The Reading Brain

What Every Educator Needs to Know

Participants Will:

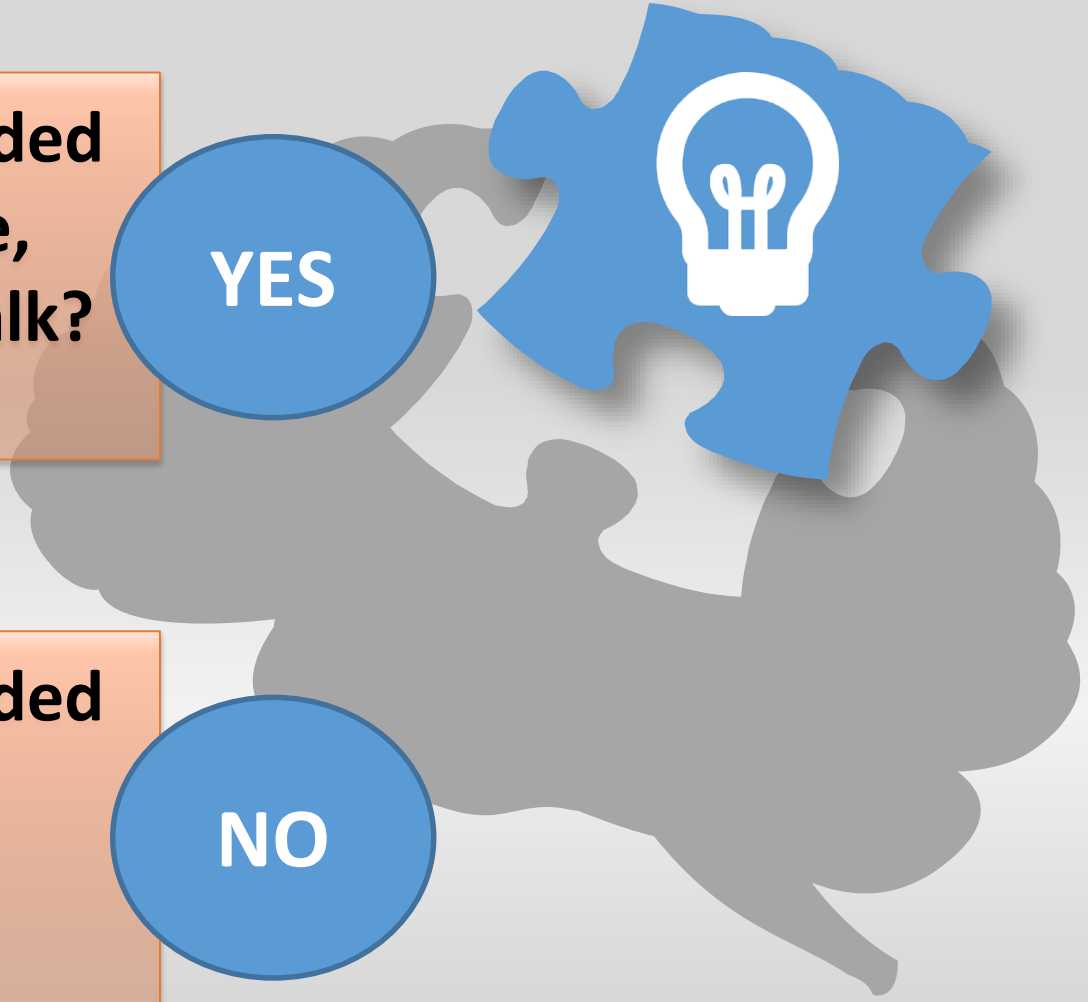
- **Examine** the reading process within the brain
- **Discover** the role of the phonology, orthography, and meaning in the reading brain.
- **Categorize and apply** the practices involved in the 4 Processing Systems for reading.
- **Debunk** reading myths using neuroscience

If a child is surrounded by spoken language, will they learn to talk?

YES

If a child is surrounded by books, will they learn to read?

NO



The Reading Brain

The brain is not wired to read naturally. We need to train it to learn to read. That makes us… neurosurgeons!

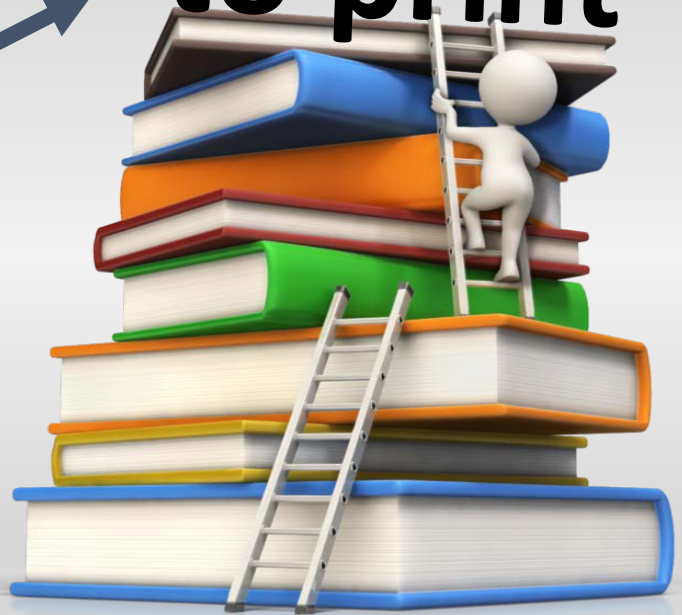
Reading is **not a natural task**, and children are not **biologically prepared to it by evolution** (unlike spoken language acquisition). Thus, teachers must be aware that many of the **reading steps** that they take for granted, because they are expert readers and have a fully automated and non-conscious reading system, **are not at all obvious for young children**. Massive changes are needed, **at the phonological and at the visual level**, before children master **the skill of reading**.

