
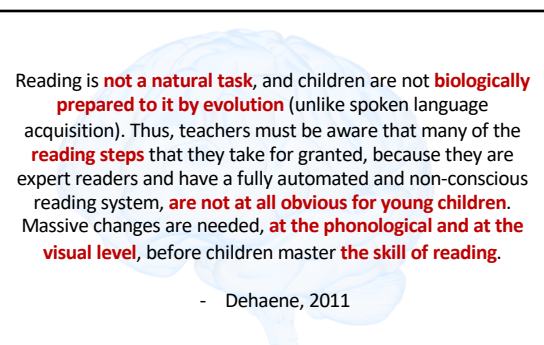


The Reading Brain



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


How the Brain Learns to Read



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**.

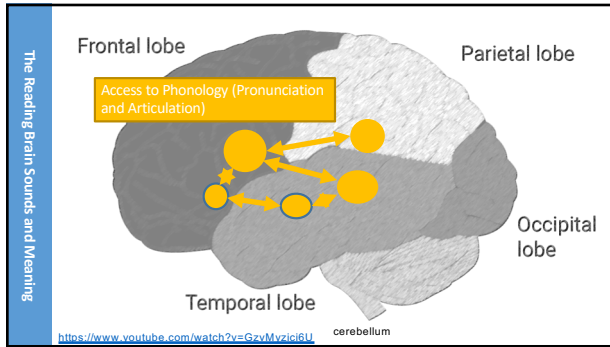
- Dehaene, 2011

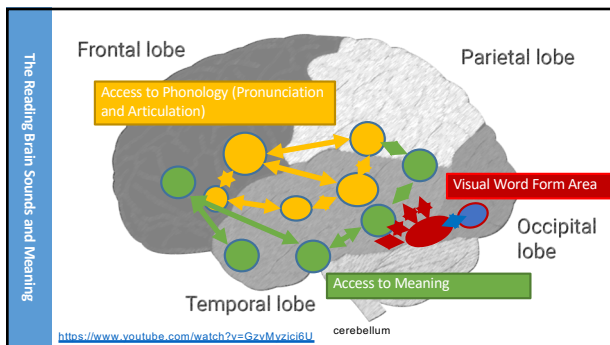
Students learn to read

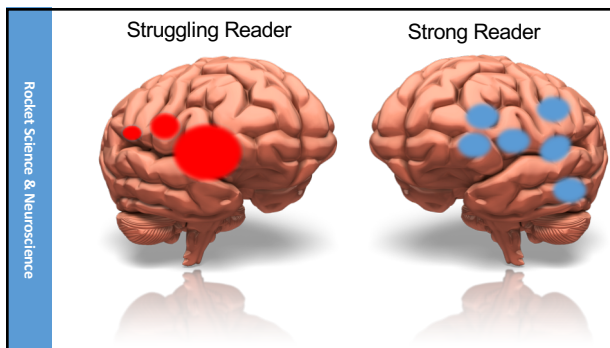


from speech

to print

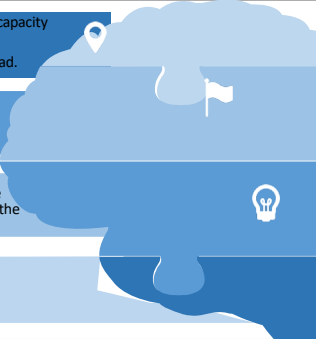






Rocket Science & Neuroscience

- 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 Reading Brain



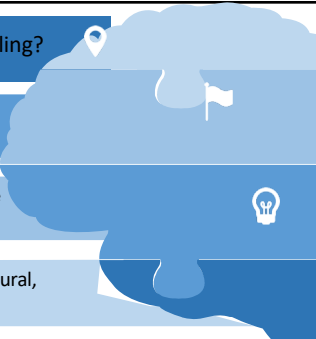
My goal is to bring these two together. Create all the theories and mathematics that will -

The Brain Puzzle – Stanislaus Dhaene https://www.youtube.com/watch?v=wIYZBI_07vk



Reading and Neuroscience

- 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.

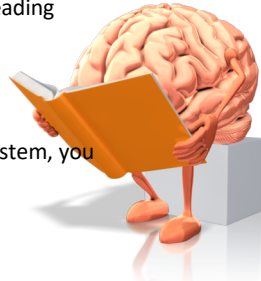


... because the brain is not evolved for reading, I am arguing that reading evolve for the brain.

