

# Neurodidactics in the university classroom – How the brain learns?

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## Topics to cover today:

- Neurodidactics... what is it?
- The structure and functions of the brain – the important and interesting
- Attention and memory
- Emotions

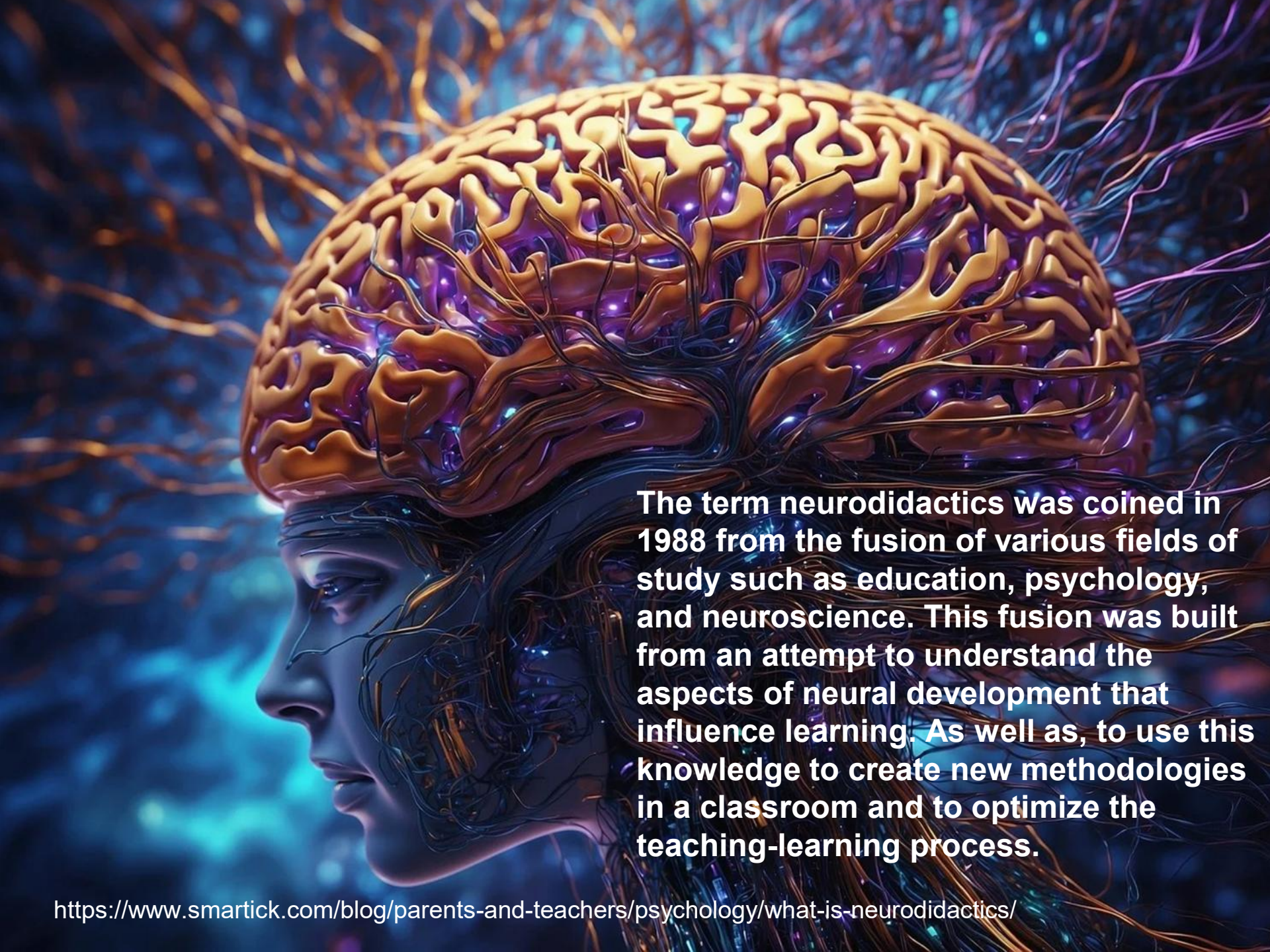
Methods and techniques useful for working with groups



OR IS NEURO THE NEW TREND...?

