INTRO

http://www.readingsoft.com/

1.ORTHO

https://youtu.be/oPA-LAAMuHE?t=57s (0.58 to 3.15)

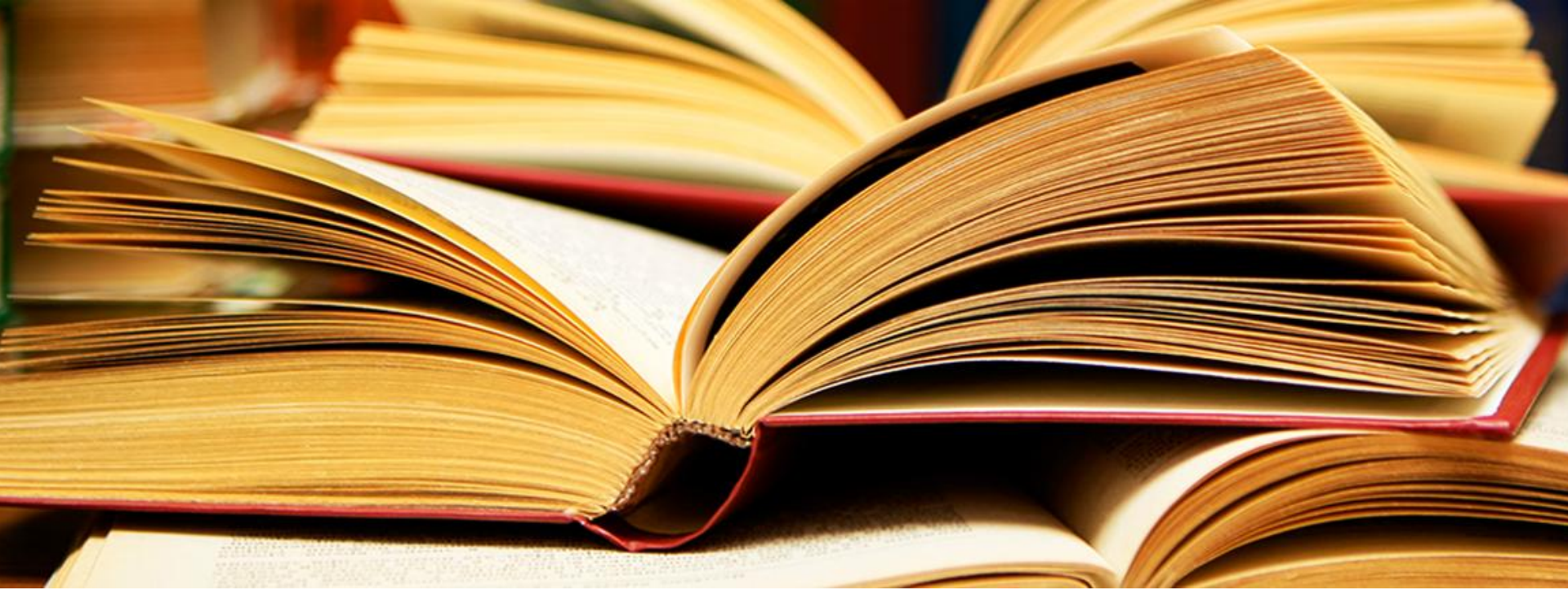
2. PHONO

https://youtu.be/BqhXUW_v-1s

TEACHING STRATEGIES

http://www.spreeder.com/

http://www.fdmt.ca/catalogue/



Constructing the Reading Brain

Sarah Holt & Noëmie Treder

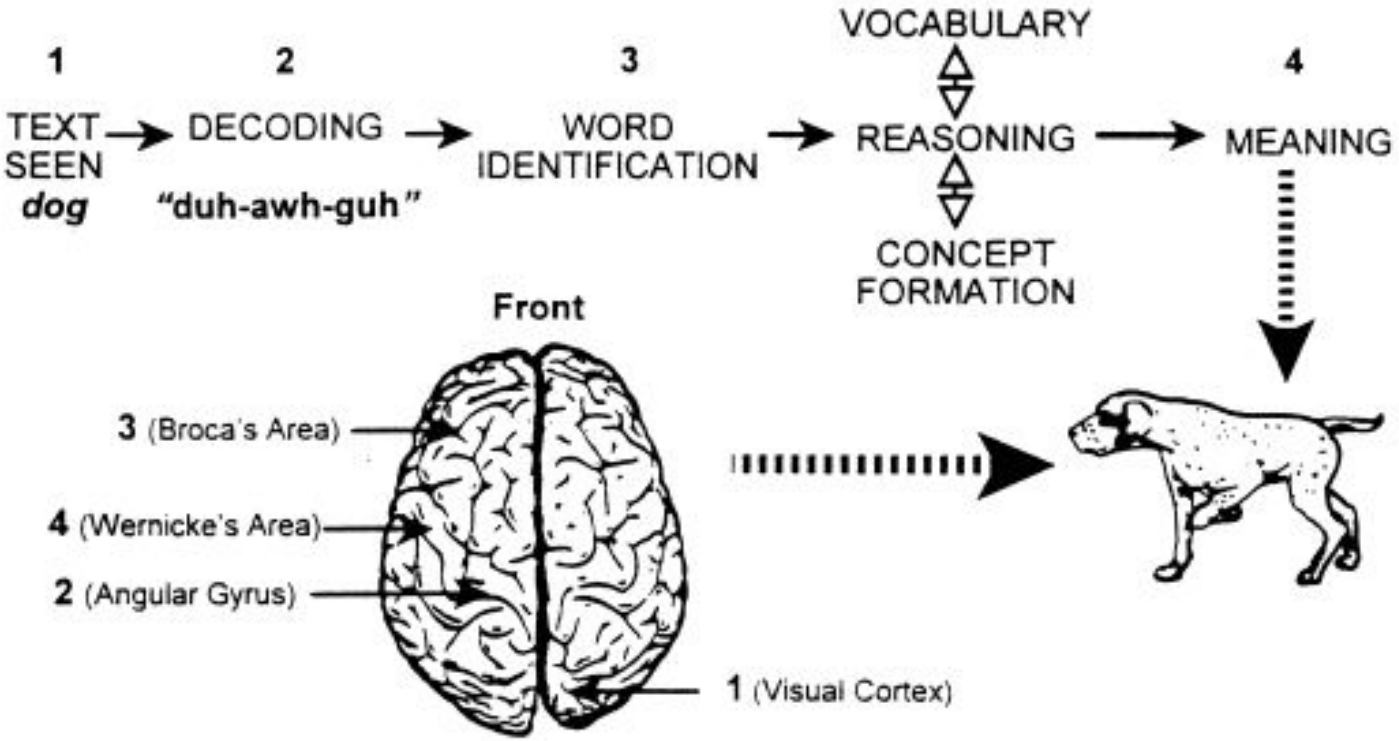
Introduction

The myth of the Reading Brain

READING BRAIN

A COMPLEX OF NEURAL SYSTEMS

A complex of neural systems



Source: Sousa (2001)

Building an "efficient system of systems"

1. **DEVELOPING** each of the systems

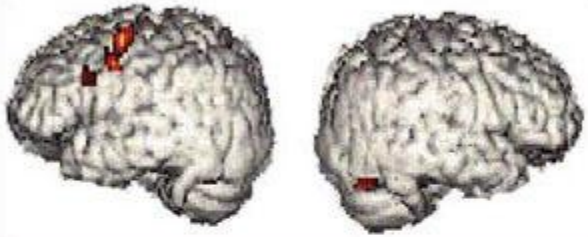
2. **CONNECTING** those systems

Brains in various stages of activity

www.brainage.com

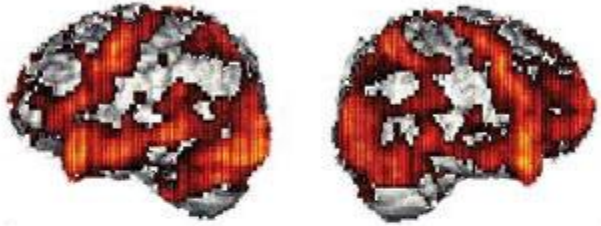
A Brain in Idle Thought

The left hemisphere is working, but the right hemisphere is hardly working at all.



A Brain Reading a Book Aloud

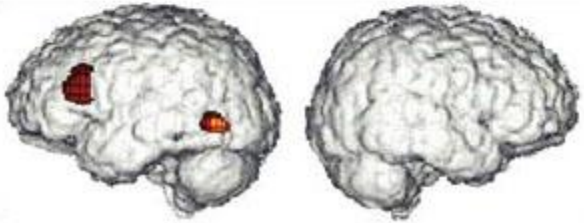
The faster you read aloud, the harder your brain works.



Brains in Various Stages of Activity

A Brain Solving a Difficult Math Problem

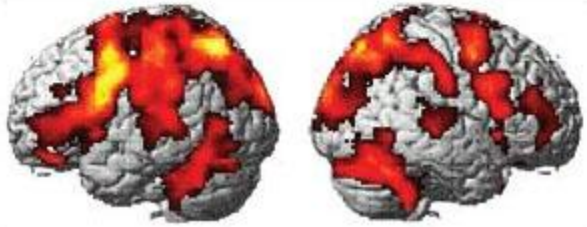
Even when solving a hard problem, your brain may not be working very hard.



Brains in Various Stages of Activity

A Brain Performing Simple Math Problems Quickly

Many parts of both hemispheres are working very hard.



