

# Executive Functions and Reading: A Neuropsychological Perspective

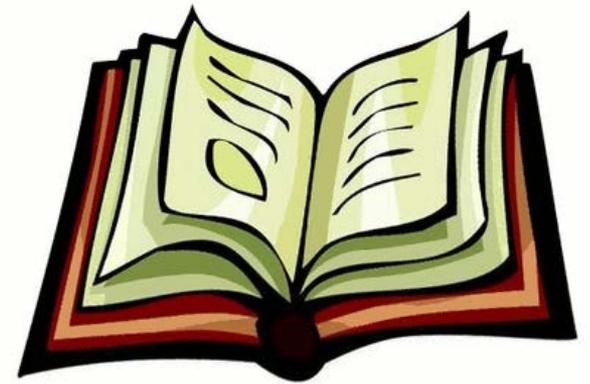
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Presented by

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Osteopathic Medicine**

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# Brain/Mind Bulletin, UC Berkeley

## Study

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**Mentally healthy persons** maintain many illusory beliefs, including:

- **Overly positive view of themselves**
- **Convenient “forgetting” of negative facts about themselves**
- **Perceptions of having greater control over events than is actually the case**
- **“Unrealistic” optimism about themselves**
- **“Unrealistic” optimism about the future**
- **“Abnormal” cheerfulness**

# Newberg's Best Ways to Exercise Your Brain

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- Yawn
- Consciously Relax
- Stay Intellectually Active
- Smile

# Benefits of Yawning

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- Stimulates alertness & concentration
- Optimizes brain activity and metabolism
- Improves cognitive functioning
- Increases memory recall
- Enhances consciousness and introspection
- Lowers stress
- Relaxes every part of your body
- Improves voluntary muscle control
- Enhances athletic skills
- Fine tunes your sense of time
- Increases empathy and social awareness
- Enhances pleasure and sensuality

# **Newberg's Best Ways to Exercise Your Brain**

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- **Maintain Faith (Positive Belief System)**
- **Dialogue with Others**
- **Engage in Aerobic Exercise**
- **Meditate**
- **Yawn**
- **Consciously Relax**
- **Stay Intellectually Active**
- **Smile**

"A fresh perspective . . . offers plenty to challenge skeptics and believers alike." —MICHAEL GERSON, *The Washington Post*

# HOW GOD

## CHANGES YOUR BRAIN

Breakthrough Findings from a  
Leading Neuroscientist

ANDREW NEWBERG, M.D.

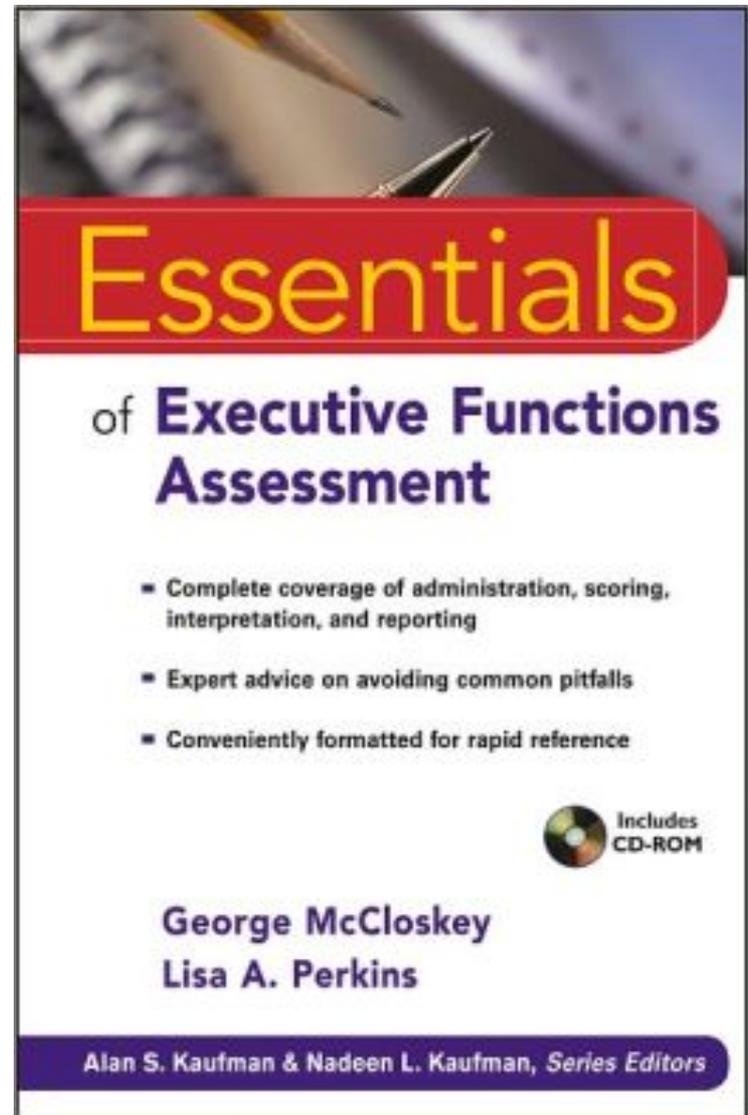
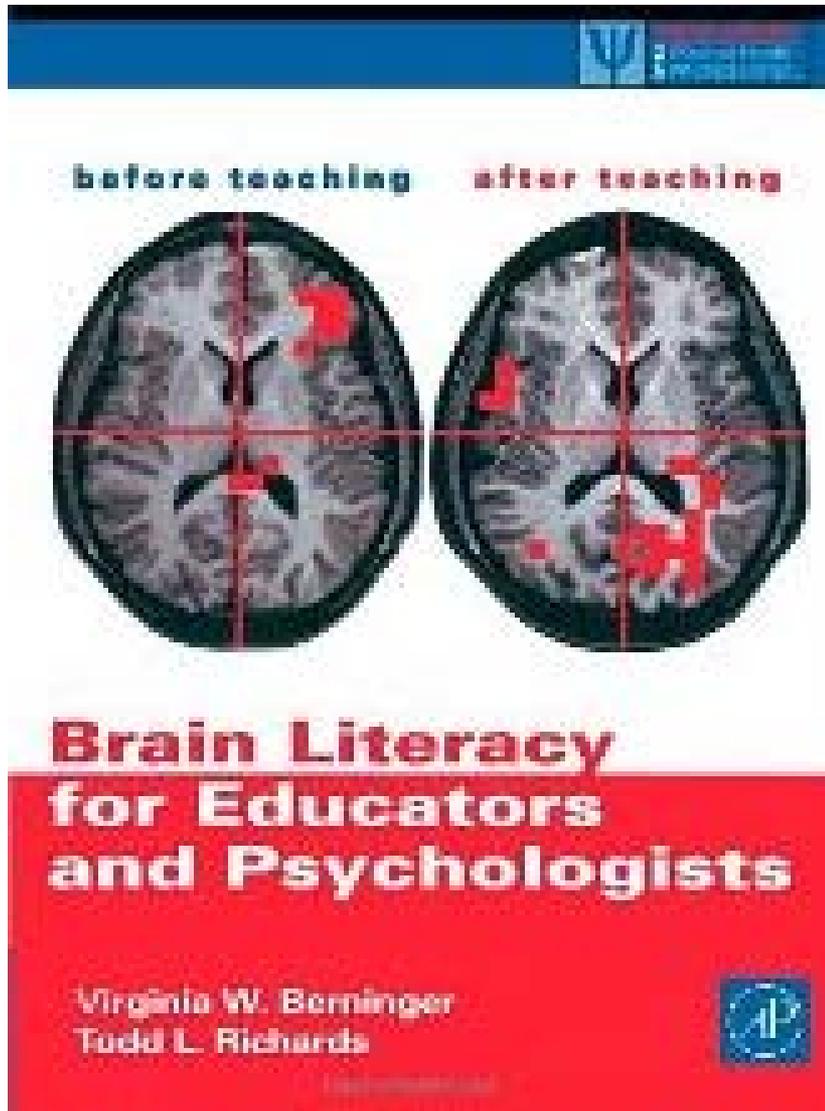
*Coincidentally of Why God Won't Go Away*

and MARK ROBERT WALDMAN



## How God Changes Your Brain Andrew Newberg & Mark Robert Waldman

# Source Acknowledgements

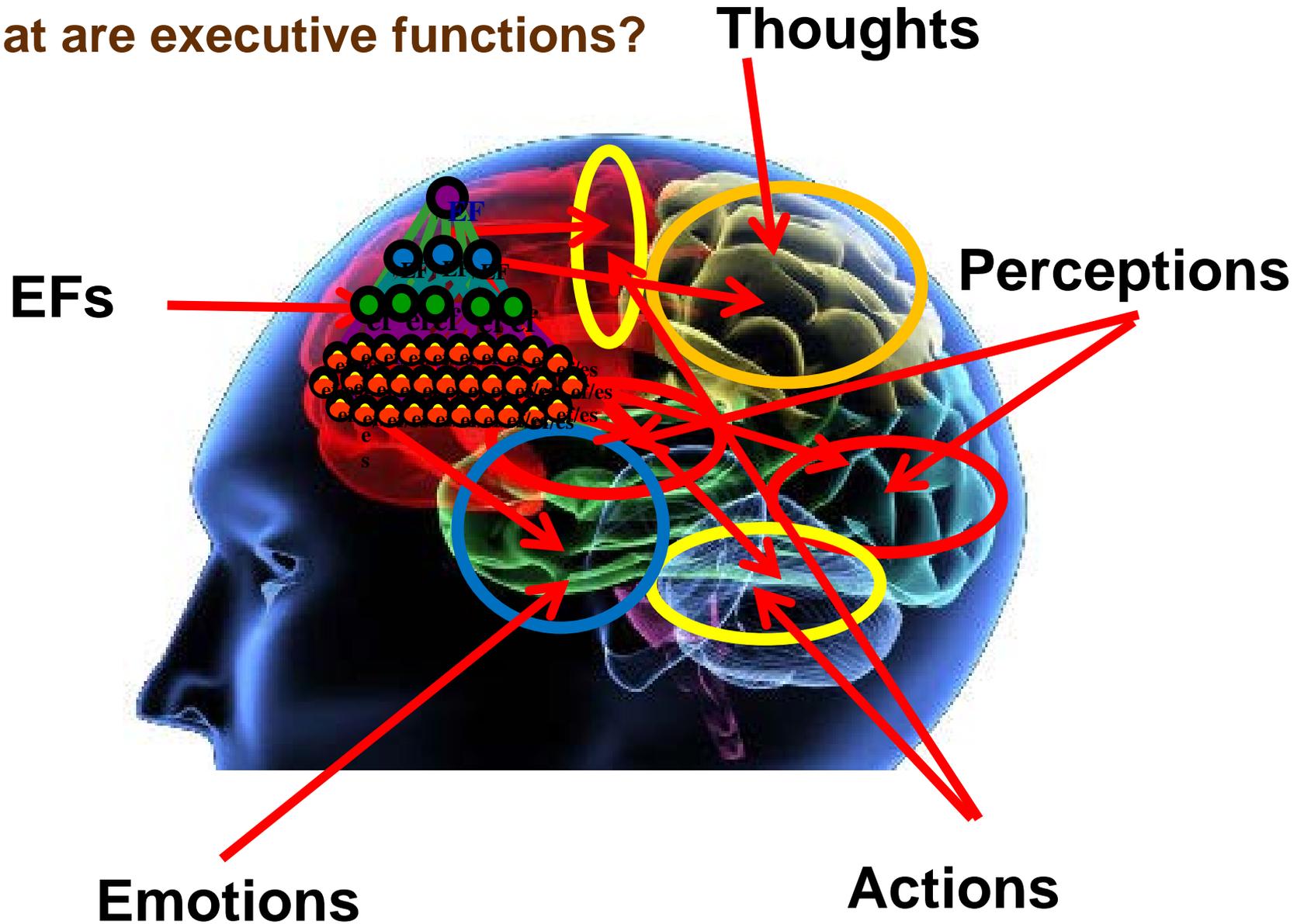


# Today's Questions

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- What are executive functions?
- How are executive functions involved in the act of reading?
- How do executive function difficulties impact the act of reading?
- How do you know if a reading problem is related to executive function difficulties?
- What instructional techniques can be used to address reading problems related to executive function difficulties

# What are executive functions?

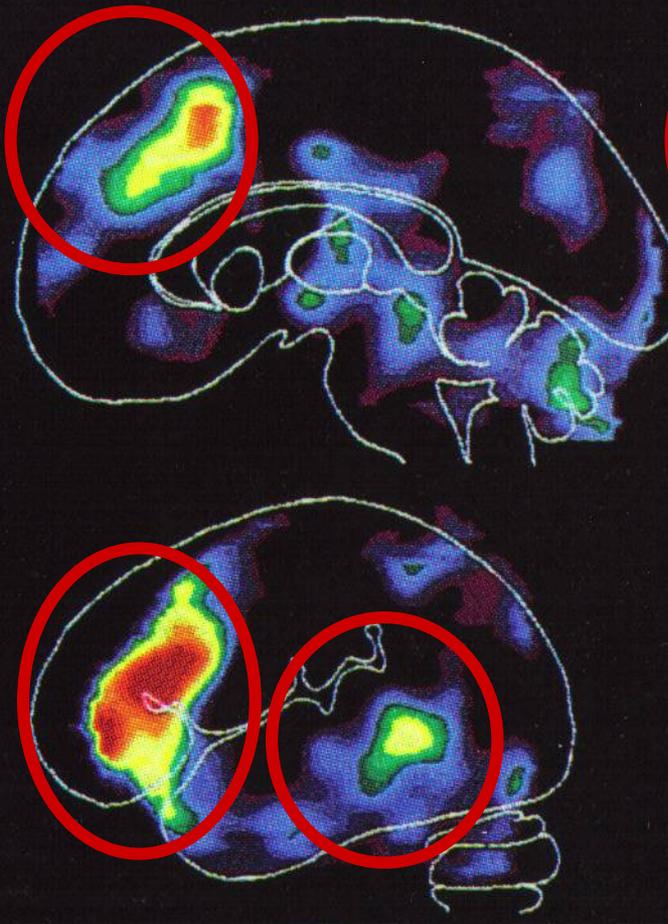


# What Are Executive Functions?

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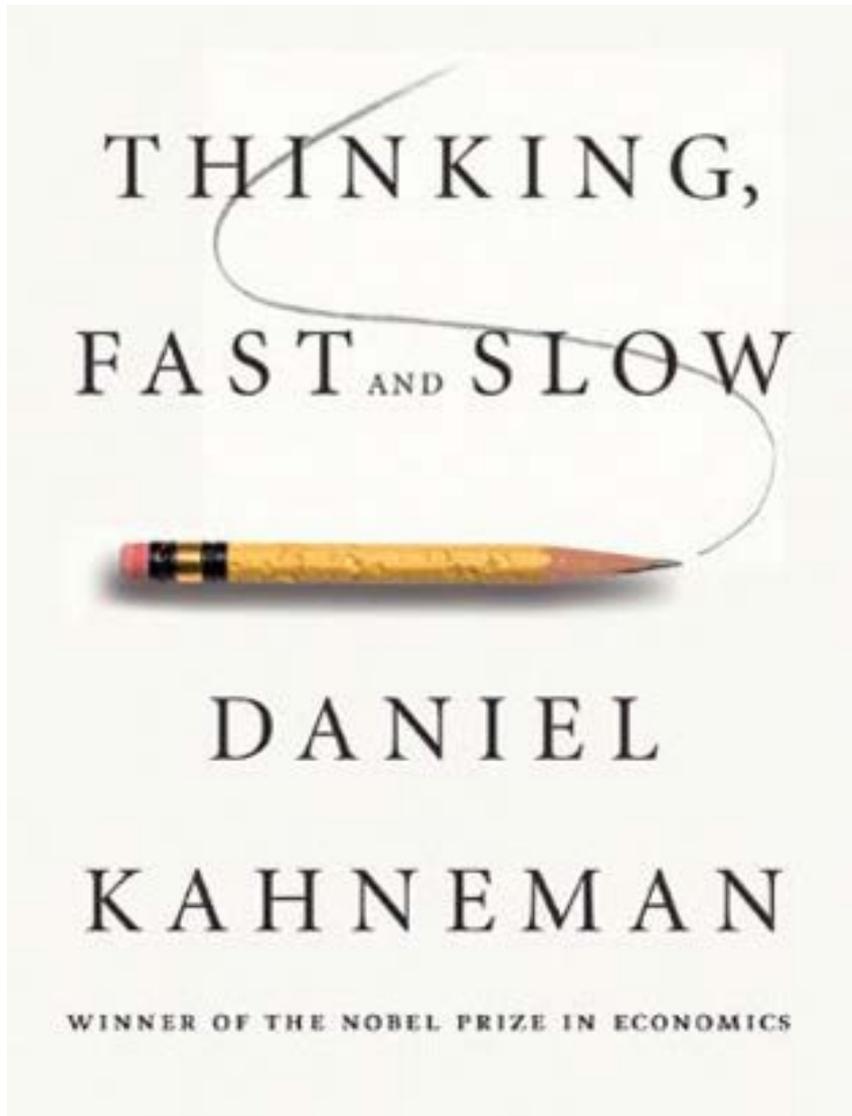
- Directive capacities of the mind
- Multiple in nature, not a single capacity
- Cue the use of other mental capacities
- Direct and control perceptions, thoughts, actions, and to some degree emotions
- Part of neural circuits that are routed through the frontal lobes

