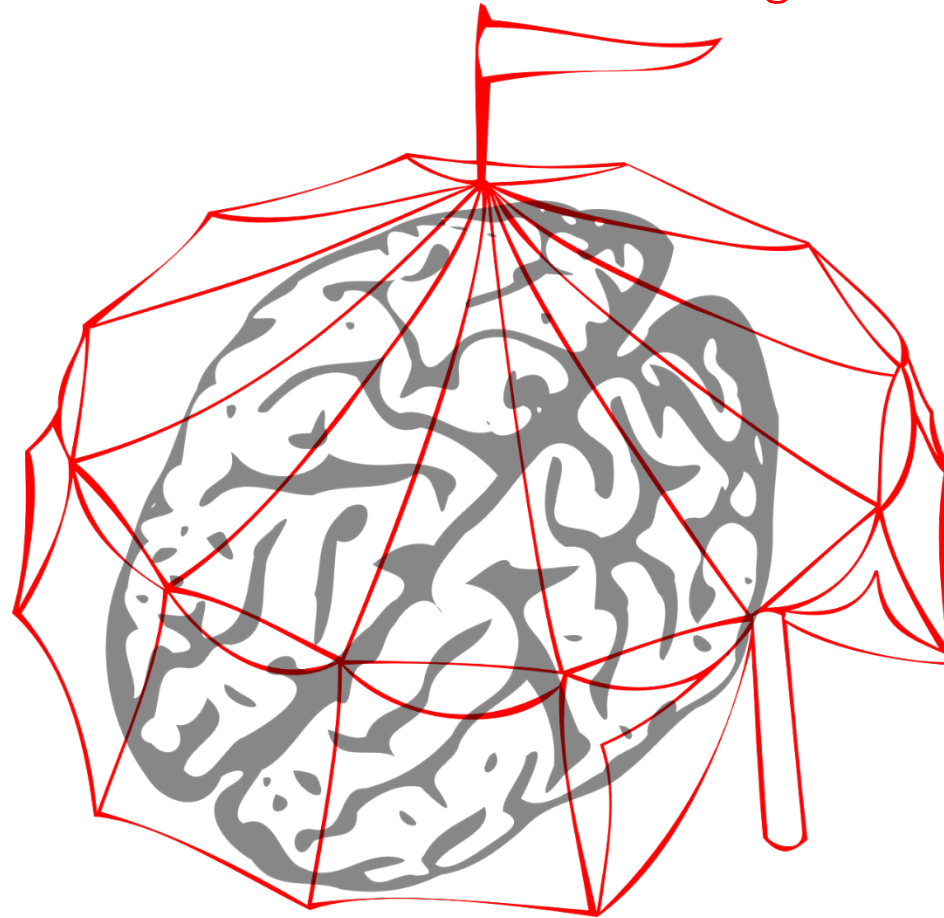


READER, COME HOME: LETTER 2

Under the Big Top:
An Unusual View of the Reading Brain

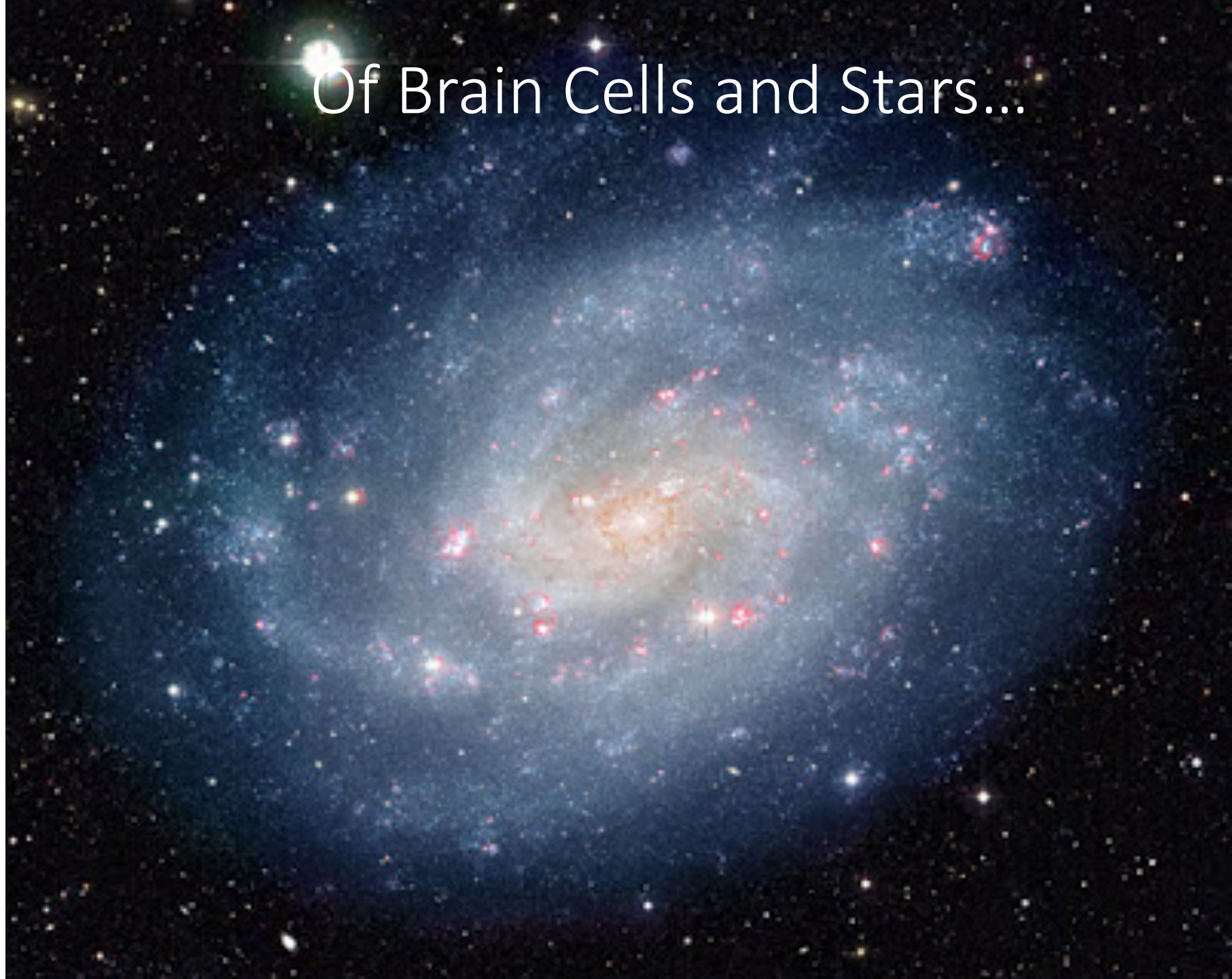
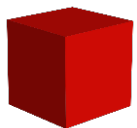