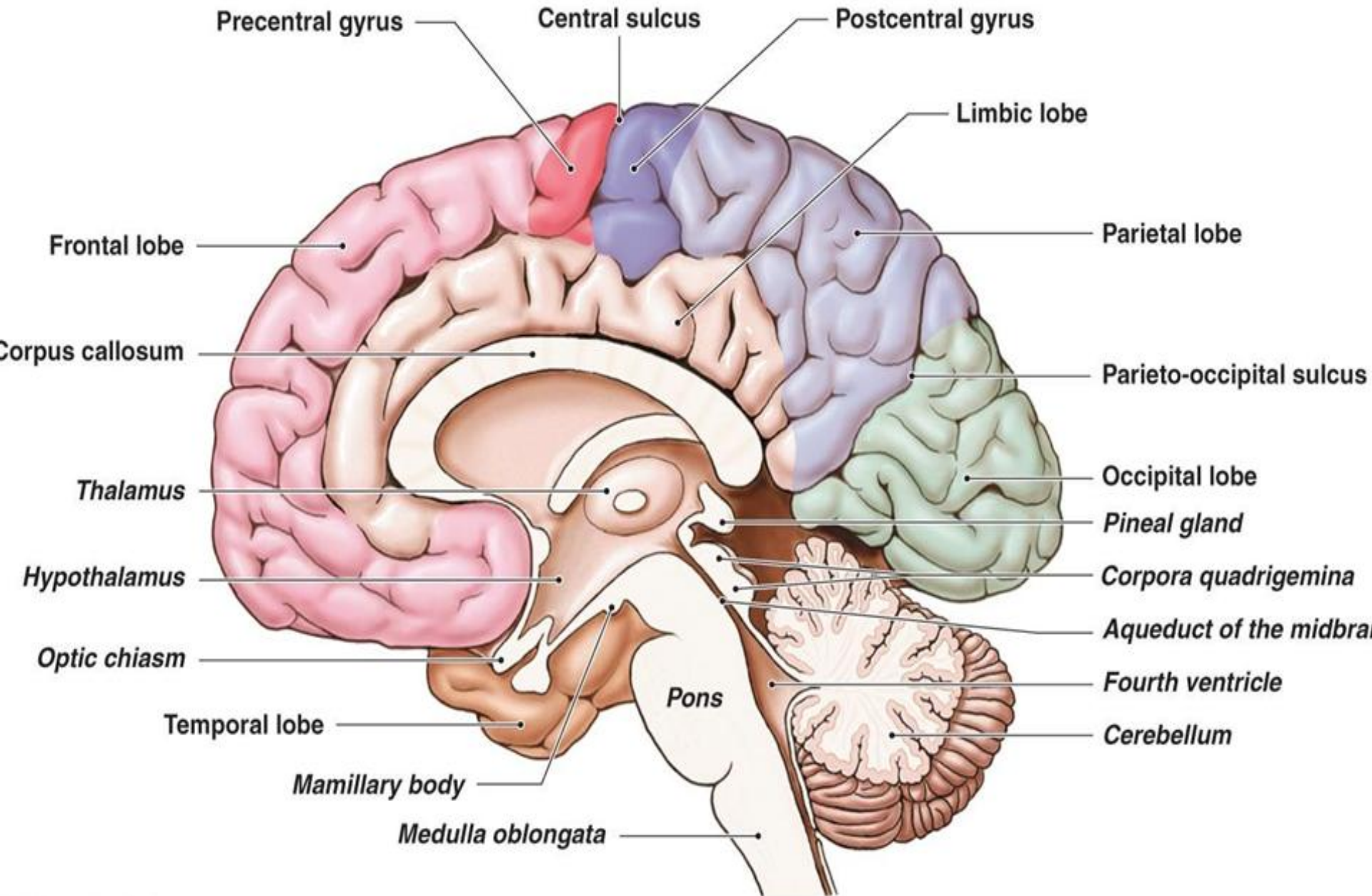
**STOP**

STOWARZYSZENIE TRENERSKIE  
ORGANIZACJI POZARZĄDOWYCH

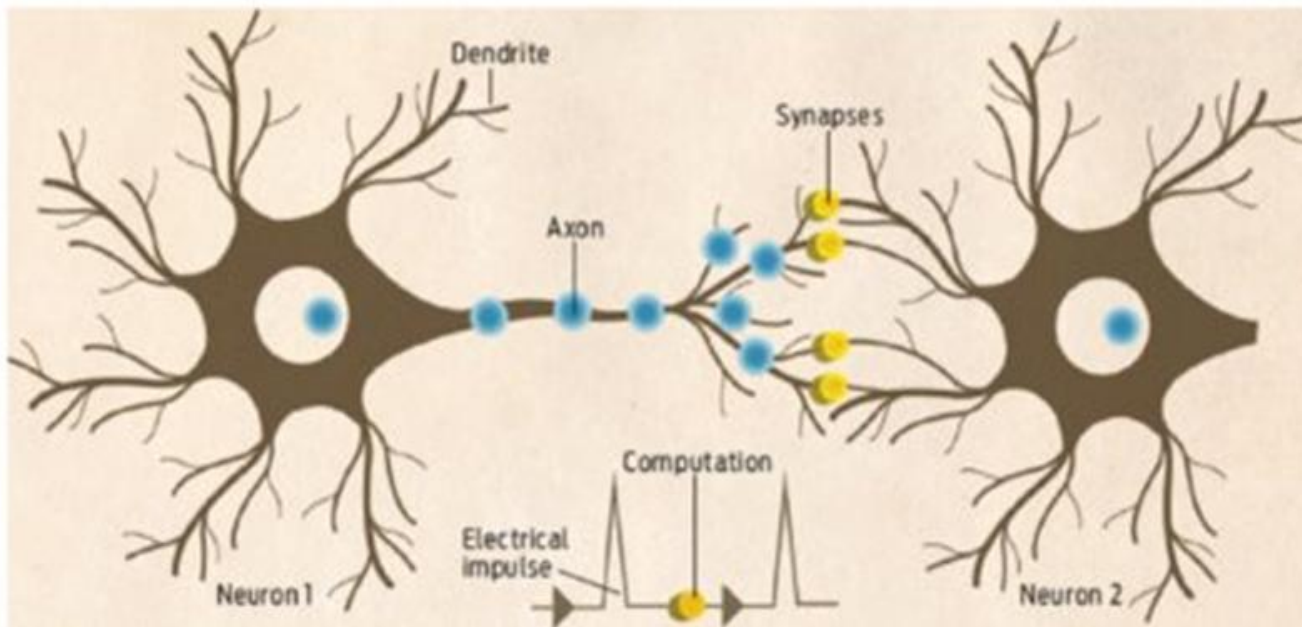


**The term neurodidactics was coined in 1988 from the fusion of various fields of study such as education, psychology, and neuroscience. This fusion was built from an attempt to understand the aspects of neural development that influence learning. As well as, to use this knowledge to create new methodologies in a classroom and to optimize the teaching-learning process.**

A midsagittal view showing the inner boundaries of the lobes of the cerebral cortex  
