


The Role of Executive Functions in Reading, Writing and Math: Assessment and Intervention Strategies




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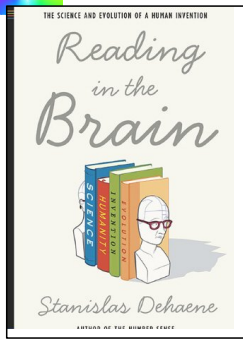
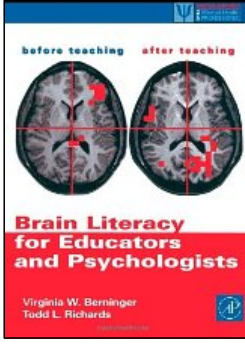
Overview

- What are executive functions/ Executive Control?
- How is executive control involved in reading, writing and using math?
- How do executive control difficulties impact reading, writing and math?
- How do you know if an academic problem is related to executive control difficulties?
- What instructional techniques can be used to address academic problems related to executive control difficulties?

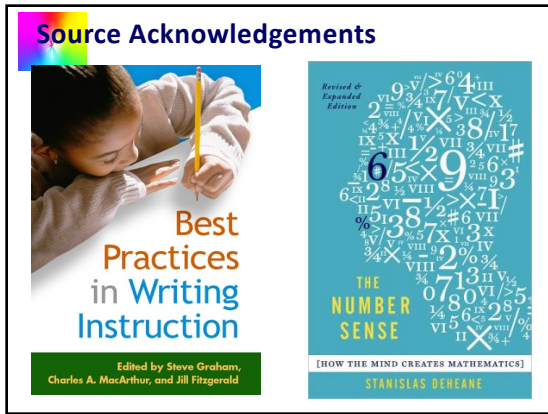


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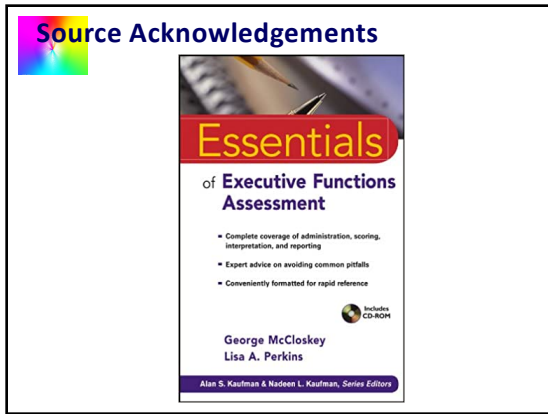
Source Acknowledgements

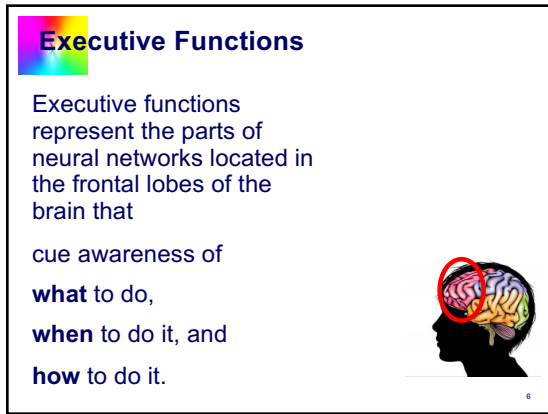
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Executive Control Is Not a Unitary Trait

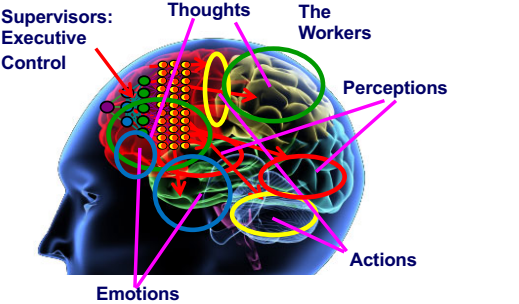
Appropriate Metaphors for Executive Control:

- The management structure of a multinational mind corporation
- The brain's supervisory system



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The brain's supervisory system



Supervisors: Executive Control

Thoughts

The Workers

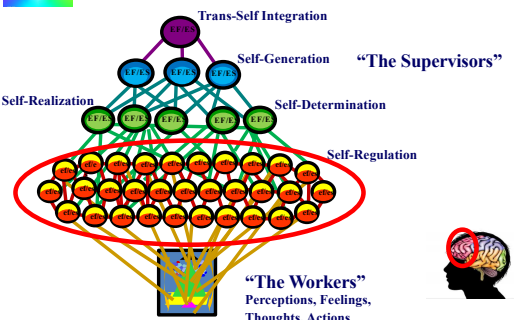
Perceptions

Actions

Emotions

8

Self-Regulation



Trans-Self Integration


Self-Generation "The Supervisors"

Self-Realization

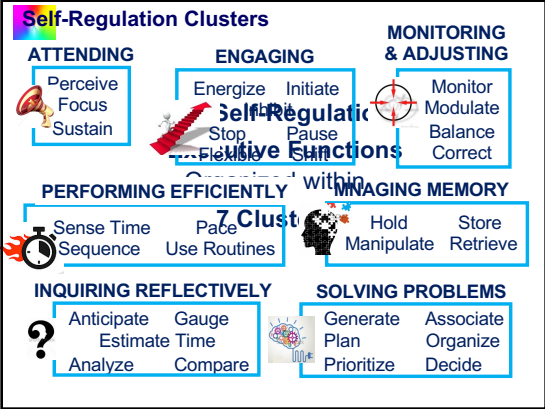
Self-Determination

Self-Regulation

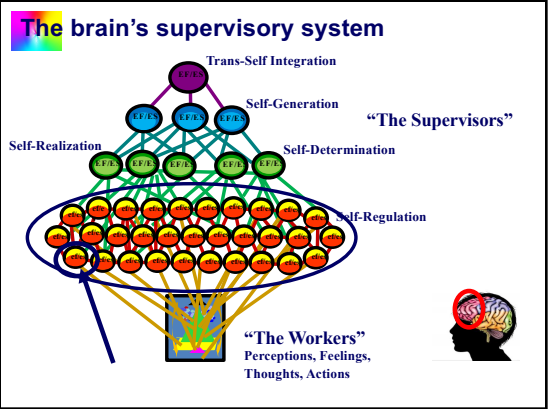
"The Workers" Perceptions, Feelings, Thoughts, Actions



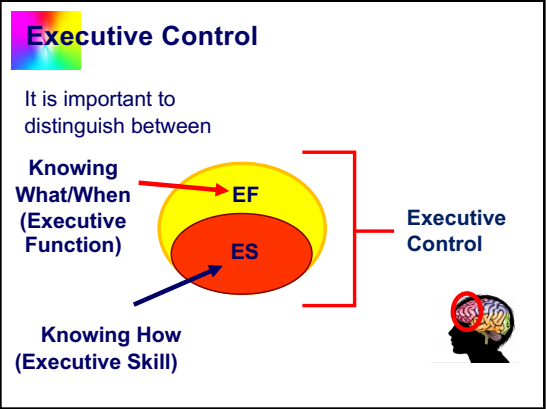
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Self-Regulation Executive Functions


Executive Functions are the parts of the executive network that cue for awareness of what to do and when to do it (e.g., awareness of **when** to inhibit impulsive responding while reading words.)



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Self-Regulation Executive Skills


Executive Skills are the parts of the executive network that are used to cue the rest of the neural network distributed in various parts of the brain needed to perceive, feel, think and act effectively (e.g., **knowing how** to inhibit impulsive responding while reading words.)



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Knowing When vs Knowing How

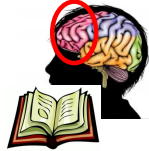
- Executive skills (knowing how) can be practiced to automaticity, reducing frontal lobe demands.
- Executive functions (knowing when) cannot be practiced to automaticity, the when is always changing depending on current conditions.



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Executive Control and School

- Although executive functions can be used to guide new learning, many new learning situations are structured in ways that reduce the need for strong executive direction.
- Teachers become the supervisory system of children's brains and lead them through the learning process.

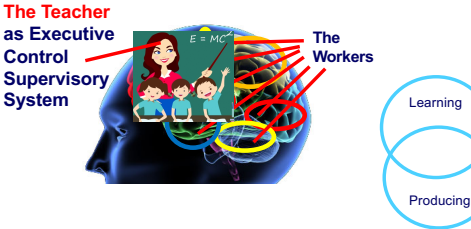


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Executive Control and School

Teacher-Directed New Learning

The Teacher as Executive Control Supervisory System



The Workers

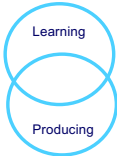
Learning

Producing

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Executive Control and School

- In contrast, **producing** (demonstrating what you have learned) usually requires a lot of involvement of executive control processes.



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Executive Control and School

Self-Directed Production

The Student's Executive Control Supervisory System

The Workers

Learning

Producing

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Learning and Producing

- We can't observe learning directly; we only observe production.
- Referrals are made on lack of production not lack of learning. The assumption is that a lack of production is the result of a lack of learning.
- In many instances, the lack of production is not the result of a lack of learning but a lack of knowing when or how to demonstrate what was learned.

Learning

Producing

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A General Model for Conceptualizing Learning and Producing Difficulties

Learning Difficulties Only

Learning Difficulties and Producing Difficulties

Producing Difficulties Only

Production is good but at great cost (stress, anxiety, exhaustion); No assessment is done. Learning Disability is not recognized unless an evaluation is requested.

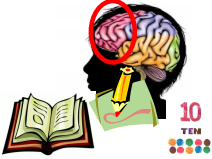
Lack of production leads to early assessment and identification of the Learning Disability.

Lack of production leads to early assessment but no Learning Disability is found. Lack of production is attributed to lack of motivation, character flaws, or behavior/personality problems.

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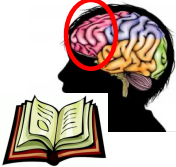
Executive Functions and Reading, Writing and Mathematics

Executive functions are used to cue, direct, coordinate and integrate all the processes, skills, abilities, and knowledge bases used when reading writing or doing math.

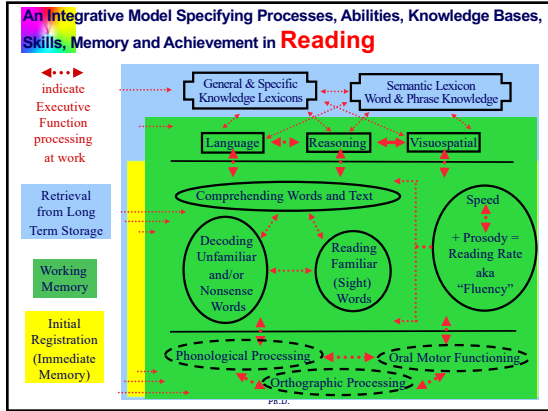


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Executive Control and Reading



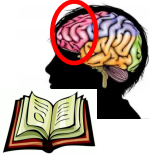
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Executive Function Difficulties and Reading

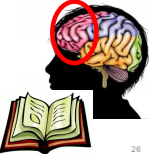
Although other mental capacities (processes, abilities, skills, and knowledge bases) involved in reading may be well-developed, difficulties with the use of executive control to cue, direct, coordinate and integrate the use of these other mental capacities results in achievement far below what is anticipated.