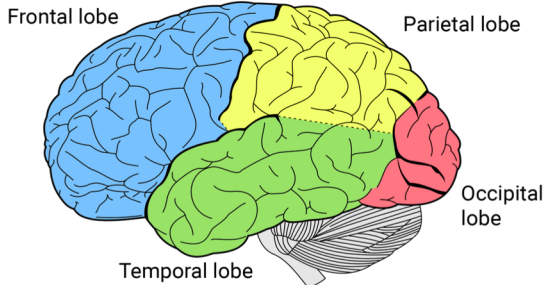
[-Stanislaus, Dehaene, 2016](#)

If you want to change the system, you have to know how it works.

[-Stanislaus, Dehaene, 2012](#)



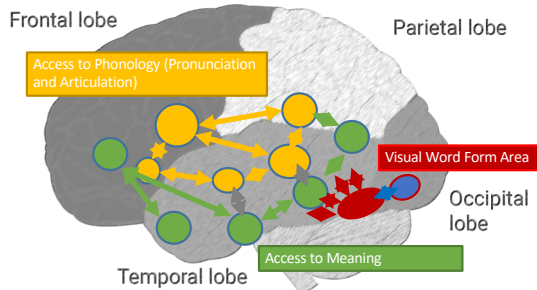
The Reading 4 Regions



<https://www.youtube.com/watch?v=GzvMvzici6LU>

cerebellum

The Reading Brain Sounds and Meaning



<https://www.youtube.com/watch?v=GzvMvzici6LU>

cerebellum

The Reading Brain
Lessons Learned

- 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 Dohaene, 2012

The Reading Brain
Lessons Learned

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

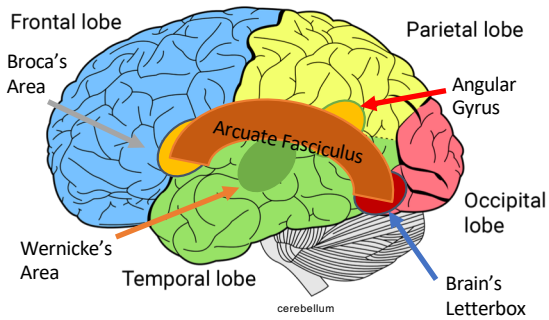
This causes changes in the brain after children have learned to read. If you can read, your brain has been dramatically changed.

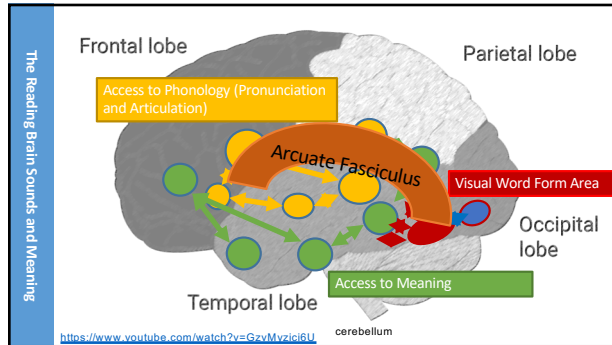
- Stanislaus Dohaene, 2012

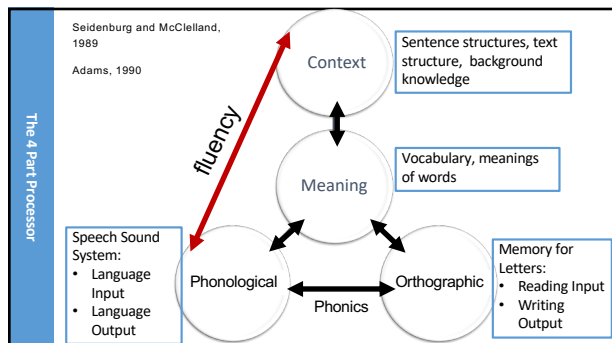
Hmm... teachers are like neurosurgeons. They change the brain!