(Structures outside of the cerebrum are labeled in italics.)



# Neuron structure in the human brain



Neurons are information messaging cells within the central nervous system (CNS) and peripheral nervous system (PNS). They make it possible for your body to manage processes that you don't think about, like digestion, as well as decisions typically within your conscious control, like walking and talking.

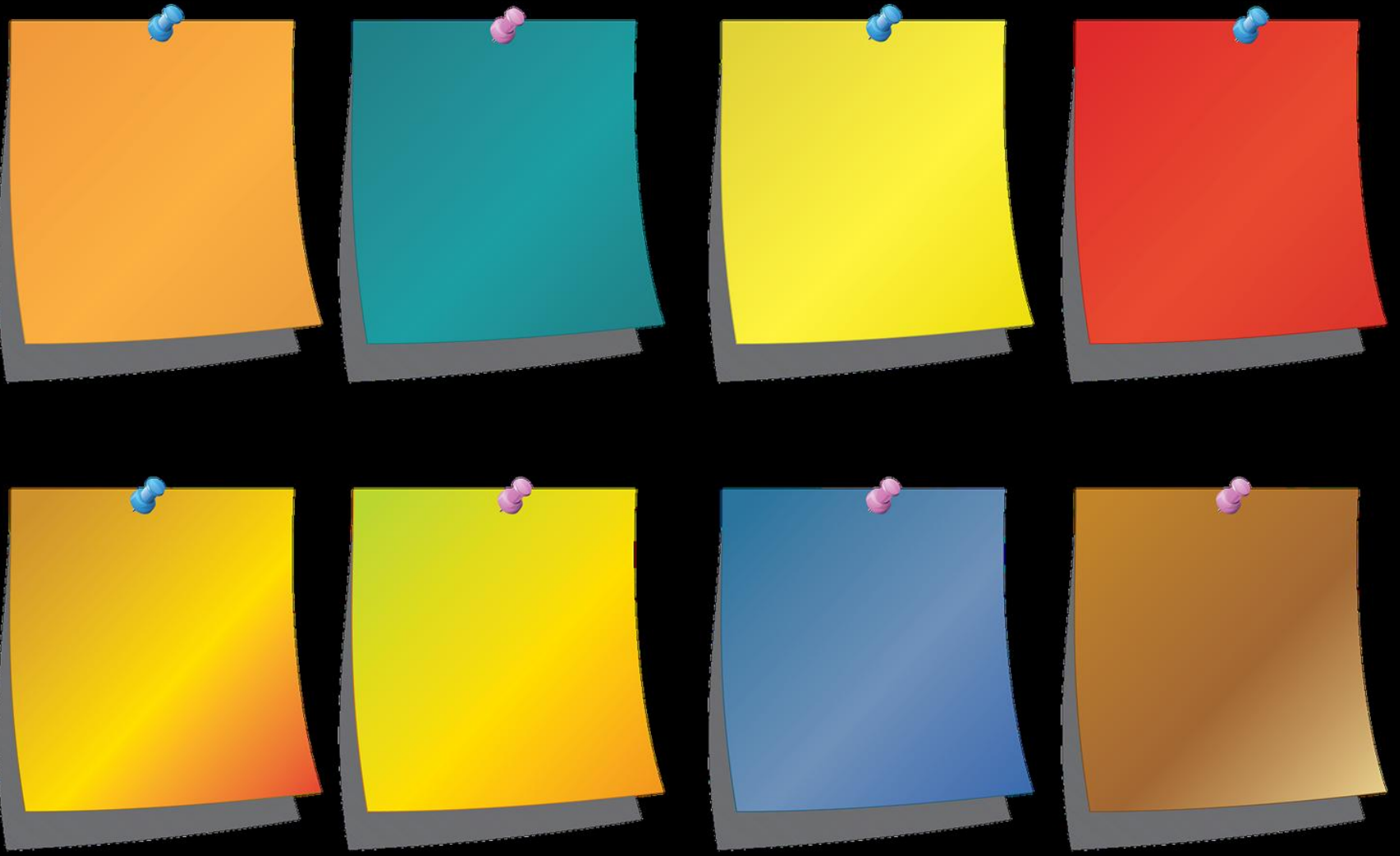
Is this true?