- Dehaene, 2011

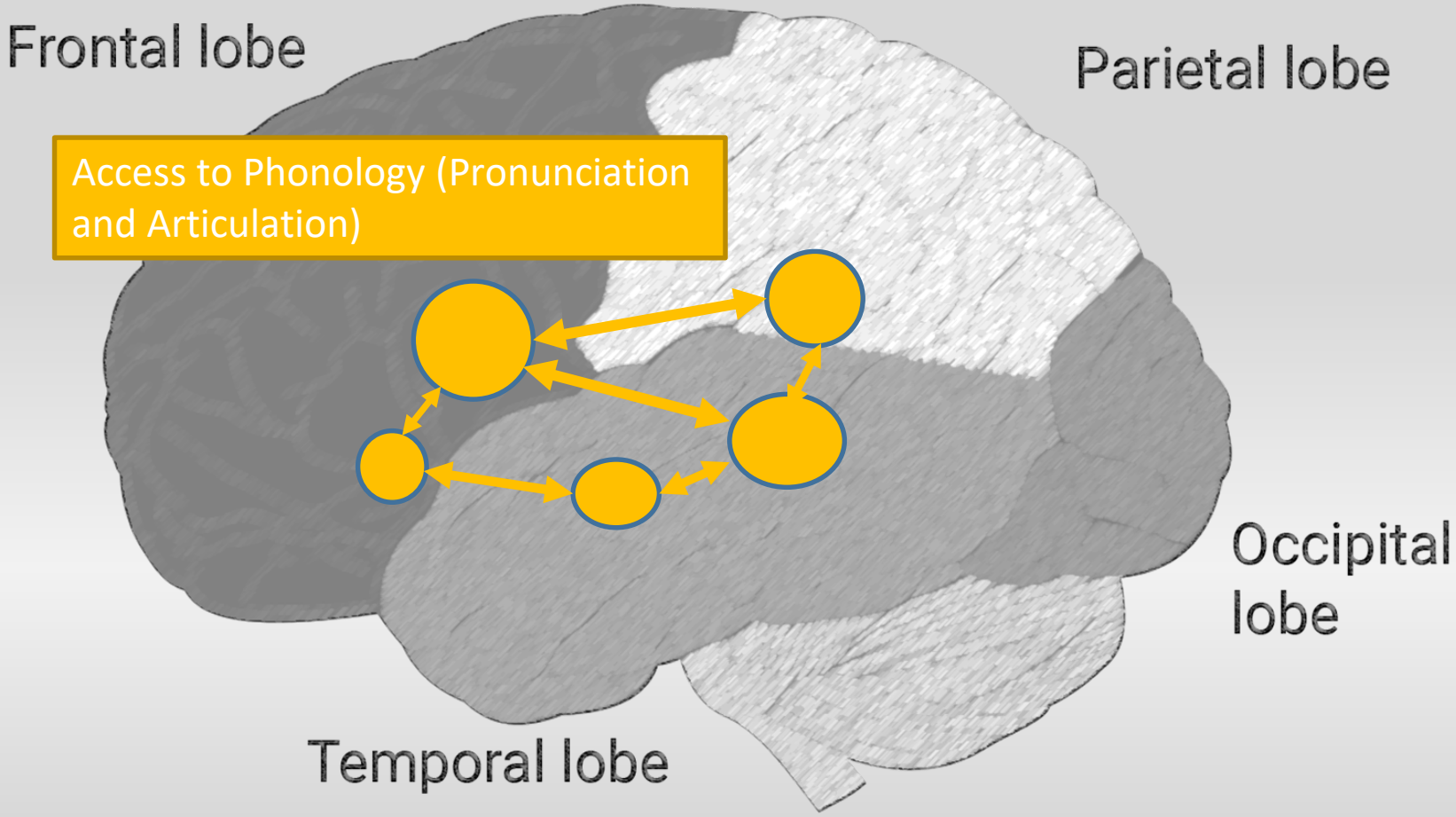
Students learn to read

from speech

to print



The Reading Brain Sounds and Meaning



https://www.youtube.com/watch?v=GzvMyzici6U

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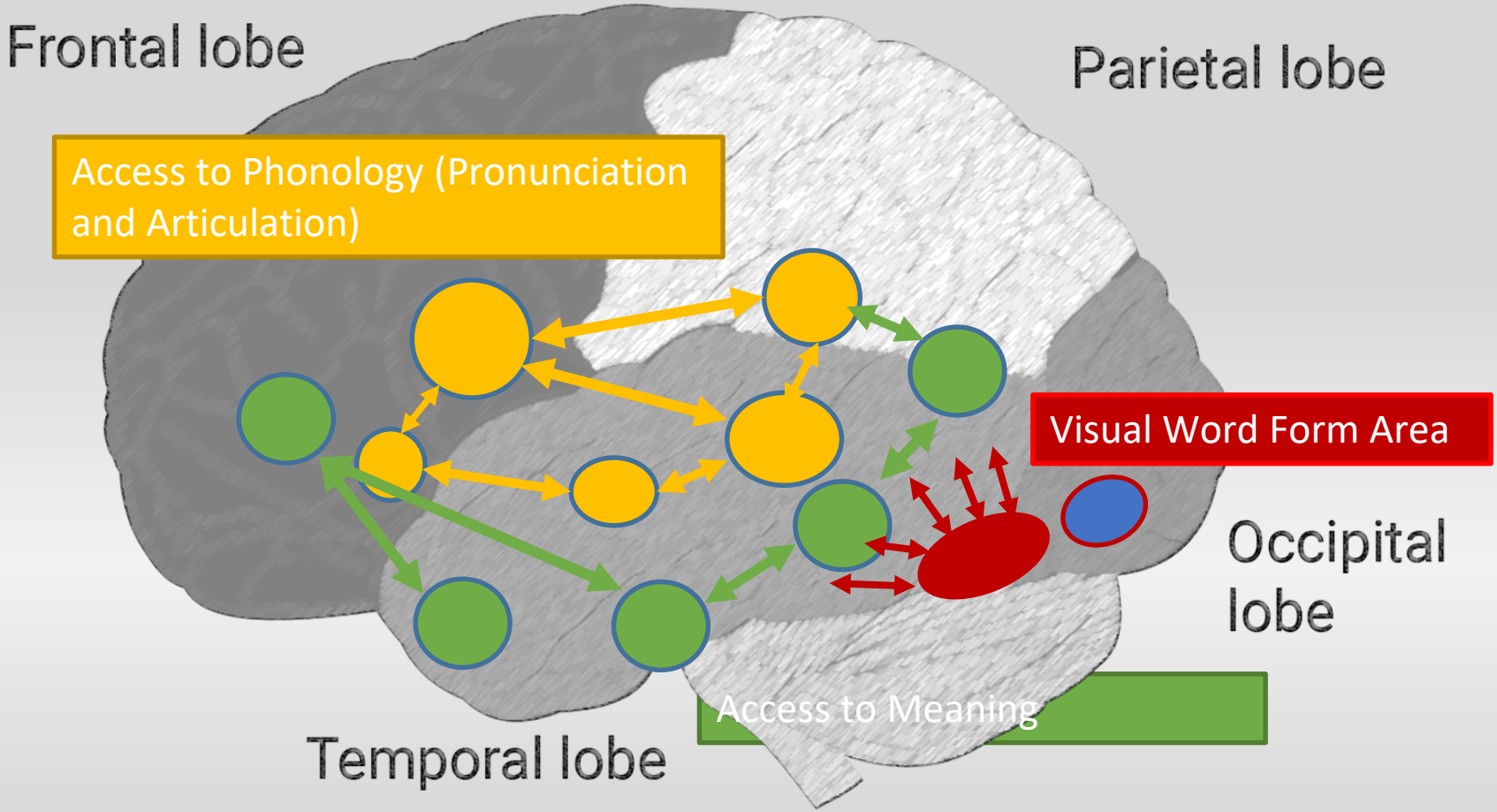

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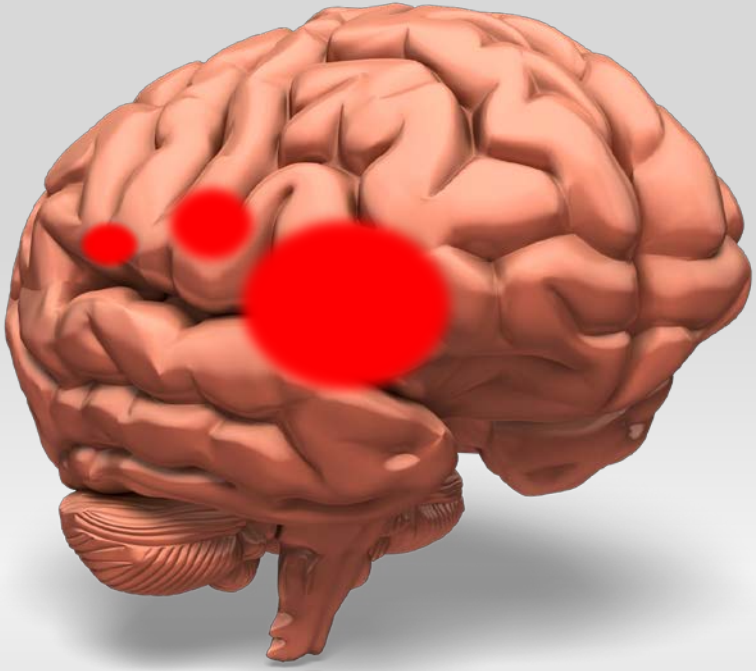
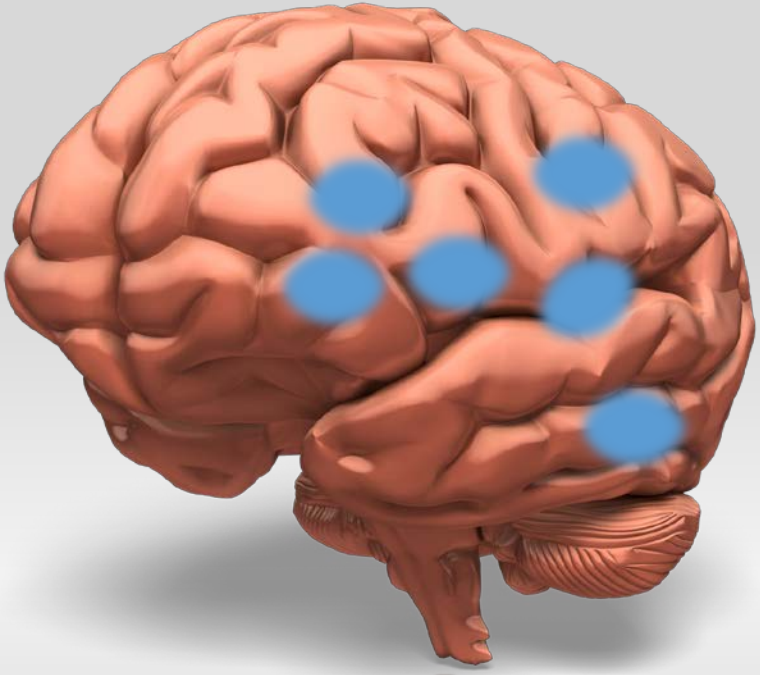
Struggling Reader



Strong Reader



Rocket Science & Neuroscience

Students are not born with the capacity for reading.

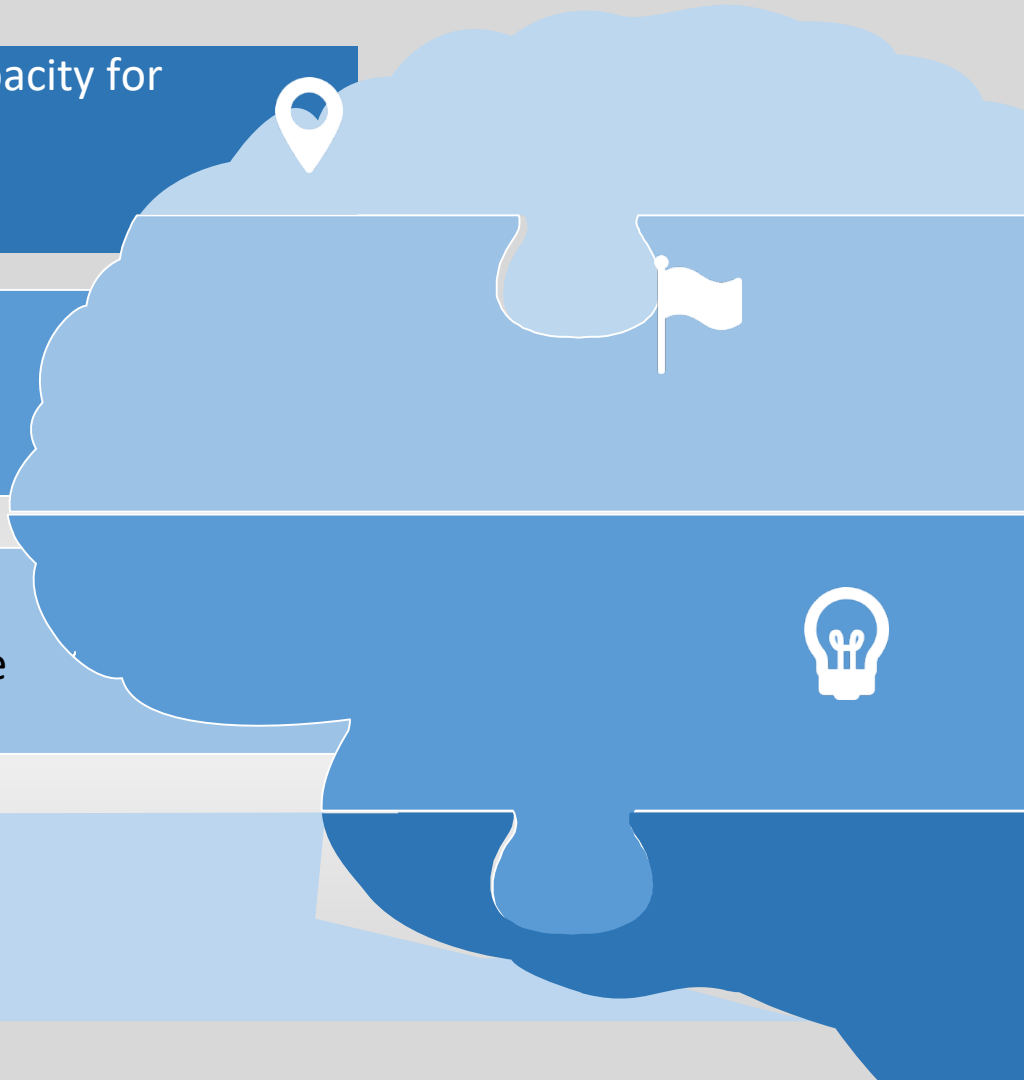
We have to train the brain to read.

Teaching reading is rocket science!

Reflection and introspection are insufficient. We need to KNOW the brain.

Fads have misled us.

Student failure is unnecessary!