## NAIVE



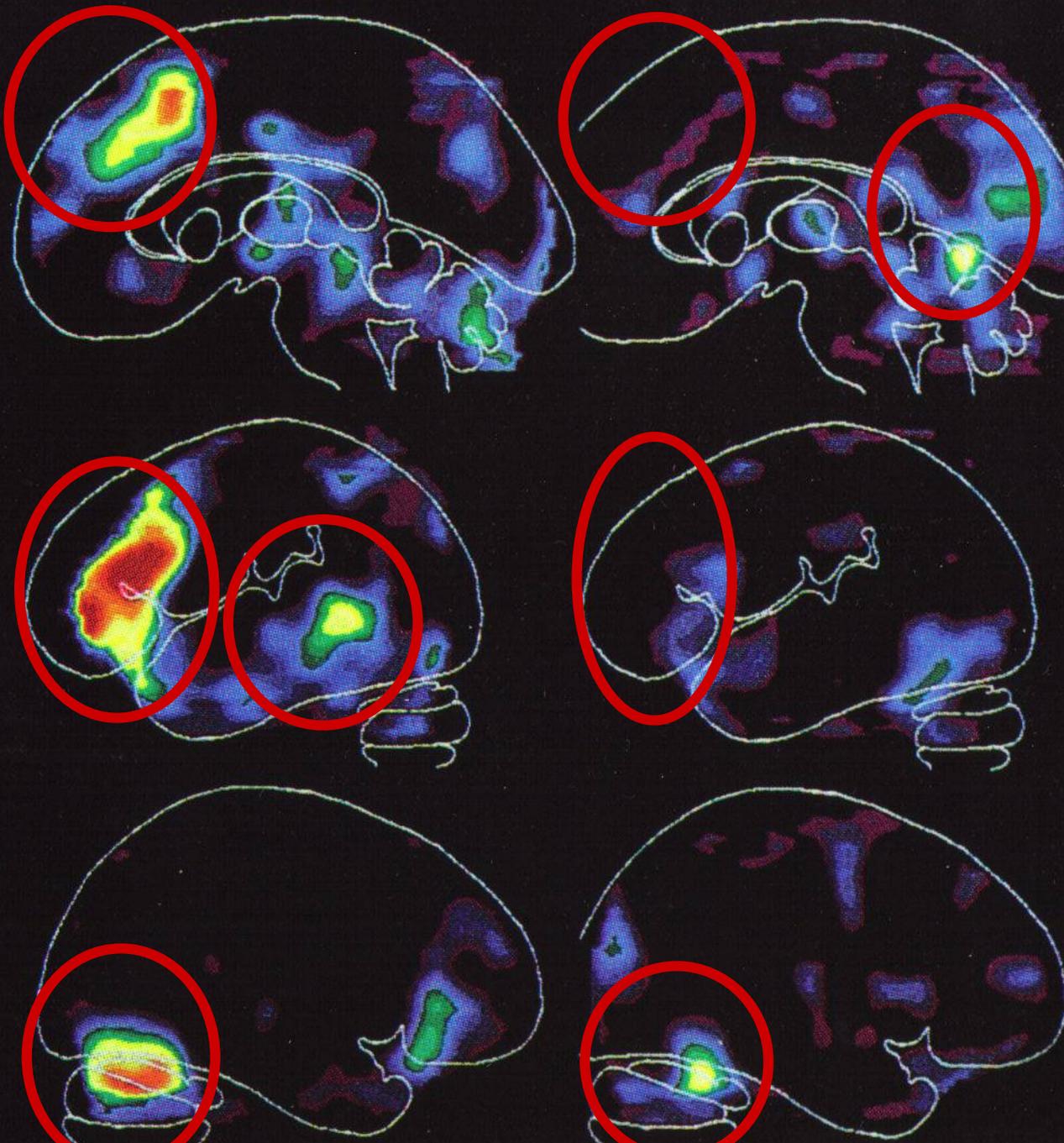
- **Naive:** First exposure to the task; responses required immediately; high demand for executive functions (EFs)
- **Practiced:** Time given to rehearse responses to the task; minimal demand for EFs
- **Novel:** Second exposure to the task, but responses required immediately to a set of all new items; moderate demand for EFs

# Recommended Reading

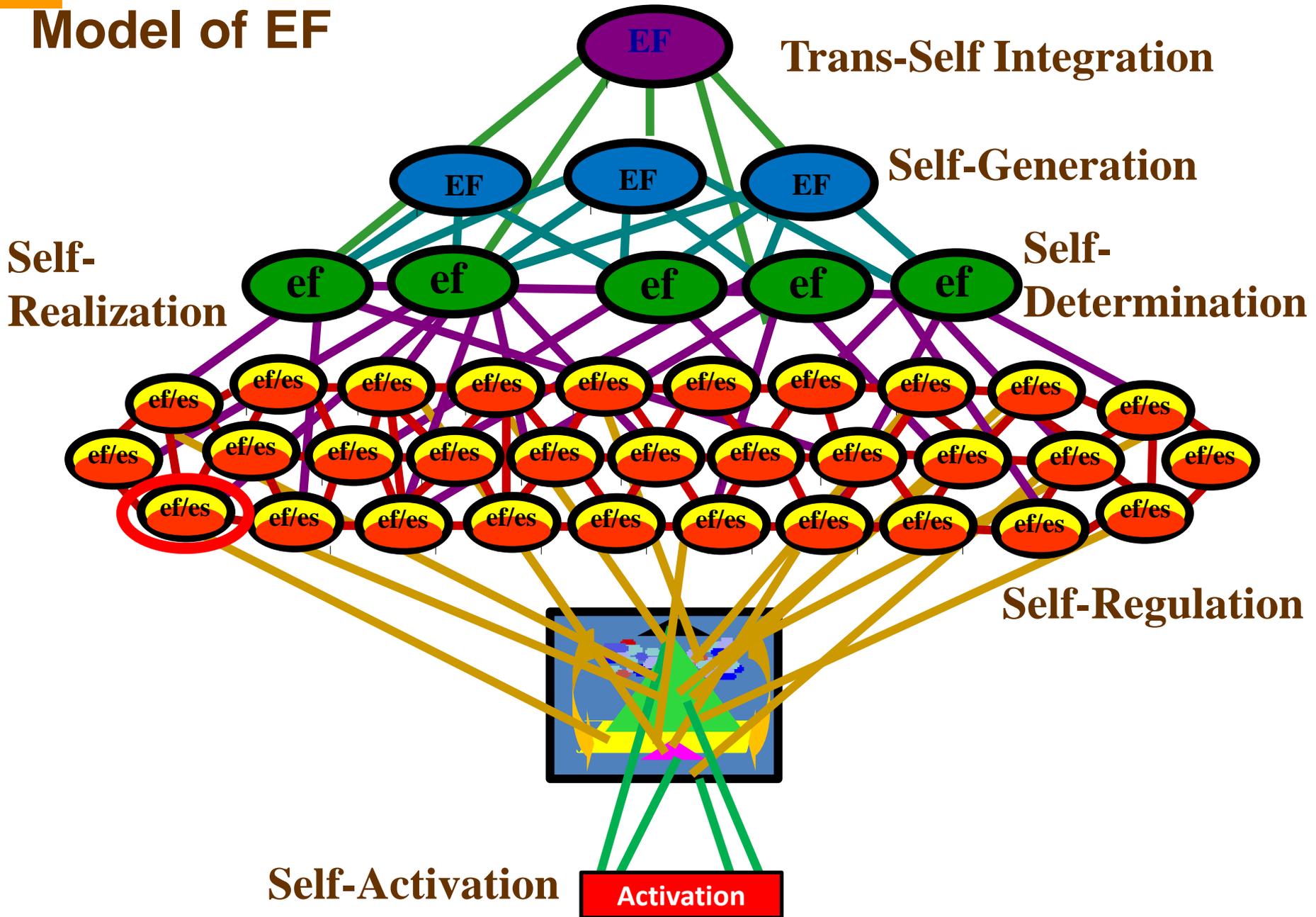


NAIVE

PRACTICED



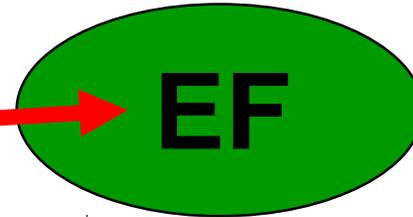
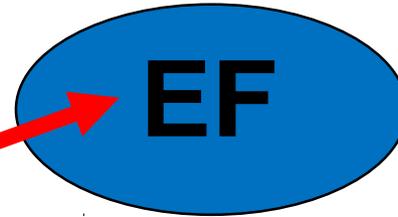
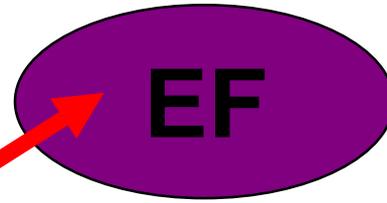
# The Management Structure within a Holarchical Model of EF



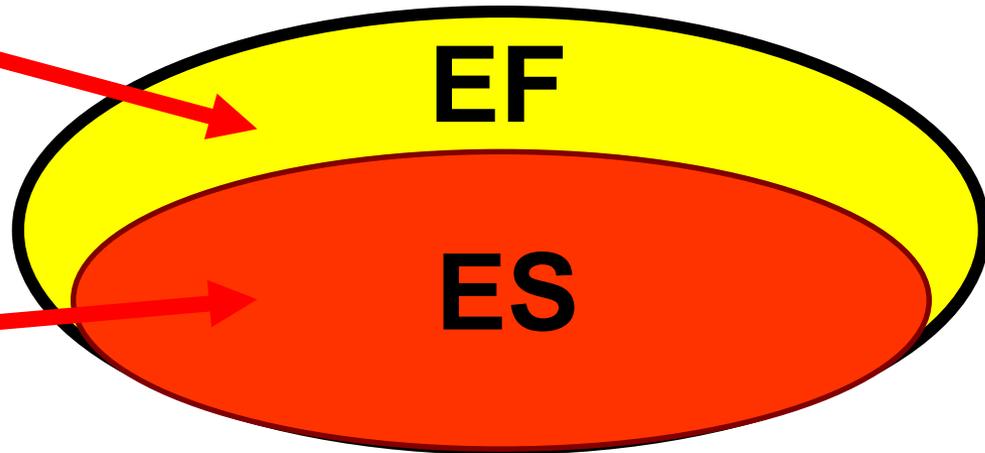


# Management Structure within a Hierarchy Model of EF

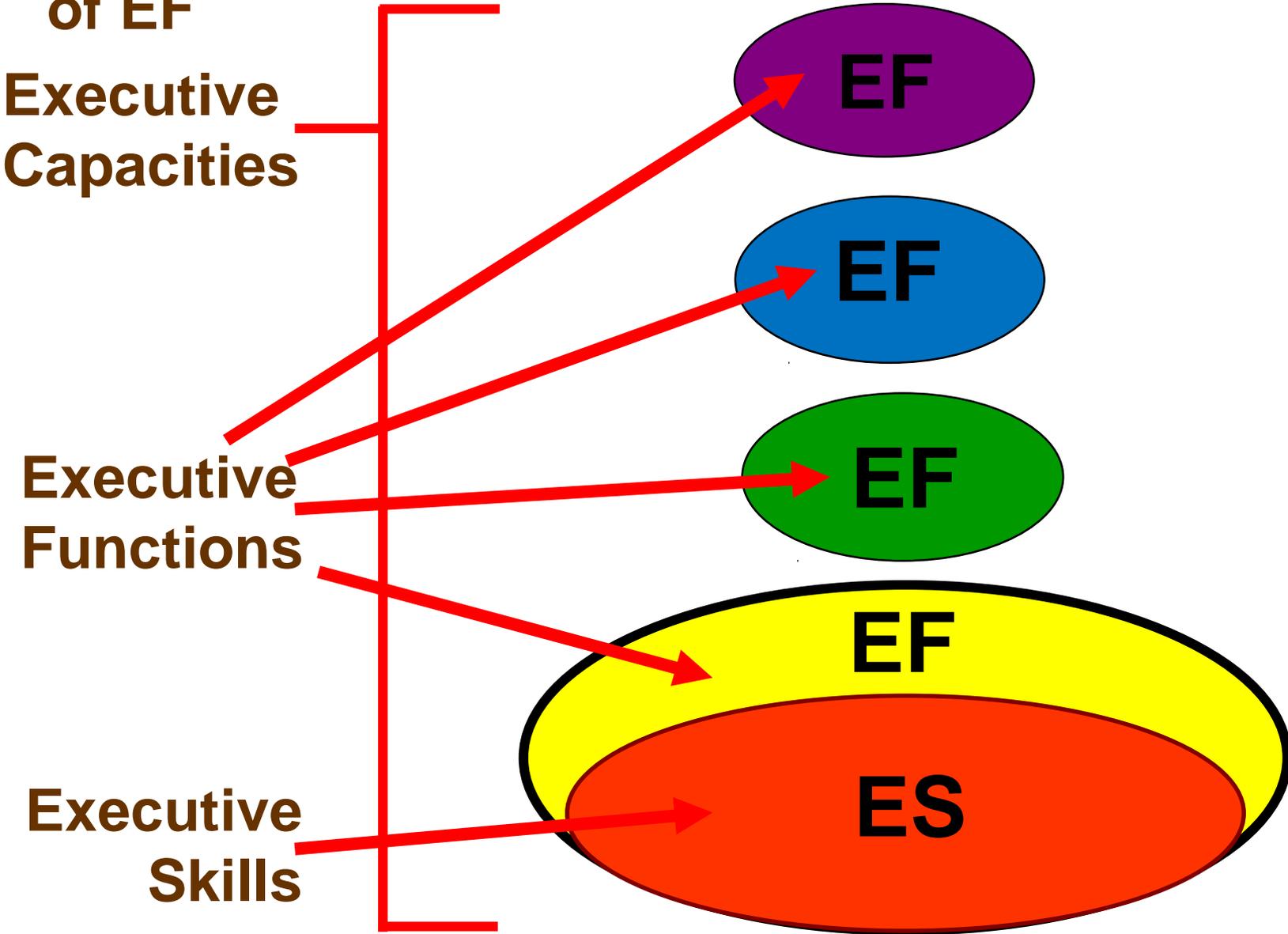
Executive Capacities



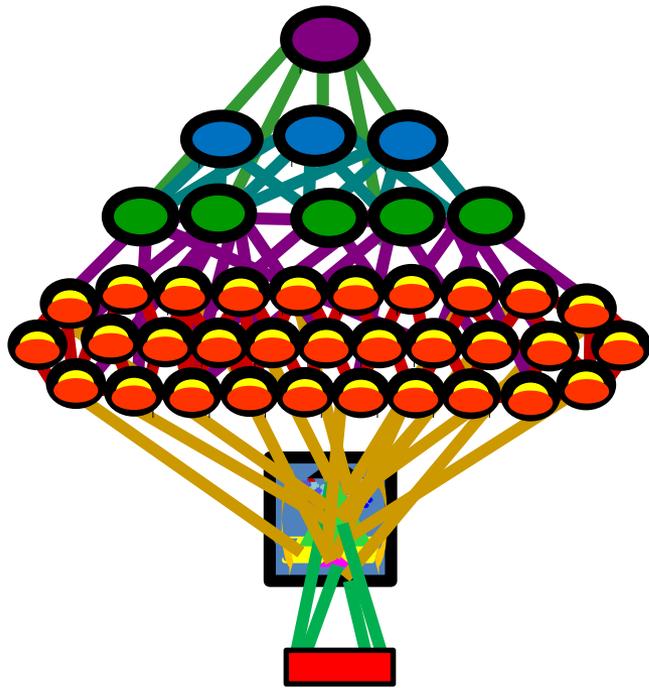
Executive Functions



Executive Skills



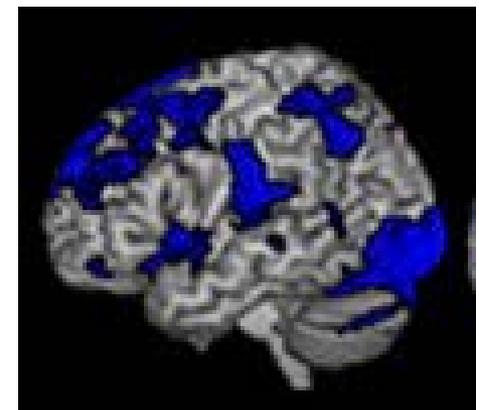
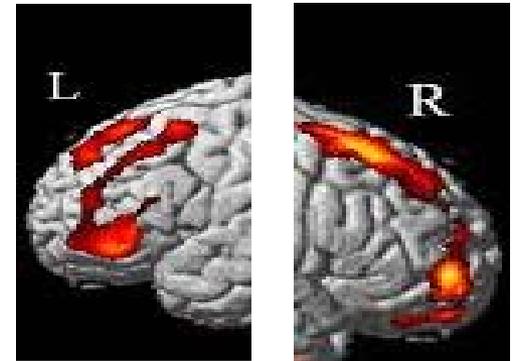
# Key Concept



It is important to distinguish between

Executive Functions  
and

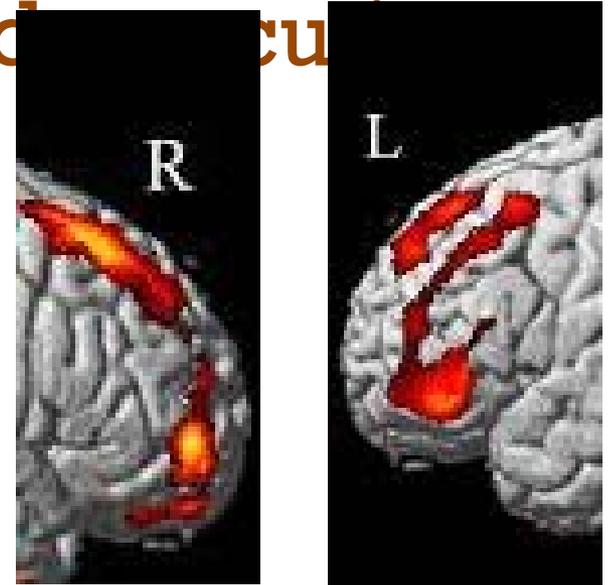
Executive Skills.