**What important insights can we gain from the knowledge of the brain's structure and functions?**

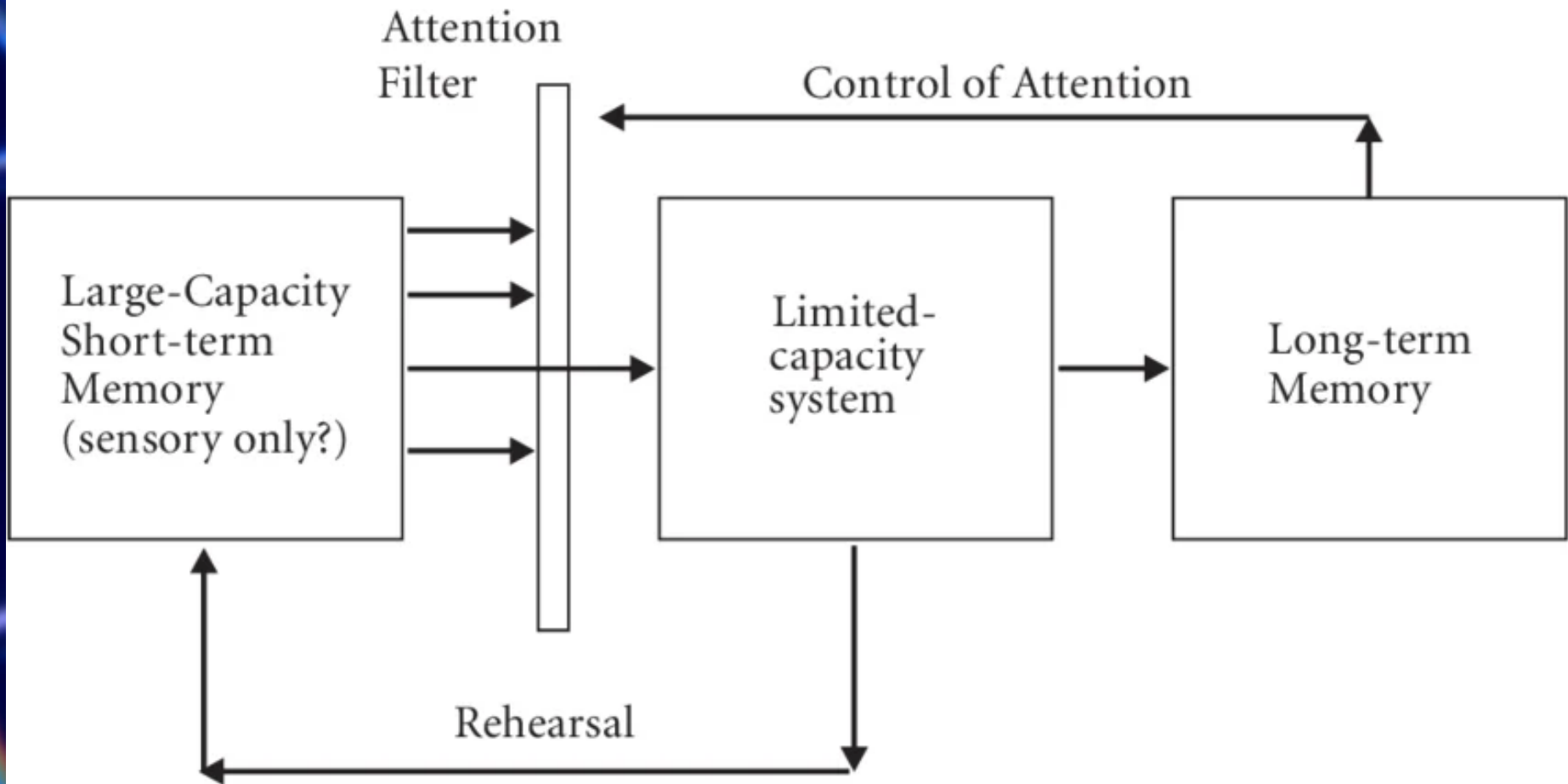
**Using work methods and techniques that stimulate different areas of our brain increases efficiency**