Summary

1. Orthographic System
2. Phonological System
3. Connectivity
4. Semantic System
5. Comprehension
6. Teaching Strategies

Speed Reading Test

http://www.readingsoft.com/

READING SPEED (Words per Minute)

Don’t speed - Read normally!

1. Before you start the real test, click the button START, scroll down without reading and click the button STOP
2. Click the START button and start reading
3. Click the STOP button as soon as you have finished
4. Write down your reading speed (wpm)

COMPREHENSION (%)

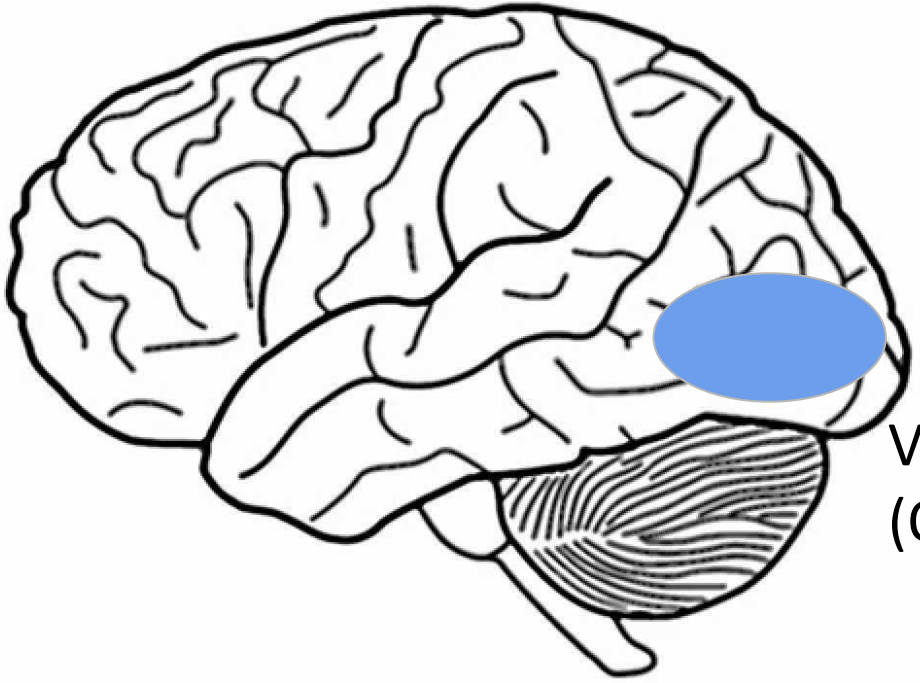
1. Click on the link “Comprehension Test”
2. Answer the 11 questions
3. Write down your comprehension level (%)

Check your reading results at the bottom of the page

1. Orthographic System

Visual Processing of Text

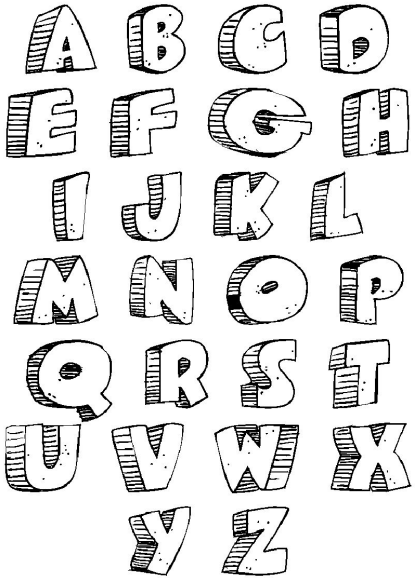
GOAL: Make meaning of marks on the page



Visual Cortex
(Occipital region)

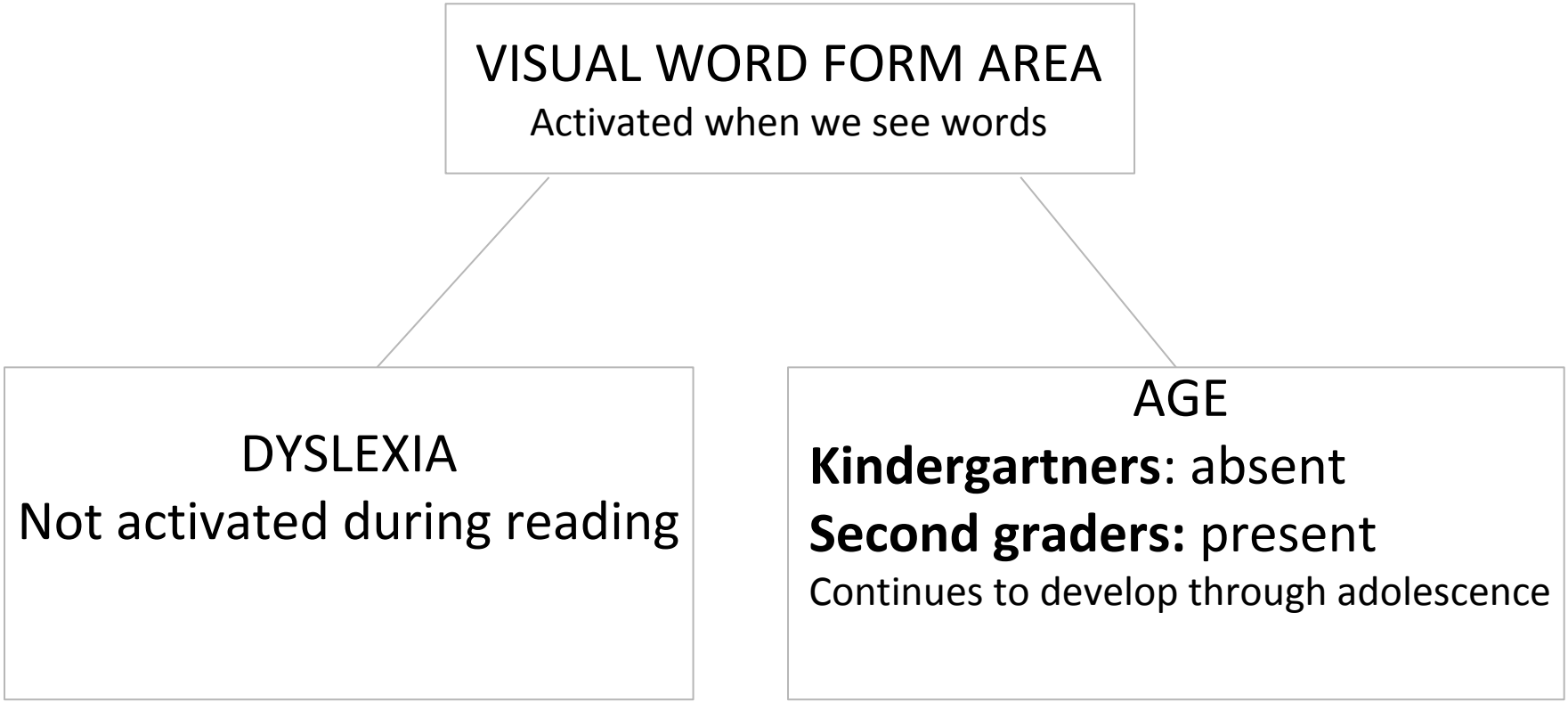
Step 1: LETTERS

Henry looked to the right. He looked to the left. He looked up and he looked down. Where had Frog gone? Henry did not like being alone in the forest. "Frog, where are you?" Henry called. "Please come back!"

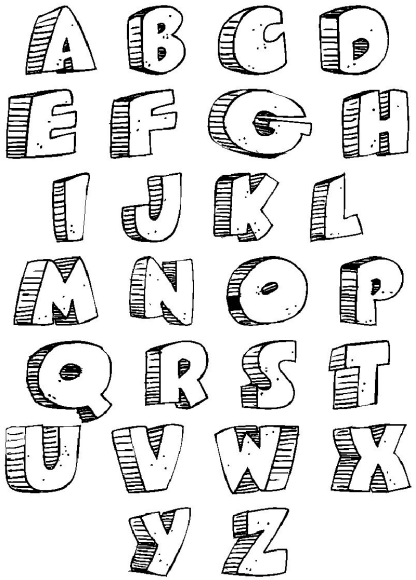


From a VISUAL INPUT → to LETTERS

Visual Word Form Area

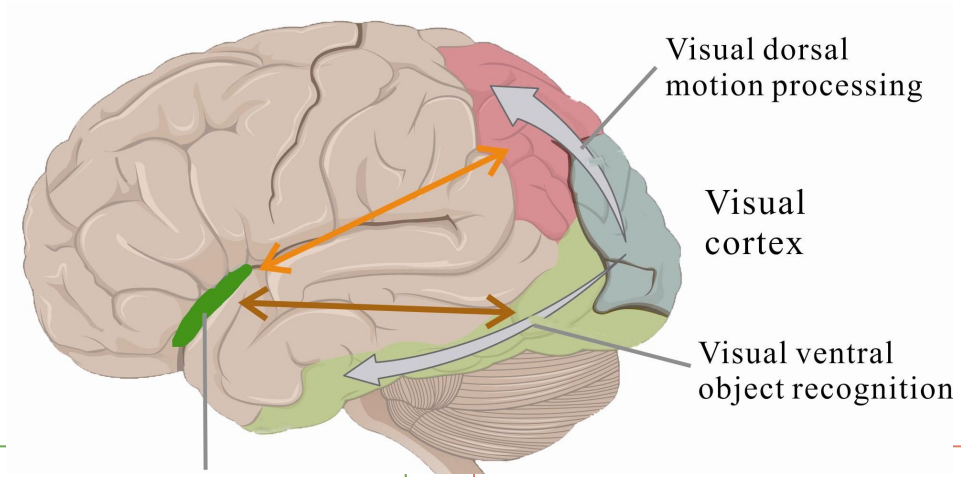


Step 2: WORDS



From LETTERS → to WORDS

Making meaning of the visual input



VENTRAL VISUAL PATHWAY

The "what" stream

Object recognition and form representation (colour, form, texture)