# Self Regulation Executive Functions

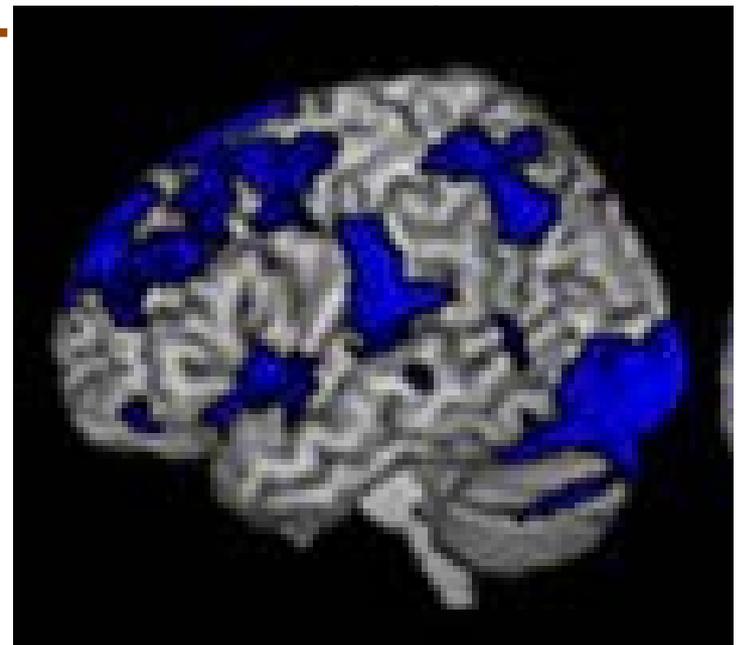
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Executive Functions involve the part of the executive network that is used to become aware of the need for the use of executive skills and other mental capacities and used to cue and direct the use of the needed executive skills.



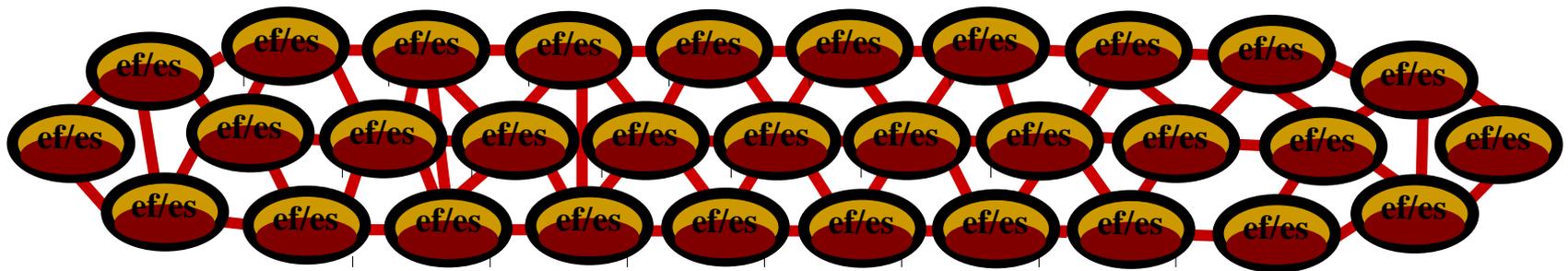
# Self Regulation Executive Skills

Executive Skills are responsible for cueing the specific areas of the brain needed to perform specific tasks (e.g., attending, inhibiting, modulating, planning associating).



# Self Regulation

- A set of control capacities that cue and direct functioning across the domains of perception, emotion, cognition, and action
- The current model posits 33 self-regulation executive functions

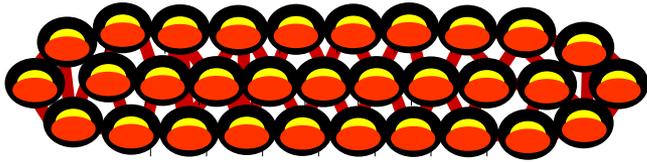


# 33 Self-Regulation EFs

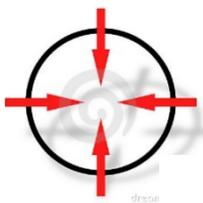
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- Perceive
- Focus
- Sustain
- Energize
- Initiate
- Inhibit
- Stop
- Interrupt
- Flexible
- Shift
- Modulate
- Balance
- Monitor
- Correct
- Gauge
- Anticipate
- Est Time
- Analyze
- Generate
- Associate
- Plan
- Organize
- Prioritize
- Compare/Eval
- Decide
- Sense Time
- Pace
- Sequence
- Execute
- Hold
- Manipulate
- Store
- Retrieve

# Key Concept



Self-regulation  
Executive Functions  
can be organized  
into 7 basic clusters.



# Self Regulation Executive Function “Clusters”



## ATTENTION

Perceive  
Focus  
Sustain

## ENGAGEMENT



Energize  
Initiate  
Inhibit  
Stop  
Pause  
Flexible  
Shift



## OPTIMIZATION

Monitor  
Modulate  
Balance  
Correct



## EFFICIENCY

Sense Time  
Pace  
Sequence  
Execute

## MEMORY



Hold  
Manipulate  
Store  
Retrieve

## INQUIRY



Anticipate  
Gauge  
Analyze  
Estimate Time  
Compare

## SOLUTION



Generate  
Associate  
Prioritize  
Plan  
Organize  
Decide

## Control

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The neural circuits for executive function activation are routed differently depending on whether the activation is based on an internally driven desire or command versus an external demand.

# Internal versus External Control

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Because internally driven production is much easier to accomplish than externally demanded production for children with “producing difficulties” their lack of production on demand often stands in stark contrast to their seemingly effortless production “when the spirit moves them.”

# Internal versus External Control

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The on-demand deficiencies observed by others are often attributed to negative personal characteristics such as lack of responsibility, apathy, passive aggressive stance, or oppositional defiance.

# Internal versus External Control

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Activation of the motivation center of the brain (nucleus accumbens) enables optimal engagement of any executive functions capacities that may be available to the child.

Internal command is driven by internal motivation that maximizes EF use; external

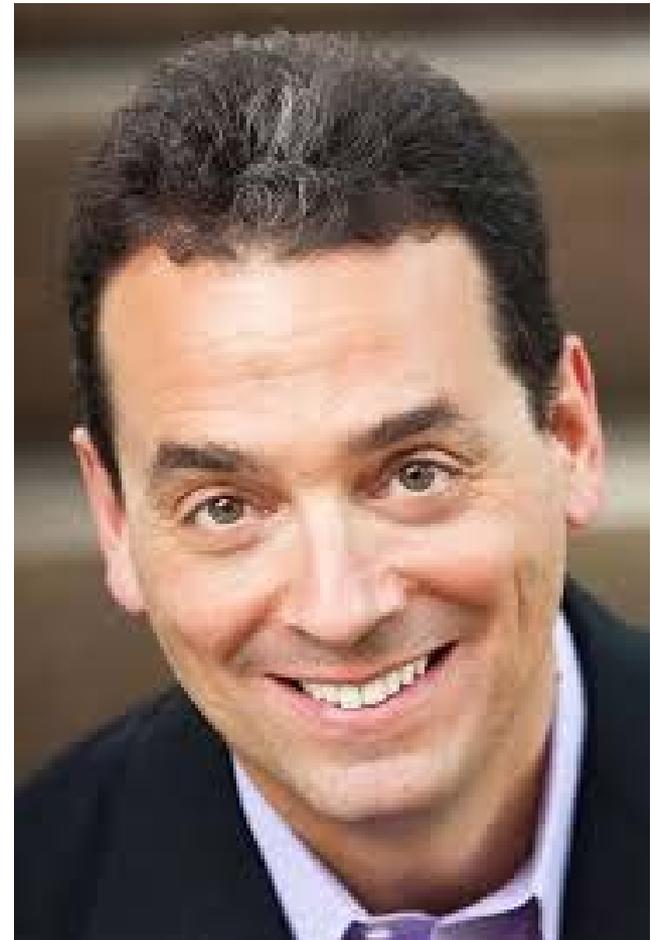
Daniel H. Pink

author of the *New York Times* bestseller

*A Whole New Mind*

**DRiVE**

The Surprising Truth  
About What Motivates Us



# Internal versus External Control

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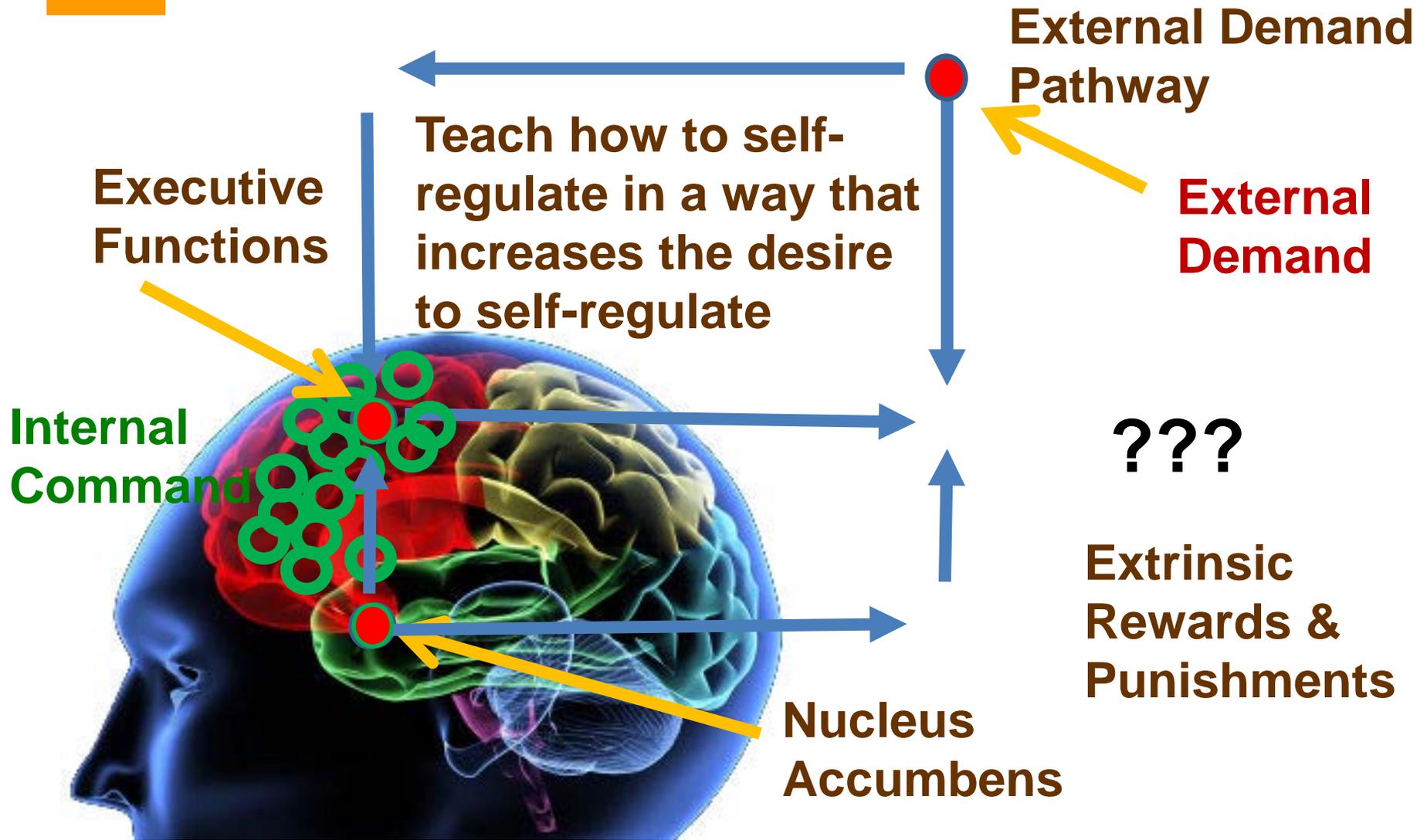
If reading is perceived as an activity driven by external demand, executive function engagement in the act of reading may be minimized thereby exacerbating reading difficulties.

# Internal versus External Control

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It is critical to find ways to help children become motivated to read in order to enable them to access executive functions needed to cue, coordinate and integrate the act of reading

# Motivation and Engagement of Self-Regulation

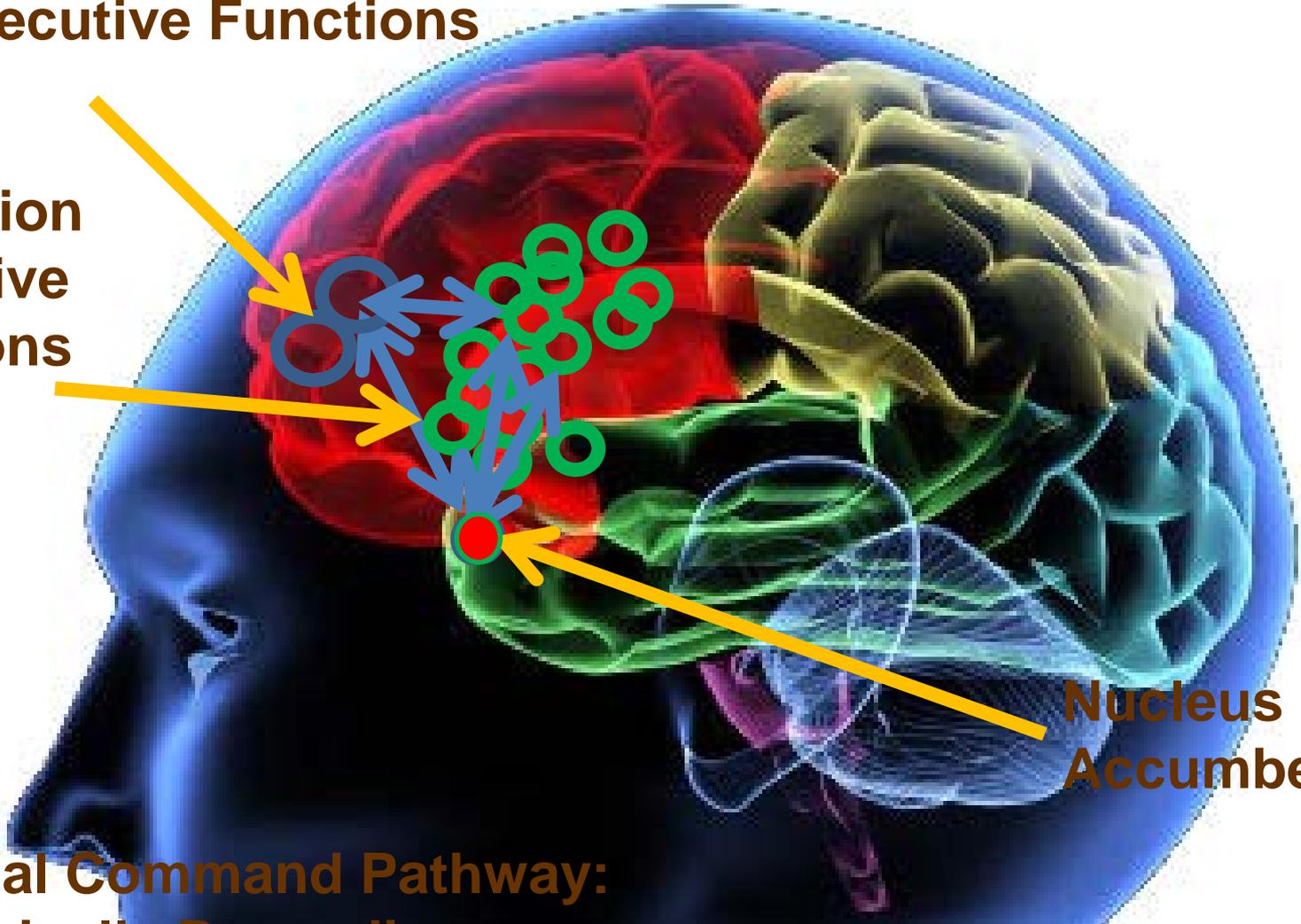


**Internal Command Pathway:  
Intrinsically Rewarding**

# Adolescent and Adult Engagement of Self-Determination

**Self-Determination  
Executive Functions**

**Self-  
Regulation  
Executive  
Functions**



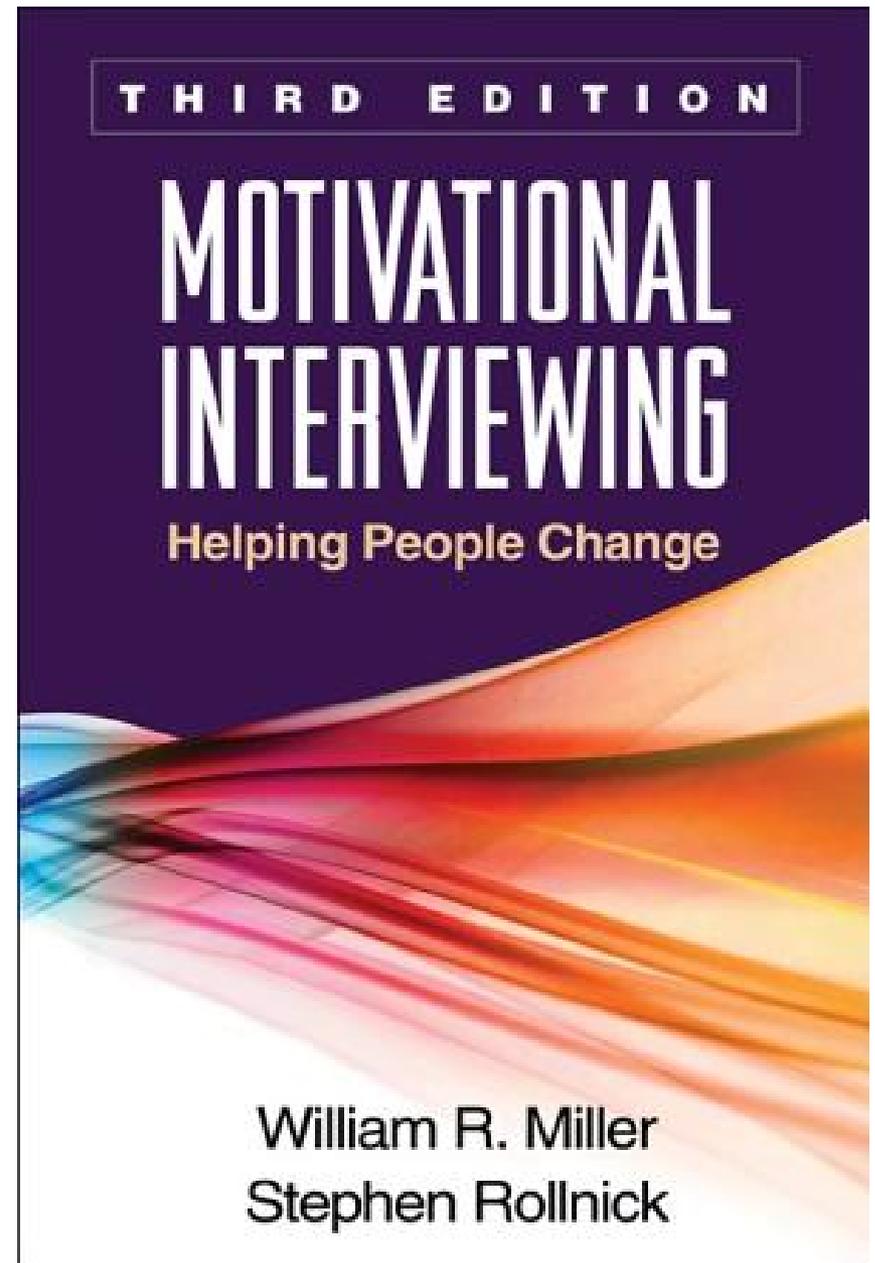
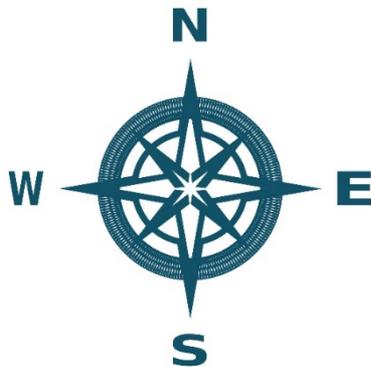
**Nucleus  
Accumbens**