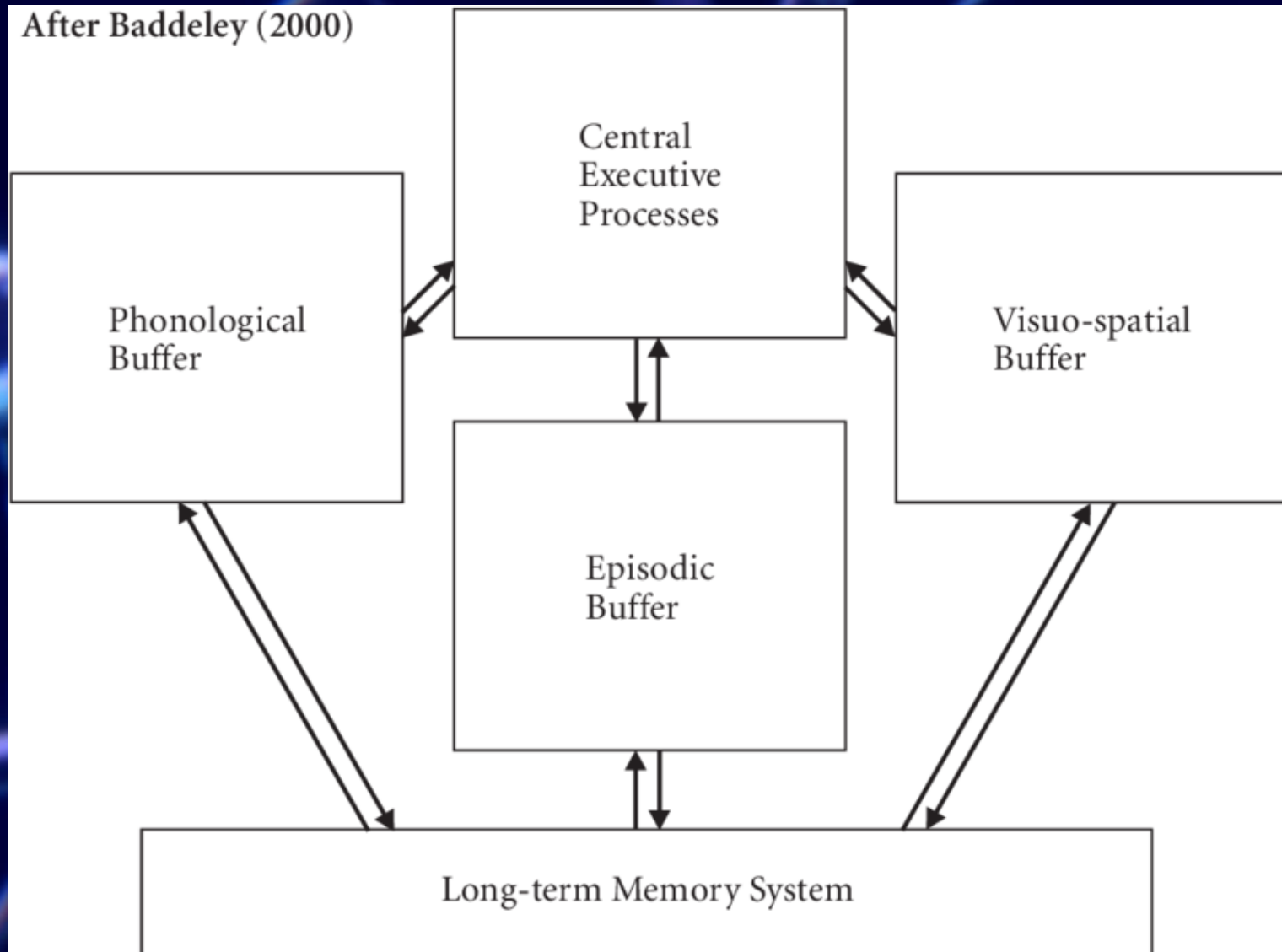
# ATTENTION AND MEMORY

# A depiction of the information-processing model of Broadbent (1958).

After Broadbent (1958), with simplifications for clarity



# A depiction of the information-processing model of Baddeley (2000).