DORSAL VISUAL PATHWAY

The "where" stream

It controls eyes movements

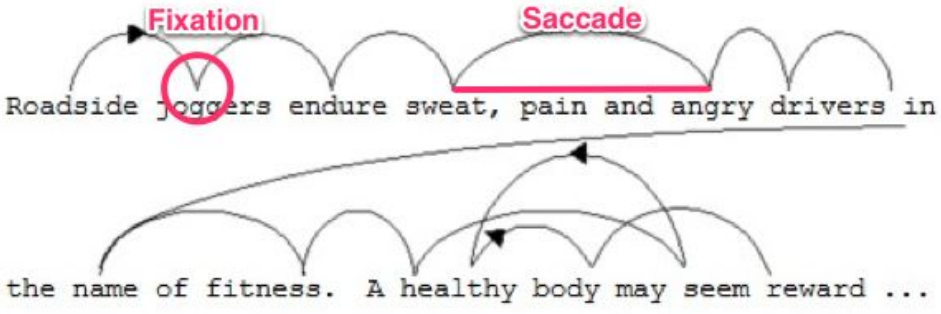
Making meaning of the visual input

DORSAL VISUAL PATHWAY

The "where" stream

It controls eyes movements

https://www.youtube.com/watch?v=oPA-LAAMuHE



Test: From Letters to Words

THE PAOMNNEHAL PWEOR OF THE HMUAN MNID. Aoccdrnig to a rscheearch at Cmabrigde Uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoatnt tihng is taht the frist and lsat ltteer be in the rghit pclae. The rset can be a taotl mses and you can sitll raed it wouthit porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe.

Test

Now, create a few of your own jumble sentences and trade with someone at a different table and see if you can decode the words!

First and Last Letters have to be in the right place

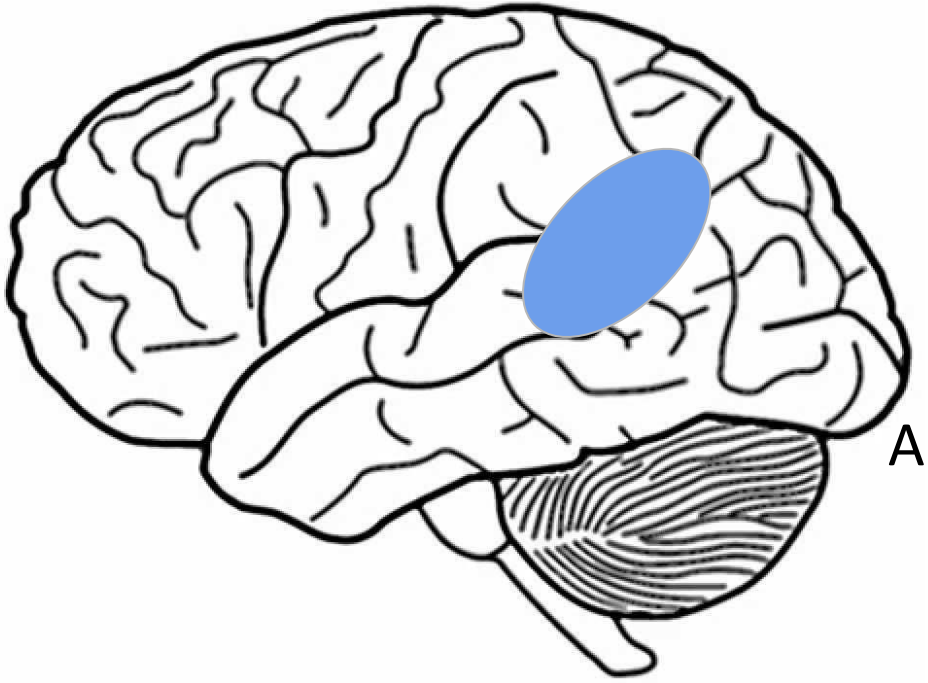
Students' Difficulties - Orthographic System

- Recognize words
- Identify and differentiate the letters

2. Phonological System

Auditory Processing of the Sounds

GOAL: Understanding the phonemes

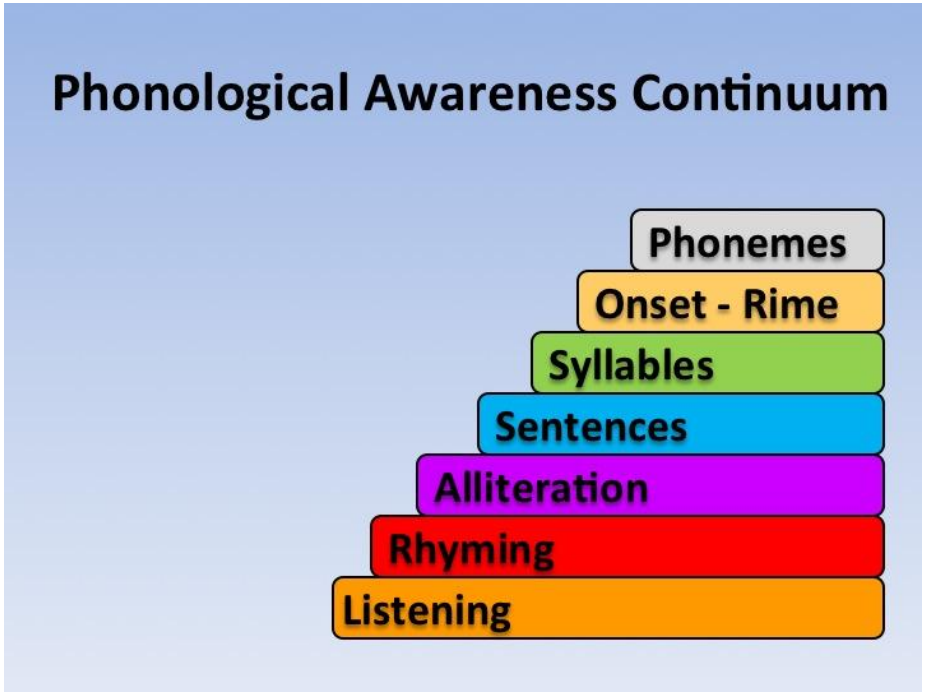


Angular Gyrus

Phonology involves the sound system of a language.

Pheonomes are the sounds of a language.

Phonological Awareness



Phonological Awareness

One of the language skills that is key to reading.

The understanding that spoken words come apart into smaller bits of sound, such as phonemes.

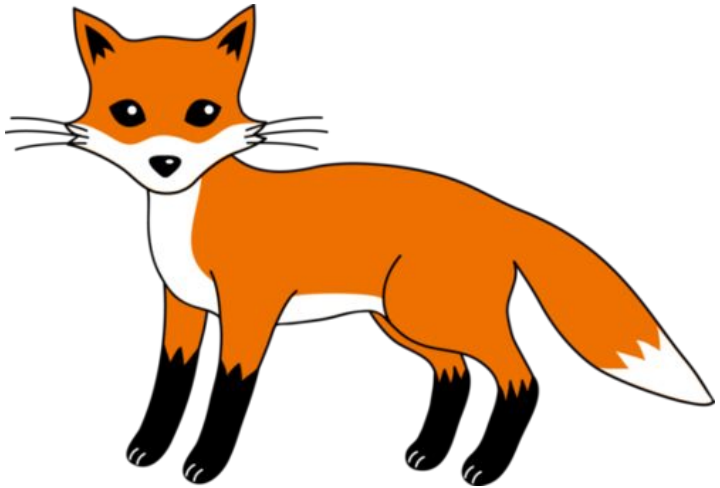
Phonological Awareness

The spoken word “fox” is composed of four phonemes:

/f/, /o/, /k/, /s/

https://youtu.be/BqhXUW_v-1s

Why are phonemes important?



Rhyming

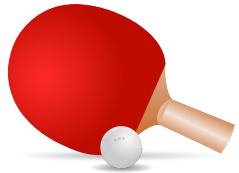
Phonological awareness occurs at multiple levels of sound analysis.

For example: rhymes!

Activities that emphasize the sound structure of language, such as rhyming games, reciting nursery rhymes or poetry, or **phoneme-deletion tasks** help to develop phonological awareness.

saying cat without the /k/

Play Rhyming Ping-Pong!



Speech appears to have specialized processing separate from the general auditory processing of other sounds, tones and noises.

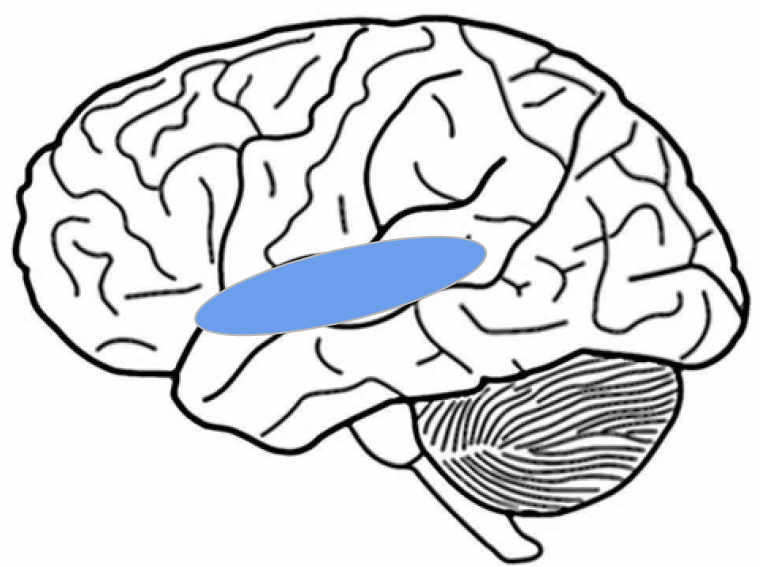
The region associated with speech processing is the superior temporal region. This region is sensitive to speech very early in development stages.