**Internal Command Pathway:  
Intrinsically Rewarding**

# Chapter 21

## Motivational Interviewing with Adolescents and Young Adults

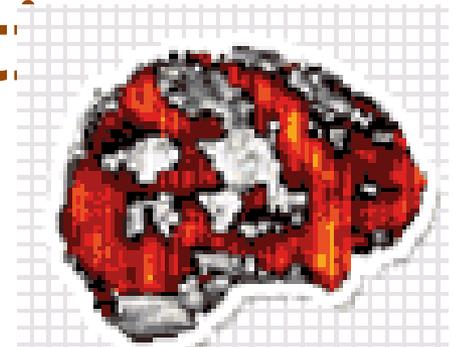
*John S. Baer and  
Peggy L. Peterson*



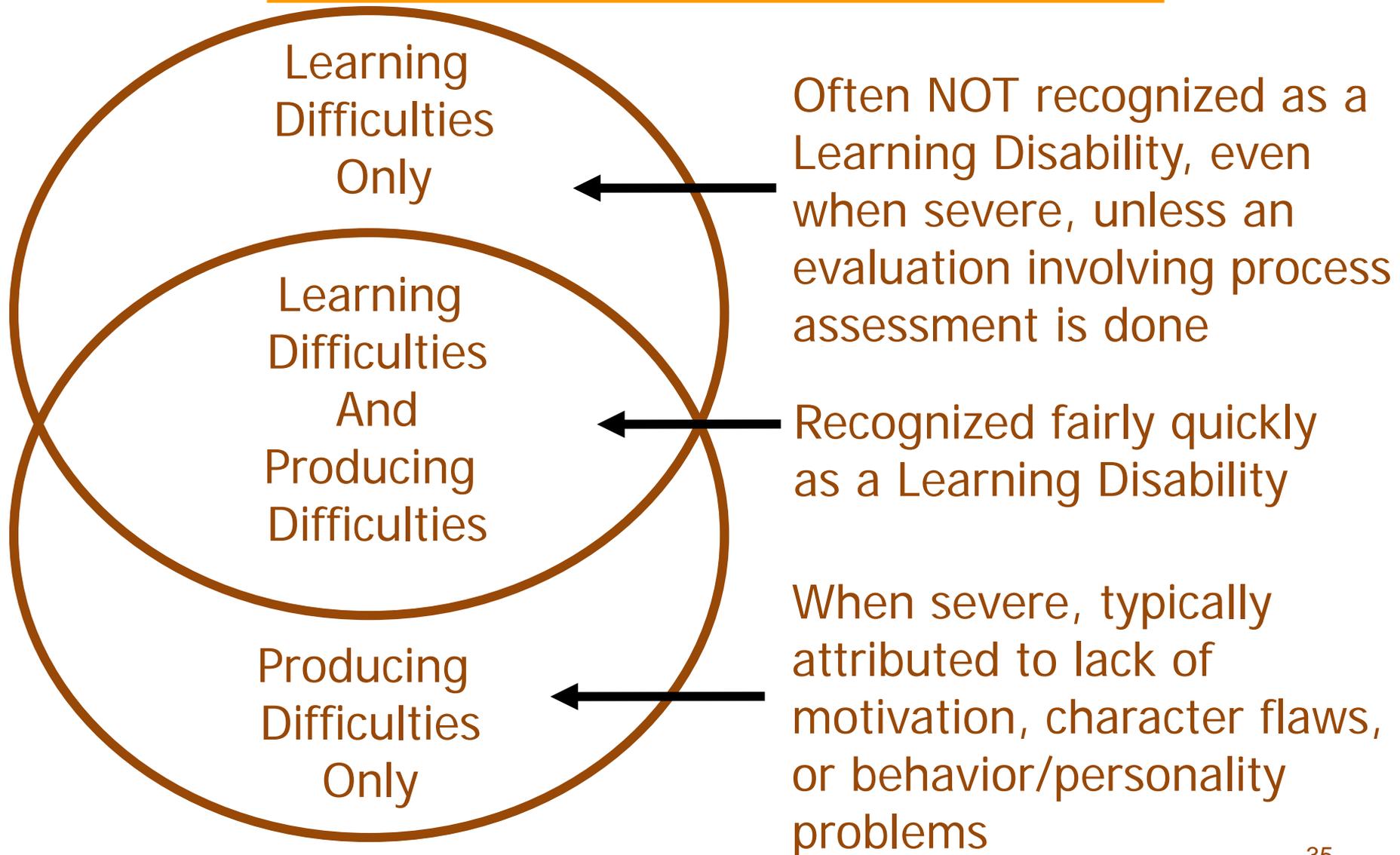
# Learning vs Producing

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- Producing difficulties are different from learning difficulties;
- Producing difficulties are more likely to reflect poor use or disuse of executive functions.



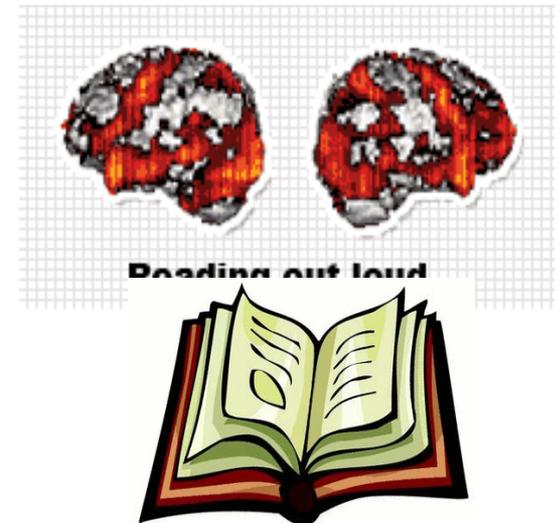
# A General Model for Conceptualizing Learning and Producing Difficulties



# The Neuropsychology of Balanced Literacy

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Neuropsychological models of reading specify the mental constructs used to acquire competence in reading



# An Integrative Model Specifying Processes, Abilities, Knowledge Bases, Skills, and Memory in Reading

General & Specific  
Knowledge Bases

Semantic Lexicon  
Word & Phrase Knowledge

Initial  
Registration  
(Immediate  
Memory)

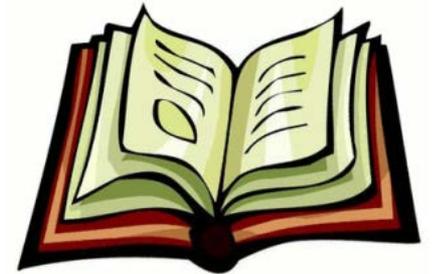
Retrieval  
from Long  
Term Storage



# Time Frames of Reference

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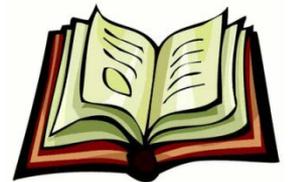
- Retrieval from Long-Term Storage



# Knowledge Stores and Lexicons

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- Sight Word Recognition Store
- Phonological Awareness
- Orthographic Awareness
- Vocabulary (Pronunciation, Semantic Lexicons)
- General Information



# An Integrative Model Specifying Processes, Abilities, Knowledge Bases, Skills, and Memory in Reading

General & Specific Knowledge Bases

Initial Registration (Immediate Memory)

Retrieval from Long Term Storage

Phonological/morphological Processing

Orthographic Processing

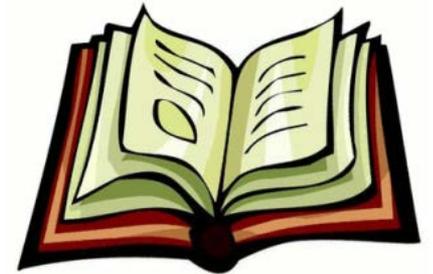
Oral Motor Functioning



# Time Frames of Reference

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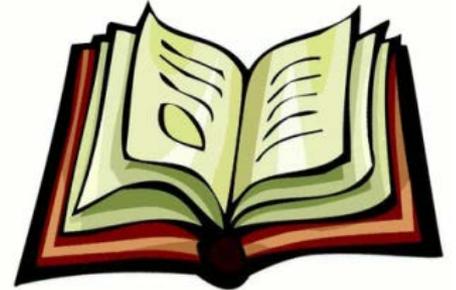
- Initial Registration/  
Immediate Memory



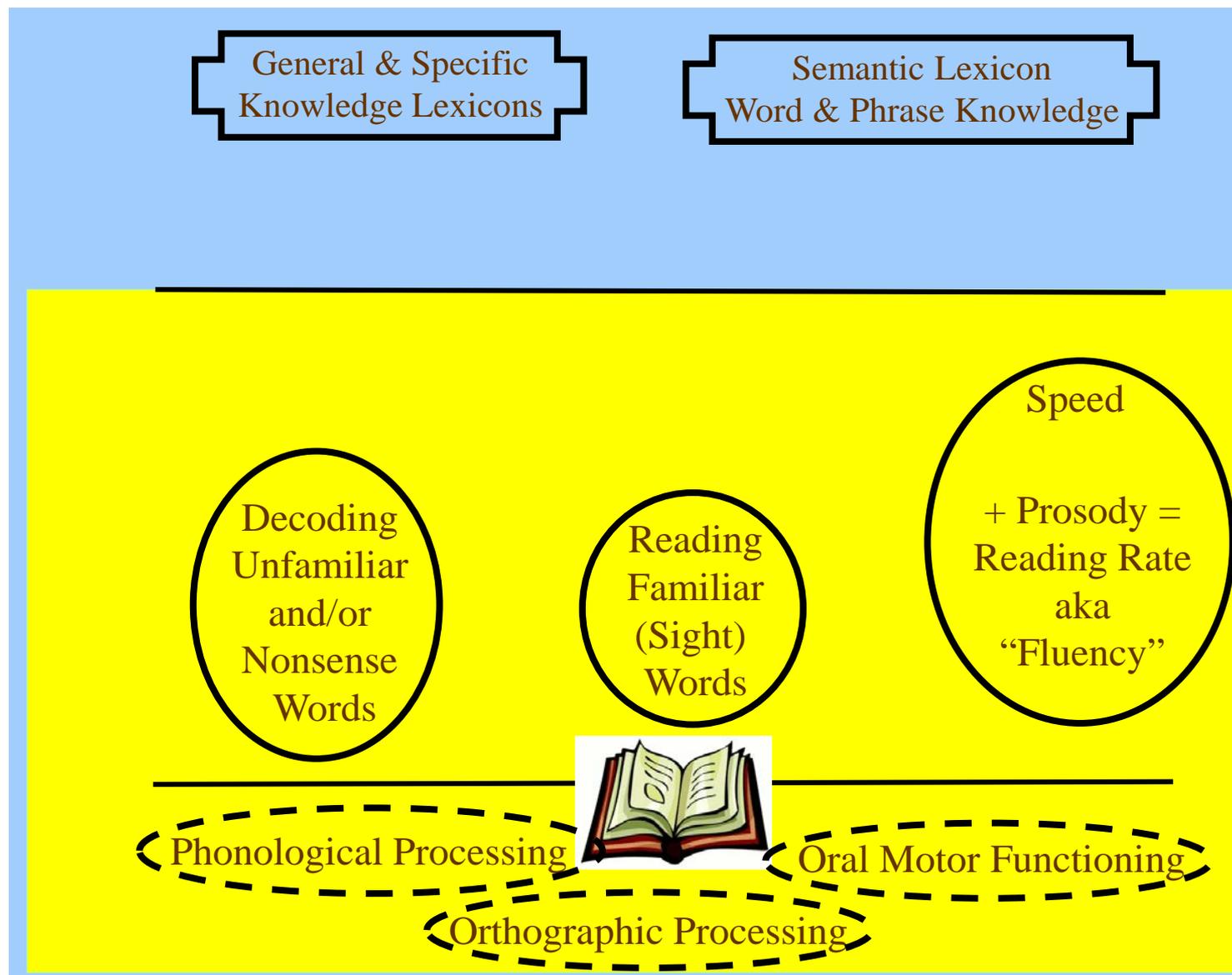
# Processing & Functioning (Taught as Skills?)

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- Orthographic Processing
- Phonological Processing
- Morphological Processing
- Oral-motor Functioning



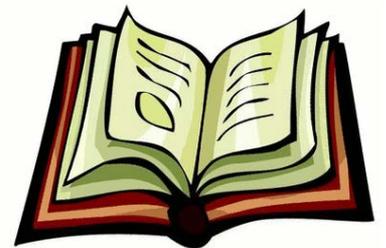
# An Integrative Model Specifying Processes, Abilities, Knowledge Bases, Skills, and Memory in Reading



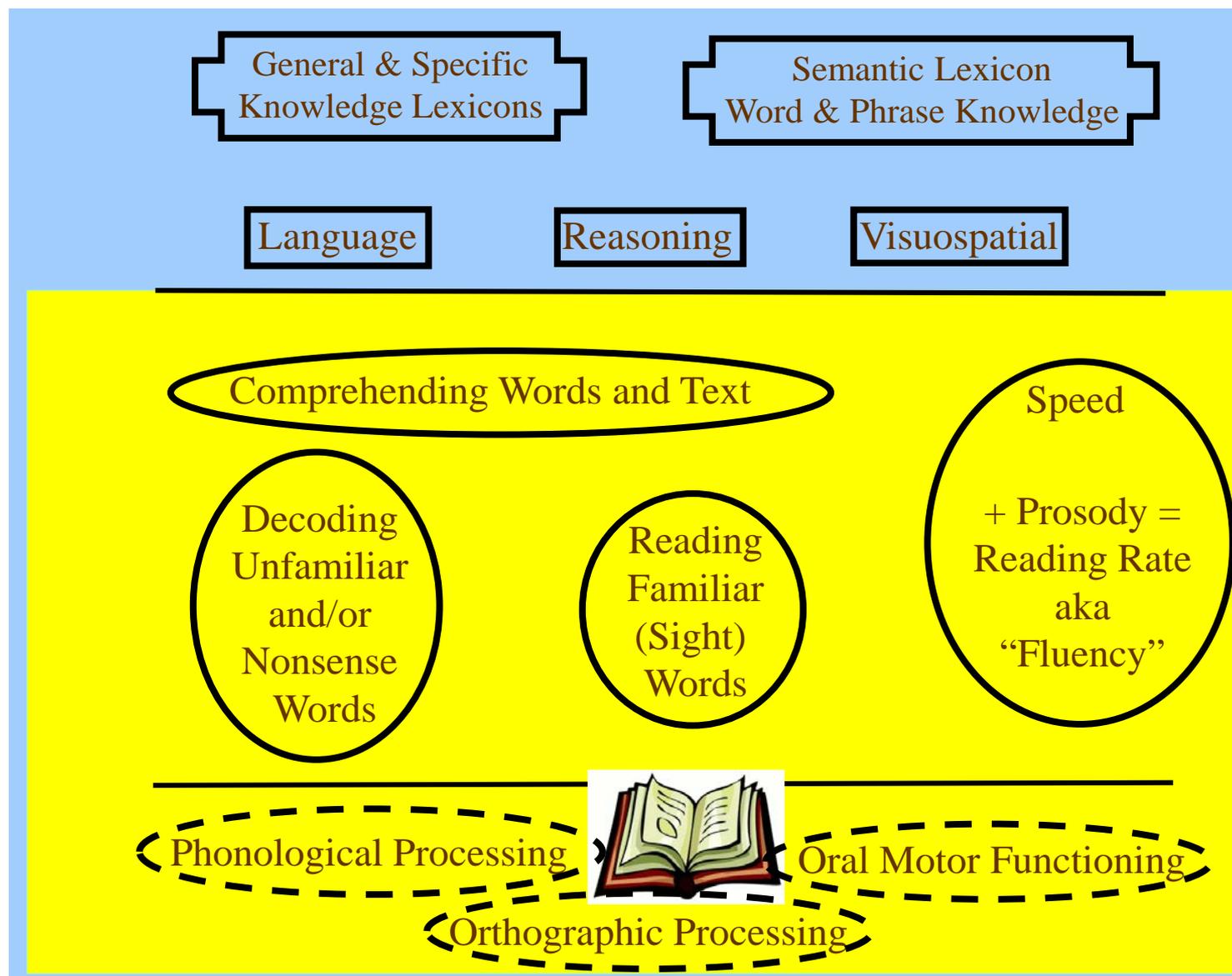
# Word Reading Skills

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- Sight Word Recognition
- Word Decoding
- Reading Speed and Prosody  
(aka “Fluency”)



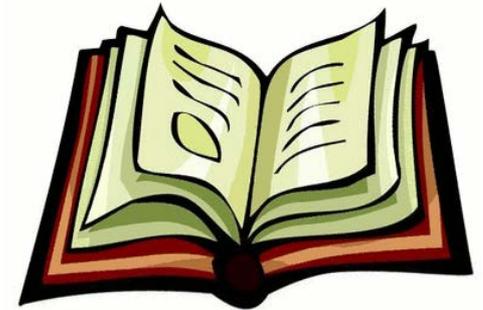
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# Abilities (Taught as Skills?)