Atlanta Speech School Professional Development
September 6, 2019

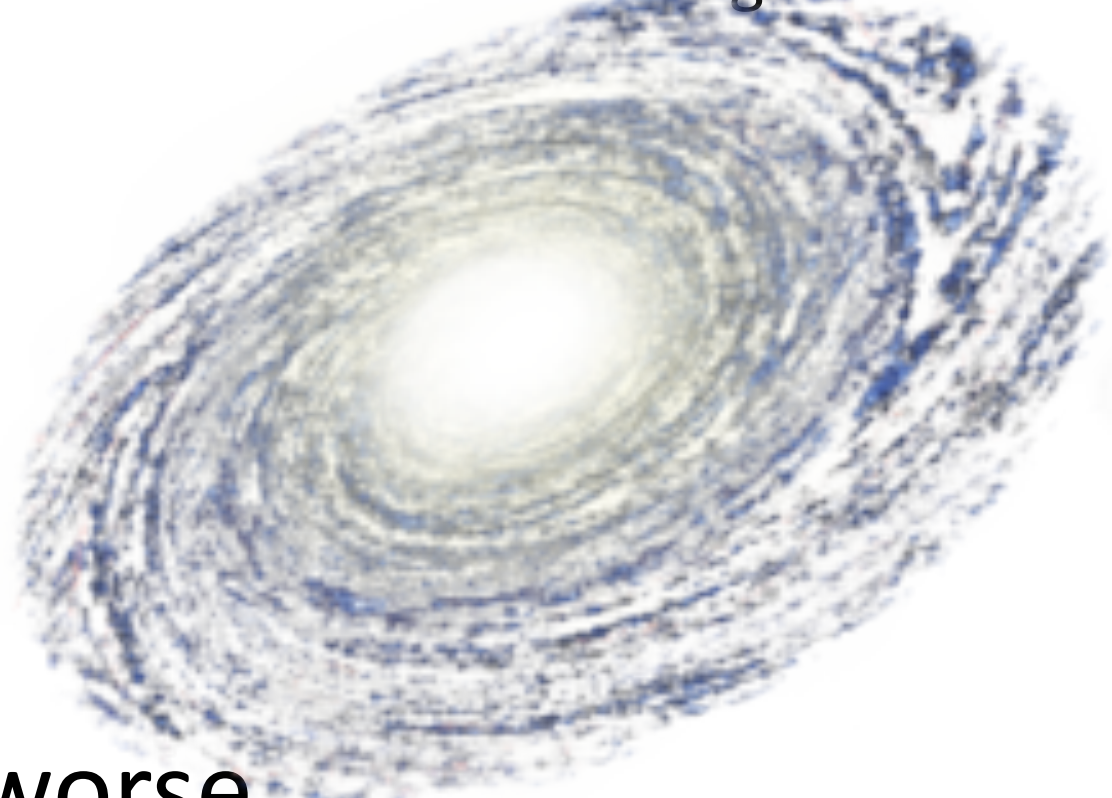
Of Brain Cells and Stars...

Our brain cells are “connected to one another in a network of such staggering complexity that it bankrupts human language and necessitates new strains of mathematics...there are as many connections in a single cubic centimeter of brain tissues as there are stars in the Milky Way galaxy.”