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Executive Control and Beginning Readers

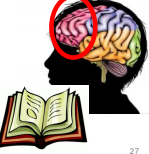
During the early stages of learning to read, executive control is focused on **how** to guide word recognition and word decoding and doing both of these as quickly as possible (word recognition fluency and decoding fluency). As word recognition and decoding fluency increases, executive involvement in these tasks decreases.



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Executive Functions and Experienced Word Readers

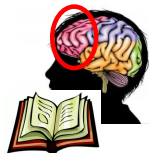
During the latter stages of learning to read, executive control is used to focus and sustain attention to reading for longer periods of time and guiding the use of abilities and knowledge bases when needed to comprehend what is being read.



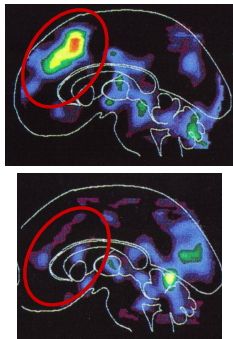
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Things that are Taught to Automaticity in Early Elementary School

- The alphabet and sight word recognition
- Graphomotor functioning for quick handwriting of letters and words
- Basic math facts and multiplication tables



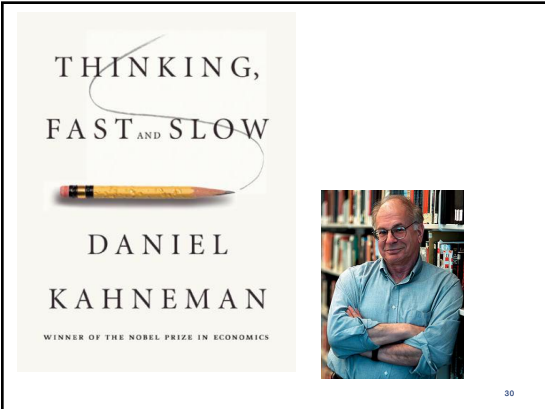
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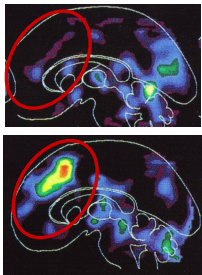
Figuring out what, when and how with a new task

Same task, same items after 25 minutes of practice repeating the same items

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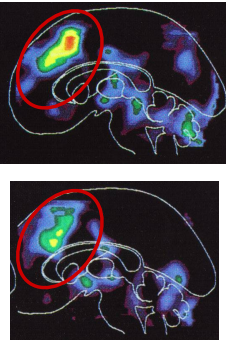
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System 1 –
Fast,
effortless,
automatic

System 2 –
Slow, effortful,
non-automatic

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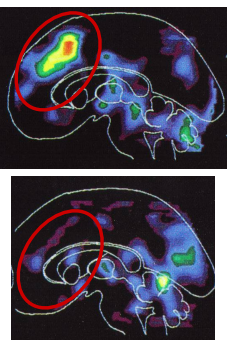


Figuring out what, when and how with a new task

Same task, new items

Using EFs to recognize when, then engaging already learned how

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Figuring out what, when and how with a new task

Practicing what, when and how to automaticity

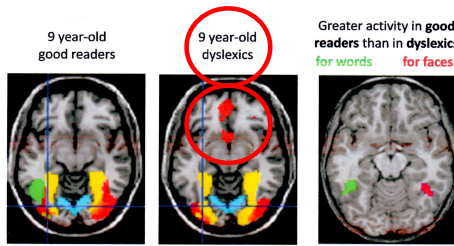
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Executive Control and Reading Disabilities

- Instead of reading words fast and automatically, the disabled word reader must use executive control:
 - to **decide** whether a word is a known word or an unknown word,
 - shift** to apply decoding skills for unknown words,
 - monitor** the use of decoding skills,
 - shift** back to making a decision about the next word.




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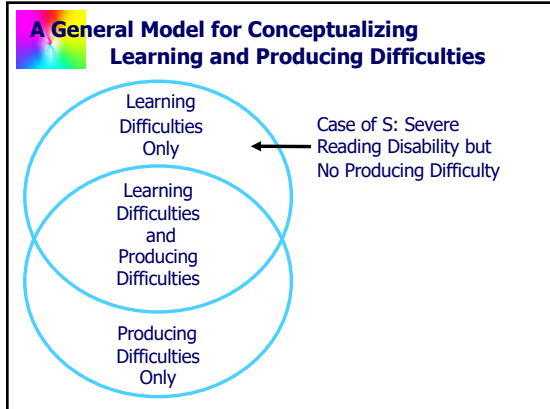
9 year-old good readers

9 year-old dyslexics

Greater activity in good readers than in dyslexics
for words for faces



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S. Age 11 to Age 13


**Severe Reading Disability
(Phonological Dyslexia)
Poor "workers"**

**No Producing Disability
(Well-developed executive capacities)
Good "supervisors"**

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S's Assessment

- **Superior Range**
 - Reasoning with Language and Language Abilities
 - Immediate and Working Memory
 - Retrieval from Long-Term Storage
 - Reading Comprehension
- **Average Range**
 - Word Reading
 - Reading Speed
 - Silent Reading Fluency




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S's Assessment

Extremely Low Range


- Nonsense Word Decoding
- Phonological Processing
- Although S. demonstrated average sight word recognition skills he was unable to decode unfamiliar words in his classroom textbooks



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S's Strategies


- S. was able to use his **superior executive capacities** to develop and use his own strategies for reading and earning good grades.
- S. tried to complete reading assignments but had difficulty understanding what he read; the next day at the bus stop, he would ask other students to tell him about the assignment they read the night before so he could answer questions in class.



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ORIENTING: S's Intervention Goals


- S. was highly motivated to improve his reading skills so that he could continue to learn new material and earn good grades.
- S. realized that he needed to improve his word decoding skills.
- S. wanted to learn decoding patterns so that he could self-correct his word reading errors and improve his comprehension of his textbooks.



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Intervention Methods Used with S.

- S's interventions focused on **remediating his decoding skill deficit.** This is analogous to improving the workers so they are available to do their job when S.'s very effective supervisory system calls on them.



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Intervention Methods Used with S.

- 30 minutes a week Monday morning 1-1 direct instruction with a reading specialist using the Megawords program to learn decoding patterns
- Scott used what he learned each Monday morning to complete Megawords workbook exercises every day.
- Teacher would check S.'s work and answer questions about workbook exercises before moving to next pattern.



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Intervention Methods Used with S.

Megawords SCOPE AND SEQUENCE CHART

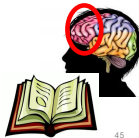
Megawords 1 Six Types of Syllables; Five Syllabication Rules	List 1 Compound Words	List 2 VCVCV Closed Syllables	List 3 VCVCV Closed & Silent-e Syllables	List 4 VCVCV Closed & e-Controlled Syllables	List 5 VCV	List 6 VCV	List 7 VCe	List 8 VV
Megawords 2 Common Prefixes and Suffixes	List 9 -ly, -ful, -ment, -fully, -ness, -some, -less, -er, -er	List 10 -ing, -er, -est, -er, -ish, -y	List 11 Three Sounds of ed	List 12 Spelling Patterns—Vowel Suffixes	List 13 re-, de-, ex-, pre-, per-, sub-, un-, in-, ante-	List 14 inter-, co-, trans-, com-, dis-, mis-, ad-, ob-, ab-		
Megawords 3 Schwa Sound	List 15 -al, -e	List 16 -e, -ie, -ate	List 17 Middle Syllable Suffixes	List 18 -ant, -ant, -ent, -ent, -ent	List 19 -er, -er, -er, -er, -er			
Megawords 4 Advanced Suffixes	List 20 -er, -er, -er, -er, -er, -er, -er, -er	List 21 -tion	List 22 -tion	List 23 -ous	List 24 -ous, -ous, -ous	List 25 -able, -able, -able, -able		
Megawords 5 Vowel Variations	List 26 Vowel Combinations with a	List 27 Vowel Combinations with e	List 28 Vowel Combinations with i	List 29 Vowel Combinations with y				
Megawords 6 Consonant Variations	List 30 Sounds of ph, ps, and qu	List 31 Soft c	List 32 Soft g	List 33 VV and VVV Combinations				
Megawords 7 Unaccented Vowels and Advanced VV	List 34 -i-, -dy, -ant, -al, -al	List 35 i = /e/, u = /a/ or /u/	List 36 i = /y/	List 37 a & e = /u/	List 38 Advanced VV			
Megawords 8 Assimilated Prefixes	List 39 com-	List 40 ad-	List 41 sub-	List 42 ob-, dis-	List 43 ex-, sym-	List 44 in-		



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S. Outcomes

- S. completed all 8 Megawords workbooks in 20 months.
- S. reading three times faster than before learning decoding skills.
- S. comprehension of class textbooks improved; no longer needed to ask other students about content of assigned readings.
- S. continued to earn high grades in all his classes.



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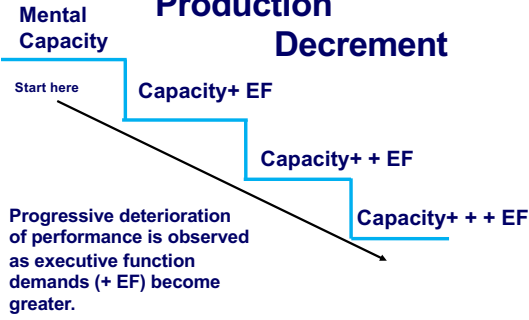
Assessment of EF Involvement in Reading

- Executive Functions must be assessed in tandem with processes, abilities, skills and/or retrieval from lexicons.
- Specific measures of Executive Functions always involve the assessment, to some degree, of a mental capacity other than executive functions.
- For the most accurate observation or measurement of EFs, the contributions of other capacities need to be minimized, controlled for, or acknowledged in some way.



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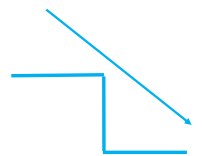
Cascading Production Decrement



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Cascading Production Decrement Assessment of Orthographic Processing

- Identify a baseline level with a measure of orthographic processing that minimizes EF involvement
- Use a measure that adds executive function demands to the baseline capacity and observe the results.
- Continue to add additional EF demands and observe results.