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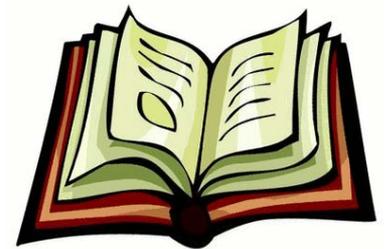
- Receptive Language
- Expressive Language
- Visuospatial Language
- Reasoning



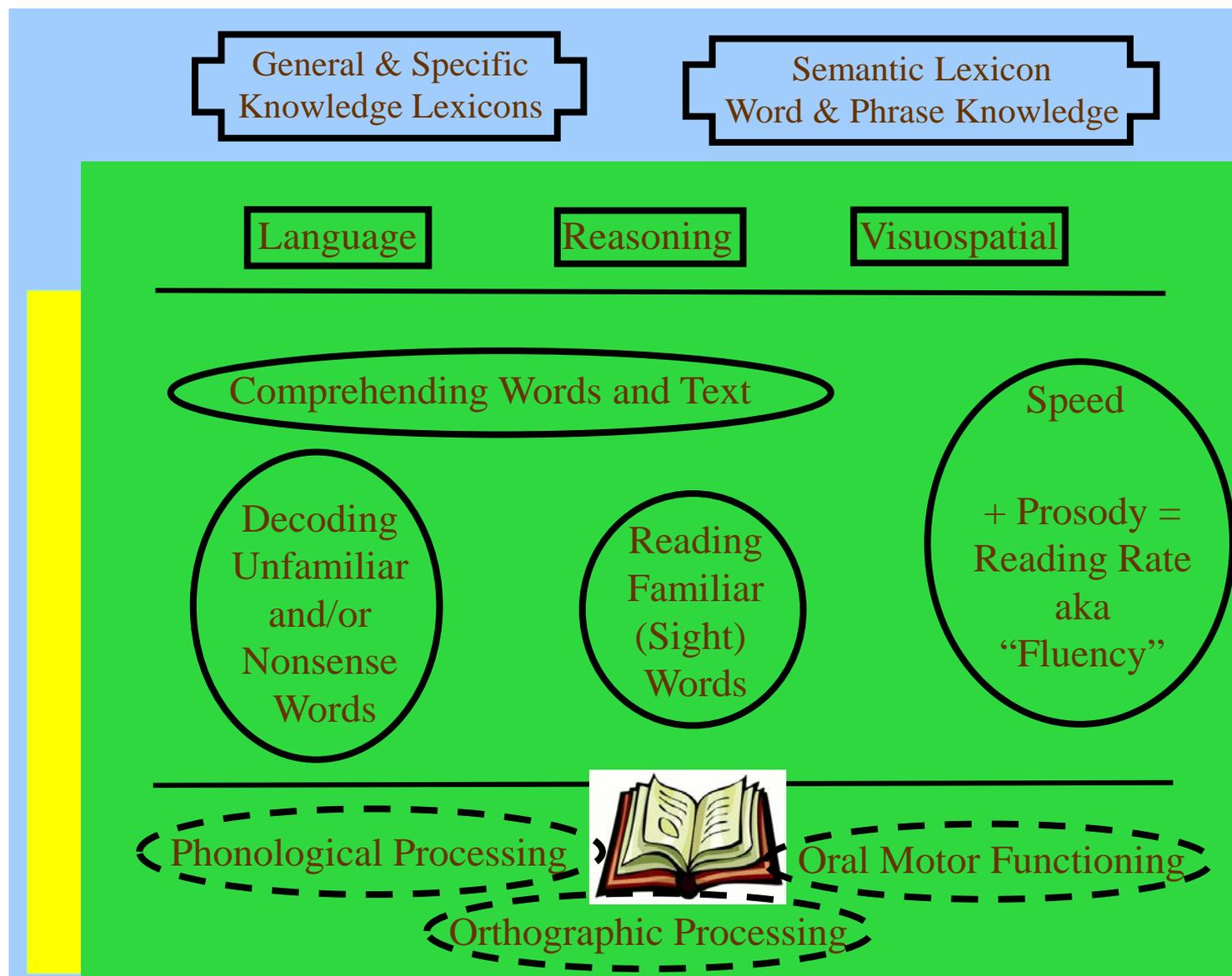
# Sentence/Passage Reading Skills

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– Reading Comprehension



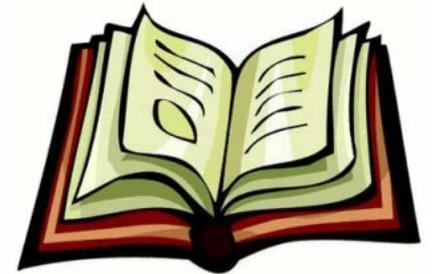
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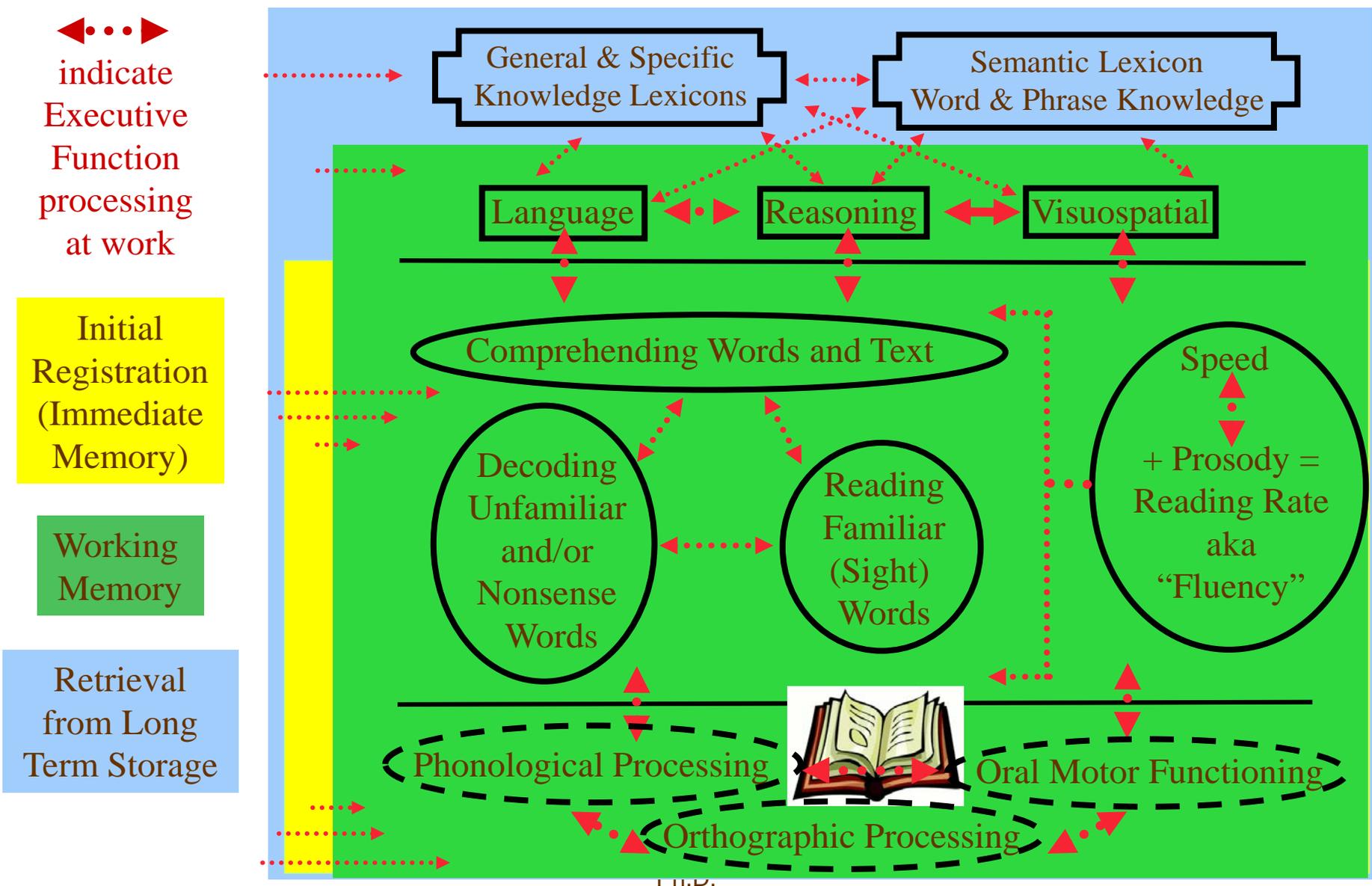
# Time Frames of Reference

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## – Working Memory



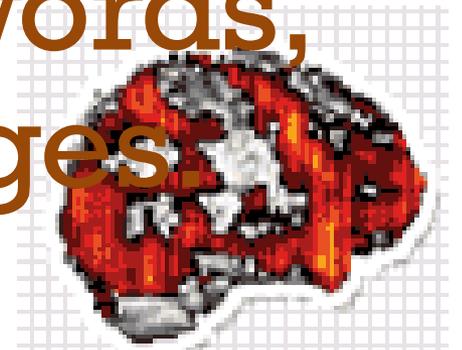
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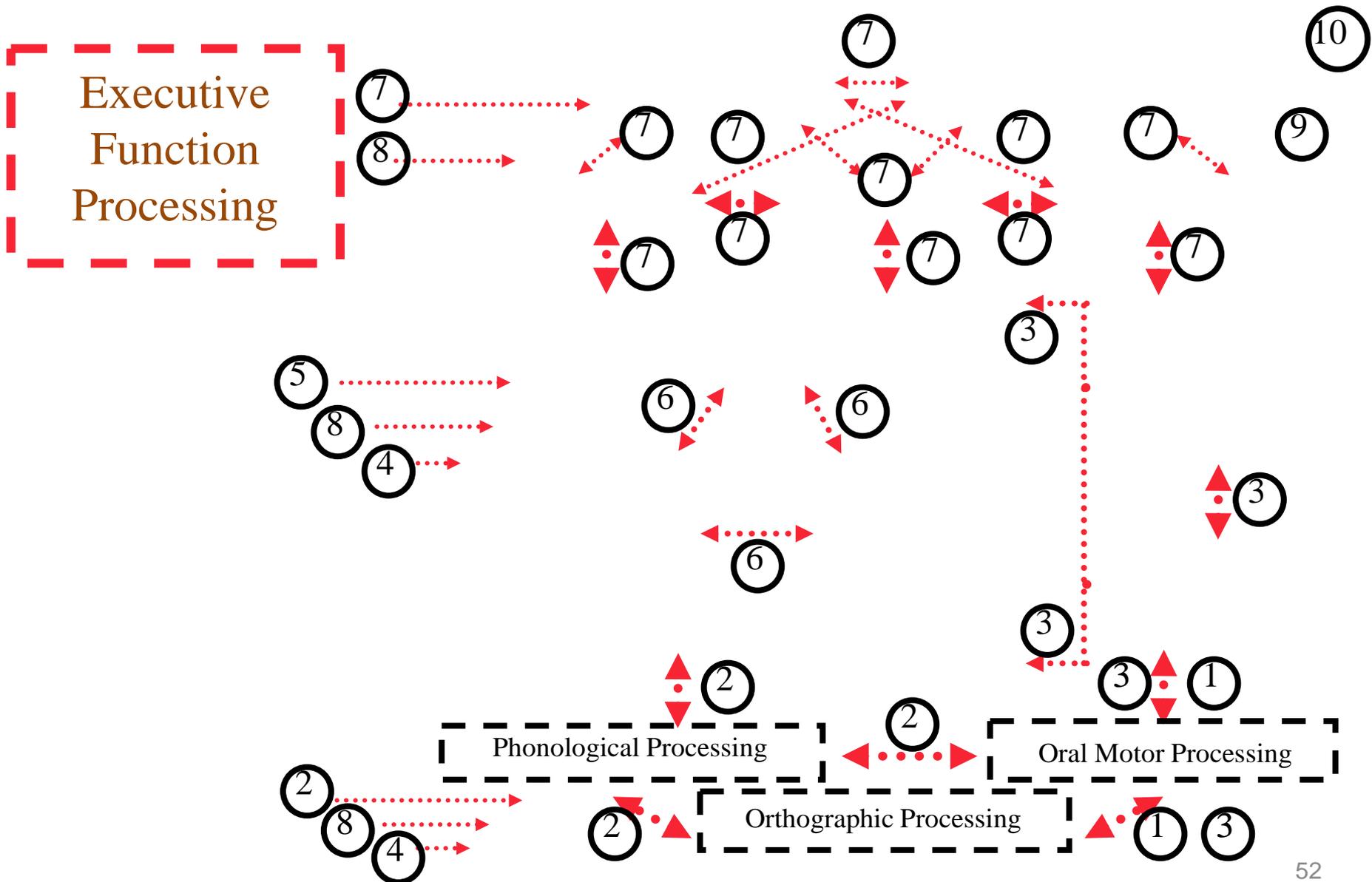
# Executive Functions and Reading

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- Executive functions are used to cue, direct, coordinate and integrate the use of the other mental constructs that are involved in reading words, sentences and passages.



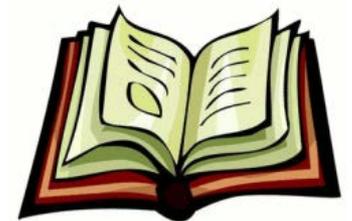
# Executive Functions and Reading



# Executive Functions and Reading

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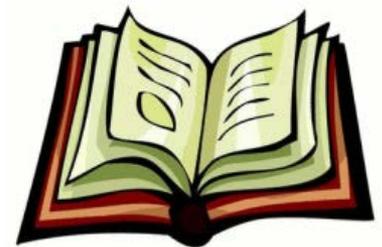
- ① Cueing immediate and sustained attention to orthography for accurate letter/word perception and discrimination
- ② Cueing and coordinating the use of phonological and orthographic processes for accurate word pronunciation
- ③ Directing efficient oral motor production, prosody, and rate for reading words and connected text



# Executive Functions and Reading

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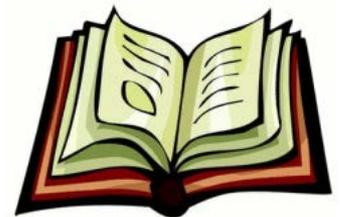
- ④ Cueing and directing the use of attention and immediate memory resources for reading words and connected text
- ⑤ Cueing retrieval of information from various Lexicons to read words and connected text
- ⑥ Cueing and coordinating the use of word recognition, word decoding, and reading comprehension skills



# Executive Functions and Reading

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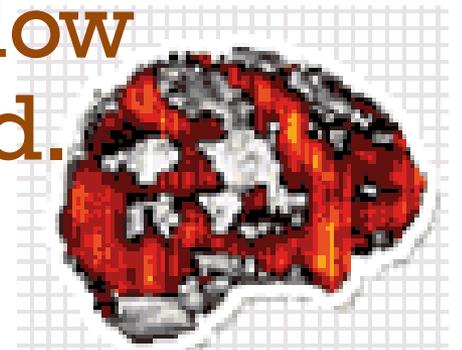
- ⑦ Cueing and coordinating the use of abilities and the retrieval of knowledge from Lexicons to create meaning for text comprehension
- ⑧ Cueing and sustaining the use of working memory resources while reading words and constructing meaning from text
- ⑨ Cueing and directing the oral expression of meaning derived from text comprehension
- ⑩ Cueing and directing the use of strategies for reading words and deriving meaning from text



# Executive Functions and Achievement

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- Although other mental constructs (processes, abilities, skills, and knowledge bases) may be well-developed, difficulties with the use of executive functions to cue, direct, coordinate and integrate the use of these other mental constructs may result in achievement far below what may be expected.



# Executive Functions and Reading

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Alana, an 11 year-old child displays adequate word reading skills when reading word lists and adequate RAN performance with letters and words. However, when asked to read a short two sentence text orally, she experiences extreme difficulties with applying both word reading and rapid naming skills; words are skipped, misread, and reread; highly familiar words are decoded instead of sight read, less familiar words are decoded at an extremely slow pace; word misreadings are left uncorrected despite the disconnect between the orally read word and the meaning of the text (e.g., reading “bornes” for “bones”). Despite superior ability to reason with verbal material, Alana is unable to offer adequate responses to questions about what she just read,

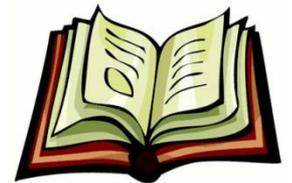
# Assessing Executive Functions Related to

## Reading

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Alana's case description serves to illustrate an important point:

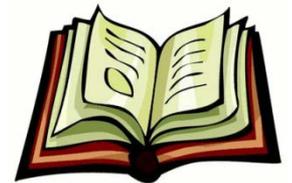
Executive function deficits often manifest as inconsistencies in the use of adequately developed processes, abilities, knowledge bases/lexicons, skills and/or strategies resulting in achievement and production below what would be expected.