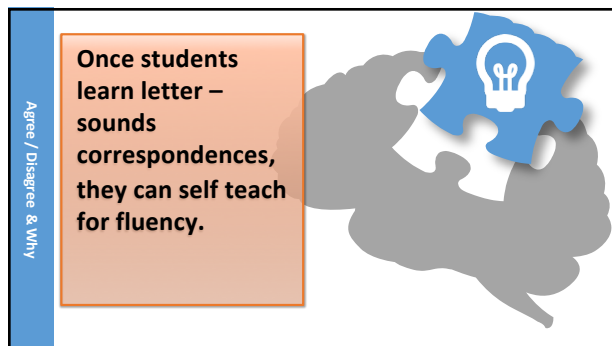


The Reading Brain



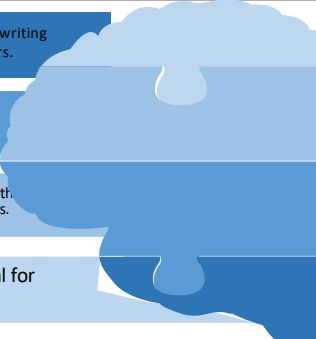






The Role of Vision in Letter Recognition

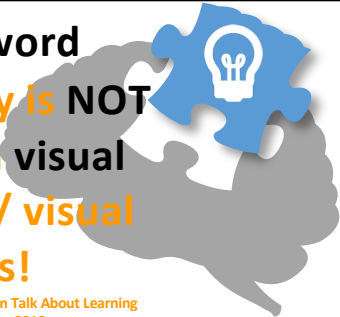
- The motor sequence in handwriting matters when teaching letters.
- Handwriting and multisensory visual- motor instruction helps with letter recognition.
- Letter reversals are common as the brain learns to distinguish letters.
- Visual Memory is critical for learning letters.



The Reading Brain


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

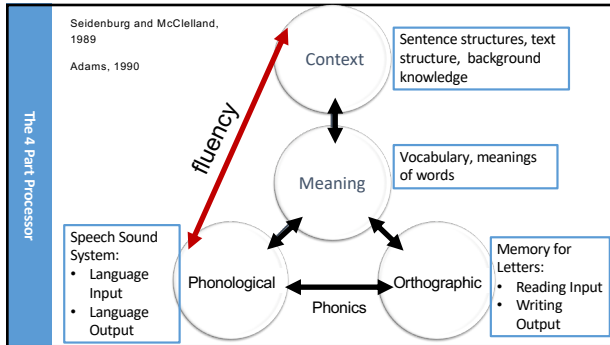
- Dr. David Kilpatrick, Plain Talk About Learning Conference 2018



The Role of Vision in Word Recognition

- 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.





The Reading Brain

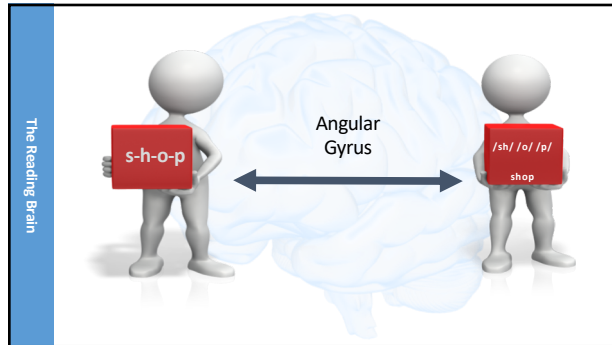
When we read, do we process written language:

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

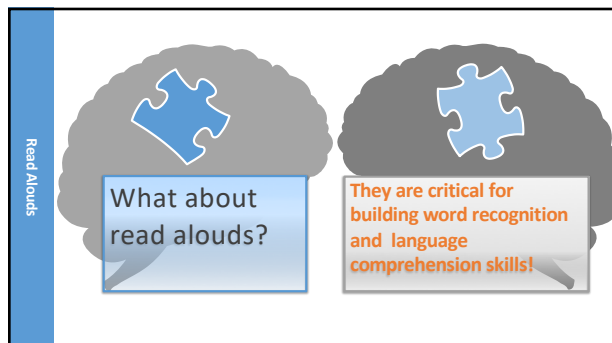
How do we read words in text efficiently?

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.

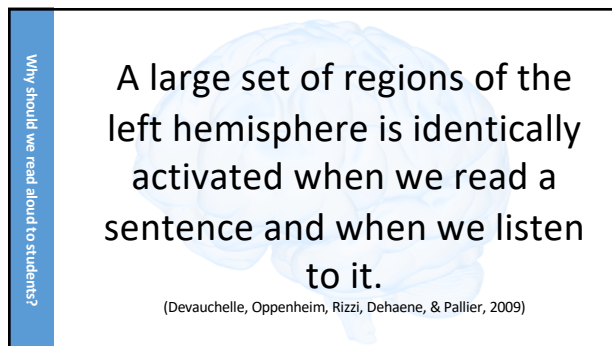
- Dehaene, 2011



The Reading Brain



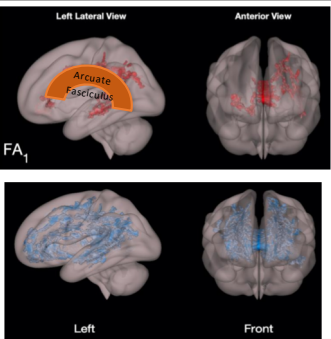
Read Alouds



Why should we read aloud to students?


The Impact of Read Alouds Over-Screen Time

- 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.

Reading Myths Debunked Today

- ~~• Learning to Read is NATURAL~~
- ~~• We read and should memorize whole words.~~
- ~~• The brain can teach itself to read.~~
- ~~• The only way to learn to comprehend text is to read text.~~

What did you learn today?

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

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