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PAL-II Rapid Automatic Naming - Letters

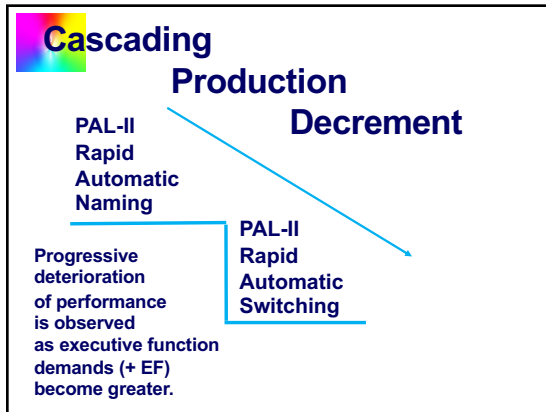
h	n	o	a	t	f	u	w	h	n	b	d
b	h	u	t	o	h	d	n	w	f	a	n
d	b	n	h	w	u	f	t	a	o	n	h
f	a	n	u	h	b	t	o	h	w	n	d

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PAL-II Rapid Automatic Switching- Words & Digits

the	69	of	38	you	17	are	78
one	91	said	36	been	96	who	83
are	71	you	13	of	67	the	89
who	been	38	17	said	69	89	one
been	one	who	71	83	said	71	36
96	you	the	63	19	are	87	of

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D-KEFS Color-Word Interference – Word Reading

green blue green red green

green red blue green blue red blue green blue green

red green blue green blue green red blue red green

red green blue green red blue green red blue red

blue green red blue green red blue green blue red

green red blue red blue green red blue red green

52

D-KEFS Color-Word Interference – Inhibition

Rule: Name the ink color.

red blue green blue green

red blue red green red

blue green blue red blue red blue red blue red

blue green blue green red green blue red blue green

red green red blue green red green red blue green

blue green blue red green blue red green red green

green blue red blue green red blue green red blue

53

D-KEFS Color-Word Interference – Inhibition/Switching

Rules:

- blue – Name the ink color.
- red – Read the word.

blue red green red blue

green red green red blue

green blue green blue red green red green red blue

red blue red green blue green blue red red blue

blue red green red red green blue red blue red

blue green blue green red red green red blue green

green red red blue green blue red green green red

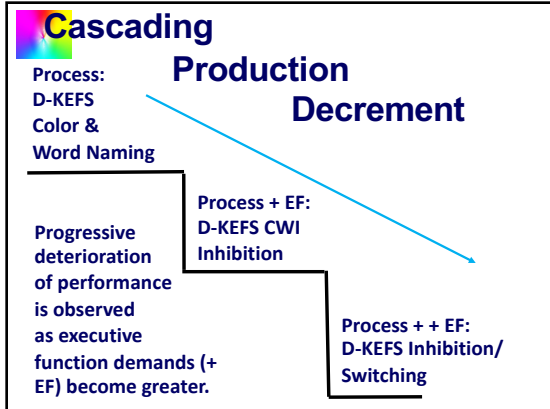
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D-KEFS Color-Word Interference – Inhibition

Rule: Name the ink color.

red	blue	green	blue	green					
red	blue	red	green	red					
blue	green	blue	red	blue	red	blue	red	blue	red
blue	green	blue	green	red	green	blue	red	blue	green
red	green	red	blue	green	red	green	red	blue	green
blue	green	blue	red	green	blue	red	green	red	green
green	blue	red	blue	green	red	blue	green	red	blue

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Assessing Executive Functions Directly Related to Reading

A process-oriented approach can be effectively used to observe and document difficulties with the use of executive function processes during the performance of reading tasks.

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Behaviors indicative of poor executive control when reading


- Mispronunciations of words that previously have been recognized by sight, and correctly pronounced;
- When reading words from a list, there is little or no awareness of the errors being made;
- Pronunciations offered are those of words highly similar in visual configuration to the correct word or start with the same letter or letter cluster as the correct word.



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Behaviors indicative of poor executive control when reading


- Mispronunciation of nonsense words that previously were decoded and pronounced correctly;
- When decoding nonsense words from a list, real words with highly similar visual configurations are offered as responses for nonsense words;
- Pronunciations offered start with the same letter or letter cluster as the target nonsense word, or a single consonant sound is deleted.



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Behaviors indicative of poor executive control when reading


- Lack of application of decoding skills when reading sentences and passages for words that have been decoded correctly during skill drills and/or substituting similarly configured sight words for nonsense words instead of applying decoding skills.



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Behaviors indicative of poor executive control when reading


- Word reading rate is inconsistent during fluency instruction or drills.
- Sentence or passage reading rates are inconsistent or not consistent with rate demonstrated during fluency instruction or drills.



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Behaviors indicative of poor executive control when reading


- Difficulty getting started with reading assignments and/or unable to sustain interest, attention and/or effort.
- Reads a passage very quickly, but when asked questions about what was just read, student must go back and reread in order to answer the question unless reminded ahead of time that they will need to answer questions after reading.



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Behaviors indicative of poor executive control when reading


- Overuses prediction as a comprehension strategy, substituting words or phrases that are consistent with predictions rather than reading the actual words on the page.
- Despite demonstrating knowledge of a word, doesn't access the meaning of that word when reading it in a sentence.
- Does not make the connection between what they know and what they are reading.



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Behaviors indicative of poor executive control when reading

- Despite demonstrating knowledge of reading comprehension strategies, student does not apply known strategies when reading for meaning.
- Despite demonstrating effective oral expression, student is not able to orally communicate the meaning of sentences or passages that are read.



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Executive Control Intervention Continuum



Orienting Strategies

External Control Strategies

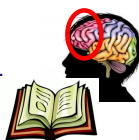
Bridging Strategies

Internal Control Strategies

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Framework for Interventions


- Orienting – help child become aware of need to change and set goals for change.
- External Control – show child when and how to produce and guide child's efforts to produce.
- Bridging Strategies – teach student strategies for how and when and provide feedback about child's use of strategies (feedback gradually faded).
- Internal Strategies – child self-cues use of strategies that increase self-regulation.



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Orienting Strategies


Orienting Strategies
increase awareness of executive functions and expectations for their use and provide self-regulation goals for students.



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Orienting Strategies


- Identify goals (with younger children / Motivational Interviewing (with older children and adults).
- Identify problems that prevent goal attainment.
- Identify solutions/strategies to address problems.
- Explain brain functions involved in positive change.



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External Control

External Control strategies enable an individual to perform more effectively but often they don't help to improve an individual's capacity for self-regulated production.



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External Control Strategies


- Clinician/Teacher mediates **production** – becomes the “supervisory system” for the child’s “workers.”
- Clinician/Teacher obtains **production** from child with rewards or negative consequence contingencies.
- Clinician provides or structures management aides: calendars, clocks, timers, schedules, peer leaders and coaches, work teams



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Bridging Strategies


Bridging strategies affect the gradual transition from external control to self-regulated internal control.



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Bridging Strategies

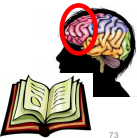
- Align external demands with internal desires / motivations
- Practice & Rehearsal with Feedback
- Cognitive Strategy Instruction
- Reflective Questioning with Feedback
- Modeling
- Collaborative Problem-Solving
- Develop a common vocabulary of change



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Interventions for Executive Capacity Difficulties Related to Reading


The most effective form of intervention for maturational difficulties with executive capacity cues is increased practice of the complete act of reading, i.e., practicing the integration of all processes, skills, abilities and lexicons while reading connected text while receiving feedback from an external source.



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Internal Control Strategies


Internal Control Strategies, when learned and practiced, enable students to effectively “run their own shows”.



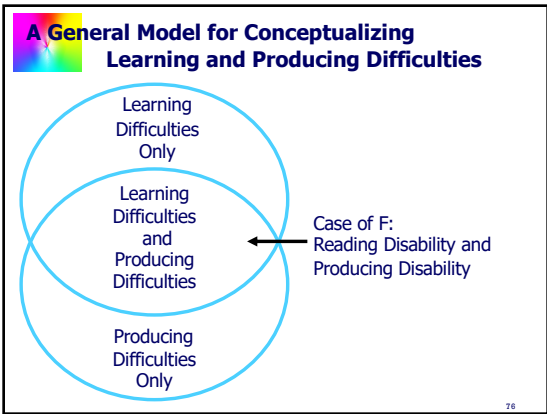
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Internal Control Strategies

- Self- Monitoring
- Self-Talk
- Self-Administered Rewards



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F. Age 8 to Age 11

Severe Reading Disability (Surface Dyslexia)
Poor "workers"

Producing Disability (Executive Control Deficits - ADHD)
Poor "supervisors"

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F's Assessment

Above Average to Superior Range


- Reasoning with Language and Language Abilities
- Immediate and Working Memory
- Retrieval from Long-Term Storage
- Phonological Processing

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F's Assessment

Below Average to Extremely Low


- **Orthographic Processing**
- **Orthographic Memory** (accessing alphabet and identifying positions of letters relative to other letters)
- **Nonsense Word Decoding**
- **Word Reading**
- **Reading Speed**
- **Reading Comprehension**



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Assessing Executive Control of Reading

A process-oriented approach can be effectively used to observe and document difficulties with the use of executive function processes during the performance of reading tasks.




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Observation of F's Reading Errors

Excessive word reading errors


- Frequently confused the symbol-sound associations for the letters b and d.
- Read words at a slow pace.
- Did not use decoding skills to sound out unfamiliar words.
- Incorrect pronunciations were words that started with similar letters or were similar visual configurations.



81

F's Assessment


- F's scores on tests of reading indicated a lack of knowledge of sight words and a lack of decoding skills despite 2 years of remedial reading instruction.
- F's scores on phonologic and orthographic process tests indicated significant process deficits that would impede learning.
- But – F. also exhibited reading errors that indicated a lack of executive control of reading.



82

F's Assessment

- F. was asked to read the Dolch Sight Word Lists for the Grades Pre-primer through Grade 2.




Word List	Pre-Primer	Primer	Grade 1	Grade 2
Words Read Correctly	34/40	33/52	29/41	41/46
Percentage of Words Read Correctly	85%	63%	71%	89%

83

Observation of F's Executive Control Difficulties


- Frequently said what he thought should be on the page instead of what was actually on the page.
- Reading triggered off-topic discussions in place of continued reading.
- Easily distracted by sounds and objects around him when reading.



84

Observation of F's Executive Control Difficulties


- Unable to focus and sustain attention for reading tasks for age-expected amount of time.
- Lack of monitoring word reading for errors.
- Unable to adjust reading pace to go faster or slower as needed.
- Unable to focus and sustain attention and effort in class.



85

Interventions for Executive Control Difficulties Related to Reading

Some executive control difficulties related to reading are the result of a lack of adequate maturation of the neural networks involved in the direction of the effective use of orthographic processing when reading.