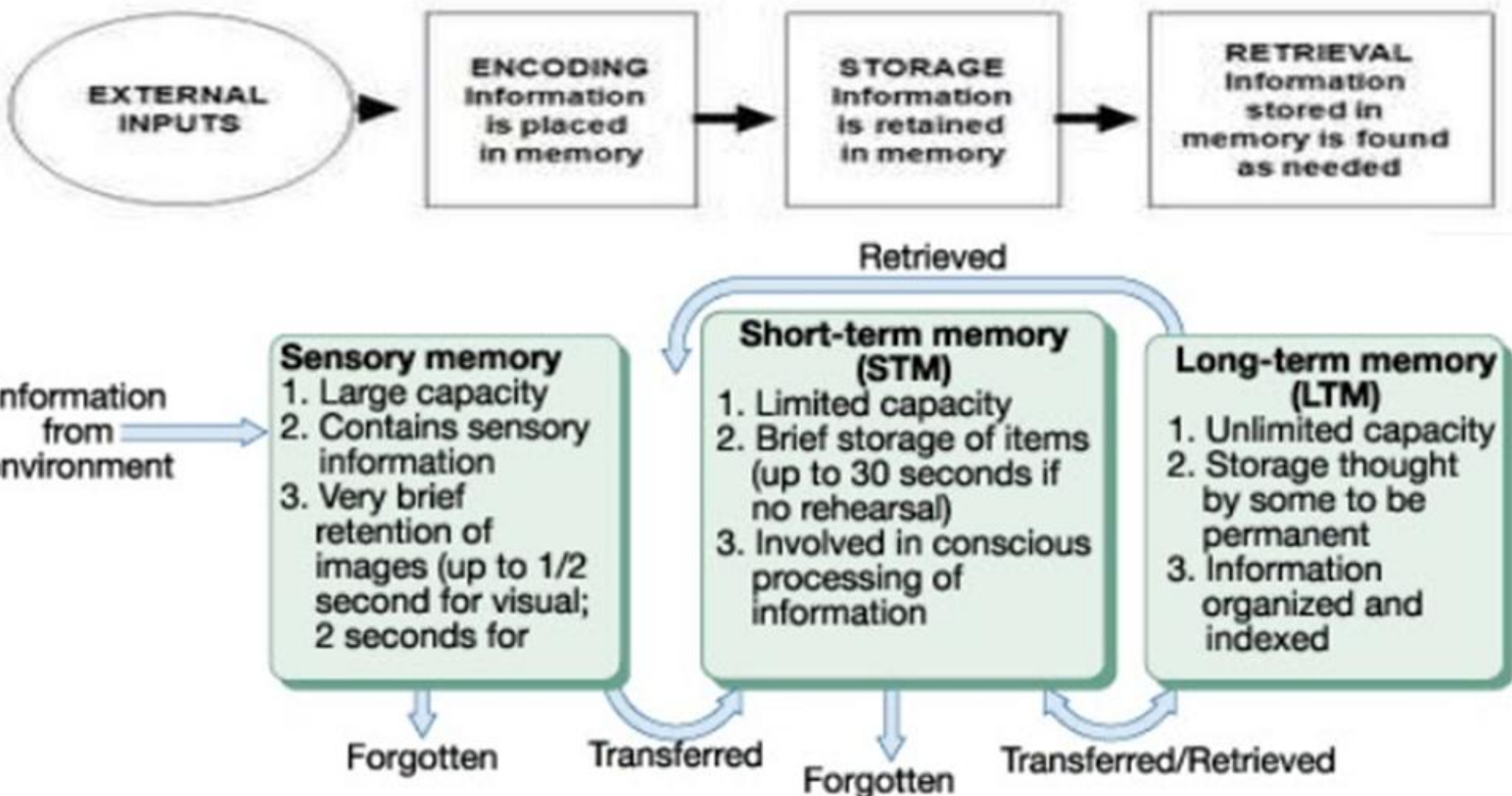
# What important insights can we gain from our understanding of attention?

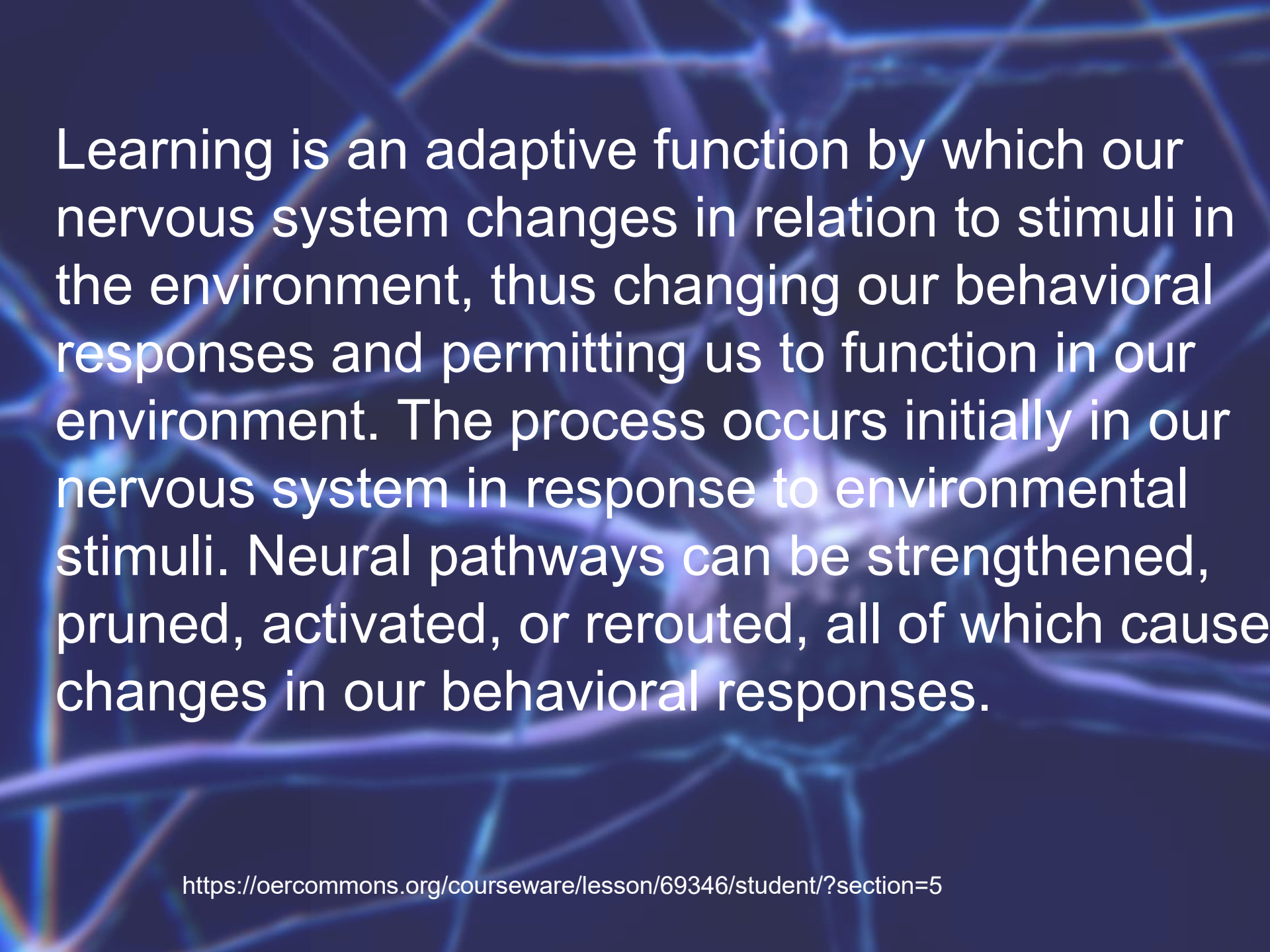
**ATTENTION** is selective, so the following factors are important:

- stimulating various senses
- focusing on the physical characteristics of the stimulus
- avoiding information interference (background noise)
- filtering information and presenting it in an organized manner
- emphasizing the significance or importance of the information
- using humor, surprise...

# Three Box Model of Memory

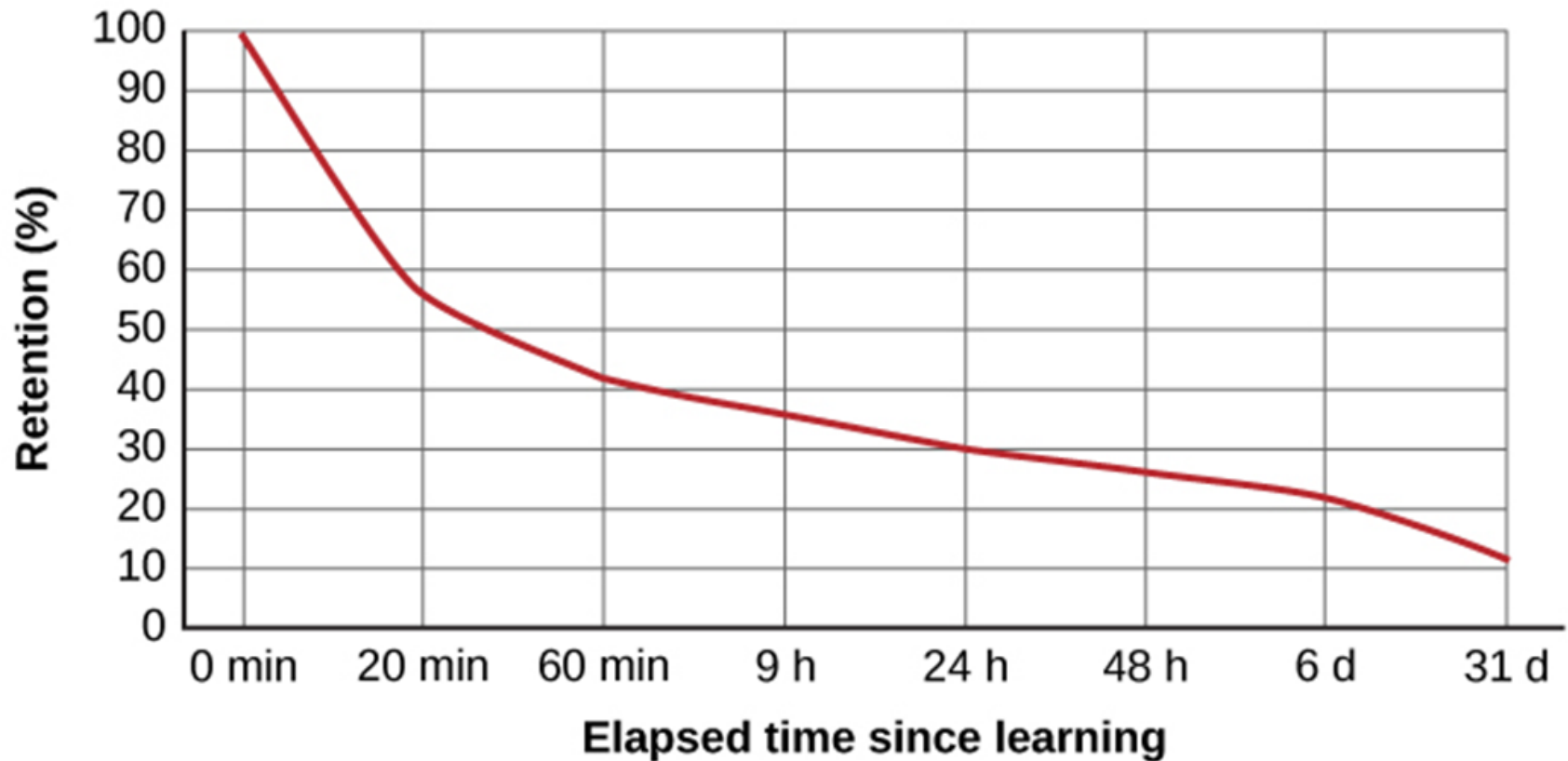
## Memory Process





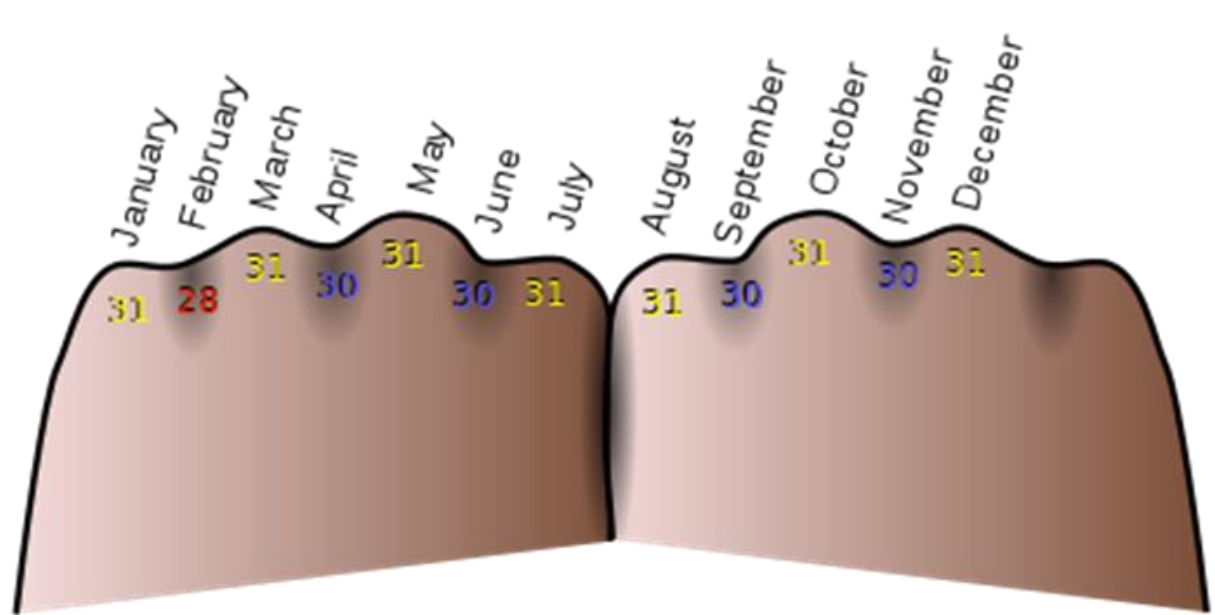
Learning is an adaptive function by which our nervous system changes in relation to stimuli in the environment, thus changing our behavioral responses and permitting us to function in our environment. The process occurs initially in our nervous system in response to environmental stimuli. Neural pathways can be strengthened, pruned, activated, or rerouted, all of which cause changes in our behavioral responses.

**The Ebbinghaus forgetting curve shows how quickly memory for new information decays.**



**This is the famous forgetting curve showing that information fades with the passage of time. An average person will lose 50% of the memorized information after 20 minutes and 70% after 24 hours (Ebbinghaus, 1885-1964). Memory for new information decays quickly and then eventually levels out.