- David Eagleman
(Neuroscientist)



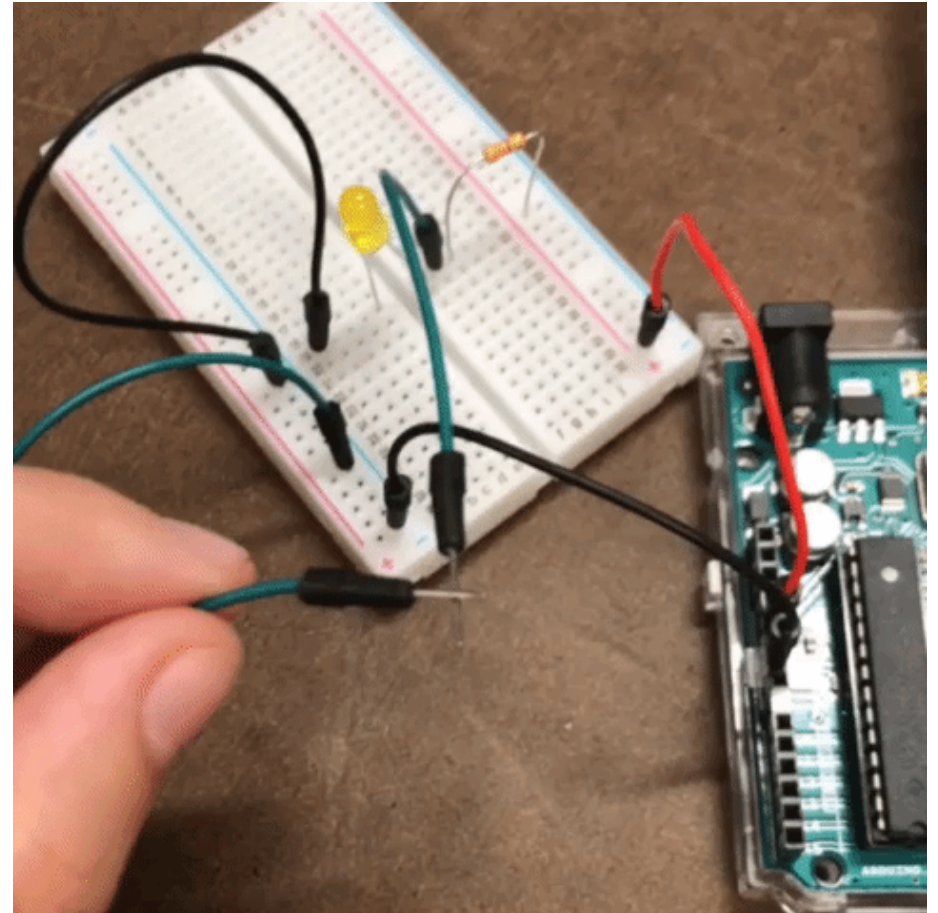
- These connections allow for a new circuit for reading
- Why do we need them? Because reading is neither natural nor innate
- Reading is an unnatural cultural invention only 6 thousand years in existence
- The capacity to change our brains is so important that it is accelerating our species' development



For better and sometimes for worse. - Maryanne Wolf

What happens if the left side of the board breaks?

“Happily, the brain comes well prepared to learn a great many unnatural things because of its basic design.”



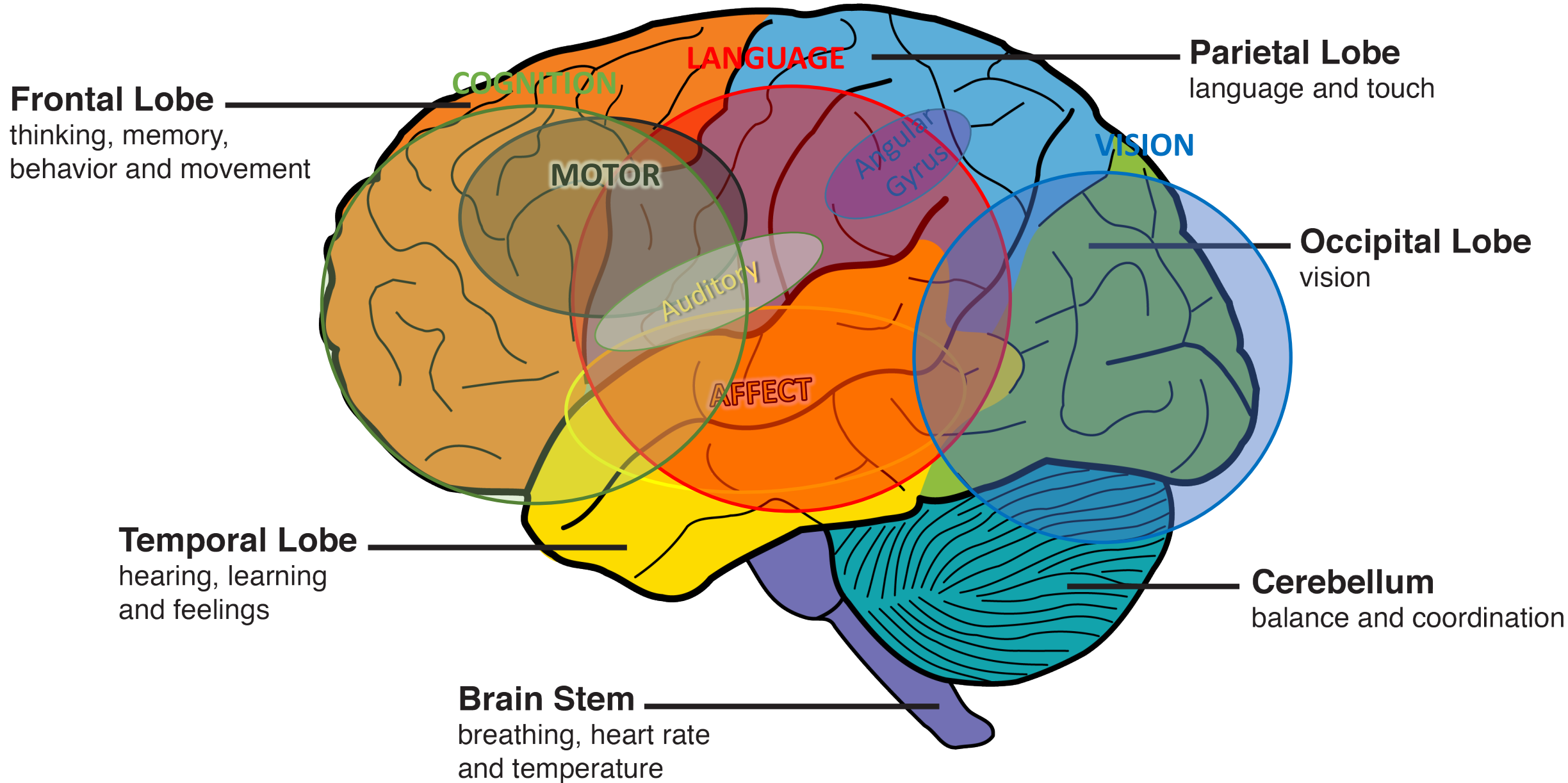
3 Design Principles Critical for Building a Reading Brain