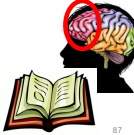


86

Case Study – Phillip's Primary Needs

Phillips' assessment results indicated:


- The need for Phillip to become proficient with quickly and accurately identifying words by sight and recognizing when he needed to stop and decode a word that he did not recognize as a sight word.
- The need for Phillip to attend more closely to the words that he was reading and construct meaning from the sentences he was reading instead of jumping ahead to infer meaning from information the he had stored previously.



87

ORIENTING: Awareness Building


- F. was aware of the difficulties he was having with word reading.
- F. was highly motivated to improve his reading skills.
- F. was very pleased to know that he earned scores in the superior range with tasks that assessed reasoning and problem-solving.
- F. was provided with an explanation of how the brain processes the visual image of words and how difficulties with processing visual images do not indicate a lack of intelligence.



88

ORIENTING: F's Intervention Goals


- Quickly and accurately identifying words by sight
- Monitor word reading to identify unfamiliar words
- Stop and decode unfamiliar words.
- Focus and Sustain Attention to the words on the page and construct meaning from the text instead of inferring meaning from previously stored information.



89

Bridging Strategies used with F.


- At Home: **Practice & Rehearsal** with feedback using **Flash Cards** to increase speed and accuracy of sight word recognition.
- At School: **Practice & Rehearsal** with feedback using **Fluency Drills** (3-5 times a day for 3-4 minutes each) reading sentences composed primarily of K and Grade 1 sight words.



90

Bridging Strategies Used with F. to Improve Reading Production


- Common Vocabulary used to describe a Cognitive Strategy for focusing attention on every letter of every word. ("Words can be like visual illusions; if you don't look carefully at every letter of a word you may see what you think is there instead of what is really there").



91

Bridging Strategies Used with F. to Improve Reading Production

- Common Vocabulary used to describe a Cognitive Strategy for comprehending the meaning of sentences. ("Don't jump to hyperspace before the crew is ready. Give your brain a chance to see all the words of a sentence before drawing conclusions about the meaning.").

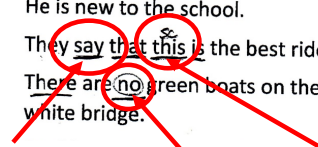


92

Fluency Drills: Reading sentences as quickly as possible with feedback.

First "cold" read of sentences (Sept.)

He is new to the school.
 They say that this is the best ride in the park.
 There are no green boats on the lake under the white bridge.



Words read incorrectly are corrected by examiner and underlined. Last word read in 60" time period is circled. Self-corrections are not counted as errors.

93

Fluency Drills: Reading sentences as quickly as possible with feedback.

First "hot" (repeat) read of sentences. Words read incorrectly during hot read are underlined

He is new to the school.

They say that this is the best ride in the park.

There are no green boats on the lake under the white bridge.

94

Second "hot" read of sentences

He is new to the school.

They say that this is the best ride in the park.

There are no green boats on the lake under the white bridge.

Last word read in 60" time period is circled.

95

Fluency Drill Progress Monitoring

Sentence Reading Fluency Drills Progress Monitoring Form

September

Date 9-14-12 Session 1 (10/10)

	Word Reading Errors	%	WCPM
Trial 1	<u>5</u>	<u>33%</u>	<u>15</u>
Trial 2	<u>5</u>	<u>30%</u>	<u>17</u>
Trial 3	<u>2</u>	<u>11%</u>	<u>19</u>

96

First "cold" read of sentences (May)

Many kids will use their pencils in class.
 She will use one of each color.
 How do these go up?
 Which book is about the other dog?
 I will play, then eat an apple.
 If I go out to play, I will need a coat.
 Is this for them to eat?
 There are so many different kinds of fruit!
 This is the way into the school.
 She has her book in her hand.
 Some people would like to make cookies.
 I could write a number on my paper.
 It is time to look for him in this crowd.
 I would like two more books.
 She will go see who has more.
 There is no time to play with you now.

Last word read in 60" time period is circled.

97

First "hot" (repeat) read of sentences

Many kids will use their pencils in class.
 She will use one of each color.
 How do these go up?
 Which book is about the other dog?
 I will play, then eat an apple.
 If I go out to play, I will need a coat.
 Is this for them to eat?
 There are so many different kinds of fruit!
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 I go out to play, I will need a coat.
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 he has her book in her hand.
 ome people would like to make cookies.
 ould write a number on my paper.
 is time to look for him in this crowd.
 ould like two more books.
 e will go see who has more.
 ere is no time to play with you now.

Last word read in 60" time period.

98

Second "hot" read of sentences

Many kids will use their pencils in class.
 She will use one of each color.
 How do these go up?
 Which book is about the other dog?
 I will play, then eat an apple.
 If I go out to play, I will need a coat.
 Is this for them to eat?
 There are so many different kinds of fruit!
 This is the way into the school.
 She has her book in her hand.
 Some people would like to make cookies.
 I could write a number on my paper.
 It is time to look for him in this crowd.
 I would like two more books.
 She will go see who has more.
 There is no time to play with you now.

Many kids will use their pencils in class.
 She will use one of each color.
 How do these go up?
 Which book is about the other dog?
 I will play, then eat an apple.
 If I go out to play, I will need a coat.
 Is this for them to eat?
 There are so many different kinds of fruit!
 This is the way into the school.
 She has her book in her hand.
 Some people would like to make cookies.
 I could write a number on my paper.
 It is time to look for him in this crowd.
 I would like two more books.
 She will go see who has more.
 There is no time to play with you now.

Last word read in 60" time period.

99

Fluency Drill Progress Monitoring

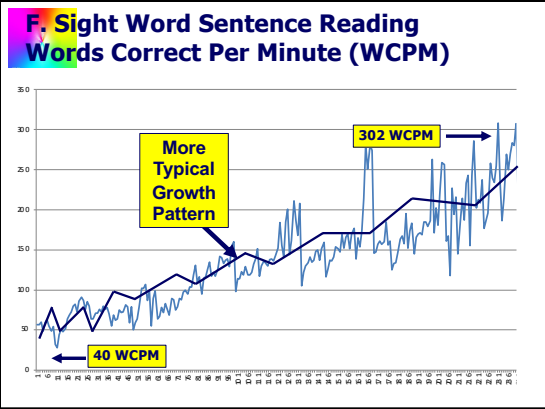
Sentence Reading Fluency Drills
Progress Monitoring Form

MAY

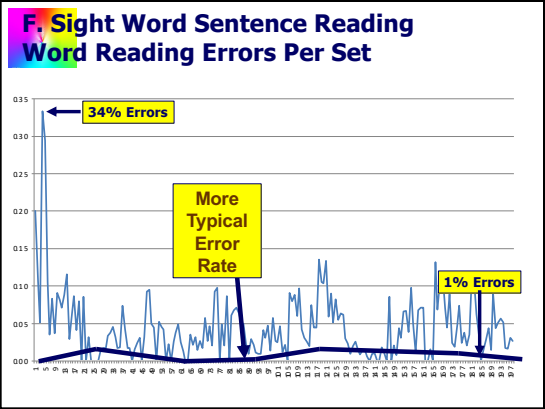
Date 5/1 Session 2 (3:05)

	Words Read	Errors	WCPM	WCPM
Trial 1	<u>3</u>	<u>3%</u>	<u>110</u>	110
Trial 2	<u>3</u>	<u>3%</u>	<u>132</u>	132
Trial 3	<u>2</u>	<u>3%</u>	<u>177</u>	177

100



101

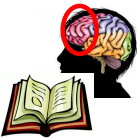


102

F's Reading Intervention Outcomes

PSSA Language Arts Annual Standardized Group Testing:

- Grade 3 – **Below Basic**
- Grade 4 – **Basic**
- Grade 5 – **Proficient**

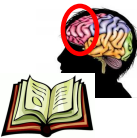


103

F's Improvements in Use of Executive Control

Gradually, over a three year period, F.:

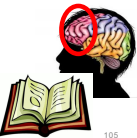
- Improved ability to focus and sustain attention for reading tasks for age-expected amounts of time.
- Improved monitoring of word reading for errors.
- Improved reading speed.
- Improved ability to focus and sustain attention and effort in class.



104

Interventions for Executive Control Difficulties Related to Reading

Some executive control difficulties related to reading are the result of a lack of adequate maturation of the neural networks involved in the direction of the effective use of orthographic processing when reading.



105

Intervention for Orthographic Awareness Difficulties

- Should be addressed directly in early intervention (Pre-K-1)
- Intervention involves transfer of visual images to long-term storage, usually through repetition drills
- Difficulties that are not remediated may result in chronic illiteracy
- Typically not the primary factor in most reading problems

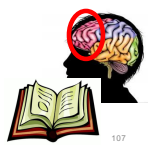


106

Interventions for Executive Control Difficulties Related to Reading

Interventions for executive control difficulties with reading rate:

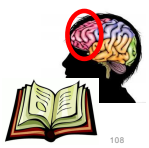
Increased oral reading practice with words and passages composed of words that can be recognized by sight.



107

Interventions for Executive Control Difficulties Related to Reading


- The goal of fluency instruction is to reduce the executive function demands by making word reading automatic.
- Fluency instruction also helps to improve use of the Pace cue; through repetition, pacing is gradually transferred from being externally guided to internally directed.



108

Cognitive Strategy Instruction

1. Explain the purpose.
2. Model the strategy.
3. Student memorizes the steps.
4. Mediate student's use of each step; scaffold as needed.
5. Student uses strategy guided by self-talk.
6. Teacher and student collaboratively evaluate student's efforts.



109

Intervention for Difficulties with EF Control of Attention to Orthography


- Attention to orthography difficulties can be addressed in conjunction with fluency instruction.
- The following strategy can be used:



110

Intervention for Difficulties with EF Control of Attention to Orthography

- Note the words that are mispronounced during a "cold" read of a fluency practice passage.
- Identify those words that have been read correctly in word decoding lessons but that were mispronounced during the cold read.



111

Intervention for Difficulties with EF Control of Attention to Orthography


- On a copy of the practice passage, place underline every mispronounced word that had been pronounced correctly during decoding instruction.



112

Intervention for Difficulties with EF Control of Attention to Orthography


- Instruct the student as follows: "When you see an underlined word, that means that this is a word that you don't always read correctly but that you know how to decode. The underline is there to remind you to use your decoding skills to sound out that word so that you will be sure to read it correctly.."



113

Intervention for Difficulties with EF Control of Attention to Orthography

- Typically not addressed specifically in intervention programs
- Intervention involves focusing attention on characteristic visual features of letters; learning to attend carefully and quickly to all the letters of every word.




114

Intervention for Difficulties with EF Control of Attention to Orthography

Interventions for executive functions difficulties with word reading miscues:


- 1) Increase awareness of and use of all of the steps in the word recognition process.