# **Interventions for Executive Functions Difficulties Related to Reading**

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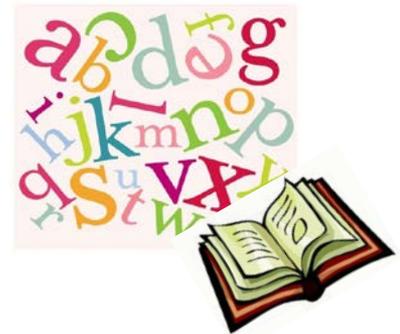
Many executive functions difficulties related to reading are the result of a lack of adequate maturation of the neural networks involved in the use of these executive functions for reading.



# Orthographic Awareness (OA)

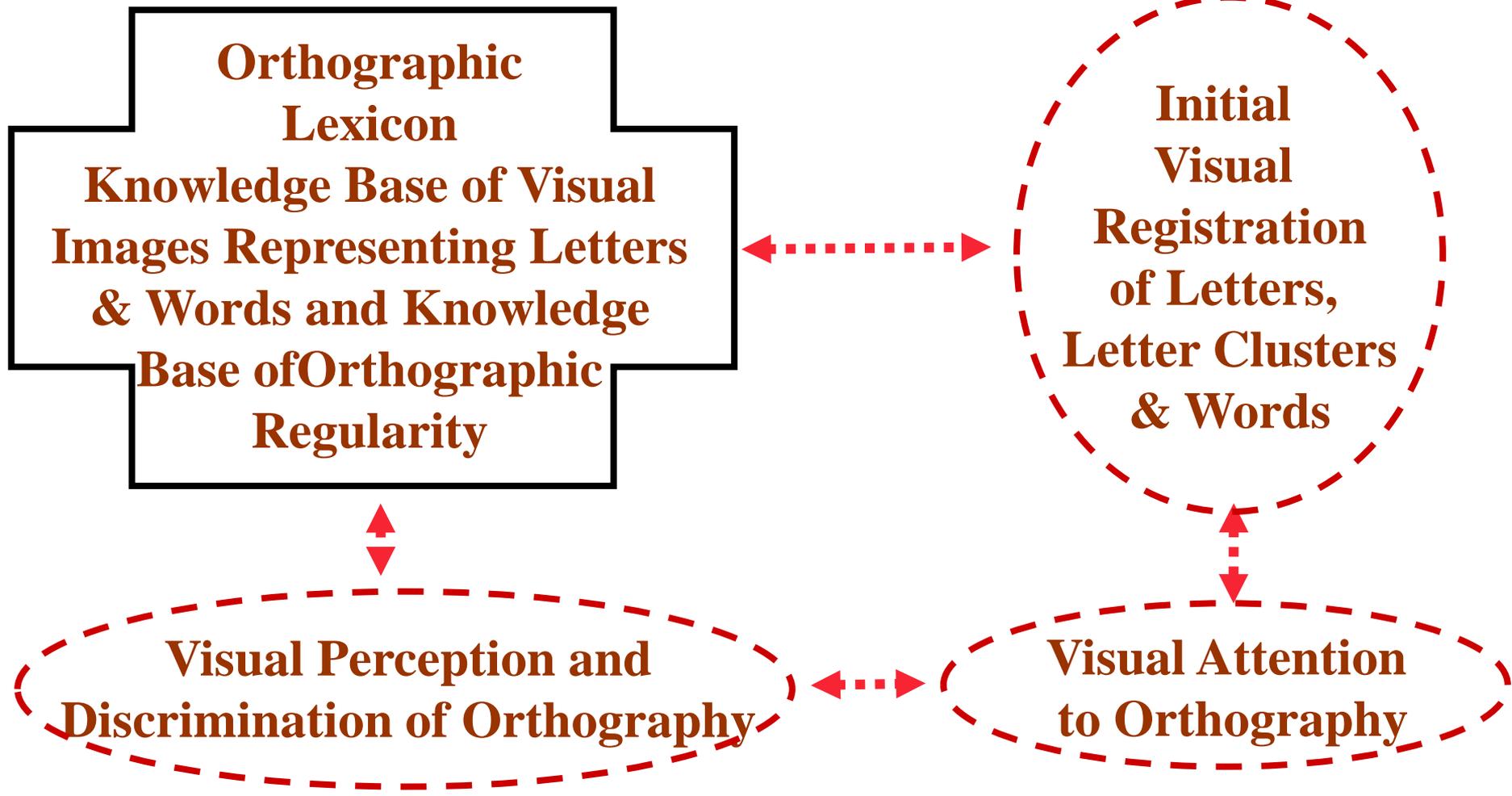
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- OA is the ability to notice, think about, and work with the individual visual representations (aka letters or graphemes) that comprise written words.
- Some children require direct instruction to learn how to attend carefully to the graphemes that make up words.





# Orthographic Processing



# Non-orthographic Visual Processing

Perception of this image varies depending on whether you are engaging pattern-oriented perceptual processes or detail-oriented perceptual processes.

Pattern-oriented processing leads to perceiving the visual image of a young girl. Detail-oriented processing leads to perceiving the visual image of an old woman. Many viewers can consciously or nonconsciously alter the perception process at will, first seeing a young girl, then an old woman or vice versa.



# Non-orthographic Visual Processing

depaint

edepaint

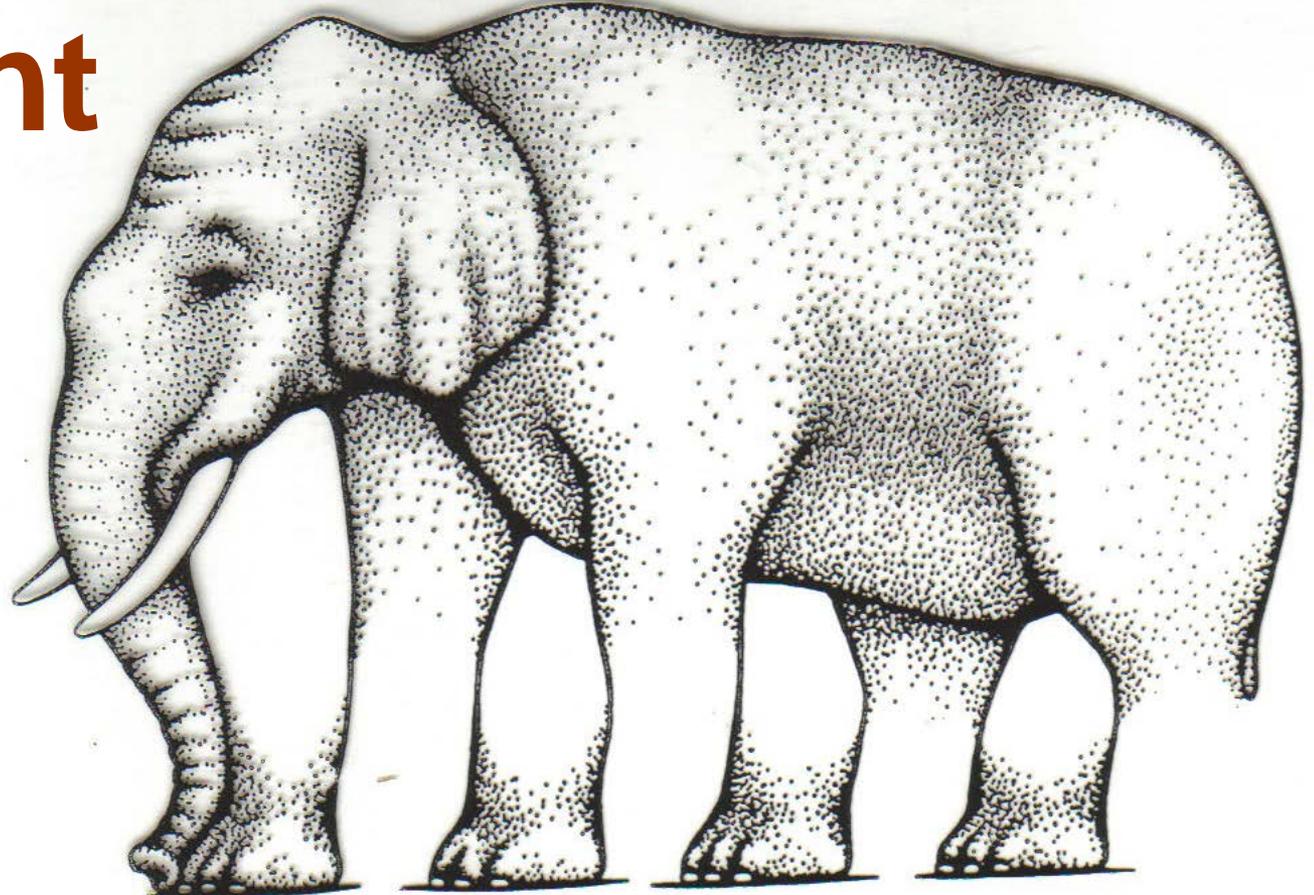
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# Visual Processing

Orthographic

Non-orthographic

elephant





# Orthographic Processing

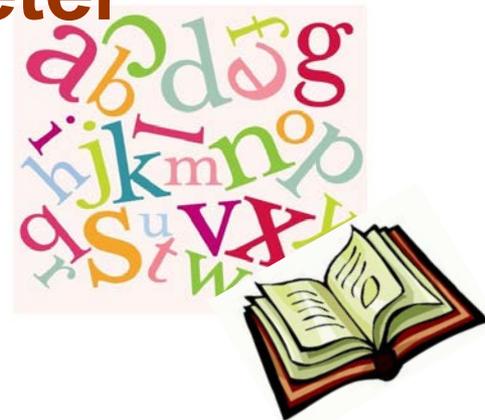
bread

beard

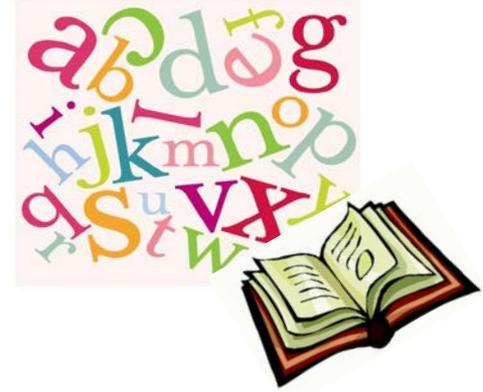
When viewing orthography, detail processing should be the preferred mode for visual processing rather than pattern processing. Although pattern processing can easily distinguish between “rea” and “ear” because the outer contours are different, pattern processing cannot distinguish “bread” from “beard” because the outer contours are the same. Good readers perceive all of the details of every word, thereby avoiding perceptual errors when reading similar words.

# Subject: soemthnig ncie

Aoccdrnig to a rscheearch at an Elingsh uinervtisy, it deosn't mttar in waht oredr the ltteers in a wrod are, the only iprmoetnt tihng is that the frist and lsat ltteer is at the rghit pclae. The rset can be a toatl mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae we do not raed ervey lteter by itslef but the wrod as a wlohe.



**Reply to something nice:**



**Subject: too eilsay led atrasy**

**A mulidutte of cusofend irentent serurfs seem to  
bilevee taht the oredr of the letetrs in wdros  
d'esnot mttear wehn you are raindeg as Inog as  
the frist and lsat leettr are in the crecort  
pitoison. If so, waht hesiopyeths mghit tehy  
greanete to epalixn why this citrpyc magesse is  
etponnexialty mroe dutiflufct to dihecepr by  
tehm?**

**[I'll bet it took you more than 11 seconds to read  
the above passage didn't it?]**

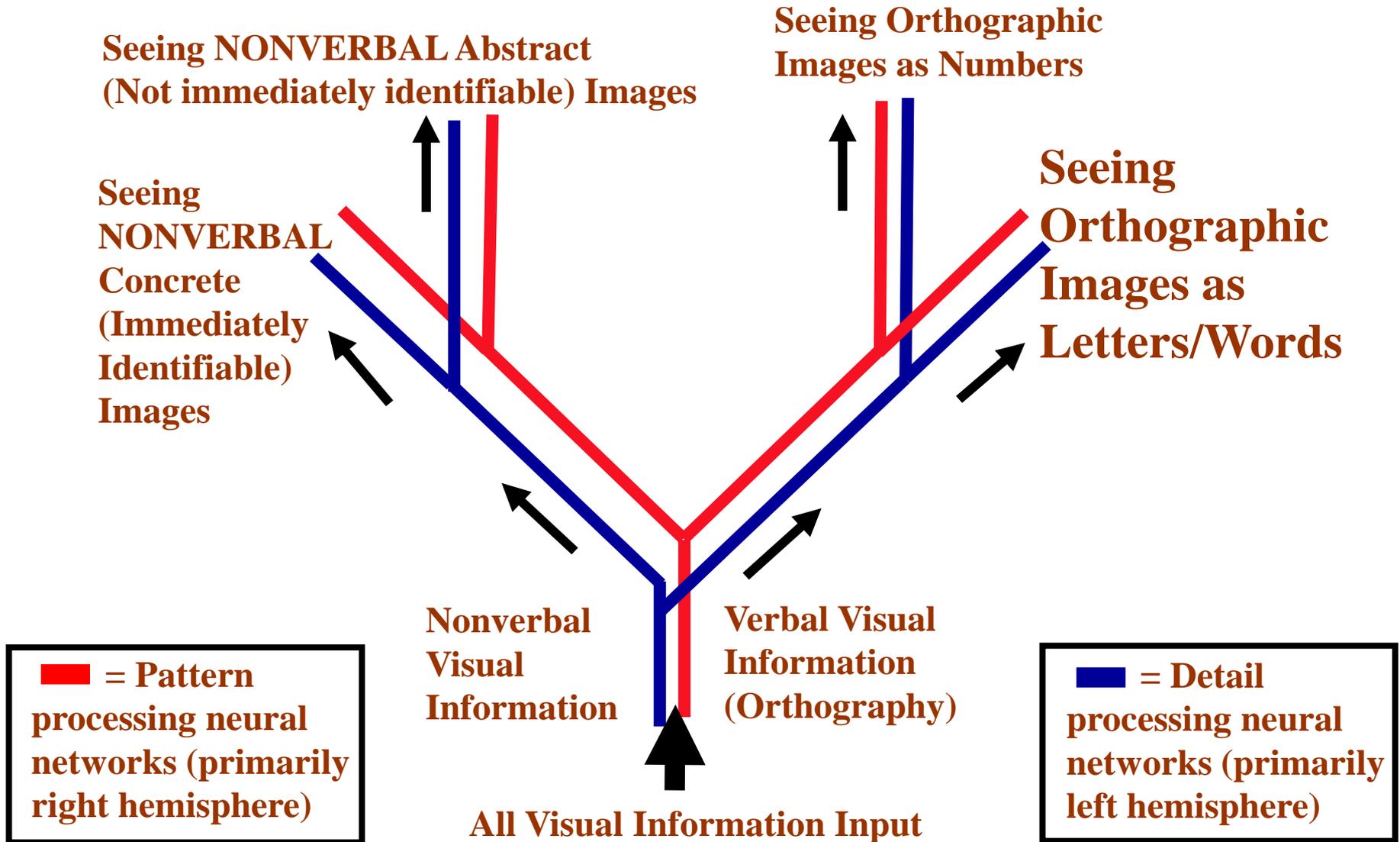
# Assessing Visual Processing Related to Reading

---

To maintain the close connection to reading skills and reading achievement, assessment must focus on visual processing of orthography rather than visual processing of nonverbal visual images



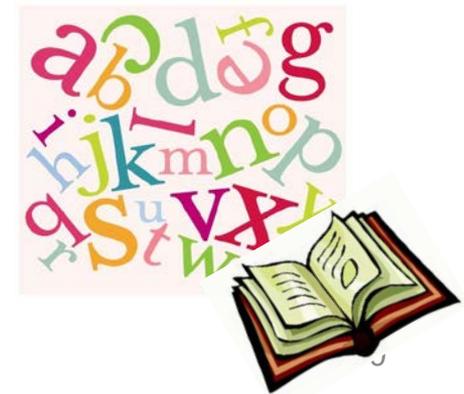
# Visual Information Processing Neural Networks