Unless a child is reading aloud, reading does not seem to be an auditory skill.

Superior Temporal Region

The superior temporal region is used in both spoken and written language processing.

Silent reading involves activation of the superior temporal region.



Building a Brain

Build a brain that reads.

Build specialized phonological systems.

In a study with literate and illiterate women, they were asked to repeat real and made-up words while the researchers recorded brain activations.

There were no brain activation differences for real-word repetition between the two, but a large network of activation during repetition of made up words seen only in the literate women.

Cont...

Learning to read develops phonological processing systems that change the way speech is analyzed and phonemes are remembered.

Learning to read affects all speech processing, as now whole word sounds are automatically broken up.

Language is never the same again.

Advantage:

An improvement in memory.

We are able to keep track of phoneme constituents and novel word sounds are remembered more accurately.

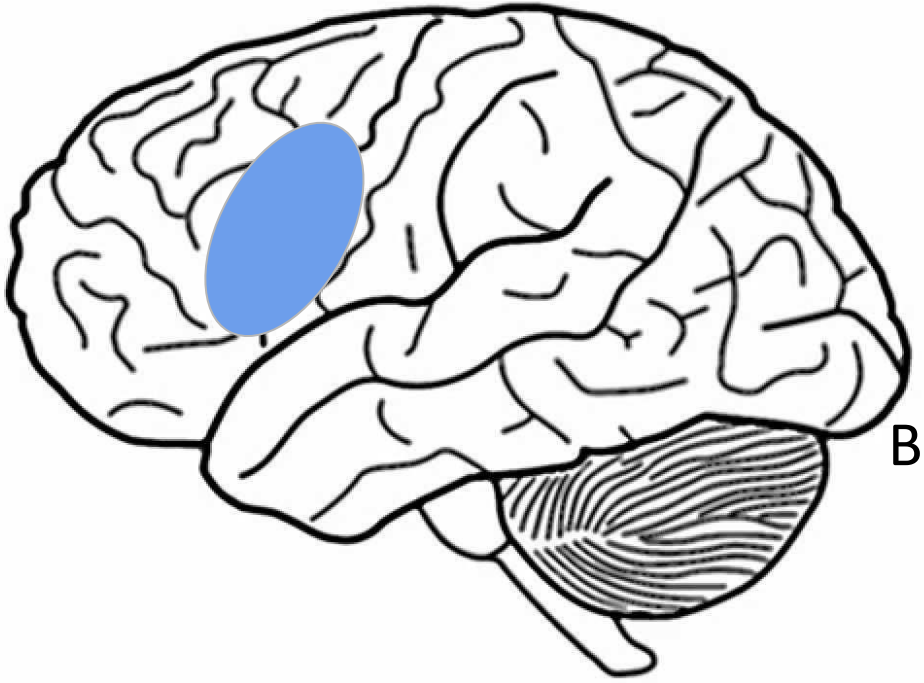
Students' Difficulties - Phonological System

- Recognize syllables
- Find rhyming words
- Spelling new words when hearing them
- See similarities between close words (whole and hole)

3. Connectivity Orthography + Phonology

Mapping Orthography to Phonology

GOAL: Decoding words



Broca's area

Decoding Words

1. Letter identification VISUAL/ORTHOGRAPHIC

Knowing the orthographic symbols or graphemes

2. Phonological awareness AUDITORY/PHONOLOGICAL

Knowing the sounds of the language or phonemes

3. Decoding words GRAPHEME-TO-PHONEME

Understanding the connection between the letters on the page and the sounds of spoken language

Test: G.B. Shaw - The made-up word

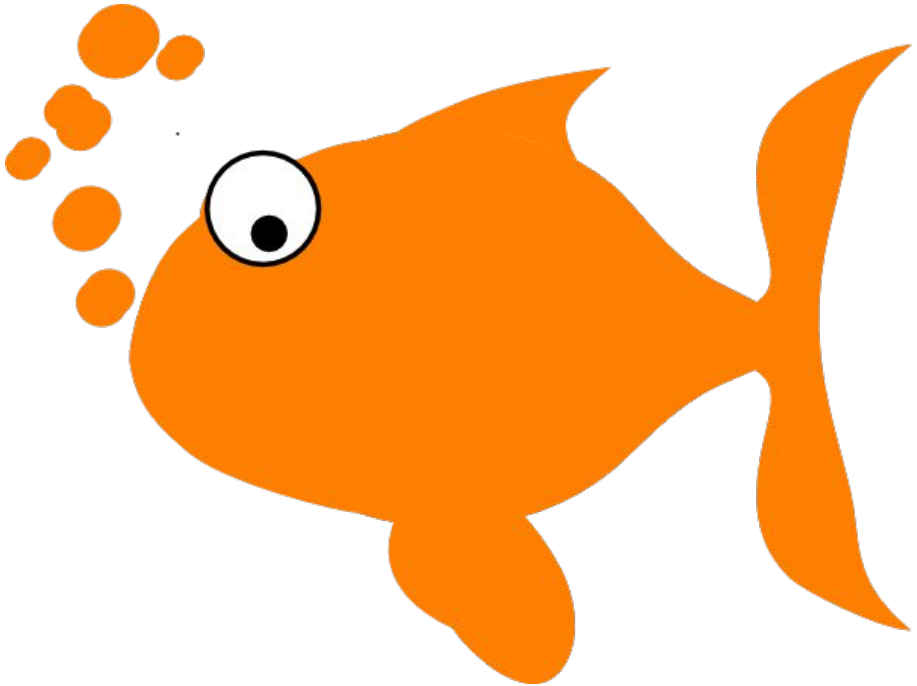
Specific difficulties to read ENGLISH

The mappings between letter and sound are not one to one.

The brain can not hold in memory all of the words in English.

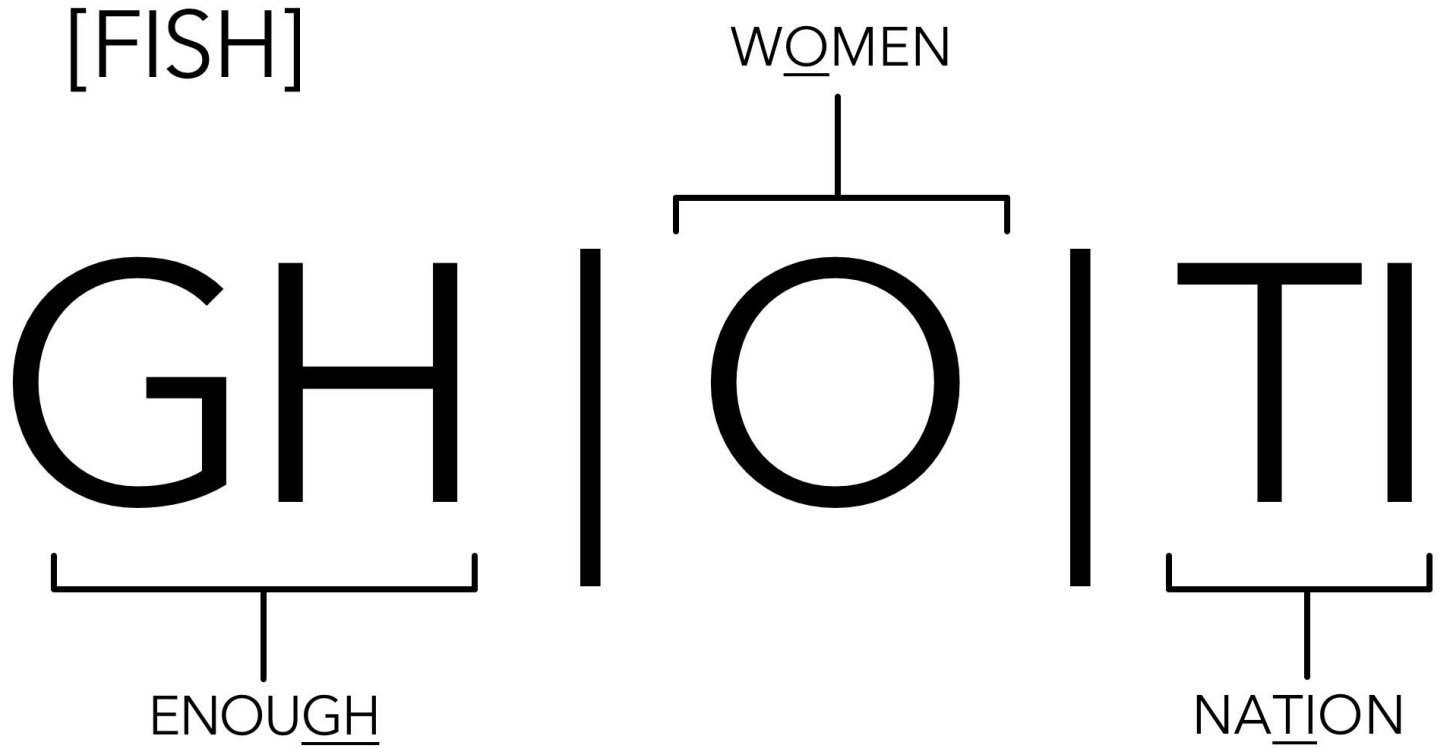
How do you pronounce this word?