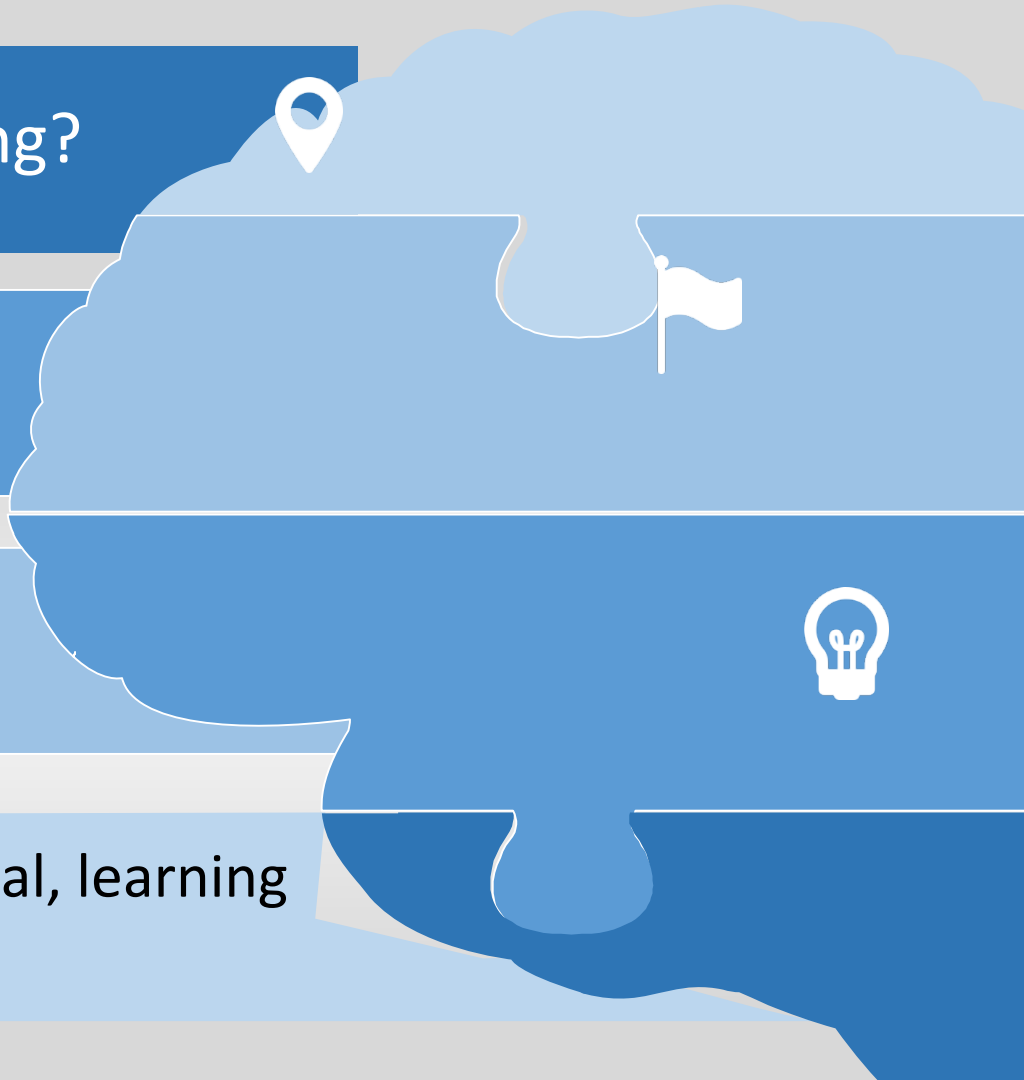
The Brain Puzzle – Stanislaus Dahaene https://www.youtube.com/watch?v=wlYZBi_07vk

What is Neuro-recycling?

Education CHANGES the brain.

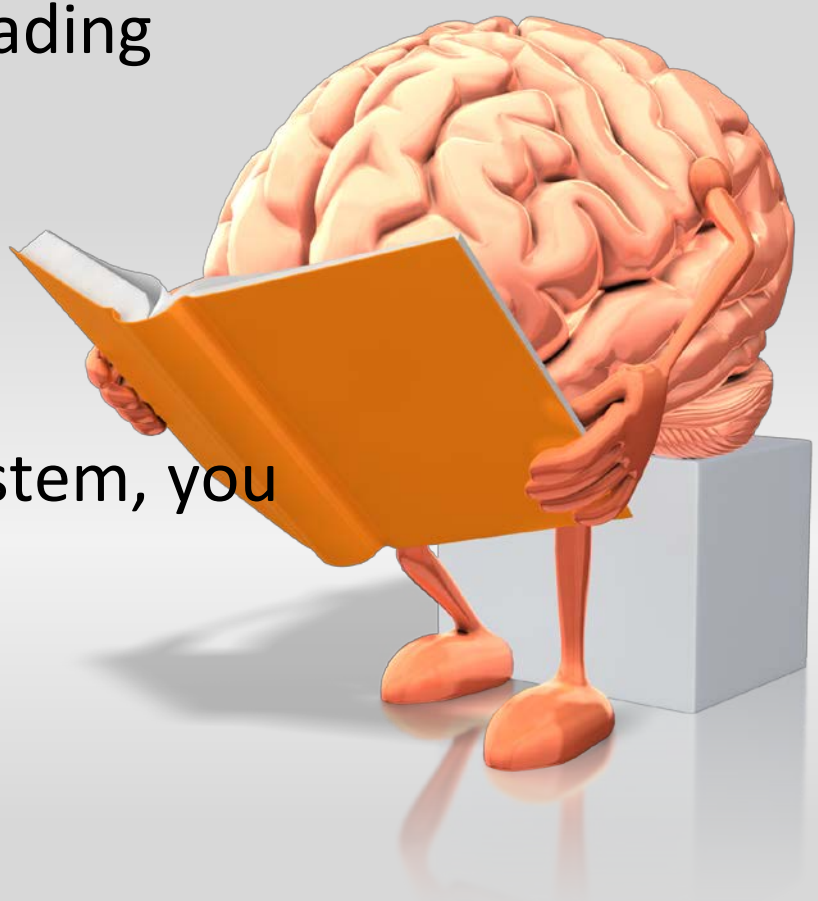
Teachers need to know how the brain works in children to teach reading effectively.

Learning to speak is natural, learning to read is not.

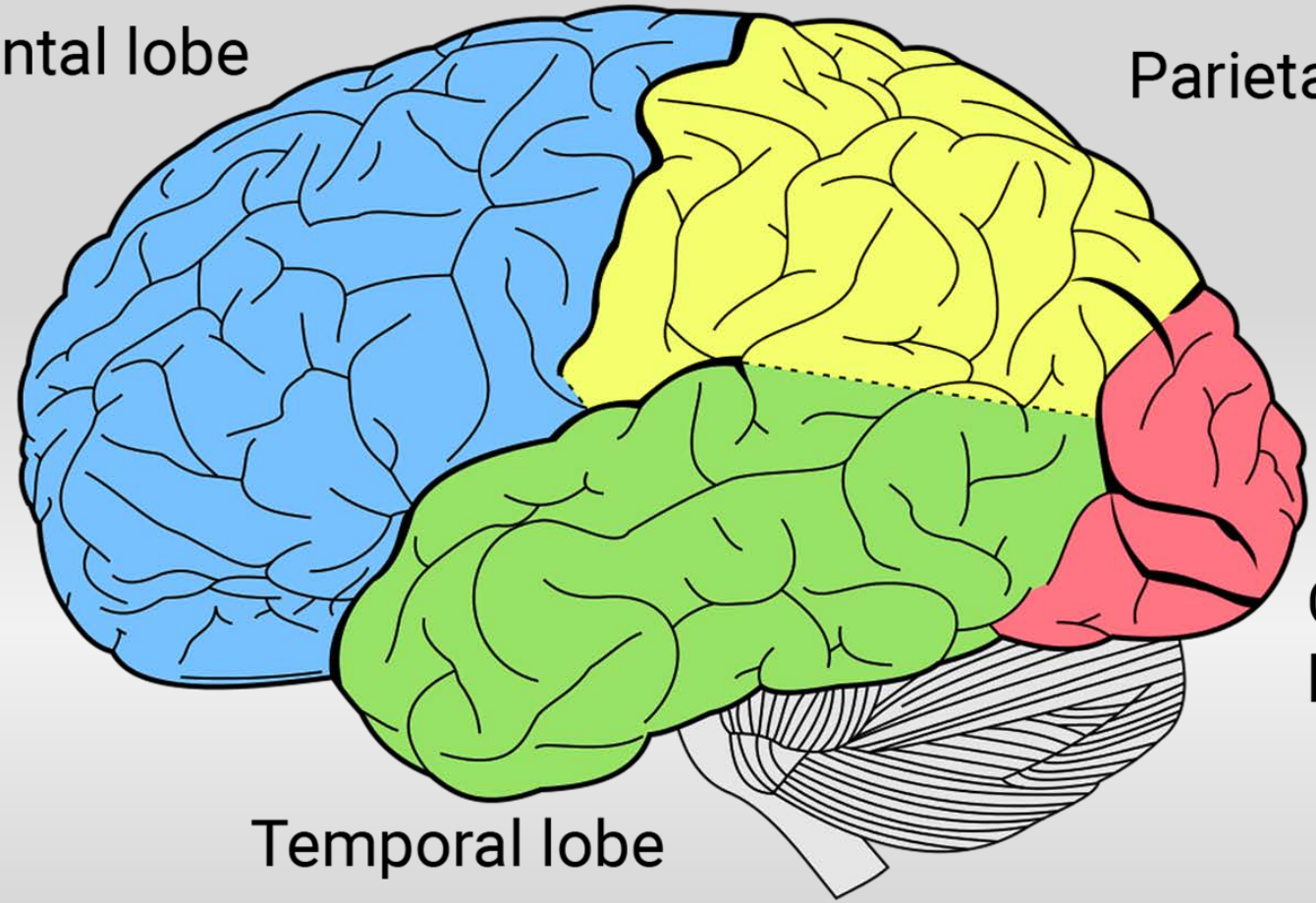


… because the brain is not evolved for reading, I am arguing that reading evolved for the brain.
-Stanislaus, Dehaene, 2016

If you want to change the system, you have to know how it works.
-Stanislaus, Dehaene, 2012