“Plasticity Within Limits”

Neuroplasticity

Retinotopic Organization

“The crux of the matter is that the plasticity of our brain permits us to form both ever more sophisticated and expanded circuits and also ever less sophisticated circuits, depending on environmental factors.” - Maryanne Wolf



Prefrontal Control Box (PCB)



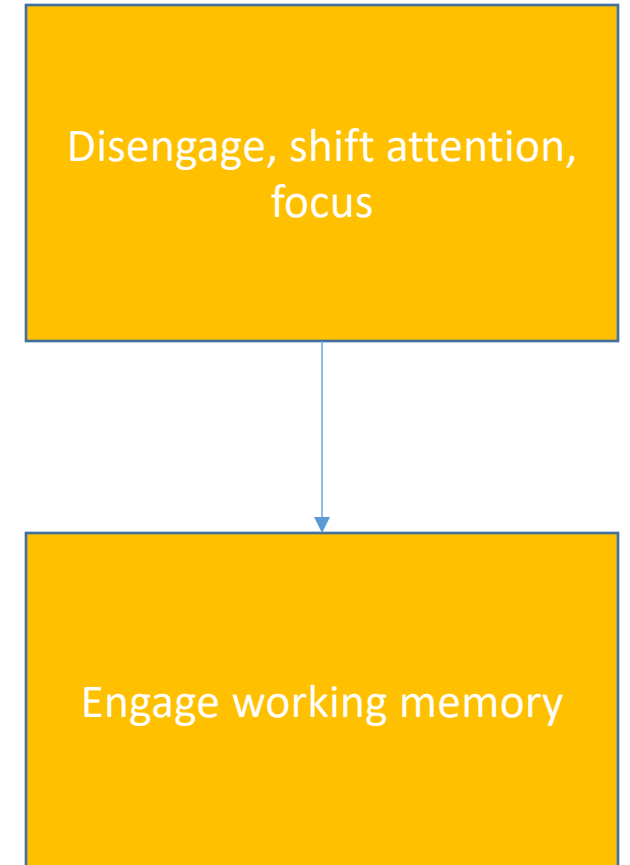
Very Important
Person Control Box

for Doing Very
Important Things

Spotlights of Attention

Orienting additional systems

- Disengage from
- Move attention to
- Alert the reading circuit



Applying the Science in the Classroom

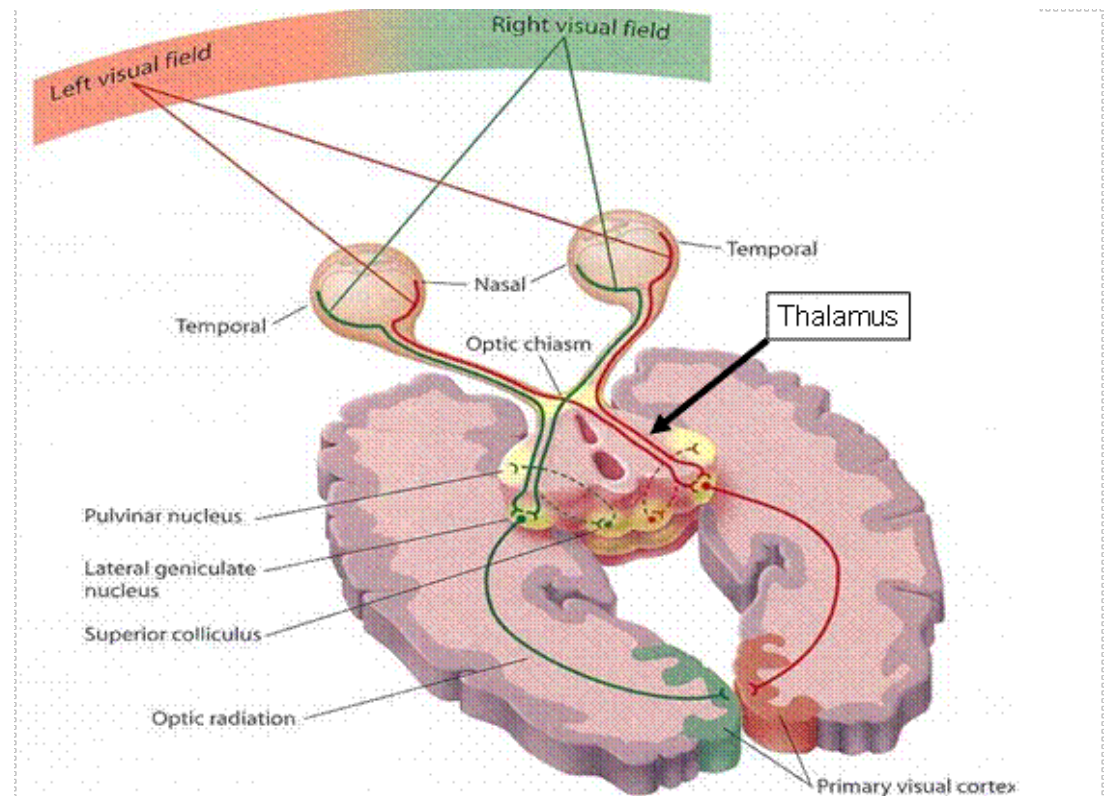
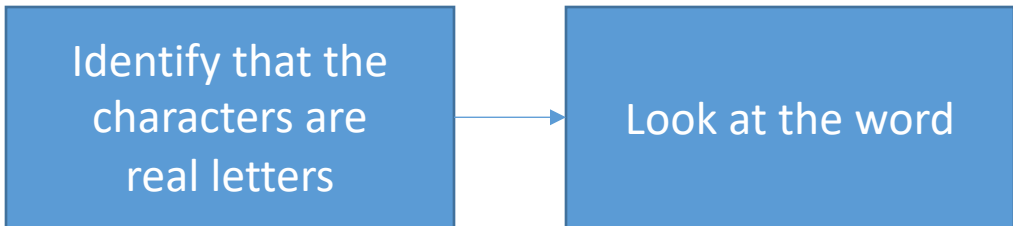