Test: G.B. Shaw - The made-up word



GHOTI = FISH

Test: G.B. Shaw - The made-up word



Students' Difficulties - Connectivity

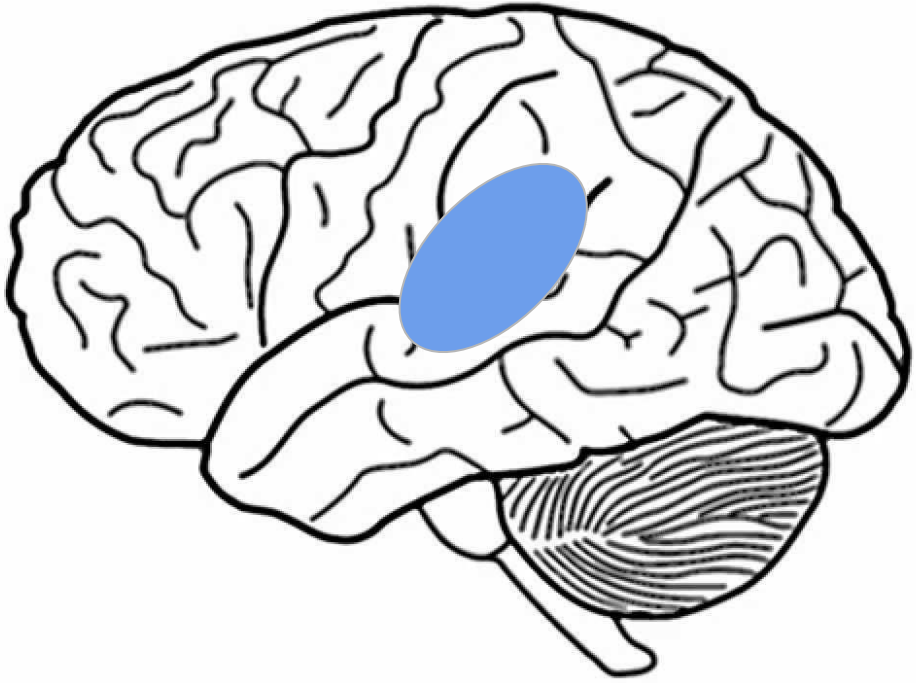
2 elements: The best predictor of reading achievement in early education

- Decode words
- Guess words based on their 1st letters
- Match letters and sounds

4. Semantic System

Semantics

GOAL: Understanding the meaning of words



Wernicke’s area

When do kids understand words?

Children begin to build knowledge about words and their meanings in their preschool years.
In their preschool years, teaching children vocabulary establishes a base on which to build on when the children enter school.

Children who are not spoken to extensively and are not exposed to a variety of words begin school with fewer words than their peers.

If the children do not have that foundational vocabulary, then are at risk for both reading and school failure.

The Lexicon

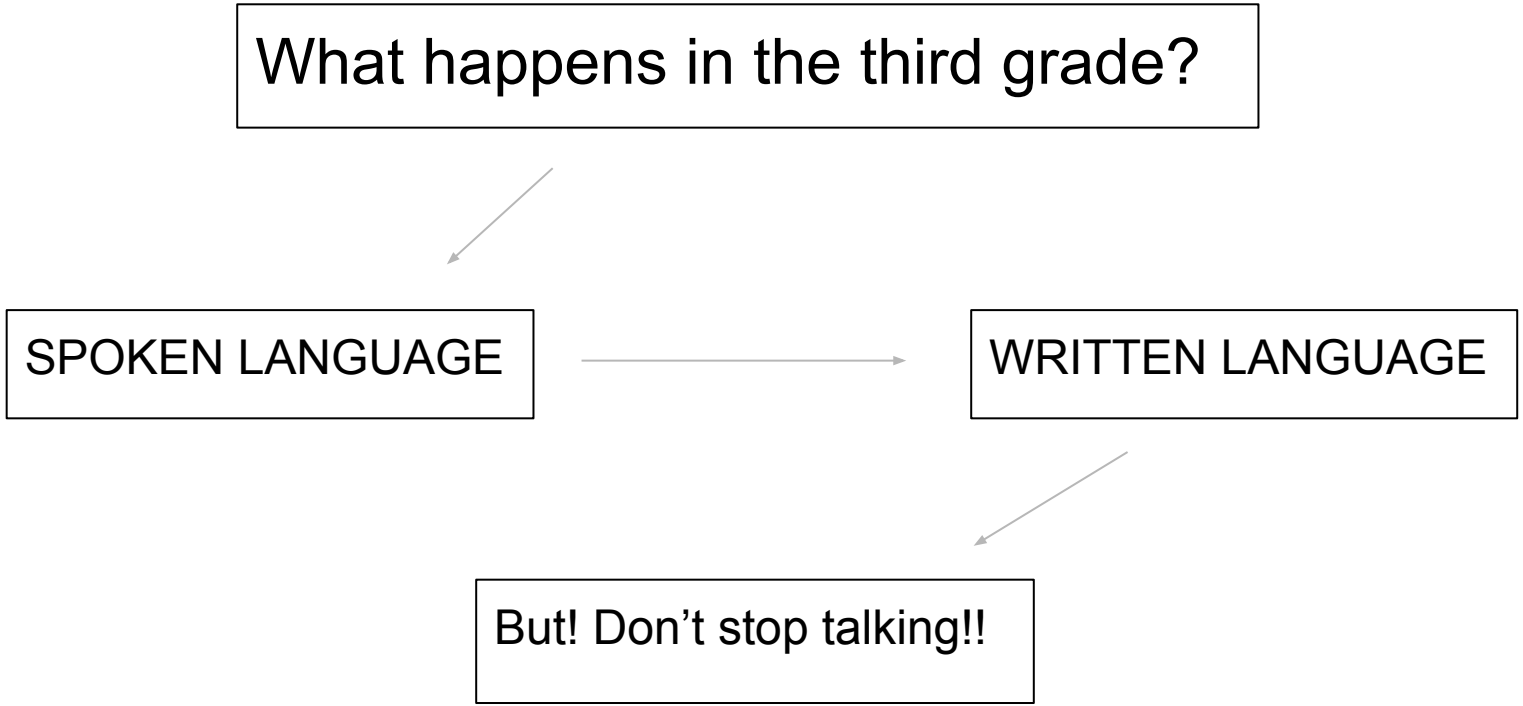
Allows children to make meaning when they begin reading.

For example, in decoding the word “dog,” a child might try and sound out the three phonemes.

Is there entry in the mental lexicon?

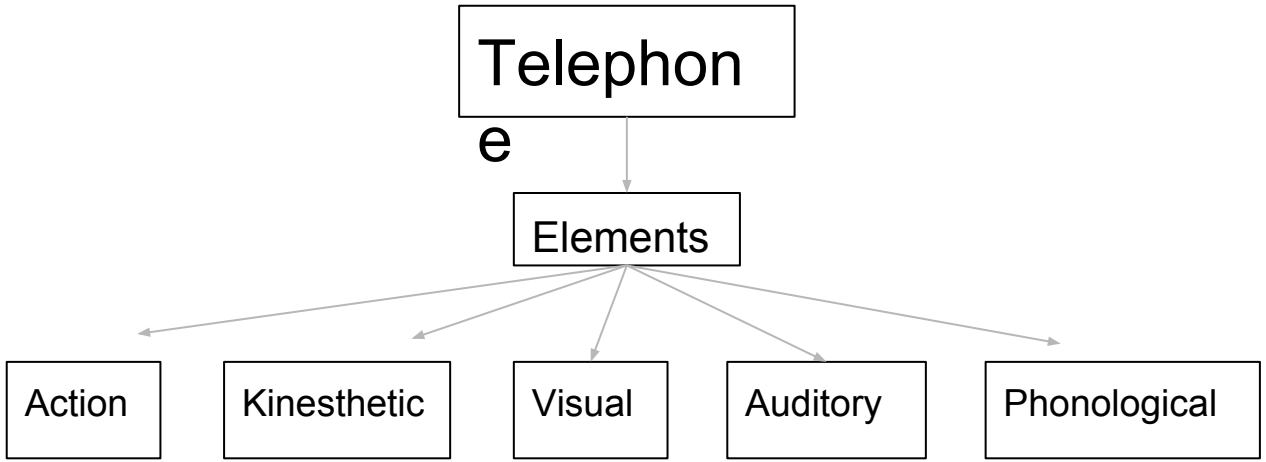
Decoder or Reader?

The Shift


What happens in the third grade?
SPOKEN LANGUAGE
WRITTEN LANGUAGE
But! Don’t stop talking!!

How is Lexical Information Stored in the Brain?

Semantic information is distributed throughout the brain.



Vocabulary Instruction

Multisensory approaches and deep knowledge of words well beyond dictionary definitions.

Give students the opportunity to experience the words, not just knowing their definitions.