# Assessing Orthographic Processing

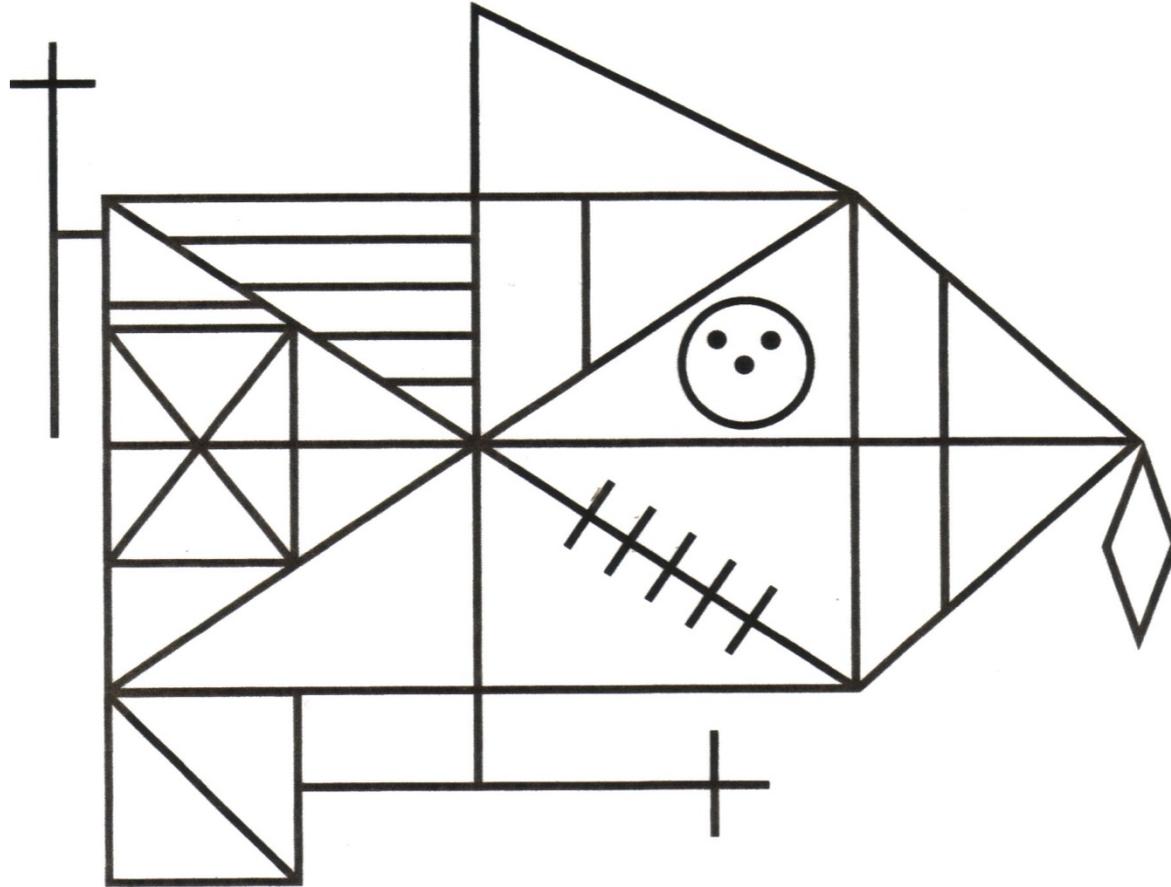
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An example of an assessment  
of nonverbal visual processing  
unrelated to reading: Rey  
Complex Figure Test (RCFT)  
Design Copy



**RCFT directions: Look at this figure. I would like you to copy that figure onto this sheet of paper. Copy it so that I would know that this is the figure you drew. Do a good job.**

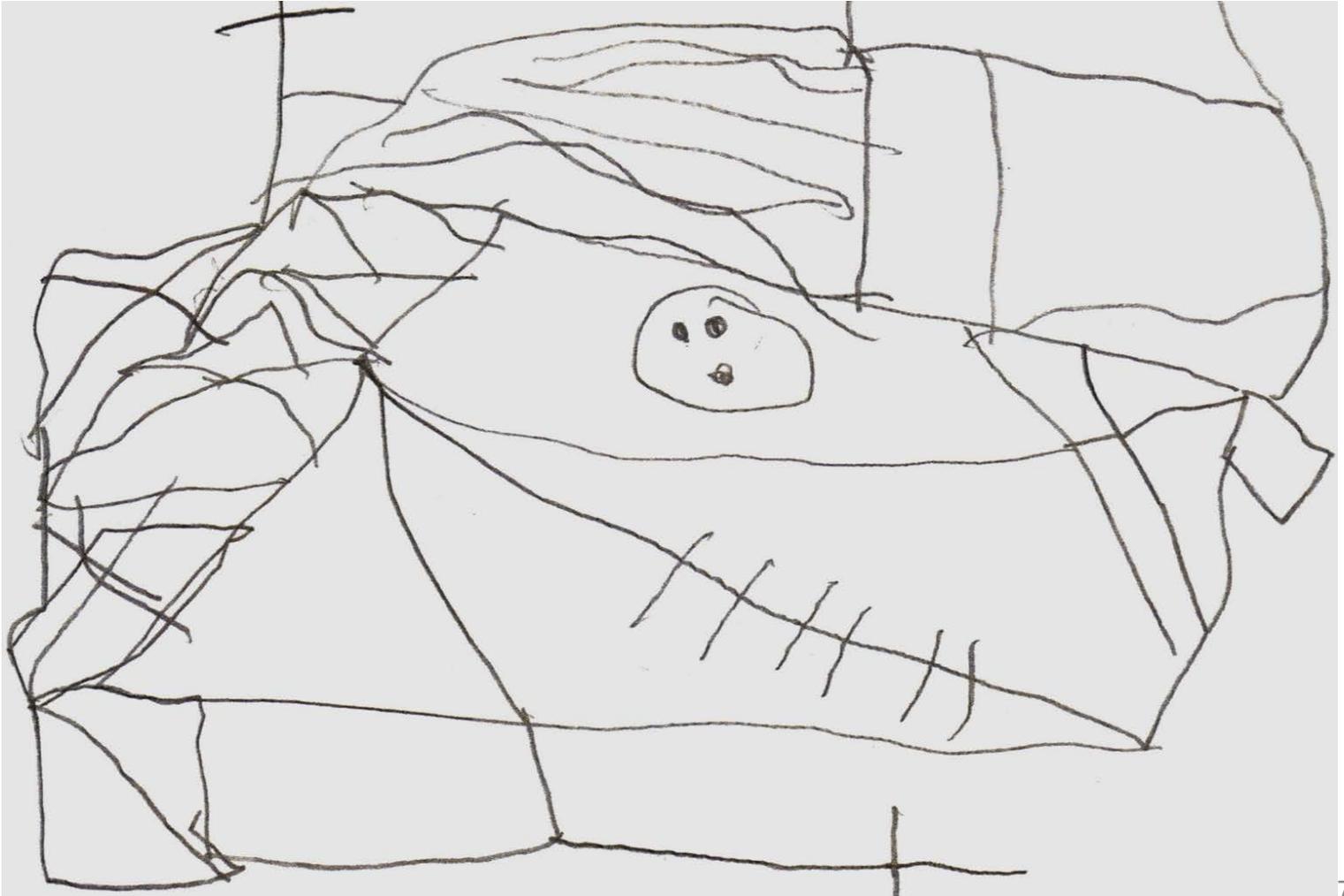
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James Age 10,

Rey Complex Figure Copy:

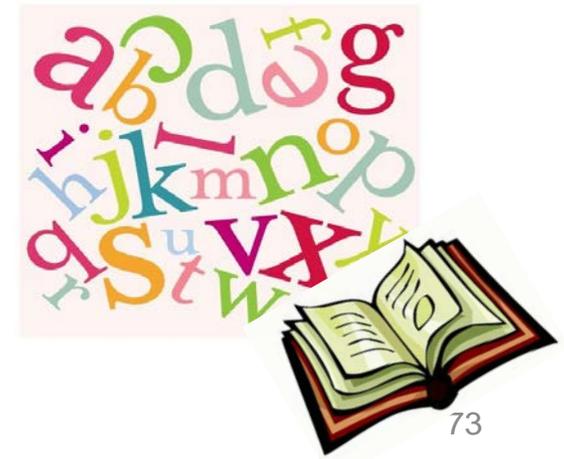
---



# Assessing Orthographic Processing

---

- James' reading scores:  
WIAT-II Basic Reading 111  
WIAT-II Reading Comprehension  
102



# Assessing Orthographic Processing

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Example of assessment of verbal visual (orthographic) processing directly related to reading:

Process Assessment of the Learner (PAL) Receptive Coding task



# Assessing Orthographic Processing

---

## PAL Receptive Coding directions:

I will show you two words one at a time.

If the words are exactly the same, say “yes.” If the words are not exactly the same, say “no.”



good

good

well

well

them

then

quieter

quarter

different

different

**consciousness**

**conscoiusness**

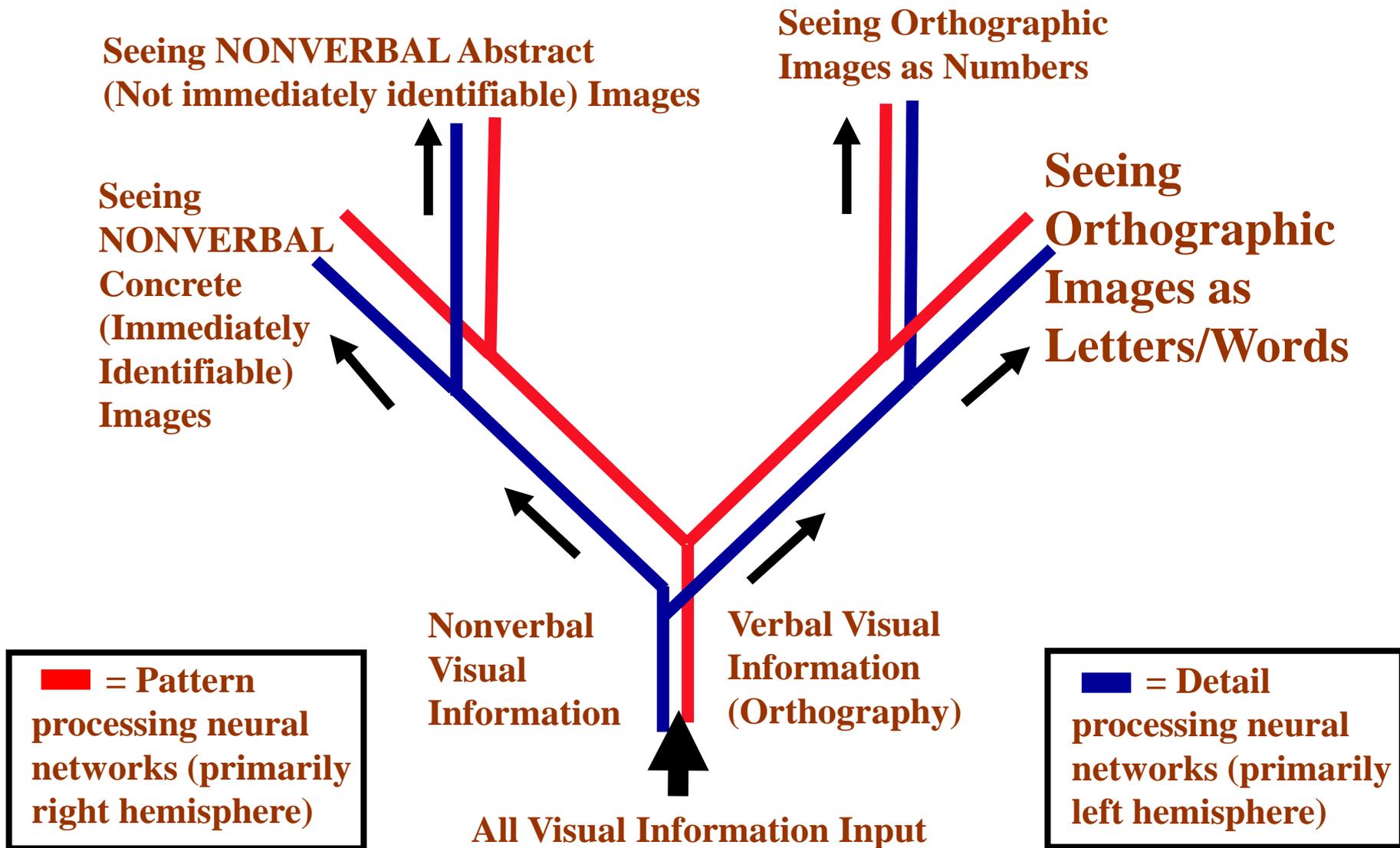
# electroencephelography

# electroencephalography

onomatopoeia

onomatopoeia

# Visual Information Processing Neural Networks



# Individually-administered Assessments of EF

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- Executive Functions must be assessed in tandem with processes, abilities, skills and/or retrieval form lexicons.
- Specific measures of Executive Functions always involve the assessment, to some degree, of a 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.



# Cascading Production Decrement

Mental  
Capacity

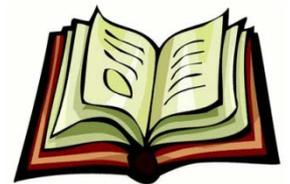
Start here

Capacity+ EF

Capacity+ + EF

Capacity+ + + EF

Progressive deterioration  
of performance is observed  
as executive function demands  
(+ EF) become greater.



# Individually-administered Assessments of EF

---

- Identify a specific cognitive capacity baseline using a measure that minimizes EF involvement with orthography.
- 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



# 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

# 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



# Cascading Production Decrement

**PAL-II  
Rapid  
Automatic  
Naming**

**Progressive  
deterioration  
of performance  
is observed  
as executive function  
demands (+ EF)  
become greater.**

**PAL-II  
Rapid  
Automatic  
Switching**



# 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**

# 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

# D-KEFS Color-Word Interference – Inhibition/Switching

**Rules:**

1. **blue** – Name the ink color.

2. **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**

# 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



# Cascading

## Production

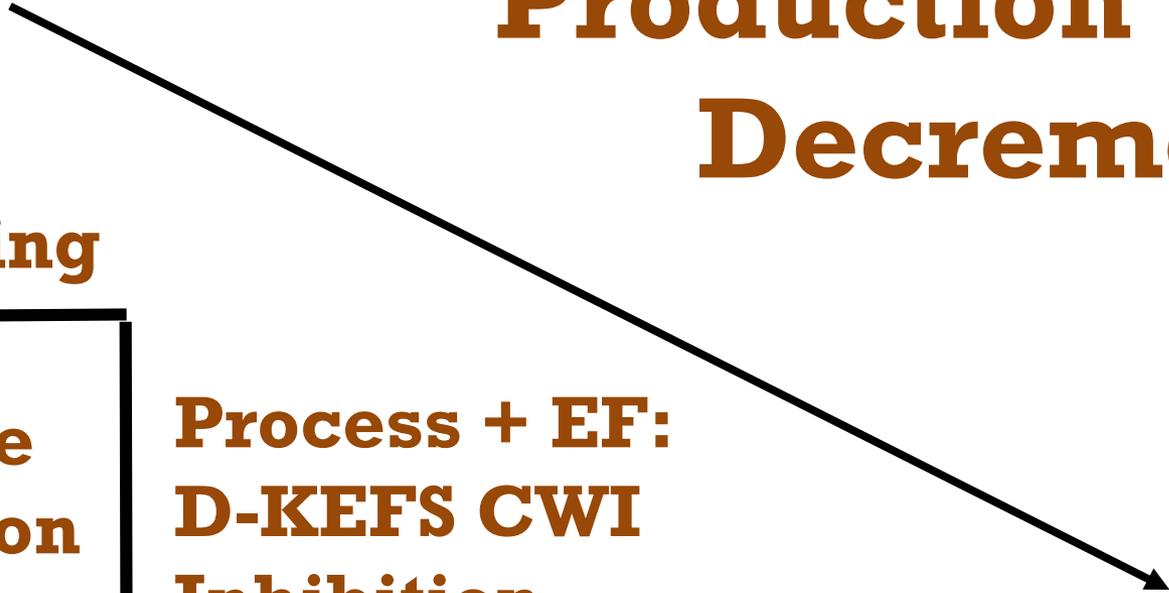
## Decrement

**Process:  
D-KEFS  
Color &  
Word Naming**

**Progressive  
deterioration  
of performance  
is observed  
as executive  
function  
demands (+ EF)  
become greater.**

**Process + EF:  
D-KEFS CWI  
Inhibition**

**Process + + EF:  
D-KEFS Inhibition/  
Switching**

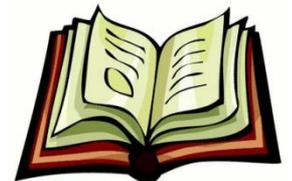


# EF Involvement in Reading

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## Essentials of Executive Functions Assessment Rapid Reference 6.6:

- Provides lists of Baseline EF-minimized Tasks and Related EF-saturated (EF+) Tasks for CPD Analyses for reading assessment

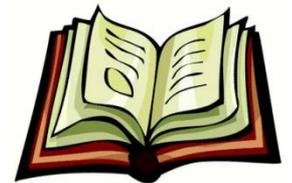


# EF Involvement in Reading

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## Essentials of Executive Functions Assessment Rapid Reference 6.7:

- The examples provided in this rapid reference illustrate how to identify reading production decrements likely to be resulting from ineffective engagement of executive functions during task performance



# EF Involvement in Reading

## Essentials of Executive Functions Assessment Rapid Reference 6.7 Text Excerpt:

### Oral Reading Fluency

Rapid automatic naming tasks can function as good baseline tasks for oral reading fluency, but the multifaceted nature of oral reading fluency requires the use of additional baseline measures in order to assess more specifically the impact of executive functions difficulties. For example, effective performance of RAN tasks can be paired with effective performance of sight word recognition tasks or word decoding tasks to examine the effect of executive functions difficulties on sight word oral reading fluency or nonsense word decoding fluency.