The Reading 4 Regions



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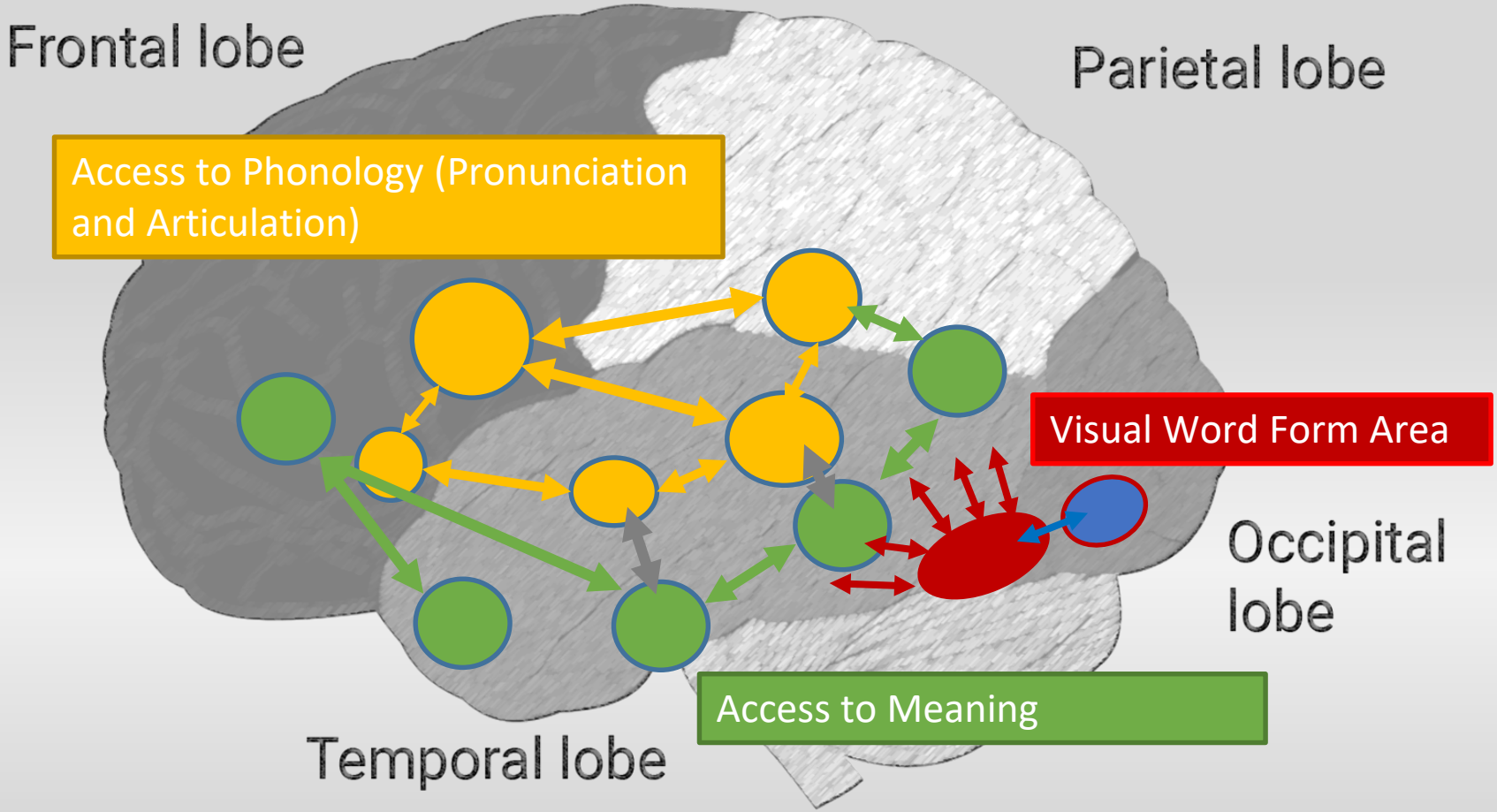
The Reading Brain Sounds and Meaning



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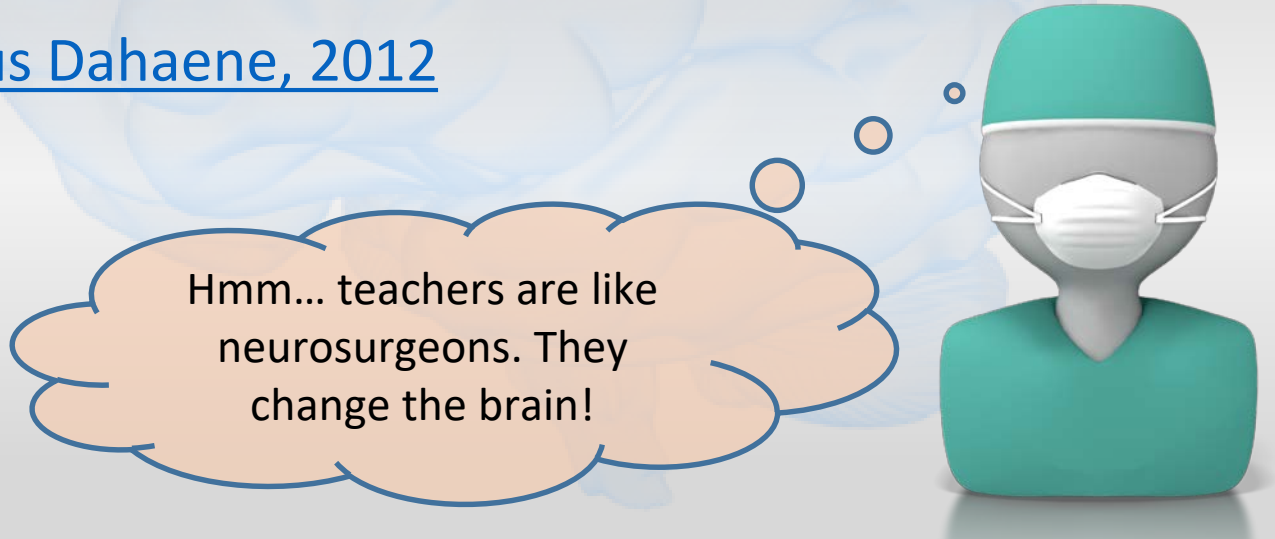
- We when read, we recognize the letters, combining them into graphemes.
- We connect these to **speech sounds to decode the word.**
- We connect to **meaning processors** to recognize the words.
- The areas for **speech sounds** and **meaning** already exist for spoken language.
- We use the **same parts of the brain** for **spoken language and written language** when it comes to speech and meaning.

- Stanislaus Dahaene, 2012

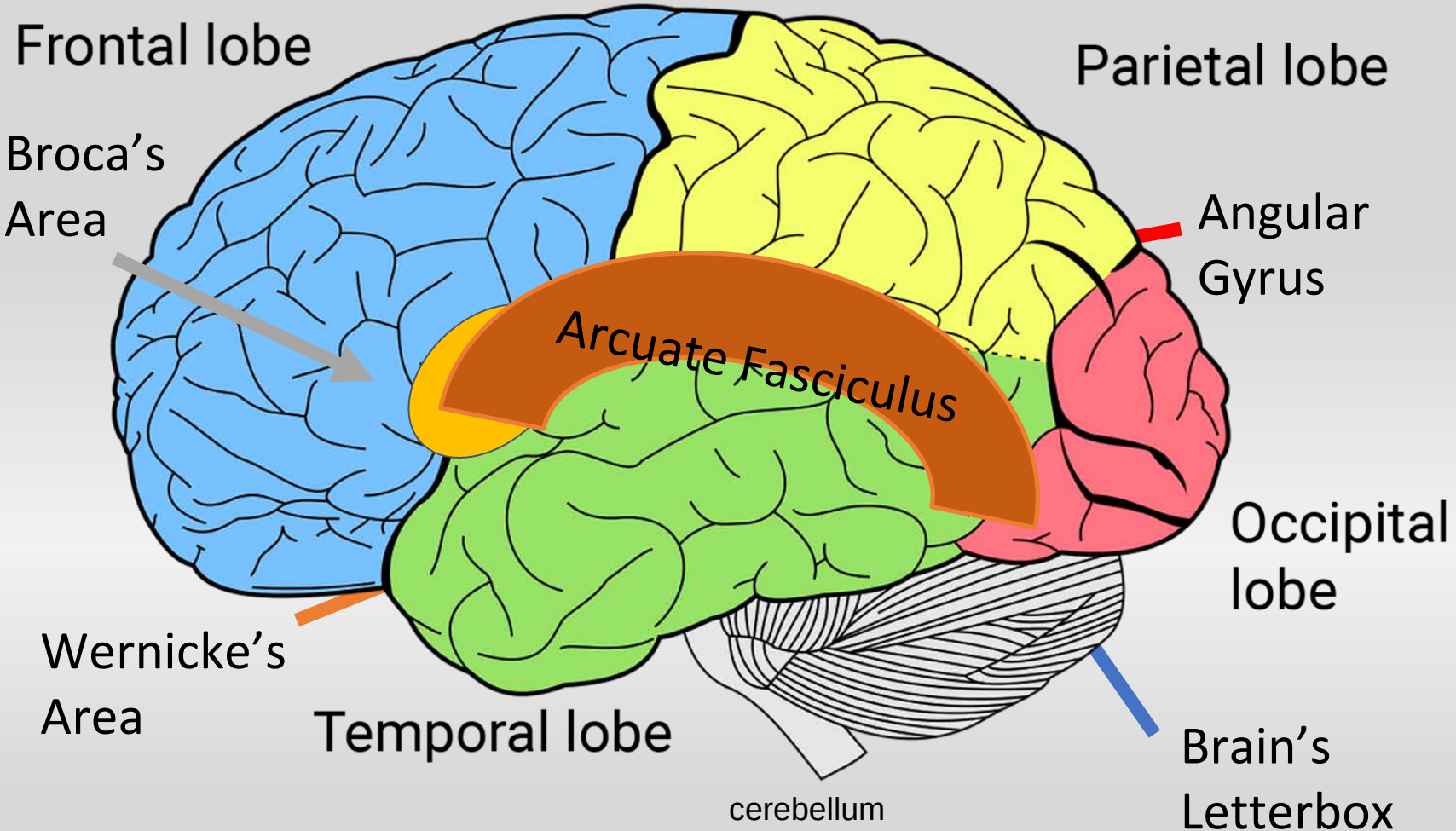
Reading is about creating an interface between the visual and spoken language system.

This causes changes in the brain after children have learned to read. If you can read, you brain has been dramatically changed.