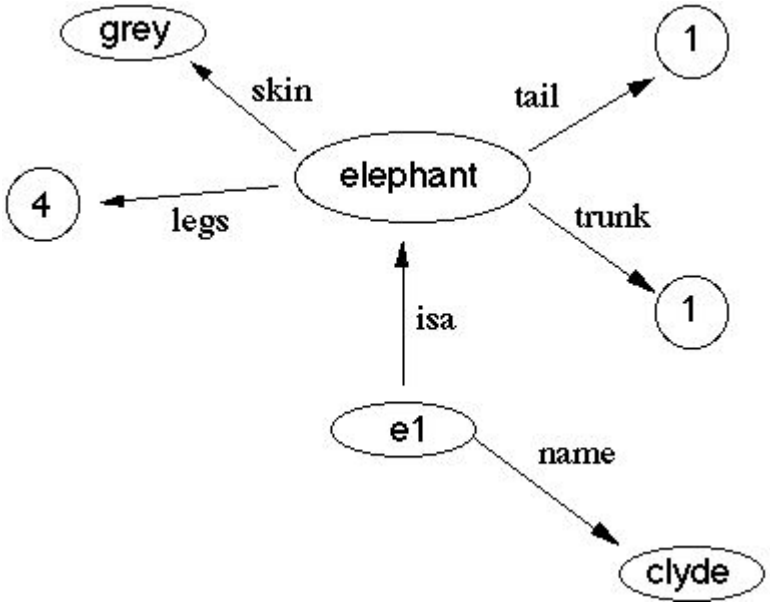
Establish a connection.

Semantic Networks

Vocabulary knowledge appears to be organized into semantic networks.

Words conceptually related to one another are linked.

Schema



Semantic Networks Cont..

Vocabulary and conceptual knowledge are also organized within our semantic networks.

Predictable texts and the repetitive experiences help build other networks.

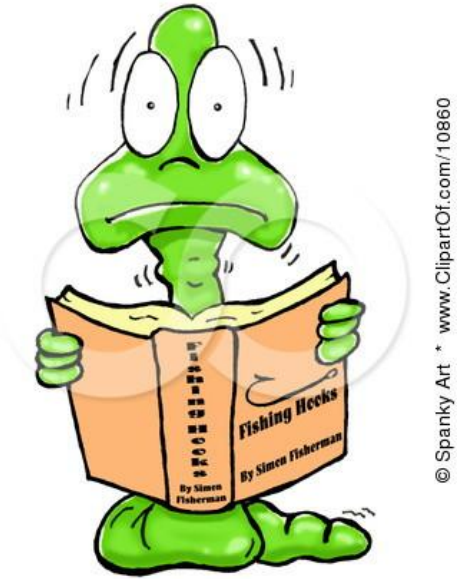
“When Mary arrived at the restaurant……”

Activity

Can you think of other words besides restaurant where you use your semantic networks to predict the rest of the context?

They may be different for every person, as personal experiences may be reflected upon your responses.

Poor Readers



Poor readers tend to depend heavily on context to figure out the meaning of unknown words.

Building a brain that reads involves building an efficient, elaborated semantic system in the service of reading.

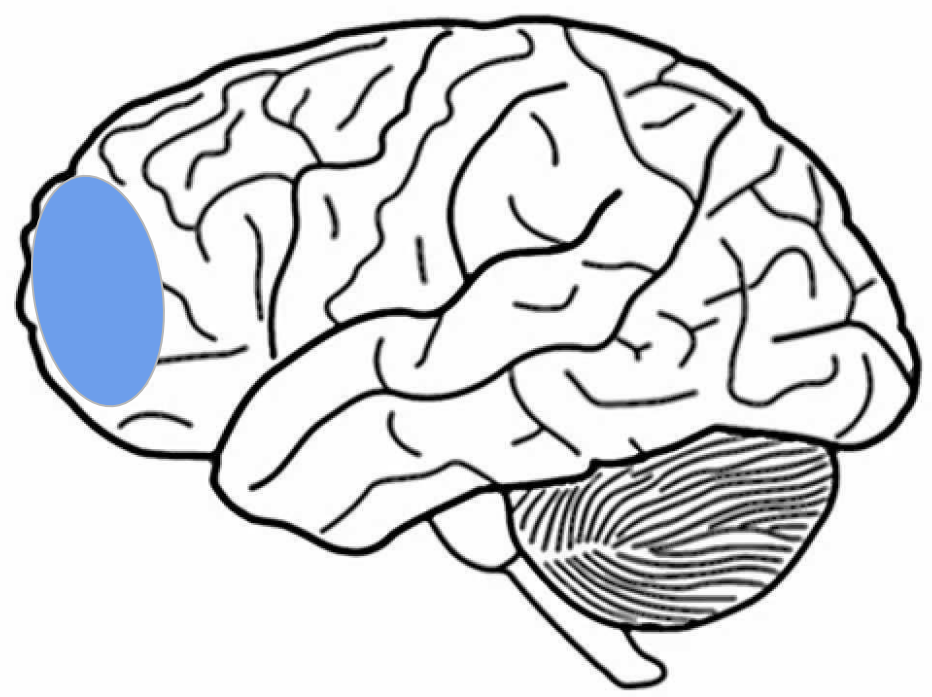
Students' Difficulties - Semantic System

- Poor Vocabulary
- Wrong use of frequent words
- Find the proper word to illustrate something
- Contextualize the words
- Not having a great semantic network

5. Comprehension

Comprehension

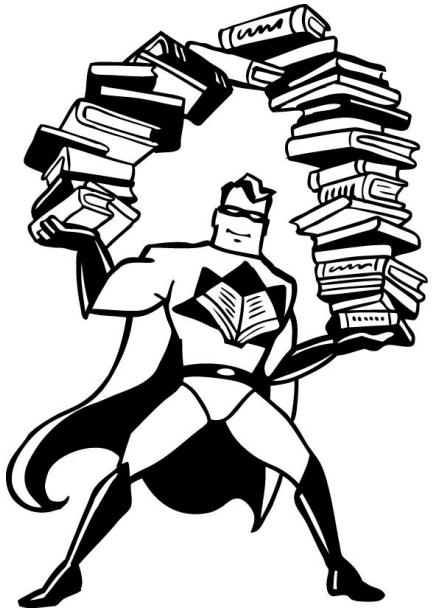
GOAL: Understanding the meaning of the text



Medial ventral orbitofrontal cortex

Reading with Comprehension:
A rewarding experience

FINAL STEP
The effective interaction between the TEXT and the READER



BE A HERO
READ!

An Interactive Discussion

- Challenging our ideas
- Comprehension
- Awareness, eye-opener

- Thoughts
- Discussions
- ...

- Challenging the text
- Desire to learn more

Students' Difficulties - Comprehension

- Reading Comprehension
- Contextualizing the text

Students' Difficulties - Consequences

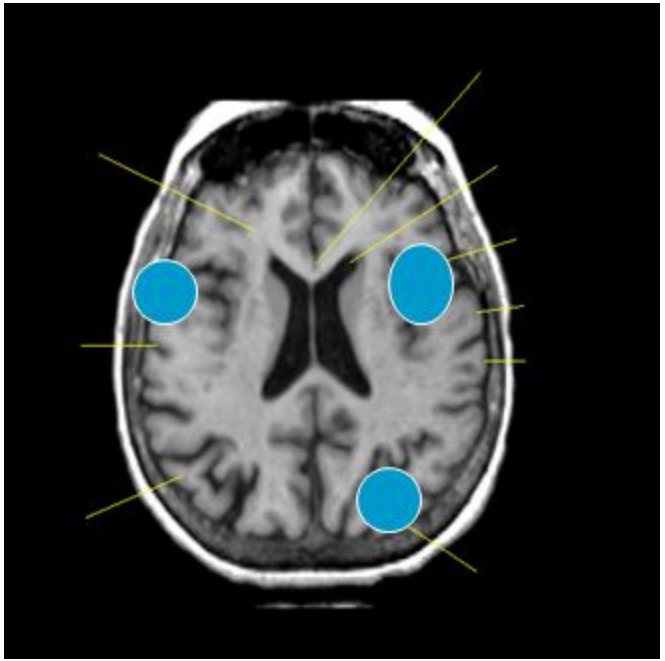
- Writing: Reading to Write (1st step)
- Speaking
- Grammar
- …

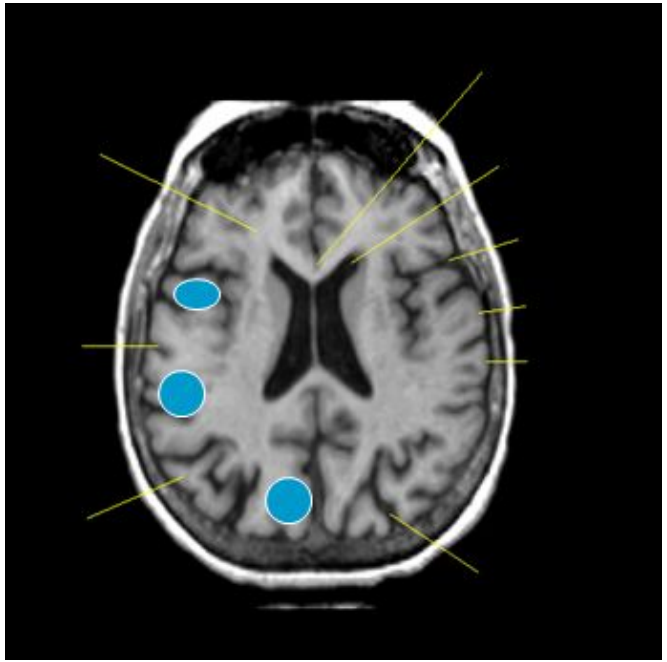
- Anxiety: Reading aloud is a nightmare!
- No pleasure to read