115

Intervention for Difficulties with EF Control of Attention to Orthography


- For a student who appears to be having a lot of difficulty with substituting visually similar highly familiar words, talk with the student about how words can be illusions in that they can fool us into believing that they look like other words we know.



116

Intervention for Difficulties with EF Control of Attention to Orthography


- Script for increasing awareness and use:
 - “Look” (Perceive cue)
 - “at each word” (Focus cue)
 - “carefully.” (Monitor cue)



117

Intervention for Difficulties with EF Control of Attention to Orthography


- “See the letters and words that **are** on the page, not the letters and words you **believe to be** on the page.” (Inhibit cue)
- “Quickly (Pace cue)
- figure out if you know the word or don’t know the word.” (Gauge cue)



118

Intervention for Difficulties with EF Control of Attention to Orthography


- “Quickly (Pace cue)
- “say the word if you know it.” (Retrieve cue)
- “Pause if you don’t know it.” (Interrupt cue)
- “Shift to decoding mode.” (Shift cue)



119

Intervention for Difficulties with EF Control of Attention to Orthography


- “and quickly (Pace cue)
- use your decoding skills to sound out the word.” (Retrieve cue)
- “Ask yourself if what you sounded out matches a word you’ve heard before.” (Monitor & Retrieve cues)



120

Intervention for Difficulties with EF Control of Attention to Orthography


- “Use your decoding skills again if you don’t recognize what you sounded out or if the word doesn’t make sense in the sentence.” (Correct cue)



121

Intervention for Difficulties with EF Control of Attention to Orthography

- Follow the discussion with word recognition drills and oral reading of passages that emphasize the use of the first four cues in the sequence (“Look / at each word / carefully./ See the letters and words that **are** on the page, not the letters and words you **believe to be** on the page.”)




122



123

Intervention for Difficulties with EF Control of Attention to Orthography


- Computer-based interventions that emphasize attention to orthographic regularity have demonstrated improvements in students' decoding skill application and overall reading achievement levels.



124

Intervention for Difficulties with EF Control of Attention to Orthography

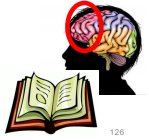
- Many computer programs available today, such as Read 180 and Lexia, have the reading with orthographic and speech support components that have been shown to help improve decoding skills.



125

Interventions for Executive Control Difficulties Related to Reading

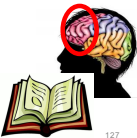
Many executive control difficulties related to reading are the result of a lack of adequate maturation of the neural networks involved in the use of these executive functions for reading.



126

Interventions for Executive Control Difficulties Related to Reading

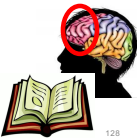
The most effective form of intervention for maturational difficulties with executive functions cues is increased practice of the complete act of reading, i.e., applying the integration of all processes, skills, abilities and lexicons while reading connected text while receiving feedback from an external source.



127

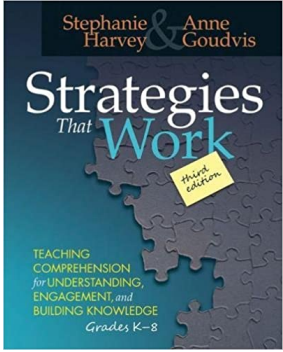
Interventions for Executive Control Difficulties Related to Reading

The most effective form of intervention for maturational difficulties with executive control of reading for meaning is cognitive strategy instruction.



128

Recommended Reading:



Stephanie Harvey & Anne Goudvis
Strategies That Work
Third Edition
 TEACHING COMPREHENSION FOR UNDERSTANDING, ENGAGEMENT, and BUILDING KNOWLEDGE
 Grades K-8


129

Cognitive Strategy Instruction

Cognitive Strategies for Teaching Reading, Writing and Math are available at cehs.unl.edu/csi/

130


Executive Control and Writing



131

Neuropsychology of Writing

- Language by hand develops over a longer developmental trajectory than the other language systems.
- Language by hand requires the greatest involvement of frontal lobe functions (executive functions and working memory) for success; as a result, relatively skilled writing does not develop typically until late adolescence.




132

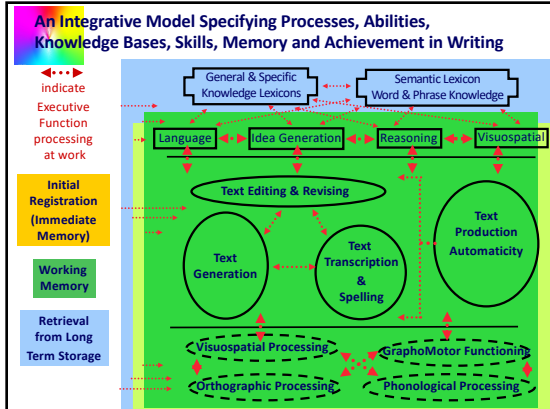
Neuropsychology of Writing

Writing is not the mirror image of reading

- Writing is not just the output stage in relation to the input (reading) stage of written language.
- Writing is not merely a motor act.
- Handwriting, spelling, and composition are separable components of the developing writing system.




133



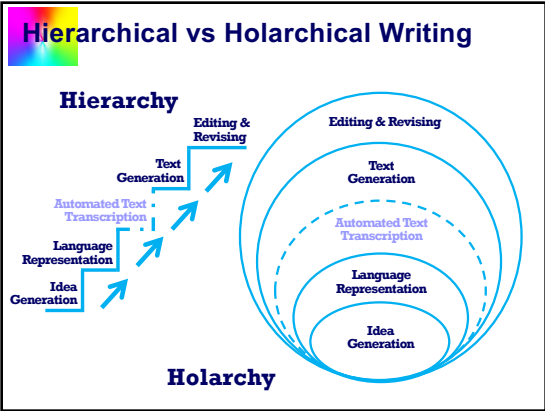
134

Holarchical Organization

- Holarchical progression to the next stage can occur before completion of the previous stage.
- Holarchical development can continue at an earlier stage even after a later stage has begun.
- In a hierarchy, progression to the next stage cannot occur until after completion of the previous stage.



135

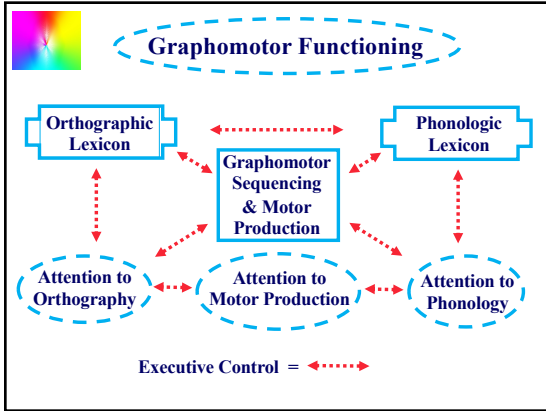


136

Neuropsychology of Writing

It is important to note that if text transcription does not reach an adequate level of automaticity to support the writing process, alternative methods (typing, texting) and alternate modalities (dictation) can be used to transform language representation into written text.

137




138

Composition Instruction

Transition from Other- to Self- Regulation

- Developing writing must become increasingly self-initiated, self-sustained, self-monitored, and self-disciplined.
- The transition to self-regulation is more likely to occur if adults explicitly prepare developing writers for it through instructional cueing. Strategies can be taught as they are unlikely to emerge solely on the basis of myelination of the frontal lobes.



139

Composition Skill Development: Intermediate Writers

- Reviewing/revising is mostly at the word and sentence level.
- Executive control focus shifts to increasing self-regulation of higher level writing components.
- Revising/reviewing skills after transcription and text generation are developing more than idea generation skills.



140

Composition Skill Development: Advanced Writers

- Executive control focus is devoted to self-regulation of higher level writing components in a more integrated manner.
- Idea generation and preplanning continue to develop.
- The integration of reading and writing skills becomes more critical.



141

Finding the EF Demand Balance in Writing Assignments

Extensive List of Detailed Constraints On the Writing Product

No guidelines for the writing product

A few guidelines and suggestions for specific writing strategies that can be used to complete the writing product

142

Executive Control Writing Challenge 1: Dealing with Physical Space Constraints:

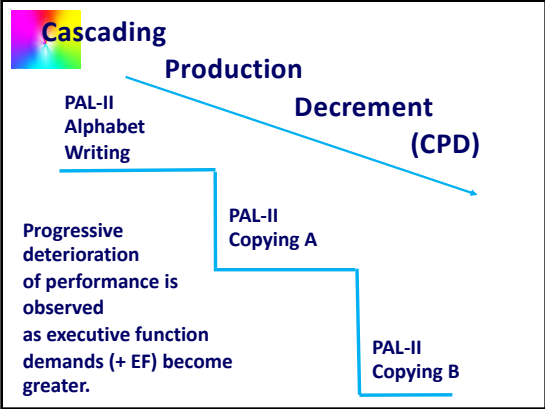
**Summer
Time is Oil
Change Time**

143

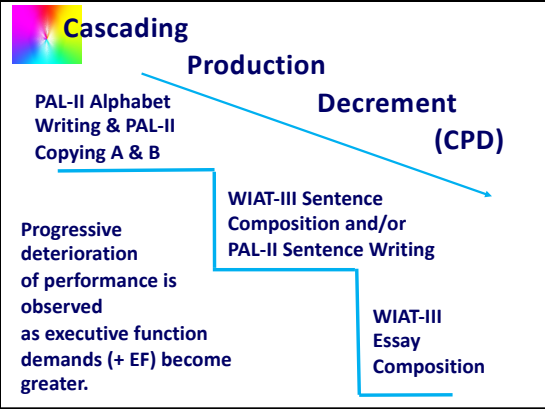
Assessments of EF Involvement in Writing - CPD

- Identify a specific cognitive capacity baseline using a measure that minimizes EF involvement.
- Select and use a measure that adds executive function demands to the baseline capacity and observe the results.
- Continue to add additional EF demands and observe results.

144




145



146

Behaviors indicative of poor executive control when Writing


- Resistance to topic/idea generation or resistance to accepting the topic/ideas of an outside source.
- Inability to get energized for, initiate, and remain engaged with the act of writing.



147

Behaviors indicative of poor executive control when Writing


- Amount of written production is limited or writing is avoided despite adequate ideas and language representation.
- Written text is overly simplistic and minimal compared to good knowledge store and good oral expression of knowledge.



148

Behaviors indicative of poor executive control when Writing


- Arguments lack coherence/logical order or do not create a visual image despite adequately developed reasoning, language and/or visuospatial translation abilities.
- Good initial use of reasoning or visuospatial translation abilities deteriorates as writing progresses.



149

Behaviors indicative of poor executive control when Writing


- Long pauses needed to access correct spellings or words usually spelled correctly on tests are spelled incorrectly in written products.
- Poor wording or grammatical errors, poor punctuation, and misspellings are not checked and/or not corrected.