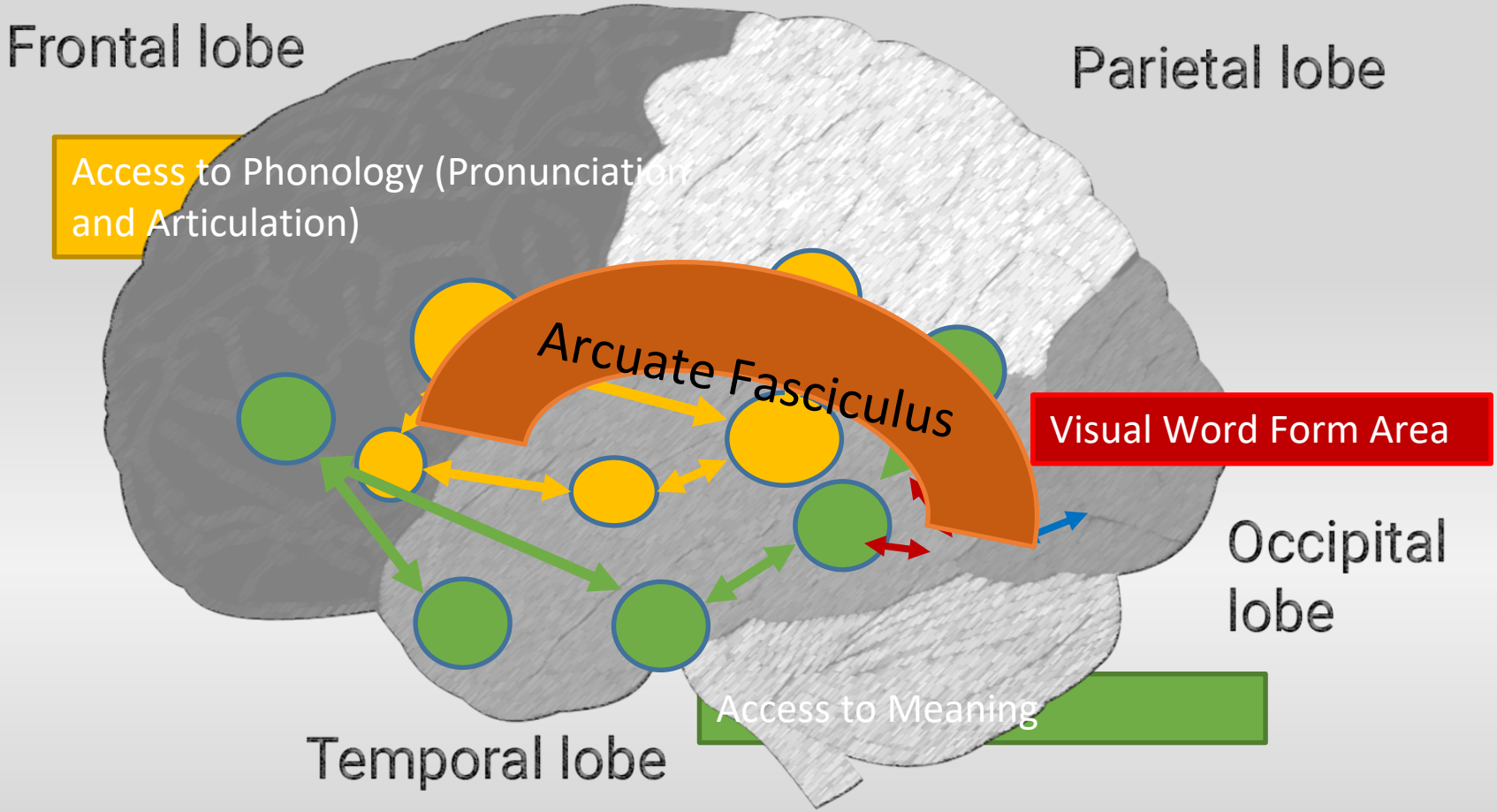
- Stanislaus Dahaene, 2012



The Reading Brain



The Reading Brain Sounds and Meaning



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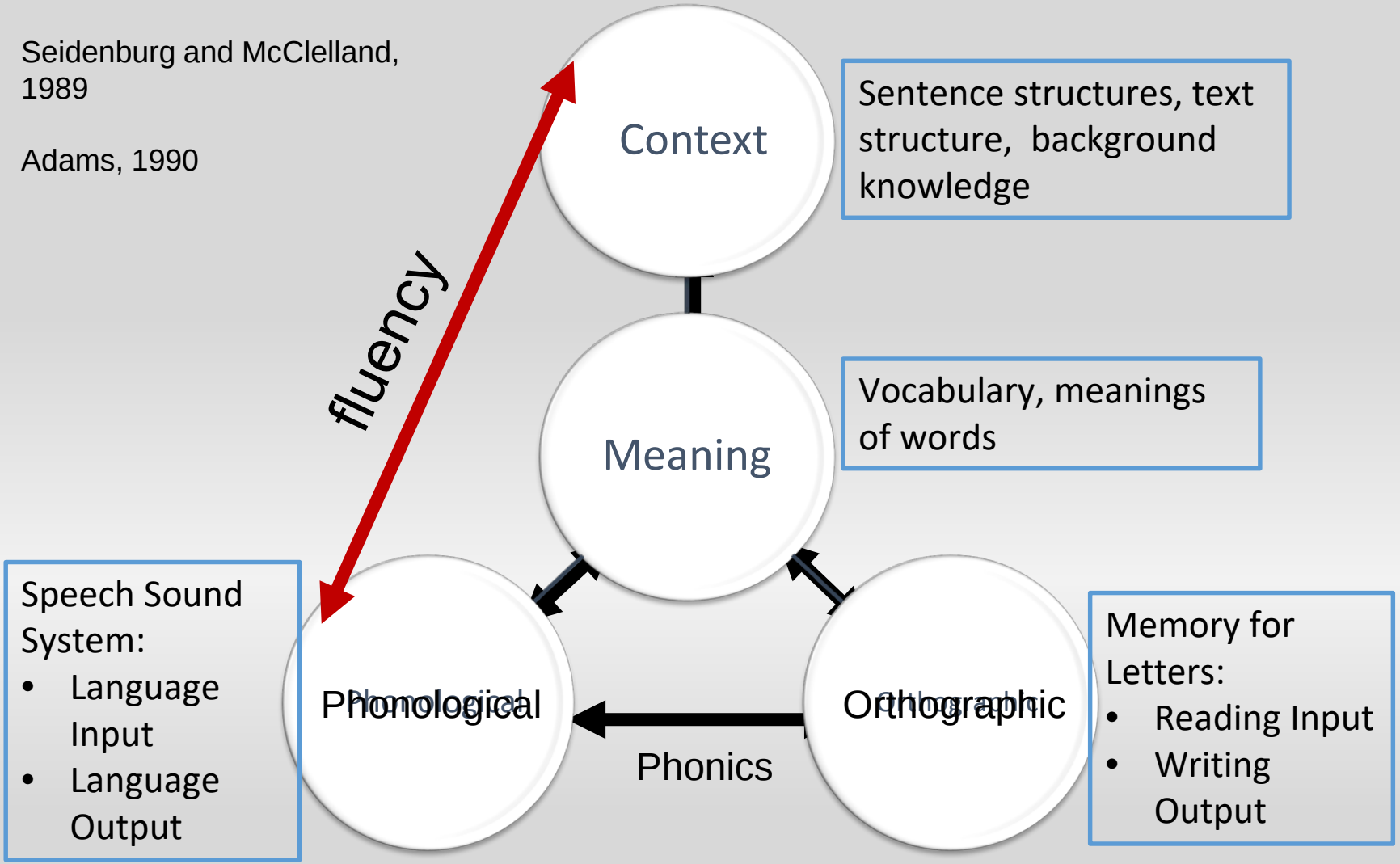
The 4 Part Processor

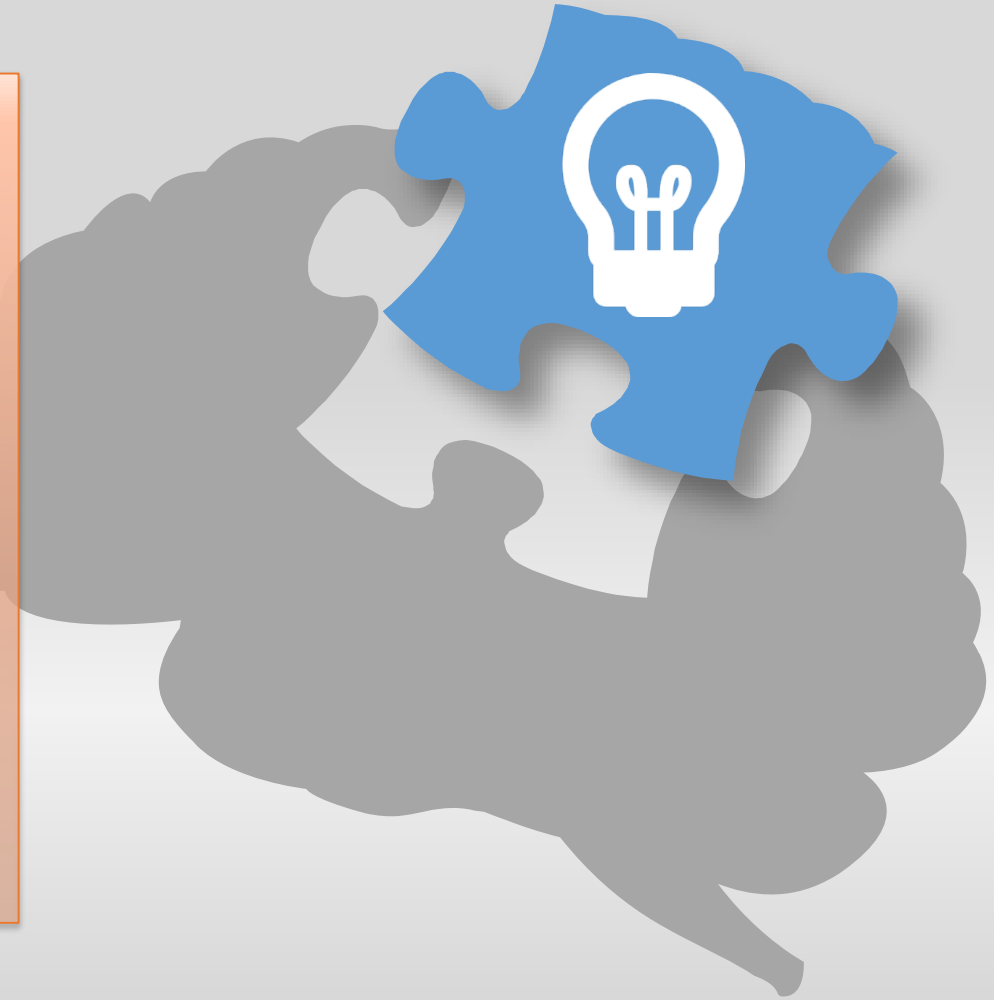
Seidenburg and McClelland, 1989

Adams, 1990



Agree / Disagree & Why

Once students learn letter – sounds correspondences, they can self teach for fluency.

