
- Impaired letter and number writing automaticity

Students may need
1.5 – 2x time or more

Dyslexic Students Need IEPs or 504s to Document Need for Extra Time

IEP OR 504

Even if all students needs are met in an individualized learning classroom, it is important to have documentation of the need for extended time on record in an IEP or 504 because students will need the documentation for:

- accommodations for college entrance exams like the SAT or ACT
- accommodations for state tests, independent private school tests, high school entrance and exit
- accommodations for professionals schools, trade exams

Accommodations for Extra Time

- Extended Time Accommodations are not unfair to other students. They level the playing field for dyslexic students so that testing more accurate reflects what they know

- Extra time gives dyslexic students more time to read through problems, correct visual and other mistakes, organize what they say in words, and write answers down on a page.

* In the 1980's, College Entrance Exams recognized the importance of providing extra time to students with learning disabilities - because they found that even if more was provided to everyone – it was the students with LD that showed a significant boost in scores.

Accommodations for Extra Time

- Students typically need **1.5 – 2x extended time** for tests. Students can take tests with their classmates, then if they need more time, they can **finish the test in a resource room or in class after school.**
- If students may have trouble reading test questions, the options include having a helper **dictate** the test during a break or after school or use of a **talking pen** like the C-pen test pen. This pen has been approved for college entrance exams and has a headphone port. It costs $250 and there is a free trial offer for teachers.
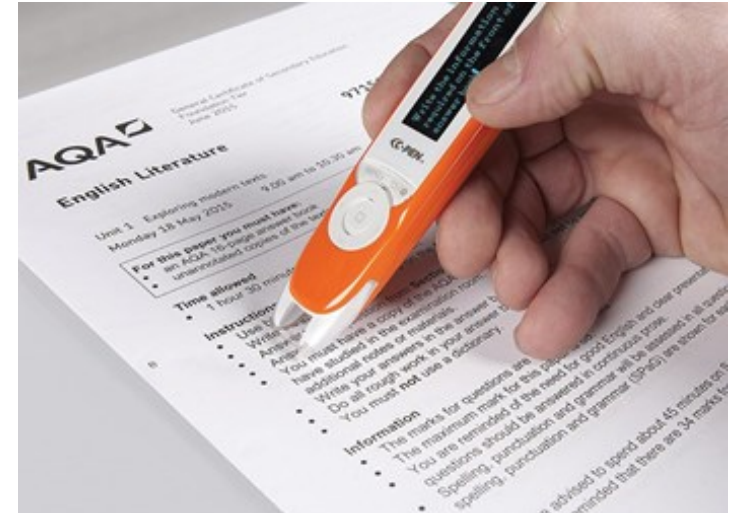
Giusto & Ehri, 2018: Partial read aloud accommodations specifically benefited 3rd grade students with reading disabilities Directions, proper nouns, and questions with multiple choices were read aloud.

1. Take the multiple choice quiz.

2. Define working memory . Do you have a strong, medium, or weak working memory? Interestingly, working memory seems to have little correlation with intelligence. It's possible to have a very weak working memory, but strong long term memory. What are signs that students are experiencing working memory overload?

3. Name at least 3 ways you can help students with working memory overload and reading.

4. Is extended time for students with dyslexia unfair to other students? Why might they need extra time for tests?

Remember to write 50-150 words in your responses. Feel free to include outside links to interesting resources if we might benefit from them.