150

Behaviors indicative of poor executive control when Writing


- Difficulty planning and organizing thoughts about what to write;
- Difficulty judging the adequacy of a written product and/or recognizing when text needs to be revised.



151

Behaviors indicative of poor executive control when Writing


- Well-articulated ideas are quickly forgotten once text generation is started.
- Ideas for revision are clearly stated but quickly forgotten once text revision is started.



152

Behaviors indicative of poor executive control when Writing

- Pace slows noticeably with passage of time.
- Use of pencil is resisted; pencil grasp is awkward and/or overly fatiguing.
- Letters and words are poorly formed, overall legibility is poor.



153

Executive Control and Writing

What Evan wrote:

My favorite game is...
"mabul roling it is
fun. I like making
the box to role in
to. lam prety gode as
well. It is rell inters
ing. It is so fun.

What Evan said:

"My favorite game is rolling
marbles. I think it is fun. I just
learned it yesterday. It can be
pretty hard at times. It can be
fun and it's interesting if you
make it challenging. I like
making the boxes to roll the
marbles into. You probably
need to be pretty skilled with
eye hand coordination to do it.
To get up the ramp you need to
roll it really fast."

154

**Interventions for Executive Control
Difficulties Related to Writing**

Many executive functions
difficulties related to writing
are the result of a lack of
adequate maturation of the
neural networks involved in
the use of these executive
functions for writing.



155

**Later Composition Instruction:
General Rationale**

"...it is unlikely that brain maturation alone
without explicit instruction in self-regulation
strategies will help middle school and high
school students develop and apply
executive functions productively to writing.
The major pedagogical goal at this stage of
development is to guide the Writing Brain in
becoming more self-regulated. A major
research-supported technique for
accomplishing this goal is teaching explicit
strategies for regulating the writing process,
some of which are genre specific, and all of
which should be coordinated with
curriculum."


Berninger, 2002, page 248.



156

Interventions for Executive Control Difficulties Related to Writing

The most effective form of intervention for maturational difficulties with the use of executive functions is increased practice of all the stages of the writing process increasingly guided by the use of self-regulation strategies that can be taught to the student.




157

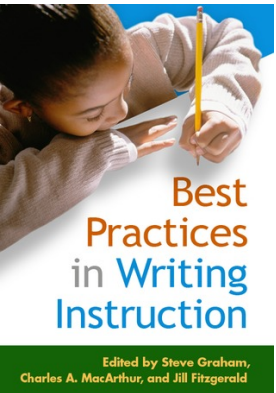
Interventions for Executive Control Difficulties Related to Writing

Brett: Oppositional Defiant?

Or struggling with the executive demands of the writing process?



158



Best Practices in Writing Instruction

Edited by Steve Graham, Charles A. MacArthur, and Jill Fitzgerald

Steve Graham
Self-Regulated Strategy Development (SRSD)

159

Cognitive Strategy Instruction

1. Explain the purpose.
2. Model the strategy.
3. Student memorizes the steps.
4. Mediate student's use of each step; scaffold as needed.
5. Student uses strategy guided by self-talk.
6. Teacher and student collaboratively evaluate student's efforts.



160

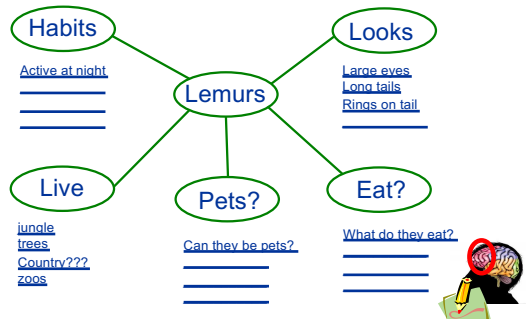
The Report Writing Strategy

1. Select a topic.
2. Brainstorm what you know and what you want to learn.
3. Organize your information using a visual web.
4. Review your visual web and identify any holes or disconnects.



161

Web for what I know and what I want to learn



162

The Report Writing Strategy

- 5. Gather new information and revise your visual web.
- 6. Use the visual web to help construct an outline for the report or to begin writing.
- 7. Review, plan and revise as you write.



163

The Report Writing Strategy

- 8. Check the visual web; did you write what you wanted to write?
- 9. Add information that is missing; fix sentences that don't say what you want to say.



164

Scaffolding Step 9


- A. Read the sentence silently and/or aloud.
- B. Does the sentence make sense to you? What does it mean?
- C. Is that what you meant to say?



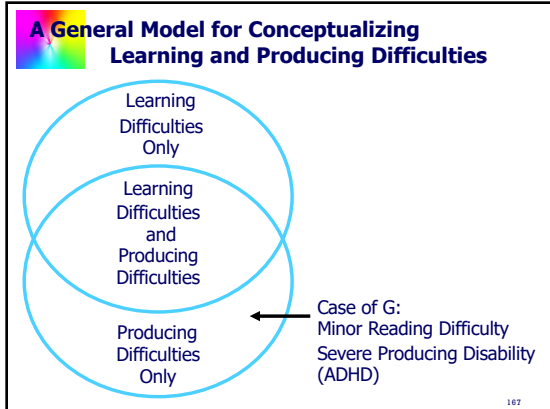
165

Scaffolding Step 9

- D. What's missing? What doesn't make sense?
- E. Restate what you want to write. Repeat it to yourself.
- F. Write what you just said.
- G. Read what you wrote; go through steps A-F if needed.



166



167

G. Age 6

**Minor Reading Difficulties
Untrained "workers"**


**Producing Disability
(Executive Capacity Deficits - ADHD)
Poor "supervisors"**

168

G's Assessment

Above Average to Superior Range

- Reasoning with Language and Language Abilities –
- Immediate and Working Memory
- Retrieval from Long-Term Storage
- Phonological Processing
- Nonsense Word Decoding
- Reading Comprehension




169

G's Assessment

Below Average to Extremely Low Range


- Orthographic Processing (recognizing of letters and words)
- Orthographic Retrieval (retrieving visual images of letters and words)
- Word Reading
- Reading Speed
- Silent Reading Fluency



170

Observation of Behavior During Testing

- G. could not focus and sustain attention to orthography (letters, numbers and math operation signs) leading to word reading errors and incorrect math calculations.
- G. was unable to sustain attention for more than 10-30 seconds for any task that he perceived to be too difficult to complete successfully.
- G. exhibited hyperactivity when trying to do word and sentence reading fluency tasks.
- Letter reversal errors when reading and when writing due to lack of attention to details.



171

Observation of Behavior During Testing

- Overemphasis on speed of handwriting resulting in poor accuracy and legibility of letter formation.
- G. could not sustain effort to accurately produce all the letters of the alphabet.
- Although he copied the words of a sentence at a relatively quick pace, G. could not sustain effort to accurately copy all the words of the sentence.
- G. exhibited hyperactivity during breaks.



172

ORIENTING: Building Awareness

- G. was not aware of the difficulties he was having due to lack of attention to detail.
- The psychologist worked with G. to help him realize the kinds of errors he was making with his favorite subject – math.
- The psychologist showed G. how he was making similar kinds of errors when reading words and printing letters of the alphabet.
- The psychologist helped G. understand why it was important for him to get good at reading and writing.



173

Math Fluency 9-12

1	2	3	4	5	6	7	8	9	10
+3	+0	+3	+4	+1	+6	+1	+1	+2	+4
4	2	7	0	6	7	0	6	6	6

1st 60" Trial

8	0	3	6	5	3	7	0
+2	+4	+2	+3	+2	+1	+0	+1
10	4	5	10	4	7	1	1

2nd 60" Trial

6	10	5	5	7	10	6	6
+7	+9	+5	+7	+2	+3	+0	+6
13	19	10	12	4	13	6	12

7/12 1/16 *athlestop!* 3/10
okav 26 *how* 7/9

174

November 2018

Alphabet Writing

K-Grade 1

175

ORIENTING: Explanation and Goals

- G. was provided with an explanation of the workers and the supervisors in the brain and the need to strengthen his supervisors so they can take charge and direct his very capable workers.
- G. was told that his time with the psychologist would involve playing a lot of games, especially games that involved timing to see how fast he could complete a task.
- G.'s goal would be to do his best when playing the games.

176


G's Production Goals: Improve Executive Control

- Focus and sustain attention for any task.
- Inhibit impulsive responding.
- Get started quickly with assignments.
- Modulate his motor responses to reduce hyperactivity
- Engage executive control to respond to external demands without emotional resistance.

177

G's Production Goals: Automate Word Reading and Writing Skills


- Quickly and accurately identifying words by sight
- Monitor word reading to identify unfamiliar words
- Stop and decode unfamiliar words.
- Focus and Sustain Attention to the words on the page and construct meaning from the text instead of inferring meaning from previously stored information.



178

G's Production Goals: Automate Word Reading and Writing Skills


- Increase accuracy and speed of sight word reading.
- Expand awareness of decoding patterns that can be used to increase word decoding speed and accuracy.
- Automate accurate handwriting of alphabet.
- Improve legible writing and correct spelling of words.



179

External Control Strategies used with G.


- **Mediate Production**
 - Psychologist posed questions to G. or talked G. through the steps required to produce correctly formed letters or pointed out letter features that differentiated similar looking letters (b, d, p, q and g; s and z).



180

External Control Strategies used with G.


- **Obtain Production with Reward Contingencies**
 - The psychologist consistently stated expectations, then reinforced desired behaviors with attention and engagement and ignored undesired behaviors.
 - Desired behaviors initially were defined as any behavior that demonstrated focused and sustained attention and gradually transitioned to mostly academic task behaviors.



181

Bridging Strategies used with G.


- **Aligning External Demands with Internal Desires**
 - Help G. maintain a high level of motivation for academic tasks by using drills that are fun and/or move quickly.
 - Presenting most reading and writing tasks as timed challenges enabled G. to sustain motivation and effort.



182

Bridging Strategies used with G.

- **Aligning External Demands with Internal Desires**
 - My willingness to join in fun activities when G. wanted to do so increased our personal bond and increased his motivation to do tasks that I asked him to do.



183

Bridging Strategies used with G.

- **Modeling**
 - Psychologist sat in one location and remained stationary despite G.'s frenetic activity; only calm, centered behavior was modeled.
- **Practice & Rehearsal with Feedback**
 - Visual discrimination tasks were practiced until letter recognition speed and accuracy was automated.



184

Intervention Methods Used with G.

- Visual (orthographic) discrimination "game": Find as many reversed letters as possible within a specific time limit to increase attention to orthography and speed of accurate orthographic processing. Also helped to correct reversal errors in reading and writing.
- Sight Word Flash Reading Drills with a powerpoint file to improve rapid recognition of basic sight words.