TEACHING STRATEGIES

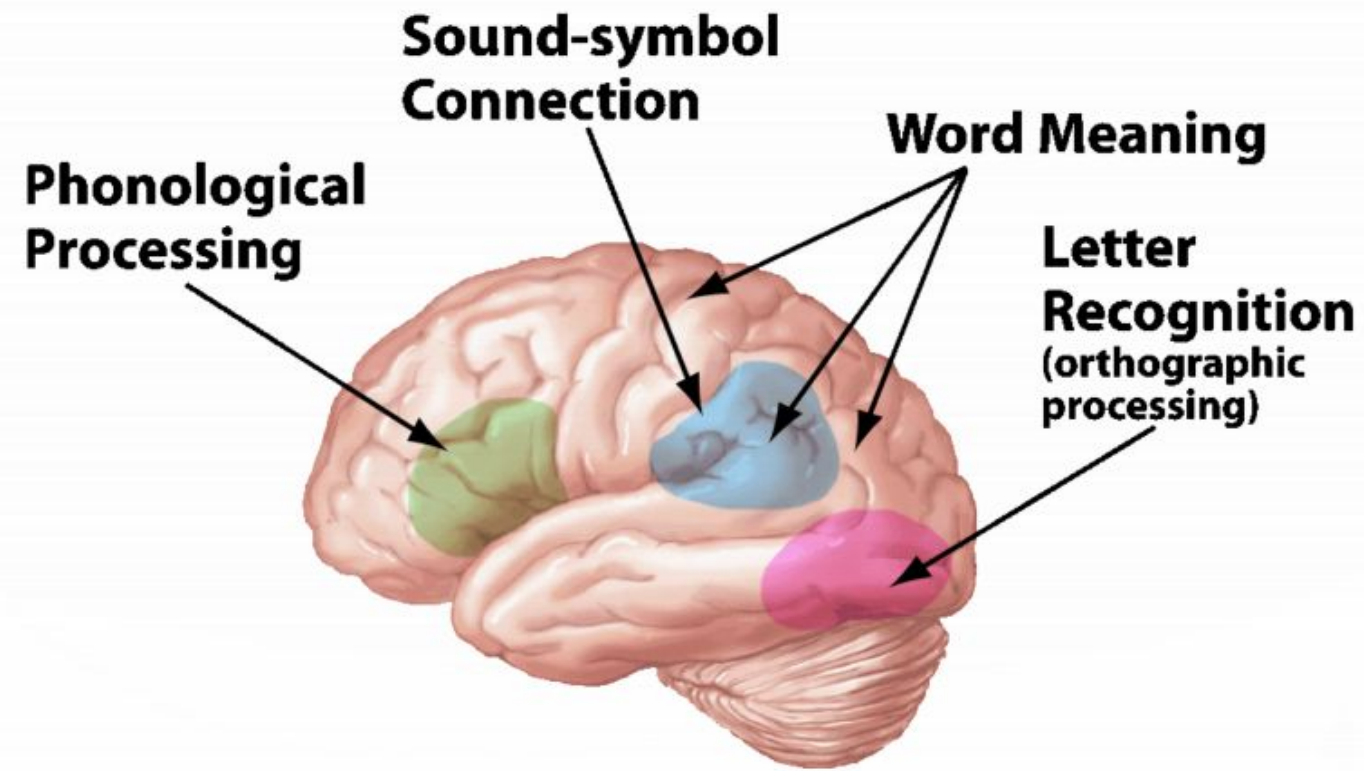
Strong Readers / Struggling Readers

Who is the Struggling Reader? the Strong Reader?

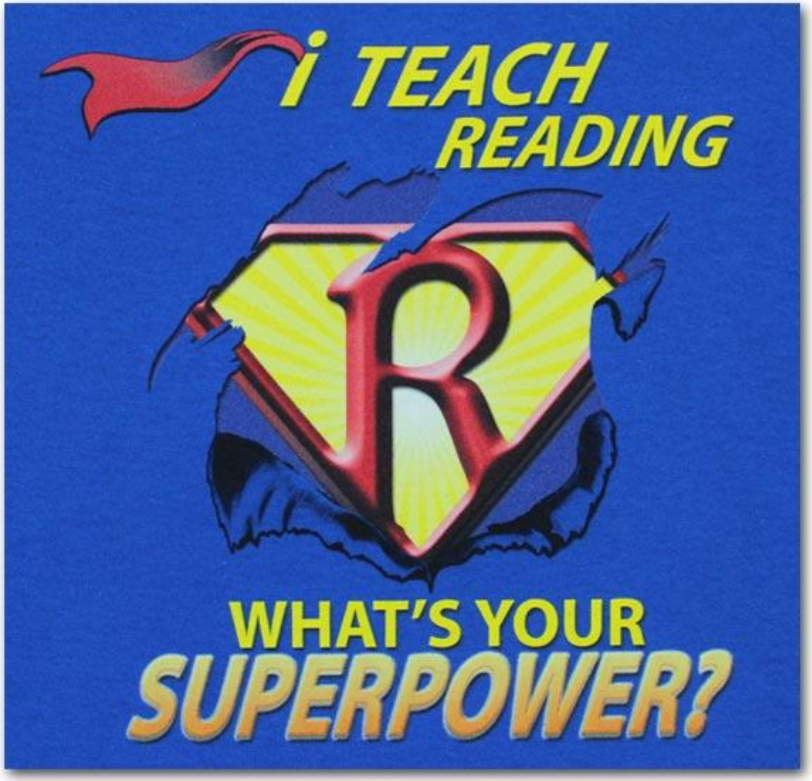




The “Reading Brain”



Teaching Reading: A huge challenge

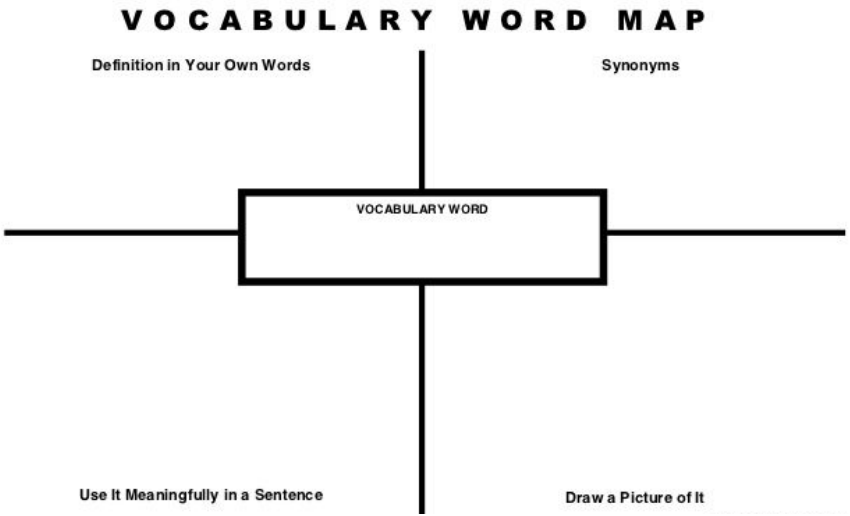


"Why is it that the hardest thing children are ever asked to do is the first thing they're asked to do!?"

Merryl Pischa, Reading Specialist

1. Developing Vocabulary

"When one realizes that children have to learn about 88,700 written words during their school years and that at least 9,000 of these words need to be learned by the end of grade 3, the huge importance of a child's development of vocabulary becomes crystal-clear."
***Proust and the Squid*, Maryanne Wolf, p. 123**



2. Using Images to Build Schemata

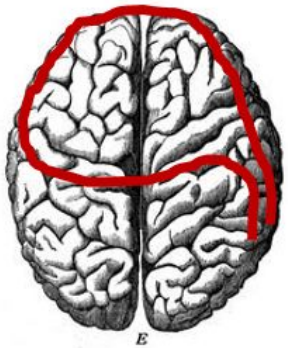
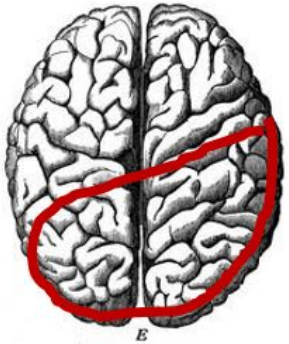


Image-Loaded Words



Verbal (Abstract) Words

3. Monitoring the comprehension

Understanding ideas

Guided reading

Asking questions

Paraphrasing

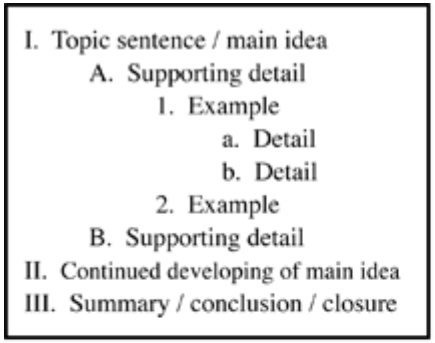
Predicting

Organizing ideas

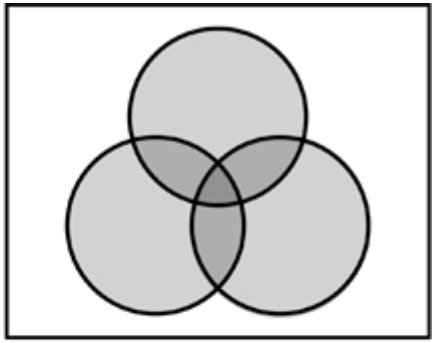
Summarizing

Recognizing story structure

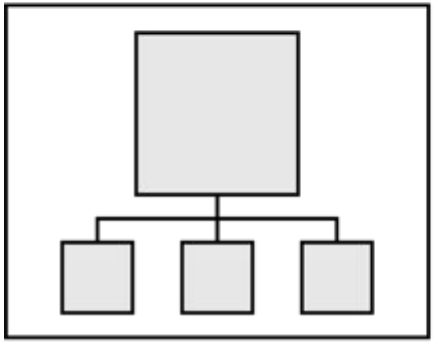
Differentiating main and secondary ideas