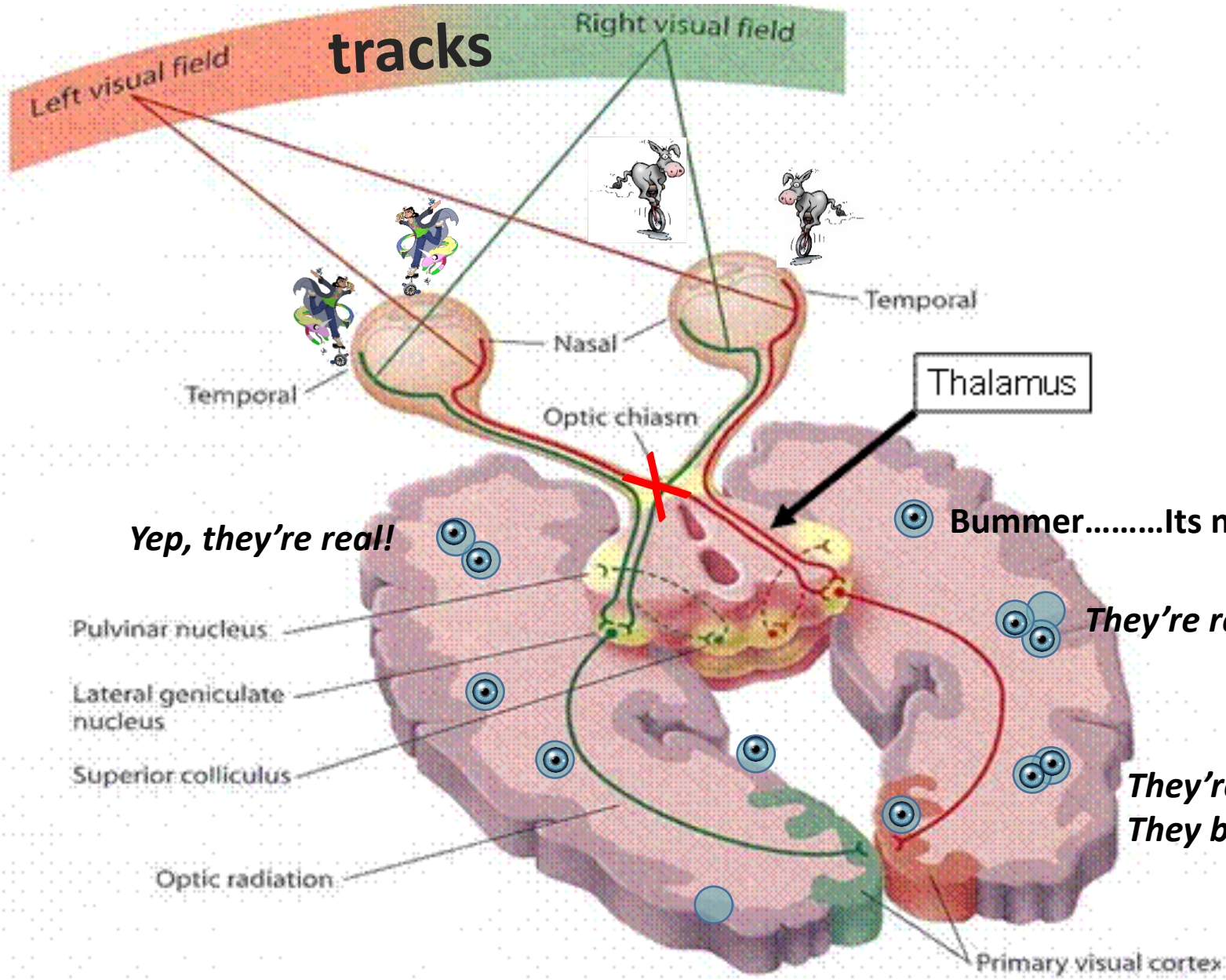
- Educators cite 5 different types of attention needed in the classroom
 - Alternating
 - Sustained
 - Selective
 - Divided
- Many refer to Executive Attention as being goal directed and focused.