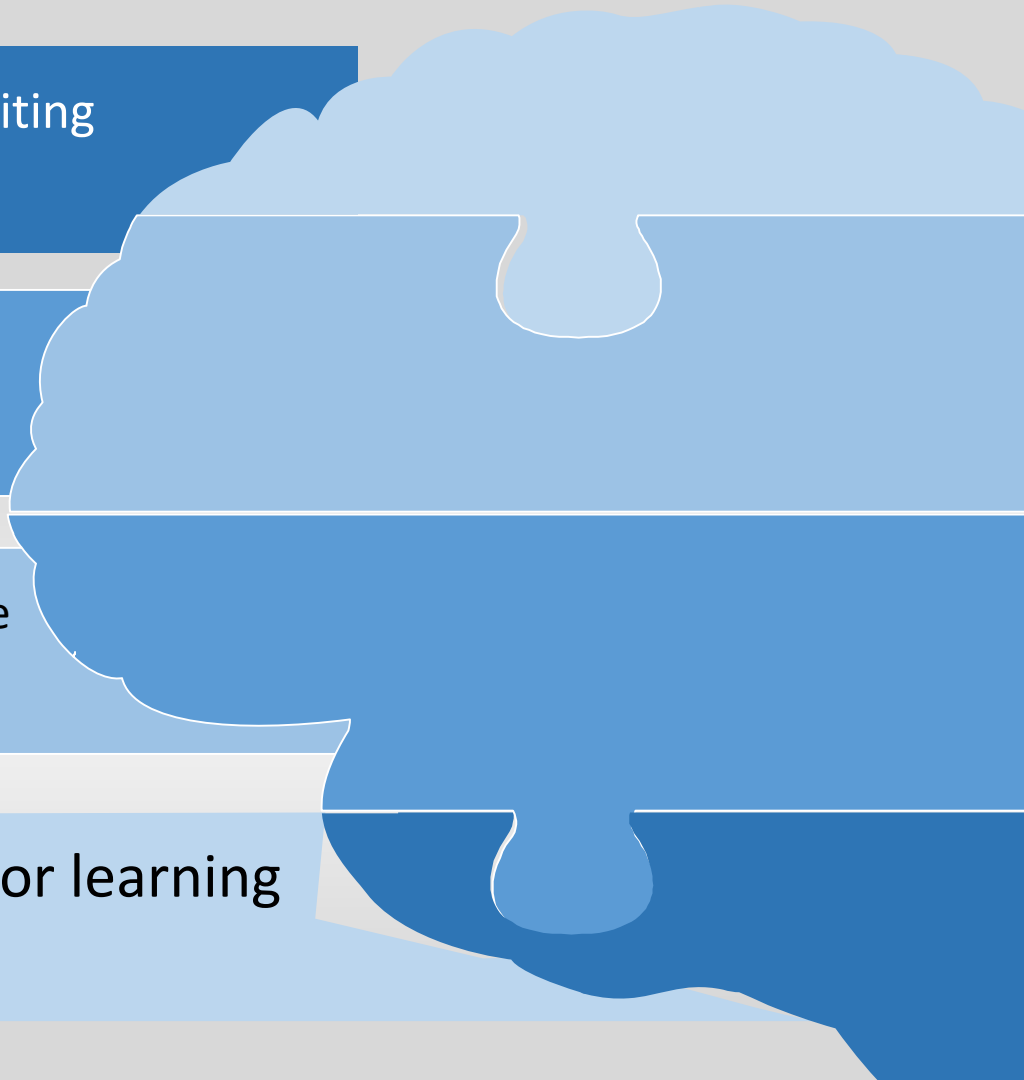


The motor sequence in handwriting matters when teaching letters.

Handwriting and multisensory visual- motor instruction helps with letter recognition.

Letter reversals are common as the brain learns to distinguish letters.

Visual Memory is critical for learning letters.



The Reading Brain

Sight word vocabulary is NOT based on visual memory / visual skills!

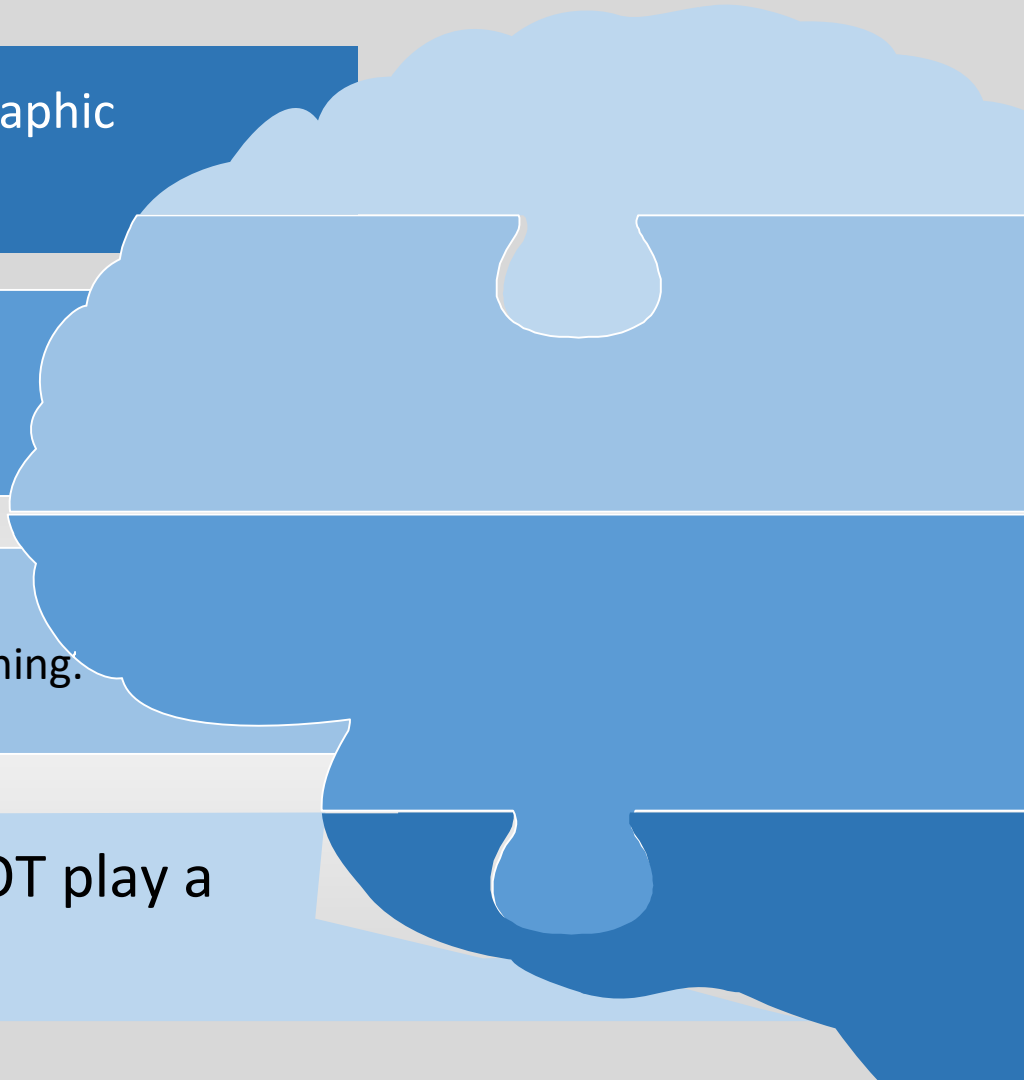
- Dr. David Kilpatrick, Plain Talk About Learning Conference 2018

Phonology maps to the orthographic patterns in words.

Phonology is CRITICAL for word retrieval and accessing meaning.

We store and retrieve words via orthography, phonology, and meaning.

Visual Memory is does NOT play a role in word recognition.



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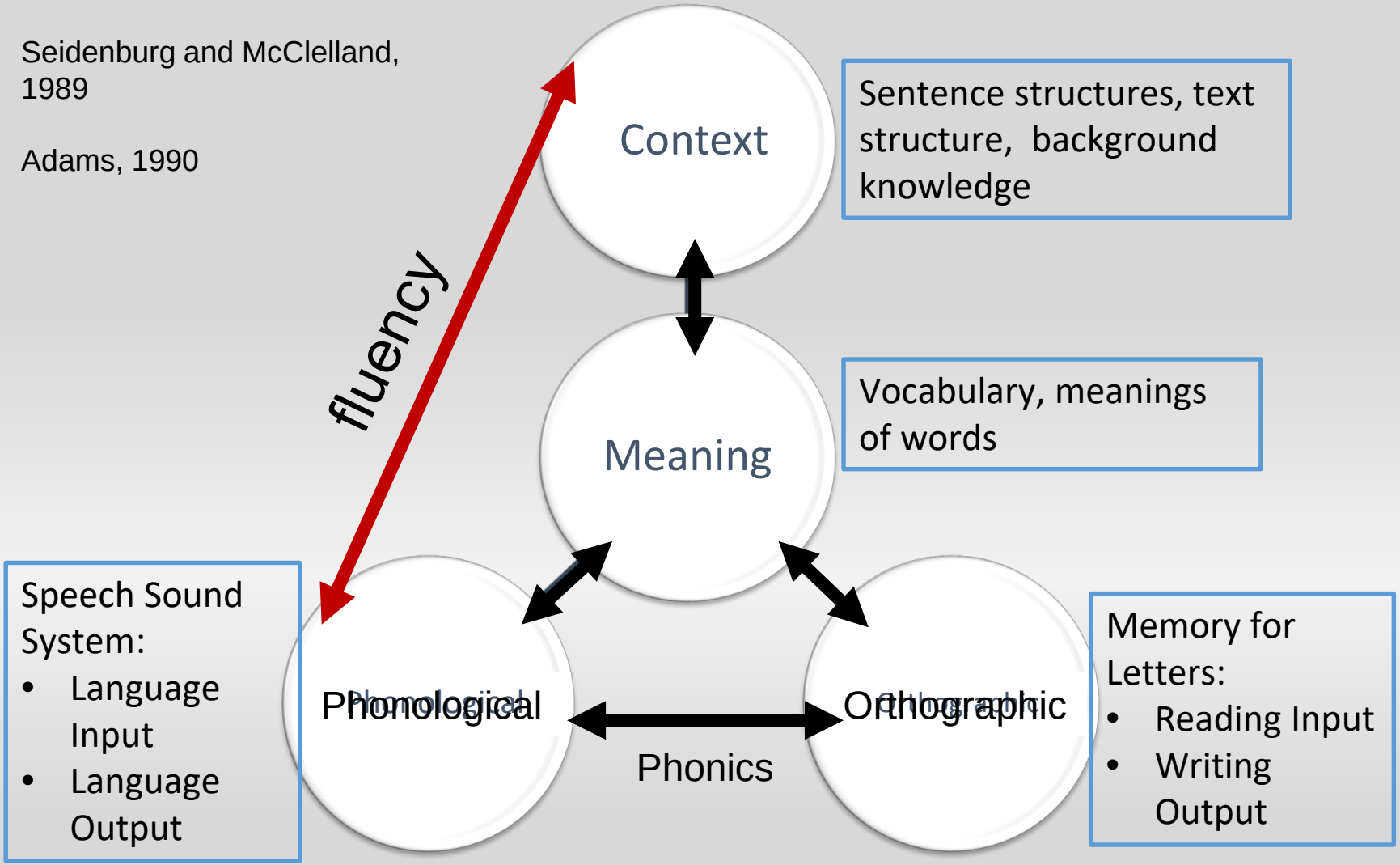
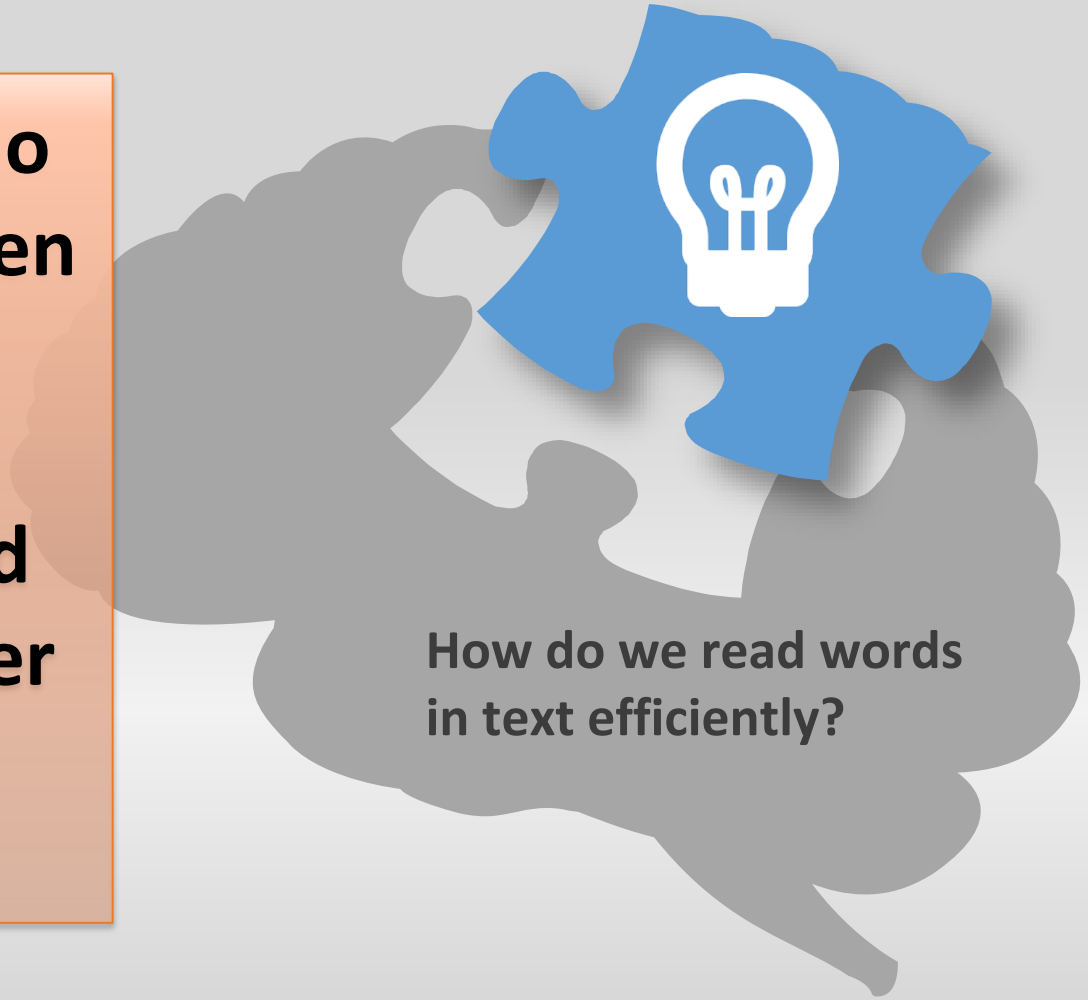