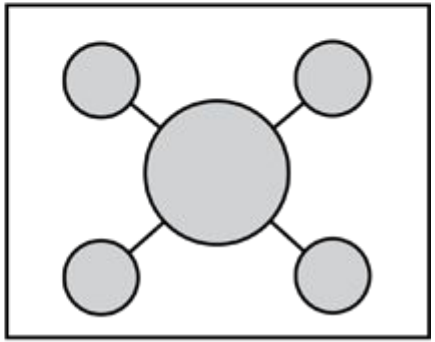
Basic outline



Venn diagram

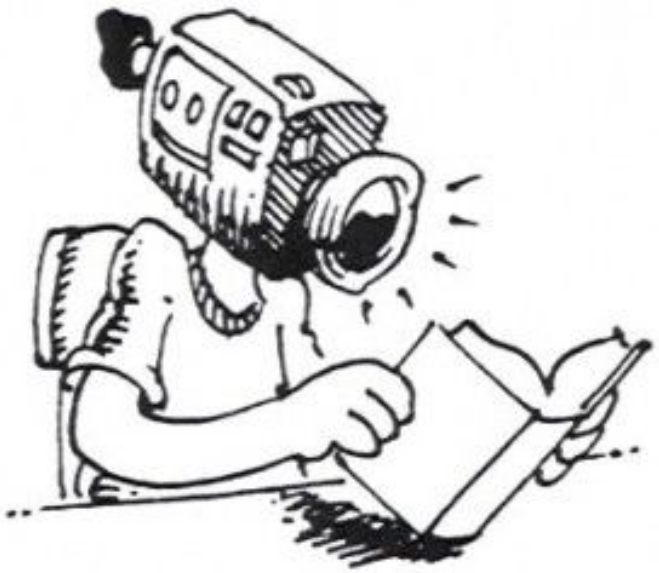


Hierarchical topical organizer



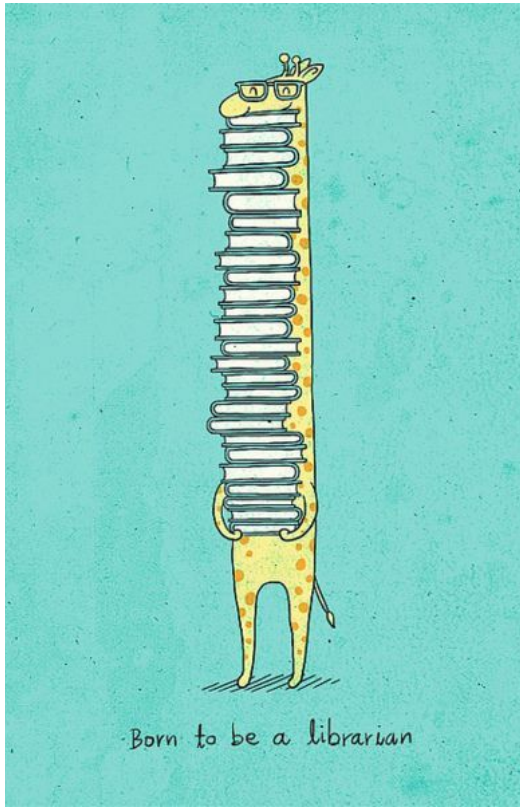
Bubble topical organizer

4. Mental Imagery



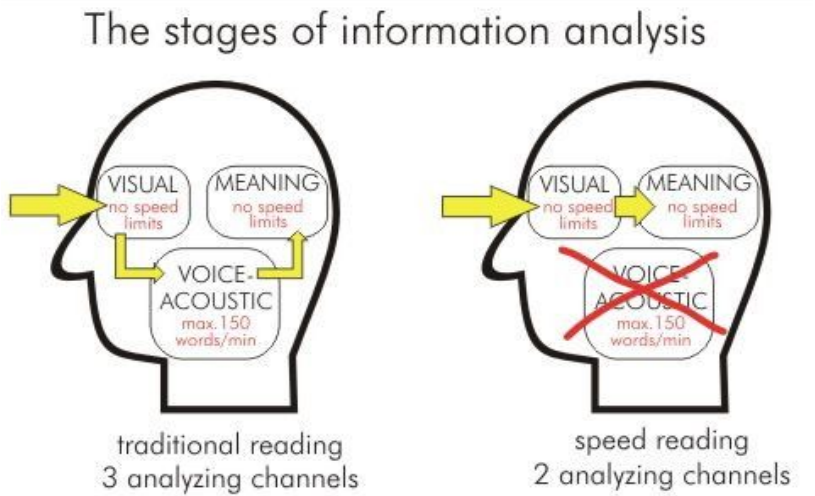
- DRAWING
- MUSIC
- ROLE PLAY
- .....

5. Reading to Read Better



The more we read, the more our “Reading Brain” is efficient!

6. Enrichment



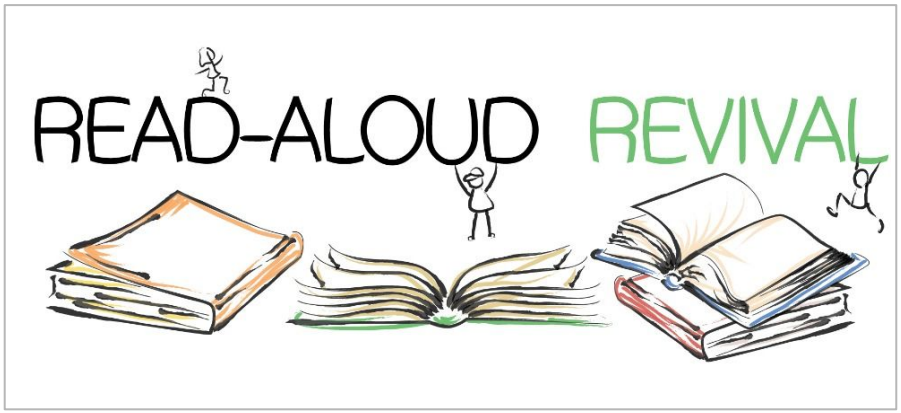
- Improved Memory
- Better Focus
- Improved Logic

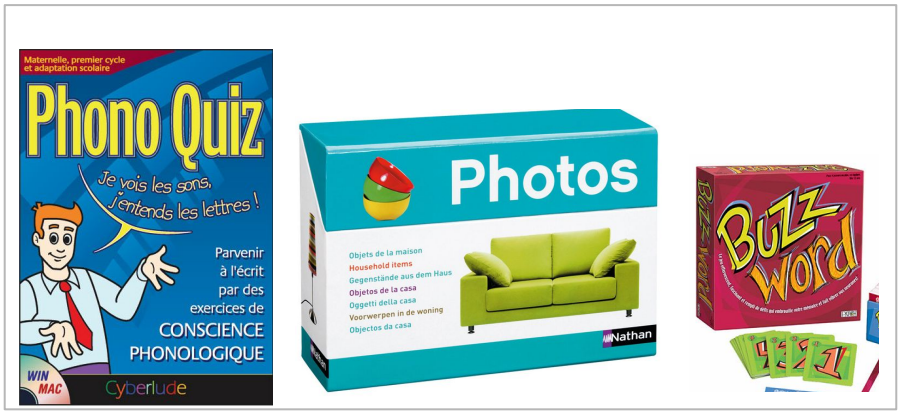
http://www.spreeder.com/
(Average: 200 wpm)

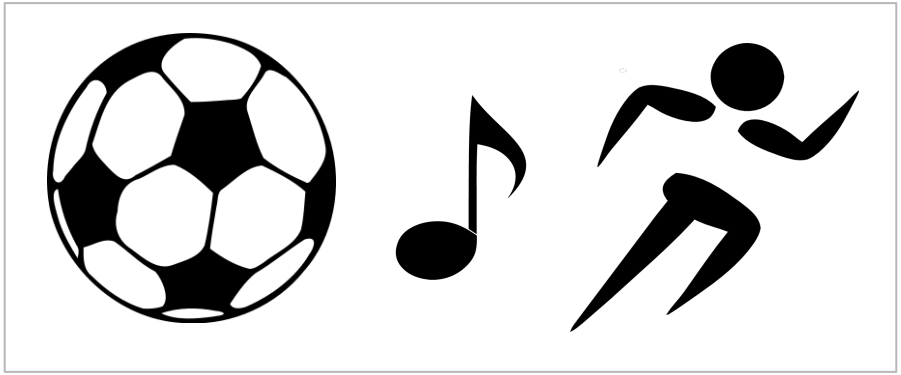
SILENT READING

SPEED READING

7. Making the Meeting Possible







References

Videos

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Articles

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Books

How the brain learns to read, D. Sousa

Wiring the brain for reading : brain-based strategies for teaching literacy, M.Sprenger

Build the brain for reading, grades 4-12, P.Nevills

Reading in the brain : the science and evolution of a human invention, S. Dehaene

Proust and the Squid, M. Wolf