Ring of Vision

1. The image is scanned by the retina, crosses in the optic chiasm and travels to the back of the brain in the occipital lobes, specifically the visual striate cortex (VSC).

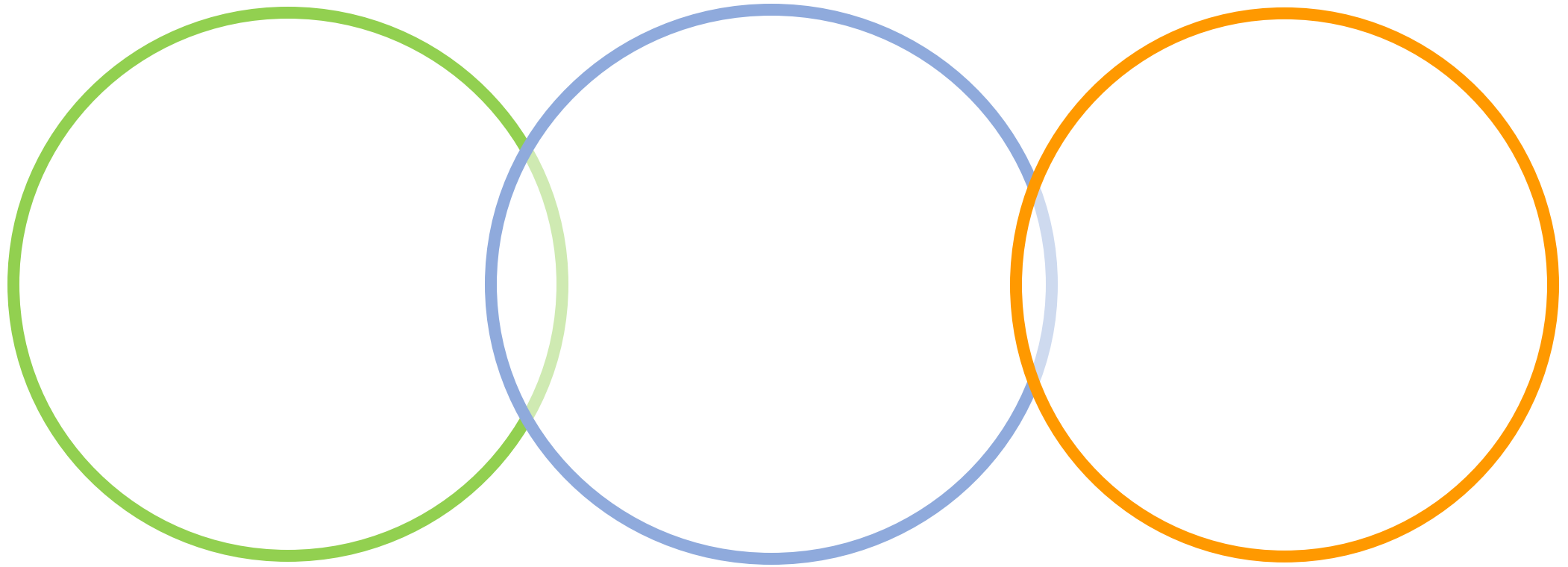
2. Once in the VSC, the brain analyzes the letters and determines whether they are recognizable letters. The letters are identified as phonemes or morphemes or treated as a sight word





50 milliseconds from beginning to end

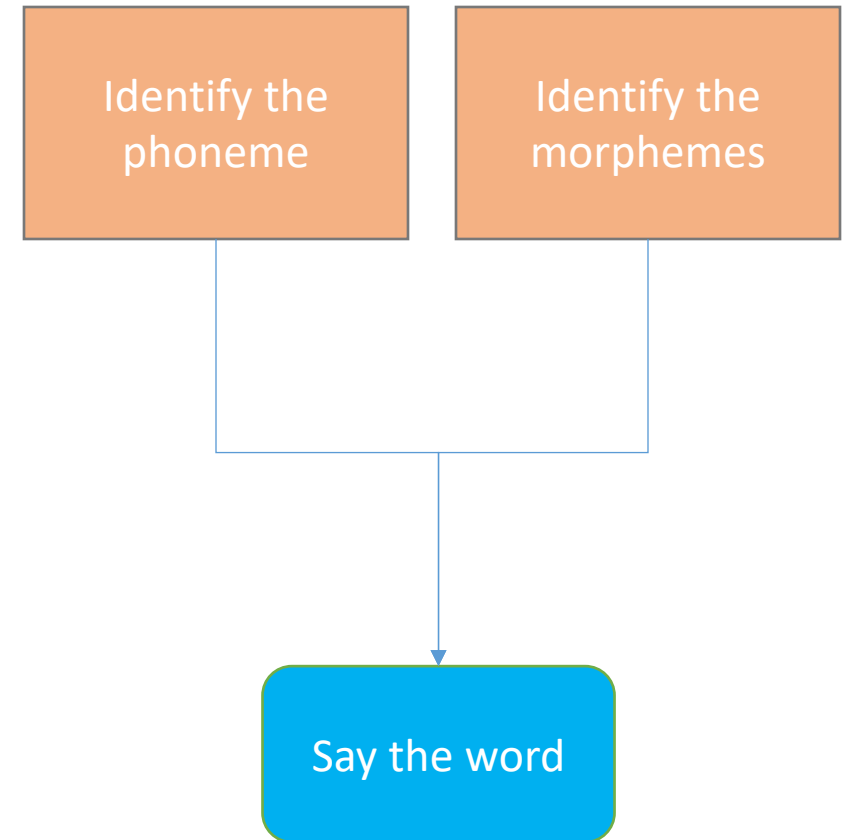
A blink takes 300 milliseconds.