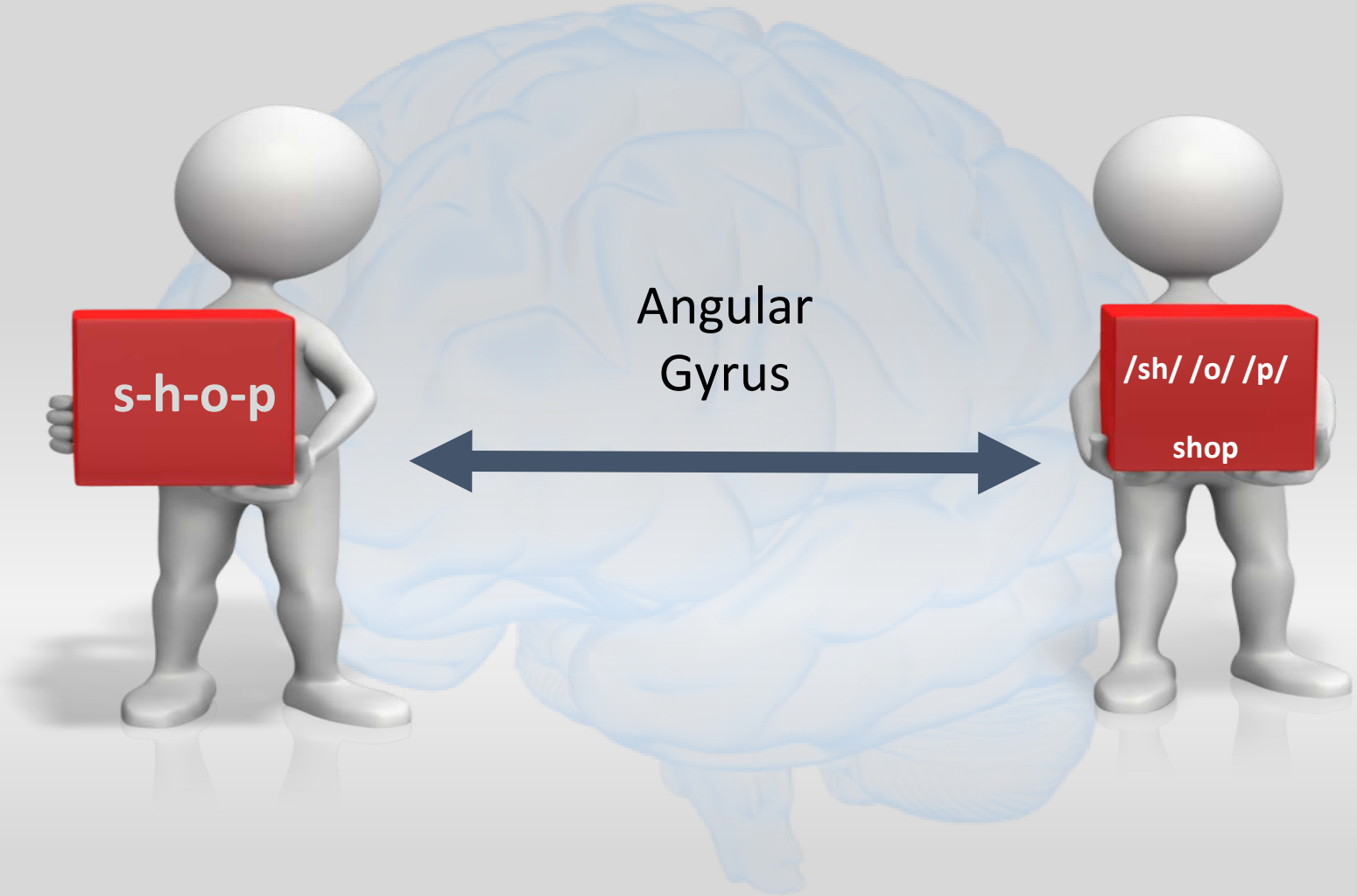
When we read, do we process written language:

A. **Word by Word**
B. **Letter by Letter**



The current thinking is that, during reading of a single word, millions of hierarchically organized neurons, each tuned to a specific local property (a letter, a bigram, or a morpheme), collectively contribute to visual recognition. This massively parallel architecture explains the speed and robustness of visual word recognition. Most importantly, for educators and teachers, it creates an **illusion of whole-word reading**. Because reading is so fast and takes about the same time for short and long words, some have assumed that the overall whole-word shape is being used for recognition, and that we should therefore teach whole-word reading rather than by letter-to sound decoding. **This inference is wrong, however.**

- Dehaene, 2011


s-h-o-p
Angular
Gyrus
/sh/ /o/ /p/
shop

What about read alouds?

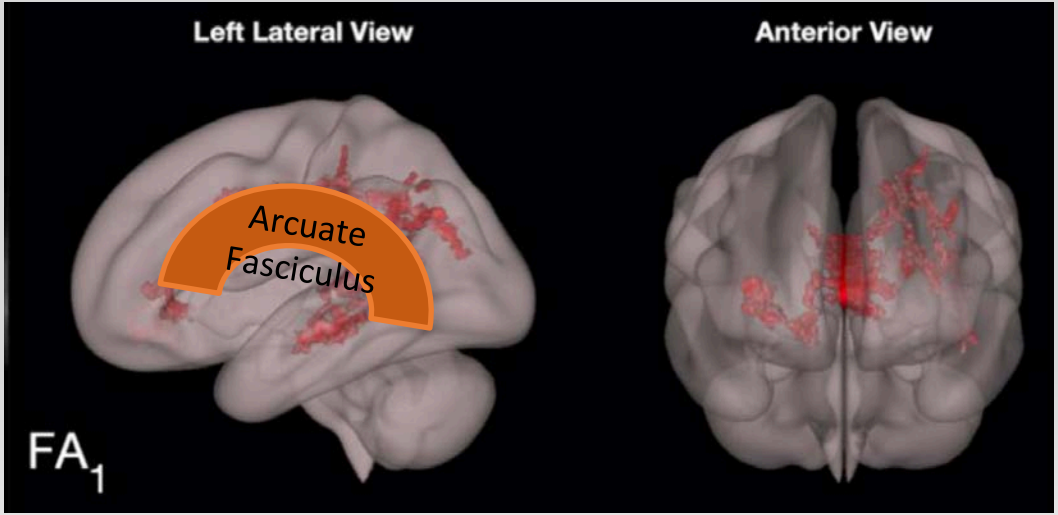
They are critical for building word recognition and language comprehension skills!

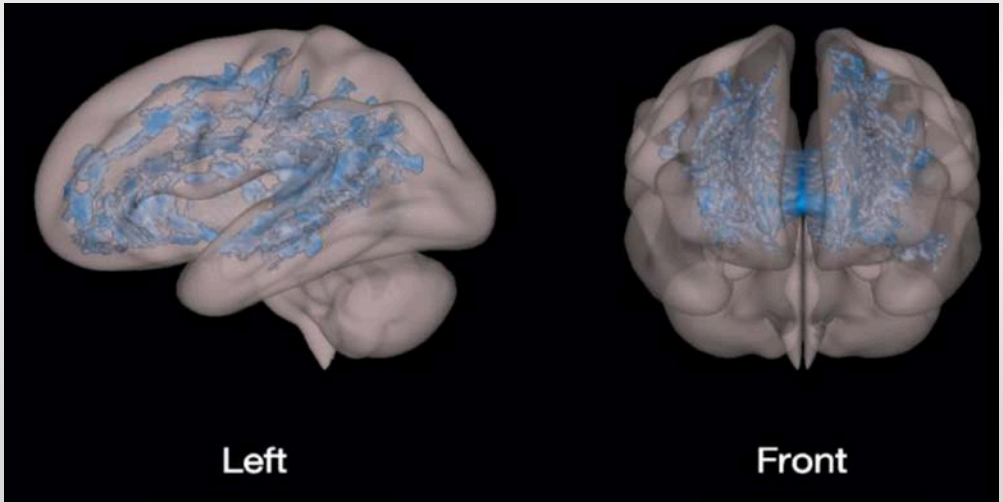
Why should we read aloud to students?

A large set of regions of the left hemisphere is identically activated when we read a sentence and when we listen to it.

(Devauchelle, Oppenheim, Rizzi, Dehaene, & Pallier, 2009)

- Read – Alouds for young children by a parent / caregiver affect the brain in ways that will impact later reading development.
- Technology led to underdevelopment in these critical brain regions.