185

Reading Intervention Methods


- Sight Word Sentence Reading to increase speed of sight word recognition.
- Reading Books of Interest to G.
- Immediate feedback about the accuracy of word reading efforts.
- Turned reading into "games" by timing performance. (Highly motivating)
- Introduced decoding and spelling patterns; G. was allowed to pick the patterns that he wanted to learn.



186

Writing Intervention Methods


- Writing the alphabet as a timed task.
- Writing words as they were spelled to him.
- Writing words based on decoding/spelling patterns.
- Spelling words from dictation.



187

G. Age 6

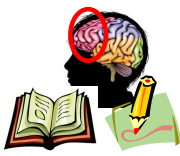
Sessions 1-3
Visual (Orthographic)
Discrimination Drills
Sight Word Flash Drills
Writing Letters



188

G. Age 6

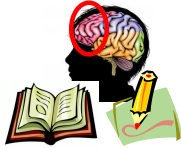
Sessions 4-7
Cold and Hot Sentence Reading Drills
Writing Alphabet
Copying Words from Dictation



189

G. Age 6

Sessions 8-9
Reading Books of Interest
Writing Alphabet
Writing Dictated Sentences
Spelling Words by Pattern



190

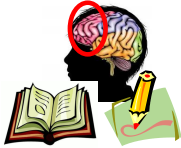
G. Age 6

Session 10
Shifting Motivation from External Rewards to Internally Generated Goals
 G. Was shown all of his work to date.
 After seeing all of his production, he focused and sustained attention for 50 minutes copying all the words he had written in previous sessions

191

G. Age 6

Sessions 11- 14
Reading Books of Interest
Pre-reading a Book for School
Spelling Words by Pattern



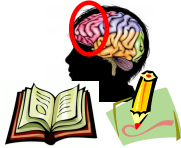
192

G. Age 6

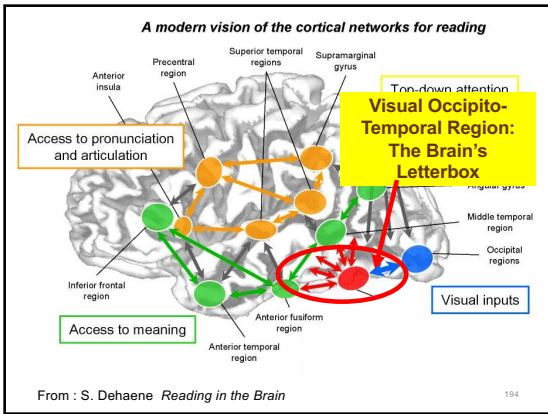
Sessions 15- 18

Reading Books of Interest

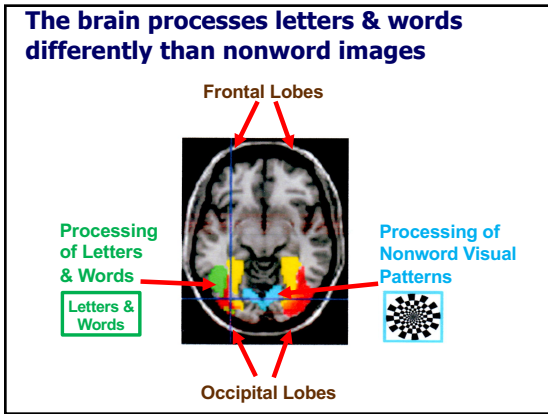
Writing and Editing a Story



193



194



195

Non-word Visual Patterns

Not effective for strengthening Occipito-Temporal processing

Sample Items

196

196

Letters & Words

Effective for strengthening Occipito-Temporal processing

Visual Perception: Letters

PK-Grade 2

Example

a b h i p

197

197

Session 1 February 18 Orthographic Drill

15 seconds
3 Letters

But he did not scan left to right to find them.

PK-Grade 2

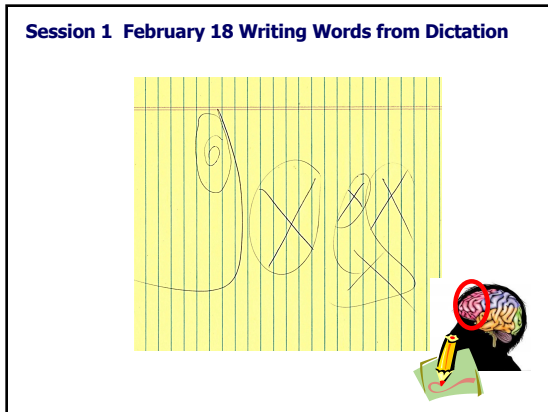
Visual Perception: Letters

60 seconds
11 Letters

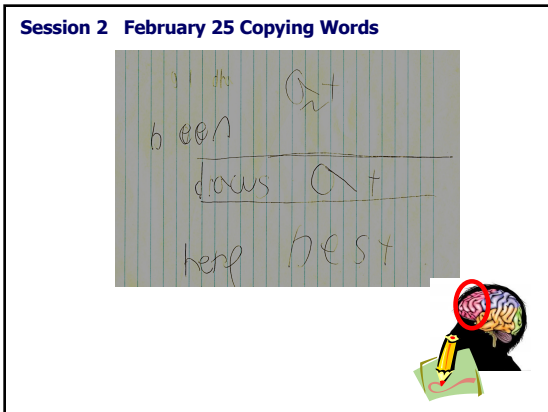
And circled 3 more letters after being told to stop.

198

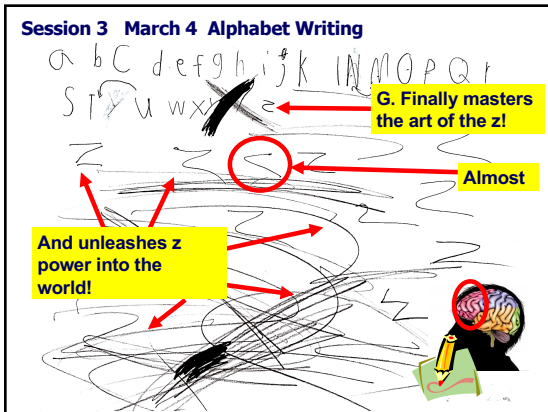
198



202



203



204

Session 4 March 11 Alphabet Writing and Copying Words

abcdefghijklmnopqrstuvwxyz 32sec

about and
around
away
all
again

205

Session 4 March 11 Alphabet Writing and Copying Words

abcdefghijklmnopqrstuvwxyz

about
and

206

Session 5 March 13 Alphabet Writing and Copying Words

abcdefghijklmnopqrstuvwxyz

about
around
away
all
again

207

Session 6 March 19 Alphabet Writing and Copying Words

208

Session 7 March 21 Alphabet Writing and Copying Words

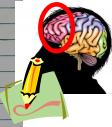
209

Session 8 March 25 Alphabet Writing and Spelling Words by Pattern

210

Session 8 March 25 Spelling Words by Pattern

ou	ee	ow
could	feed	out
would	need	
show	wee	put
	see	snout
	deed	
ew	indeed	mouth
new	high	round
chew	light	
freew	straight	ouch
crew	high	
brew		




211

Session 9 March 27 Alphabet Writing
Spelling Words by Pattern
Spelling Dictated Sentences

abcdefghijklmnopqrstuvwxyz

do not step on a crack

black	clash	steep	flax
bleed	clax	sheet	day
hick	plug	steep	fox
blob	plush	crush	fox
clap	slab	crash	flax
clat	slab	clap	flax
class	slam	clap	flax
		clap	flax
		clap	flax



212

Feedback from School

G.'s teachers notice improvements in reading and writing and offer G. more praise for his efforts.

Their praise motivates G. to do more during our sessions.


213

Session 11 April 10 Spelling Words by Pattern

dge	ing	ood	4/10/19
ledge	ring	mouth	(5)
badge	fling	bound	
bridge	bring	found	
ridge	bring	found	
ridge	bring	found	
ridge	bring	found	
ridge	bring	found	
ridge	bring	found	
ridge	bring	found	
ridge	bring	found	

The boys are playing in the park.
it was nice out side.

park
park, park
park, park
park
park

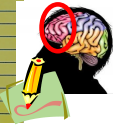


217

Session 12 April 24 Spelling Words by Pattern

4/24/19 (2)

ew	x
new	mix
blow	fox
chew	fox
new	fox
shew	six
low	
chew	
blow	




218

Session 12 April 24 Spelling Words by Pattern

4/24/19 (2)

x
mix
fox
fox
fox
six



219

November 2018 **May 2019**

Alphabet Writing

K-Grade 1

223

Session 7 March 21 Example of fluency drills

SET 1 Form T1-S2

G. Decides to use an underlining strategy while reading to help keep his attention focused on the words on the page.

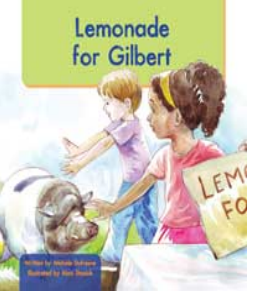

On the walk to the store I saw the little lake.
 There were many fish in the lake.
 Why are some fish yellow but others are not?
 What is the name of that brown fish over there?
 Do you think that fish are fun to watch?
 Where can I get three red fish?
 When we went to the zoo, we saw many monkeys in those trees.
 Some of them are brown and white but most are black.
 They hold onto vines and jump from tree to tree.
 Please make me some of that toast.
 I ate the warm toast without jelly.

224

Sessions 8-13 March 25 – April 29
G. Orally Reading from his favorite book series

225

Session 11 April 10
G. Reading the book sent home by teacher before the class reads it so he can be prepared to read well.

226

Teacher Meeting on May 6, prior to next session

- Meeting with Classroom Teacher and Reading Teacher to discuss George's progress. Dr. G ask to have G. dismissed from the "Reading Club" intervention group and consider Dr. G's work with G. as his only reading support.
- The reading teacher is hesitant because G. is reading at Level F and should be reading at level I. She finally agrees when Dr. G understands that the goal is to have G. reading at level I by the end of May. Dr. G. asked if the teacher could send home the books that G. will be reading but school policy did not permit.

227

Parent Meeting on May 7, prior to next session

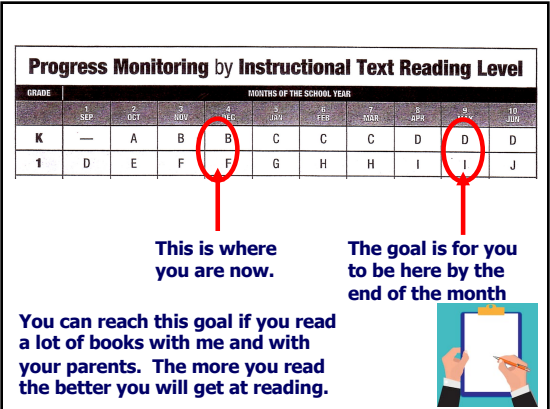
- The next day, a discussion with G.s mother led to a plan:
- G's parent would purchase a set of the books that the class was reading.
- Dr. G would have G. read the books to him in guided feedback sessions.