Faster Than The Blink Of An Eye

Ring of Language

- First, that the visual information (i.e., the letters) is quickly connected with the correct sound.
- Neuronal Orbs organize themselves to offer the most probable matches to the sounds and words.
- Once completely sounded out, deeper language, cognition and motor engage, offering context to the word and the ability to physically speak the word.



Angular Gyrus



http://www.viewpure.com/03Xtiz_ikw4?start=0&end=0

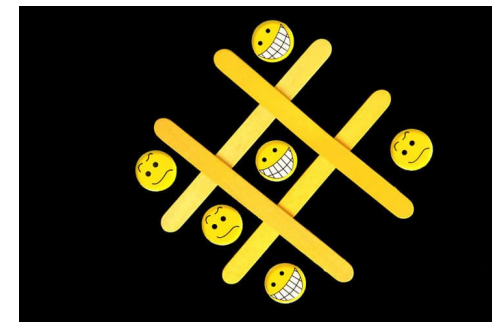
- The **angular gyrus** is responsible for auditory and visual processing and also for language comprehension. As an important part of the brain the angular gyrus allows for cross modal transfers and associations between touch or sight and one's auditory functions. This also may be applied in its reverse. For example, the angular gyrus would be responsible for making connections between a certain sound and a touched object. In terms of language, the angular gyrus is an essential part of the brain. During language development a person usually has to make a connection between an object shown (such as an apple or bear) and the auditory functions so one may be able to properly pronounce the word.
- The angular gyrus is in direct proximity to primary language cortex (Wernicke's area). **Wernicke's area** is the region of the brain that is important for language development. Thought to be Wernicke's counterpart, **Broca's area** is related to the production of speech.

Ring of Cognition

- Once read, the brain places value or meaning around the group of letters you have just turned into a word.
- Actively the brain takes the new word and applies context to the word itself and hopefully with the words surrounding it.