(Hutton et al, 2019)

Wash Them in Waves of Words

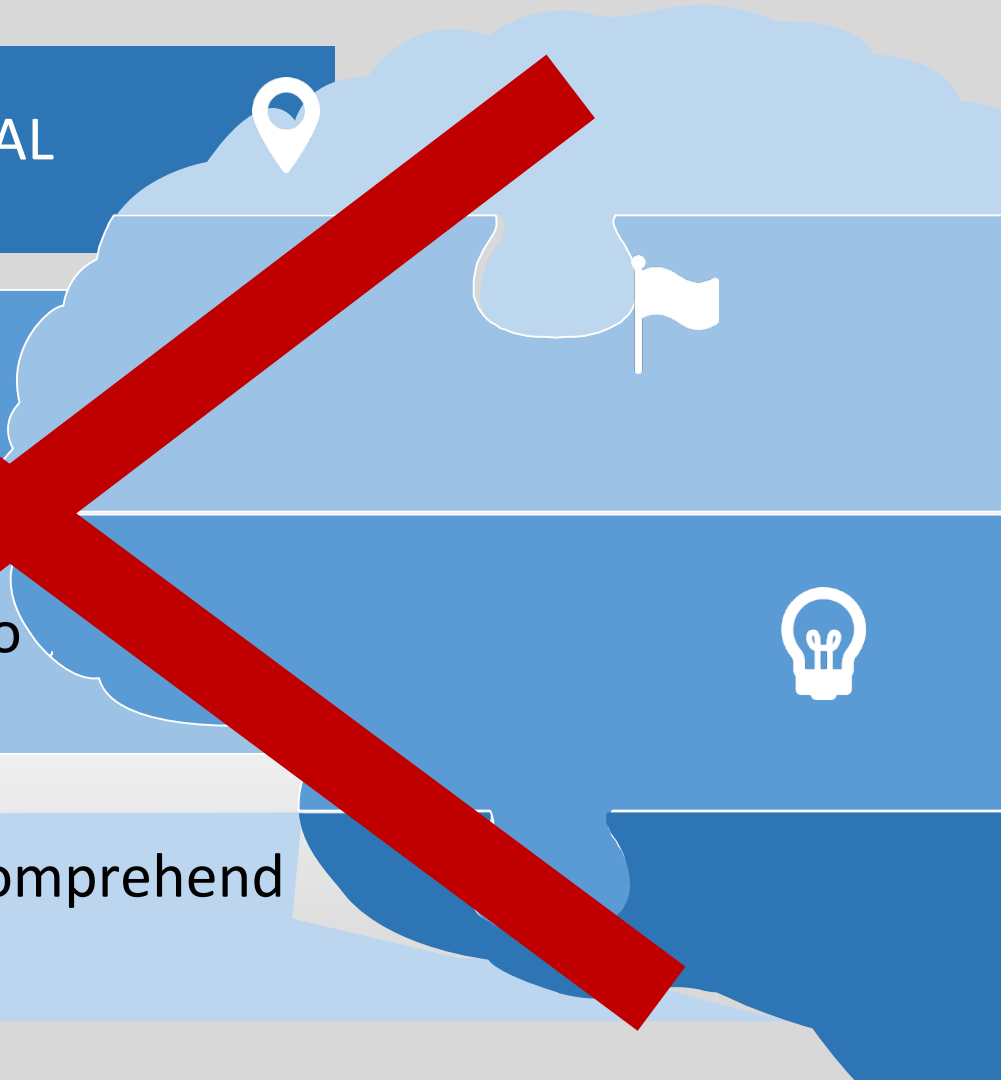
- Some children come to school with too little language to support comprehension.
- Washing our kids in words through READ ALOUDS and oral language gives them a background in language, background knowledge, and more access to meaning.

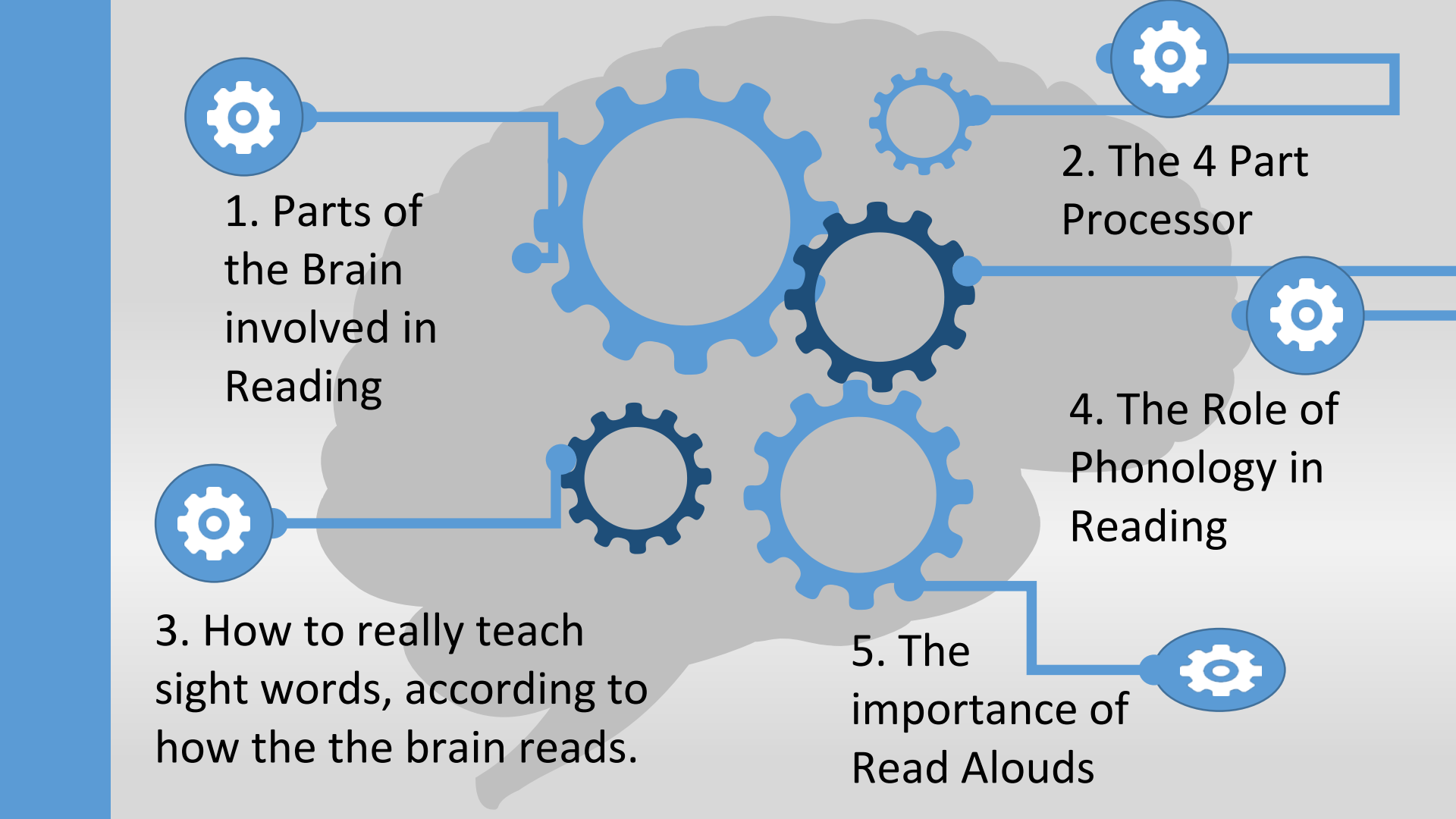
Learni… Read is NATURAL

We read and sho… memorize whole wo…

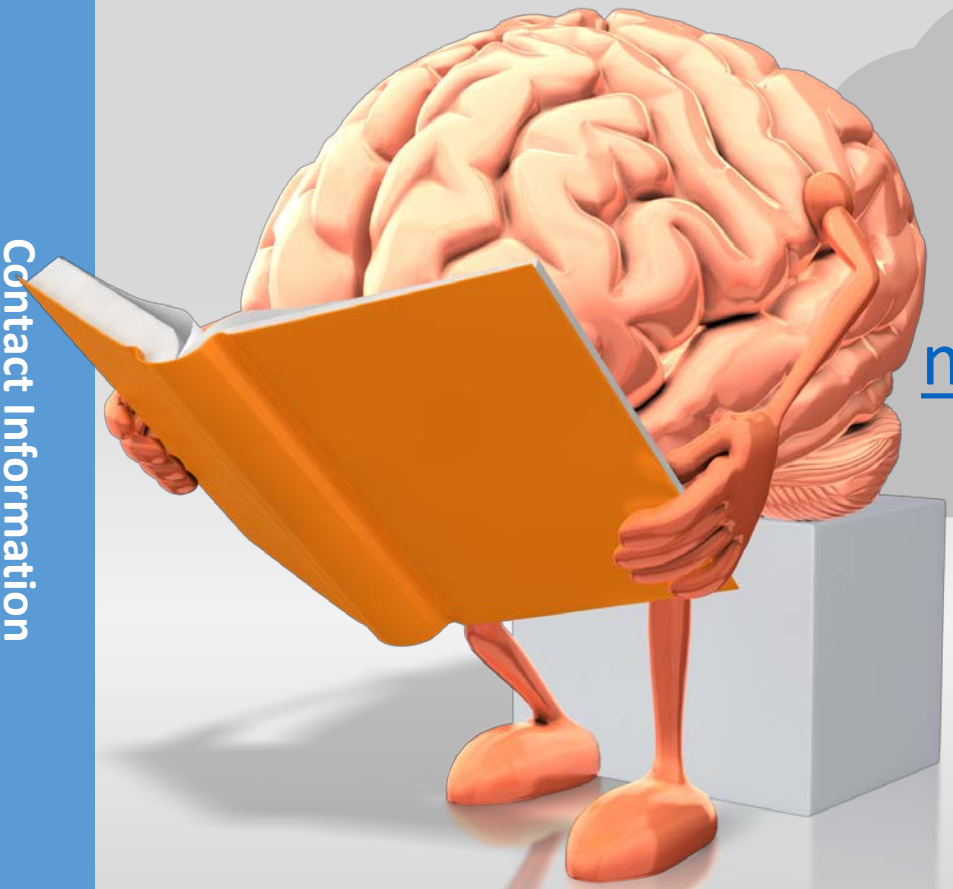
The brain can teach… elf to read.

The on… way to learn to comprehend text is to read text.




1. Parts of the Brain involved in Reading
2. The 4 Part Processor
3. How to really teach sight words, according to how the the brain reads.
4. The Role of Phonology in Reading
5. The importance of Read Alouds

Contact Information



Questions?

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(330)518-4382

Resources

Castles, A., Rastle, K., & Nation, K. (2018). Ending the reading wars: Reading acquisition from novice to expert. *Psychological Science in the Public Interest*, *19*(1), 5-51.

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