228

Parent Meeting on May 7, prior to next session

- Dr. G showed G. the reading levels progress monitoring chart and showed him his current reading level and the goal for the end of the month.
- G. was very motivated by his dismissal from the remedial reading group and agreed to the goal of moving from Level F to Level I by the end of the month.

229



230

G. Reads books prior to next session

- The books were delivered before the next session and G. immediately read 10 books to his parents over the weekend. 5 F Level and 5 G Level.

231

G's book reading from May 11 to May 28

- The books were delivered before the next session and G. read 21 books to Dr. G. or his parents in 17 days. 10 Level G, 5 Level H, and 5 Level I.

232

Fountas & Pinnell LITERACY™

Progress Monitoring by Instructional Text Reading Level

GRADE	MONTHS OF THE SCHOOL YEAR									
	1 SEP	2 OCT	3 NOV	4 DEC	5 JAN	6 FEB	7 MAR	8 APR	9 MAY	10 JUNE
K	—	A	B	B	C	C	C	D	D	D
1	D	E	F	F	G	H	H	I	I	I

At the end of May G. tested at Level I

In early June, G. tested at Level I-J

233


November 2018

May 2019

Alphabet Writing

1-Grade 1


234



fountasandpinnell.com

Progress Monitoring by Instructional Text Reading Level

GRADE	MONTHS OF THE SCHOOL YEAR											
	1 SEP	2 OCT	3 NOV	4 DEC	5 JAN	6 FEB	7 MAR	8 APR	9 MAY	10 JUN	11 JUL	12 AUG
K	—	A	B	B	C	C	C	D	D	D		
1	D	E	F	F	G	H	H	I	I	J		
2	J	K	K	K	L	L	L	M	M	M		



In early November, G. tested at Level M With 25/30 points, 1 point below the cut-off for Advanced

235

Sent: Thursday, January 9, 2020 2:58 PM

Parent to Psychologist Email:

Hi there! Hope you had a wonderful holiday break! Just wanted to forward along the email I got from G's teacher. Apparently today was the kid year reading assessment (I had no idea) and she wanted to tell me how great he was. Then before I even had a chance to tell G after school he said she called him in before lunch to read. Then she called him back again after lunch because what she gave him was too easy so she wanted to go up a level or two! Just wanted to forward along the good news. Solid Level M! He read FOR PLEASURE three books over break and literally couldn't put them down.

Below is our correspondence from this afternoon. Hope all is well!!!

236

Sent: Thursday, Jan 9, 2020, at 2:33 PM


Teacher to Parent Email:

Happy New Year! I wanted to bring you up to date on G's oral reading fluency (and comprehension). I did the mid-year assessment with him today. For the mid-year, the students read an informational selection. He read a Level M with 97% accuracy (this was for the oral reading part). He read the rest silently. I observed him pointing to each word and really showing persistence to decode. For example, he figured out "England" by a context clue. He used "equal" in equality to help figure it out.

I am very proud of his effort!

237


Executive Control and Mathematics



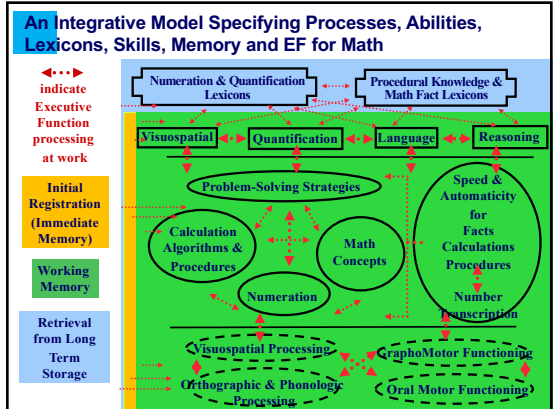
238

Mathematics and Cognition

- Like Reading and Written Expression, Mathematics is a complex psychological construct that encompasses the acquisition and use of many other psychological constructs.
- Mathematics involves numerous mental activities, all of which are dependent on adequate functioning of a number of cognitive abilities and processes, well-developed lexicons related to math knowledge, adequate development of basic math skills, effective application of problem-solving strategies, the capacity for holding and manipulating information in mind, and the use of executive functions to coordinate all of these.



239



240

**Assessing Executive Functions
Directly Related to Math**

A process-oriented observation approach can be effectively used to observe and document difficulties with the use of executive function processes during the performance of math tasks.



241

Behaviors indicative of poor executive control when doing math

- Easy calculation items incorrect, more difficult calculation items correct.
- "Careless" errors, misreading operation signs, basic addition and subtraction errors, despite capable performance with most item types.
- Inconsistent grades on classroom tests.
- Math problem-solving skills much better than math calculation skills.



242

Behaviors indicative of poor executive control when doing math

- Despite prior demonstration of accurate storage and retrieval, basic facts are calculated rather than retrieved automatically; long pauses are needed to recall basic facts; facts are recalled inconsistently.
- Numbers are reversed or incorrectly sequenced; signs are substituted (e.g., use of a + sign for a - sign); columns are misaligned in calculations; written work on problems is poorly organized.



243

Behaviors indicative of poor executive control when doing math

- Well-known calculation routines are applied inconsistently (e.g., steps are omitted or applied out of sequence; basic calculation errors occur; transferred numbers are recorded incorrectly).
- Problem-solving routines or procedures that have been used correctly in past situations are not retrieved; student "draws a blank" on how to solve problem.



244

Behaviors indicative of poor executive control when doing math

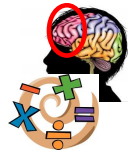
- Despite demonstrated knowledge of math concepts and adequate quantification and reasoning abilities, student is unable to identify solutions to novel math problems.
- Loses track of steps in long problem-solving or calculation routines.
- Adequate working memory capacity is not effectively applied during problem-solving as errors reflecting lapses in working memory are evident.



245

Math EF Difficulties: Case Example

- Low scores on both WIAT-III Numerical Operations and Math Problem-Solving, failing Algebra II, but...
- Grades on tests inconsistent, some A's, some F's, homework not completed resulting in failing grade; grade of B in Algebra I, grade of B in Geometry. History and present behavior assessment indicating ADHD.



246

Math EF Difficulties: Case Example

- Standard Score of 120 on Math Problem-Solving, but Standard Score of 80 on Numerical Operations.
- Process-oriented examination of student response booklet reveals several very easy calculation items incorrect due to misreading the operation sign and/or errors in basic addition or subtraction when borrowing and carrying. Numerical Operations items reflecting math skills being taught this school year performed much more effectively than items assessing skills taught in previous years.



247

Math EF Difficulties: Case Example

- Standard Score of 70 on Numerical Operations during first assessment session but Standard Score of 92 during second assessment session three days later.
- Process-oriented examination of student response booklet reveals easy calculation items incorrect due to operation sign errors and/or errors in basic addition or subtraction. Numerical Operations items reflecting math skills currently being taught performed much more effectively than items assessing skills taught in previous years.



248

Interventions for Executive Capacities Difficulties Related to Math

The most effective form of intervention for maturational difficulties with the use of Executive Capacities is increased practice of all facets of mathematical thinking increasingly guided by the use of self-regulation strategies that can be taught to the student.



249

Cognitive Strategy Instruction

1. Explain the purpose.
2. Model the strategy.
3. Student memorizes the steps.
4. Mediate student's use of each step; scaffold as needed.
5. Student uses strategy guided by self-talk.
6. Teacher and student collaboratively evaluate student's efforts.



250

The Tens Strategy for Checking Addition "in the Teens"
(Tens for Teens)

1. Explain the purpose:
 If you are having difficulty remembering your math facts when the sum of two numbers is between 11 and 19, you can use the Tens for Teens strategy.

251

The Tens Strategy for Checking Addition "in the Teens"
(Tens for Teens)

2. Model the strategy:

$$\begin{array}{r}
 6 - 1 = 5 \\
 + 9 + 1 = 10 \\
 \hline
 15 \qquad 15
 \end{array}$$

252

The Tens Strategy for Checking Addition "in the Teens"
(Tens for Teens)

2. Model the strategy:

$$\begin{array}{r} 8 + 2 = 10 \\ + 7 - 2 = \underline{5} \\ 15 \qquad 15 \end{array}$$

253

The Tens Strategy for Checking Addition "in the Teens"
(Tens for Teens)

3. Students memorize the steps in the strategy using mnemonics whenever possible:

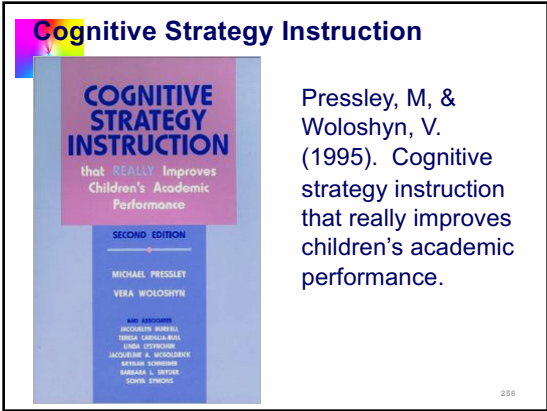
Find Big Ben $6 - 1 = 5$
 Add to Ten $6 - 1 = 5$
 Subtract from Lean $\underline{+ 9} + 1 = \underline{10}$
 Sum the Teen $15 \qquad 15$

254

The Tens Strategy for Checking Addition "in the Teens"
(Tens for Teens)

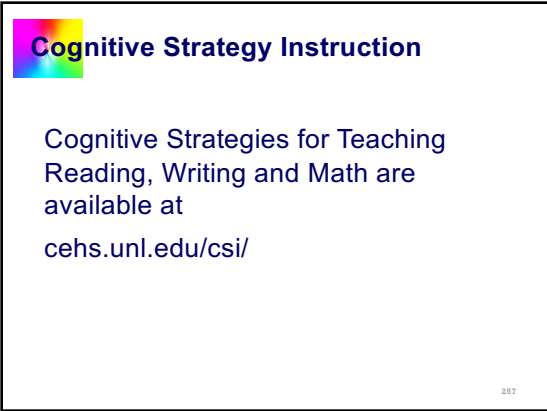
- Teacher supports implementation of the strategy, scaffolding as needed.
- Student applies the strategy in a self-directed manner.
- Student and teacher evaluate the effectiveness of the student's use of the strategy.

255



Pressley, M., & Woloshyn, V. (1995). Cognitive strategy instruction that really improves children's academic performance.

256



Cognitive Strategies for Teaching Reading, Writing and Math are available at cehs.unl.edu/csi/

257