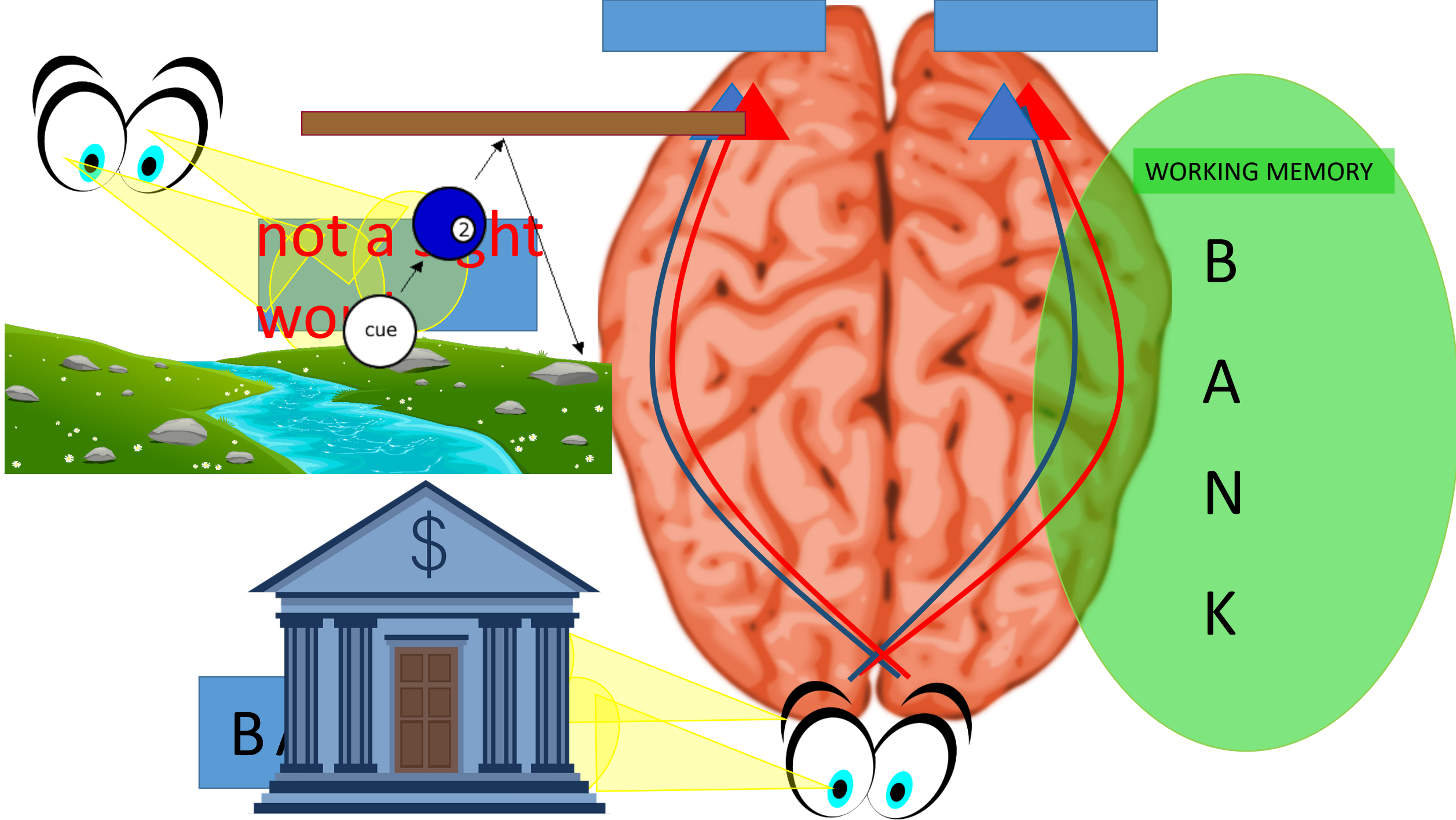
Ring of Affect

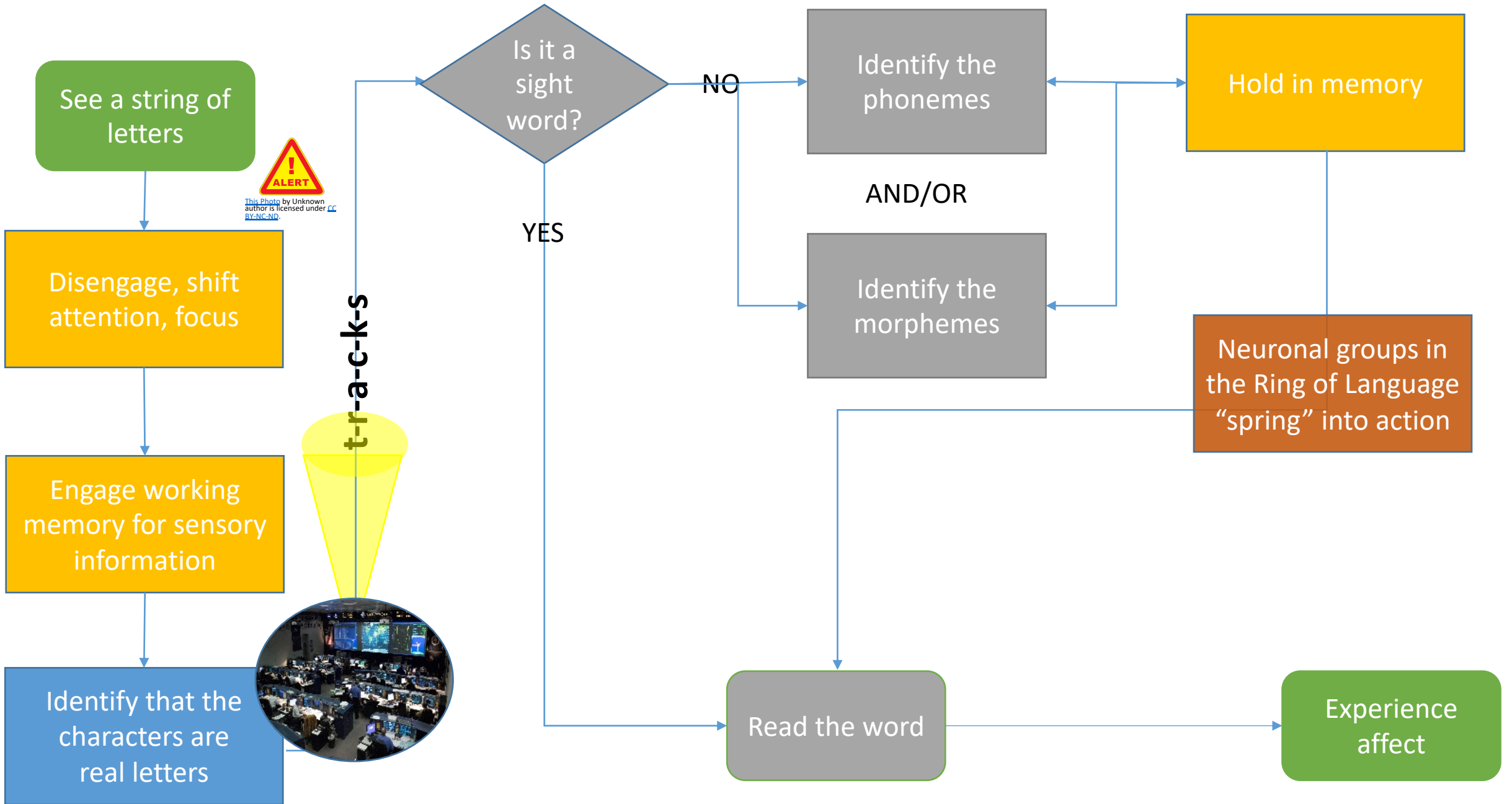


- Once you read and comprehend a word (words) a specific emotional response is elicited.

Ring of Motor

- You physically or mentally mouth the words that you are reading





Takeaways

- Our brains are not wired to read. There is no ideal reading circuit.
- Oral language is a basic human function, reading is not.
- "Placticity within limits" means we are using old parts of the brain for new purposes. The brain is able to go "beyond" its original, biologically-endowed functions and develop totally unknown capacities. Neuronal groups that are to be repurposed share similar functions with the new one.
- We are talking about a process that takes 400ms to complete

(a blink takes 300ms)



The Reading Brain Collaboration