Word level Oral Reading Fluency tasks alter the stimuli of rapid naming tasks to become more challenging by having the child read lists of non-repeating sight words or nonsense words as quickly as possible. This format greatly increases the need for the engagement of the Pace, Retrieve, and Balance cues to coordinate oral motor production with retrieval of sight words or decoding pattern knowledge. This increase in demand for the use of these executive functions to guide the reading process is likely to account for cases where, despite adequate performance on rapid naming tasks and word recognition and/or word decoding tasks, a child demonstrates deficient performance on a sight word fluency and/or decoding fluency tasks such as those found in the Test of Word Reading Efficiency (TOWRE) that require rapid application of sight word recognition (Sight Word Efficiency) or rapid application of decoding skills (Phonemic Decoding Efficiency) as shown below:





## Baseline Oral Motor Functioning Measures

PAL RAN Words Scaled Score 10 (50<sup>th</sup> percentile)

PAL RAN Letters Scaled Score 11 (63<sup>rd</sup> percentile)

## Baseline Word Recognition Skill Measure

KTEA-II Letter & Word Recognition Standard Score 105 (63<sup>rd</sup> percentile)



### Word Recognition Skill EF+ Measure

TOWRE Sight Word Efficiency Standard Score 84 (14<sup>th</sup> percentile)

---

## Baseline Oral Motor Functioning Measures

PAL-II RAN Letters Scaled Score 10 (50<sup>th</sup> percentile)

PAL-II RAN Letter Groups Scaled Score 11 (63<sup>rd</sup> percentile)

## Baseline Word Decoding Skill Measure

KTEA-II Nonsense Word Decoding Standard Score 100 (50<sup>th</sup> percentile)



### Word Decoding Skill EF+ Measure

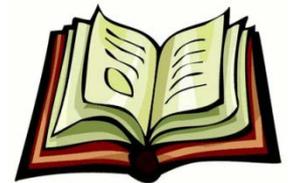
TOWRE Phonemic Decoding Efficiency Standard Score 84 (14<sup>th</sup> percentile)



# Assessing Executive Functions Directly Related to Reading

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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

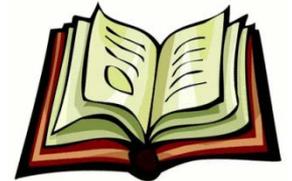


# EF Involvement in Reading

---

## Essentials of Executive Functions Assessment Rapid Reference 6.2:

- Description of EF involvement in the act of reading
- Lists the EFs most likely to be involved in various facets of reading
- Describes task behavior likely to be indicating a lack of effective EF use

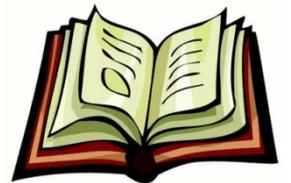


# **EF** Involvement in Reading

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## Attention to Orthography

- Cueing/directing/coordinating immediate and sustained attention to orthography for accurate letter/word perception and discrimination

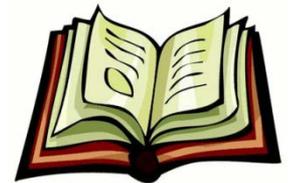


# **EF** Involvement in Reading

---

EFs Likely to be involved in directing orthographic processing during word reading and decoding:

- **Perceive, Focus, Monitor, Correct**

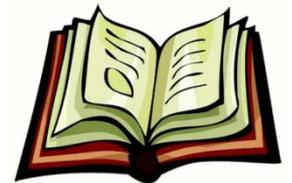


# EF Involvement in Reading

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Behavior indicating EF difficulties:

- Quick but inaccurate offerings for individual words with no recognition of the errors being made; words offered are highly similar in visual configuration to the correct word or start with the same letter or letter combination as the correct word or the nonsense word when performing decoding tests.

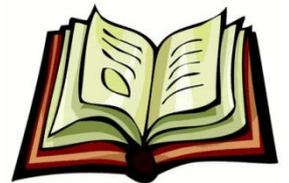


# EF Involvement in Reading

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## Fluent Sentence Reading

- Cueing/directing/coordinating speeded oral motor production and prosody for fluent sentence and passage reading.

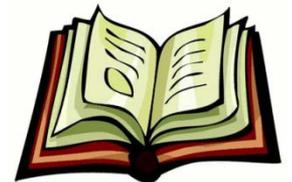


# **EF Involvement in Reading**

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EFs Likely to be involved in directing sentence reading rate:

- **Execute, Pace, Balance, Monitor, Correct, Sustain**

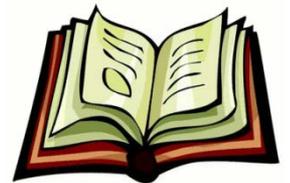


# EF Involvement in Reading

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Behavior indicating EF difficulties:

- Sentence or passage reading rate is not consistent with rate demonstrated during fluency instruction or some forms of assessment.

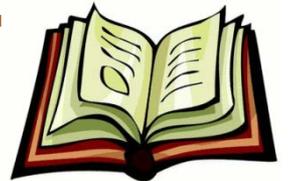


# **EF Involvement in Reading**

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Avoiding “zoning out” while reading

- Cueing/directing/  
coordinating sustained  
extraction of meaning  
from passage reading

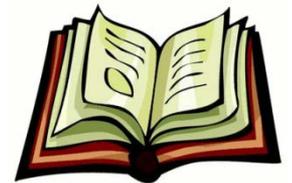


# **EF** Involvement in Reading

---

EFs Likely to be involved in avoiding zoning out while reading passages:

- **Focus, Sustain, Monitor, Correct**

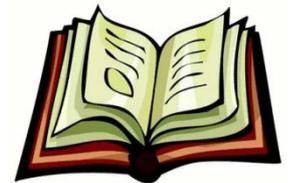


# **EF** Involvement in Reading

---

Behavior indicating EF difficulties:

- Lack of recollection of any of the content of a passage that was just read despite indications that the words of the passage were being read.



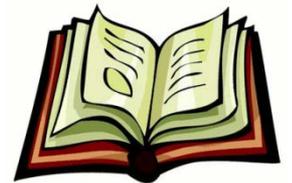


# **EF** Involvement in Reading

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## Essentials of Executive Functions Assessment Rapid Reference 6.15:

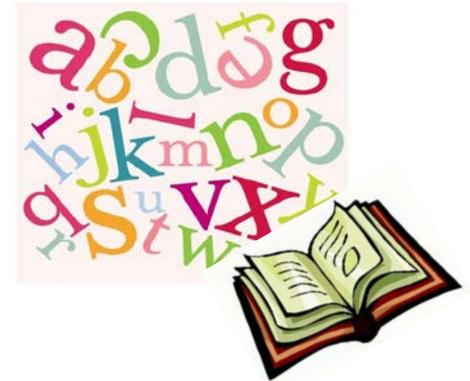
- Case study report section describing a process-oriented assessment of executive functions difficulties affecting reading



# 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



# Intervention for Difficulties with Direction 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



# Intervention for Difficulties with Directing 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.



# Intervention for Difficulties with Directing 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.



# Intervention for Difficulties with Directing Attention to Orthography

---

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



# Intervention for Difficulties with Directing 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.” (Gain)



# Intervention for Difficulties with Directing 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)





# Intervention for Difficulties with Directing 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)



# Intervention for Difficulties with Directing 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.”)



**minister**



# Intervention for Difficulties with Directing 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.



# Intervention for Difficulties with Directing Attention to Orthography

---

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



# Intervention for Difficulties with Directing 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..”



# Intervention for Difficulties with Directing Attention to Orthography

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



# Intervention for Difficulties with Directing Attention to Orthography

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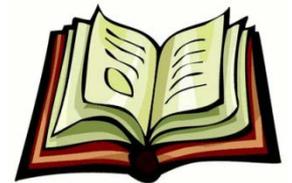
- Many programs available today, such as Read 180 and Lexia, have the reading with orthographic and speech support components that have been shown to improve decoding skills.



# Interventions for Executive Functions Difficulties Related to Reading

---

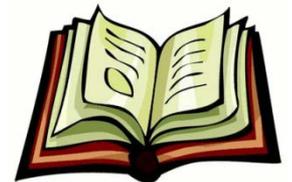
Many executive functions difficulties related to reading are the result of a lack of adequate maturation of the neural networks involved in the use of these executive functions for reading.



# **Interventions for Executive Functions 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.

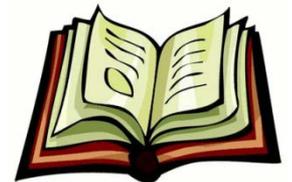


# **Interventions for Executive Functions Difficulties Related to Reading**

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**Interventions for executive  
functions difficulties with reading  
rate:**

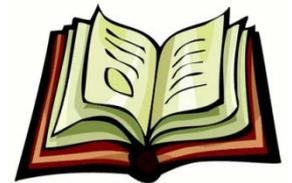
**Increased oral reading practice  
with words and passages  
composed of words that can be  
recognized by sight.**



# Interventions for Executive Functions Difficulties Related to Reading

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- 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.

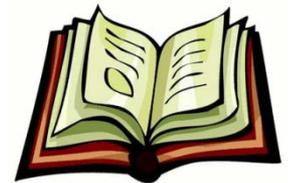


# **Interventions for Executive Functions Difficulties Related to Reading**

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**Interventions for executive functions difficulties with cues involved in reading comprehension:**

**Strategy instruction that models and teaches the student how to approach the tasks of vocabulary building and reading comprehension.**

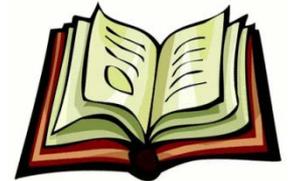


# **Interventions for Executive Functions Difficulties Related to Reading**

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**Interventions for executive functions difficulties with cues involved in reading comprehension**

**Strategy instruction that encourages students to generate a list of questions that the students ask themselves before, during and after reading.**



# Comprehension Instruction

---

The NRP's conclusions about CI:

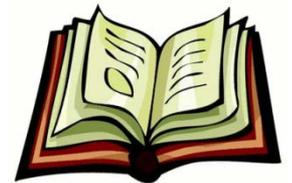
- Strategies for active comprehension are normally acquired informally
- Explicit or formal instruction of strategies leads to improvement of comprehension
- When the strategies have been acquired, students can apply the strategies independently
- Students who are not explicitly taught these strategies are unlikely to learn, develop, or use them spontaneously



# Comprehension Instruction

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“The idea behind explicit instruction of text comprehension was that comprehension could be improved by teaching students to use specific cognitive strategies or to reason strategically when they encountered barriers to comprehension in reading.” NRP 2000, page 4-5

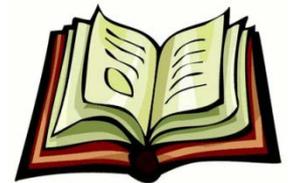


# Comprehension Instruction

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The NRP identified 8 kinds of CI that “appear to be most effective and most promising for classroom instruction”:

**Comprehension Monitoring –**  
teaching students how to be aware or conscious of the attempt to understand what is being read; procedures for dealing with problems in understanding are learned and applied as needed.



# Comprehension Instruction

---

The NRP's cited two major approaches to comprehension strategy instruction:

**Direct Explanation (DE)** – teachers help students view reading as a problem-solving task that requires the use of strategic thinking and help them learn to think strategically about solving reading problems. DE focuses on developing teachers' capacities for explaining the reasoning and mental processes involved in successful reading comprehension in an explicit manner.

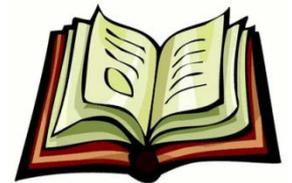


# Comprehension Instruction

---

The NRP's cited two major approaches to comprehension strategy instruction:

**Transactional Strategy Instruction (TSI)**  
– also views reading as a problem-solving task, but focuses on teacher's capacities to facilitate discussion in which students collaborate to form joint interpretations of text and explicitly discuss the mental processes and cognitive strategies involved in comprehension of text.



# Comprehension Instruction

---

Typically, Comprehension Strategy Instruction involves:

- Developing of an awareness and understanding of one's own cognitive processes that are amenable to instruction and learning
- Guiding and modeling the actions that a reader can take to enhance the comprehension processes used during reading
- Practicing strategies with teacher assistance until students internalize them and use them independently

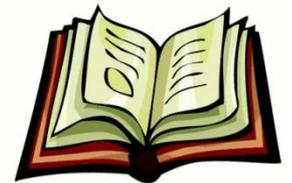


# Comprehension Instruction

Use Direct Explanation (DE) or Transactional Strategy Instruction (TSI) to help students interpret this song lyric:

“I’ve got brains like antique floors  
I’ve built each one on the one before  
I use all three but they don’t agree.  
One of them wants to love you  
Another one wants to club you  
I guess my old natures  
move like glaciers”

- Stuart Davis



# Comprehension Strategy

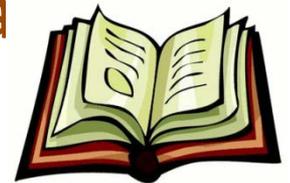
## Instruction:

### Does it Work?

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The NRP's review of the research literature led to the following conclusions about CI:

- “The focus on what we know about cognition has led to the development of practical strategies for improving students’ comprehension.” Page 4-41
- “The cumulative result of nearly 3 decades of research is that “there is ample extant research supporting the efficacy of cognitive strategy training during reading as a means to enhance students’ comprehension.” Bauma 1992.



# Bridging Strategies

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Model appropriate use of self-regulation executive function capacities



# Bridging Strategies

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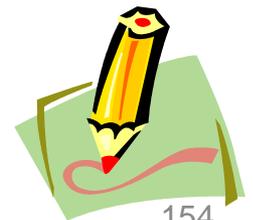
Teach self-regulation capacities with specific skill routines using Cognitive Strategy Instruction approaches (e.g. Graham & Harris Self-Regulated Strategy Development approach for Written Expression).



# Five Stages of Strategy Instruction



1. Explain the purpose of self-regulation strategies in general and describe and discuss the specific steps of the strategy that will be taught.

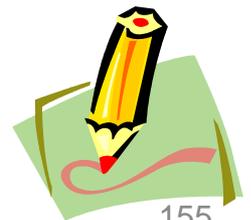


# Five Stages of Strategy Instruction

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2. Model the use of the strategy using language and examples that connect with the students.

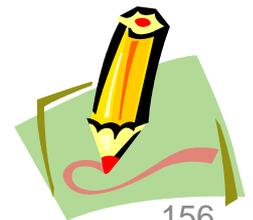


# Five Stages of Strategy Instruction

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3. Students memorize the steps in the strategy as well as any mnemonics that are used as part of the strategy.



# Five Stages of Strategy Instruction



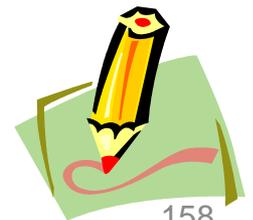
4. Teacher supports the implementation of the strategy by the students, scaffolding as necessary to help the students to master the use of the strategy.



# Five Stages of Strategy Instruction



5. Students independently apply the self-regulated strategy covertly (in their own minds). Students and teacher collaboratively evaluate the effectiveness of student self-directed strategy application.



# The Report Writing Strategy

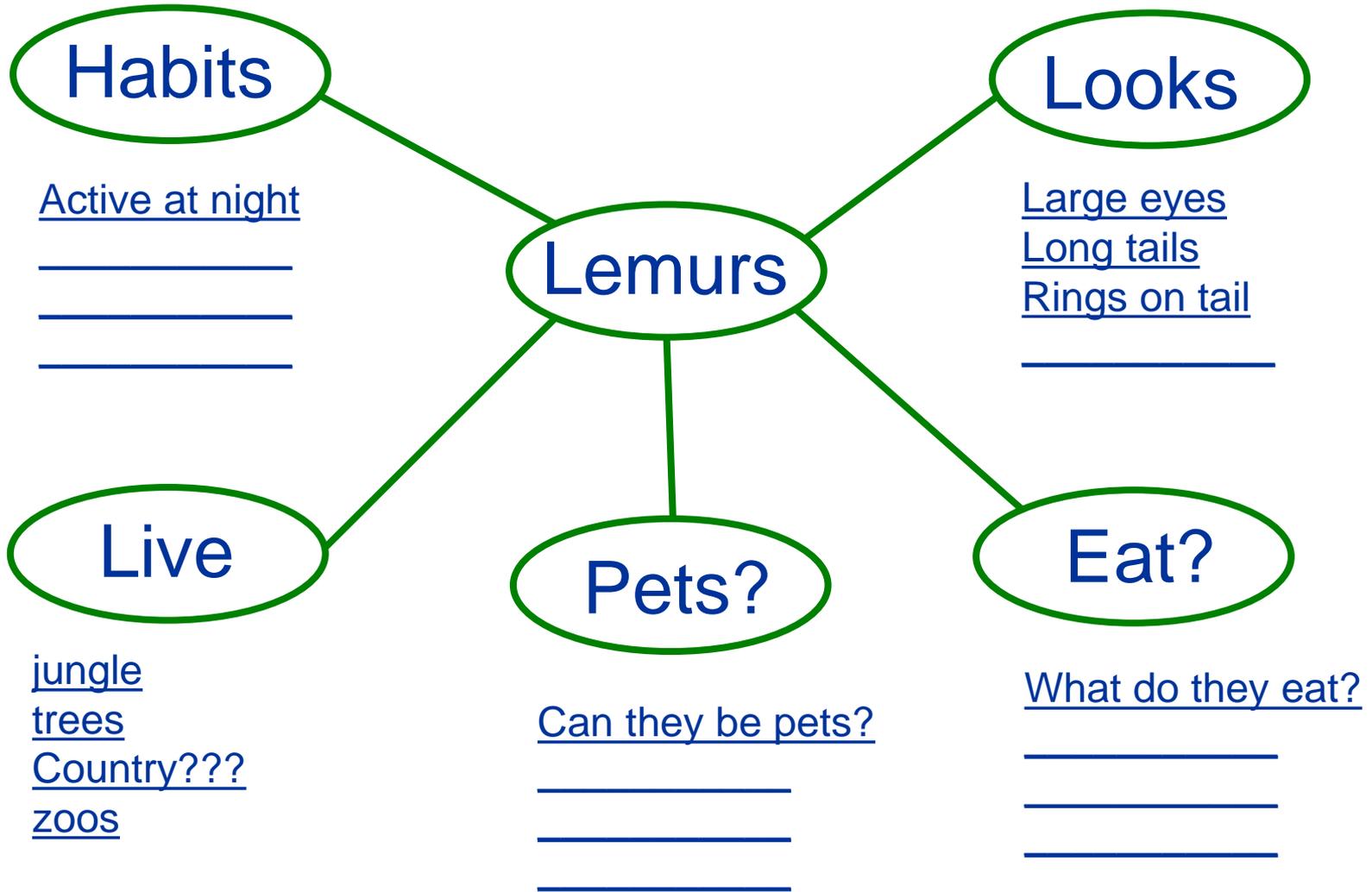
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1. Select a topic.
2. Brainstorm what you know and what you want to learn.
3. Organize your information using a visual web.
4. Review your visual web and identify any holes or disconnects.



# Web for what I know and what I want to learn



# The Report Writing Strategy

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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.



# The Report Writing Strategy

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8. Check the visual web; did you write what you wanted to write?

9. If the answer to 8 is “no”:  
Add information that is missing; fix sentences that don't say what you want to say.



# Scaffolding Step 9

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- 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?



# Scaffolding Step 9

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- 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-G again if needed.