**

# What is a Mnemonic Technique?



**A mnemonic is a learning technique that helps us to remember information. Mnemonics are used in the form of memorable words. Mnemonics are formed following the theory that it is easy for the human brain to remember spatial, personal, surprising, sexual, humorous, physical or otherwise relatable information, rather than impersonal and abstract data.**

<https://pediaa.com/difference-between-mnemonic-and-acronym/>

# HOW STORYTELLING AFFECTS THE BRAIN

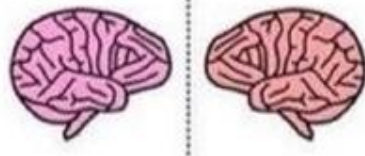
## NEURAL COUPLING

A story activates parts in the brain that allows the listener to turn the story into their own ideas and experience thanks to a process called neural coupling.



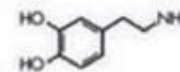
## MIRRORING

Listeners will not only experience the similar brain activity to each other, but also to the speaker.



## DOPAMINE

The brain releases dopamine into the system when it experiences an emotionally charged event, making it easier to remember and with greater accuracy.



## CORTEX ACTIVITY

When processing facts, two areas of the brain are activated (Broca's and Wernicke's area). A well-told story can engage many additional areas, including the motor cortex, sensory cortex and frontal cortex.

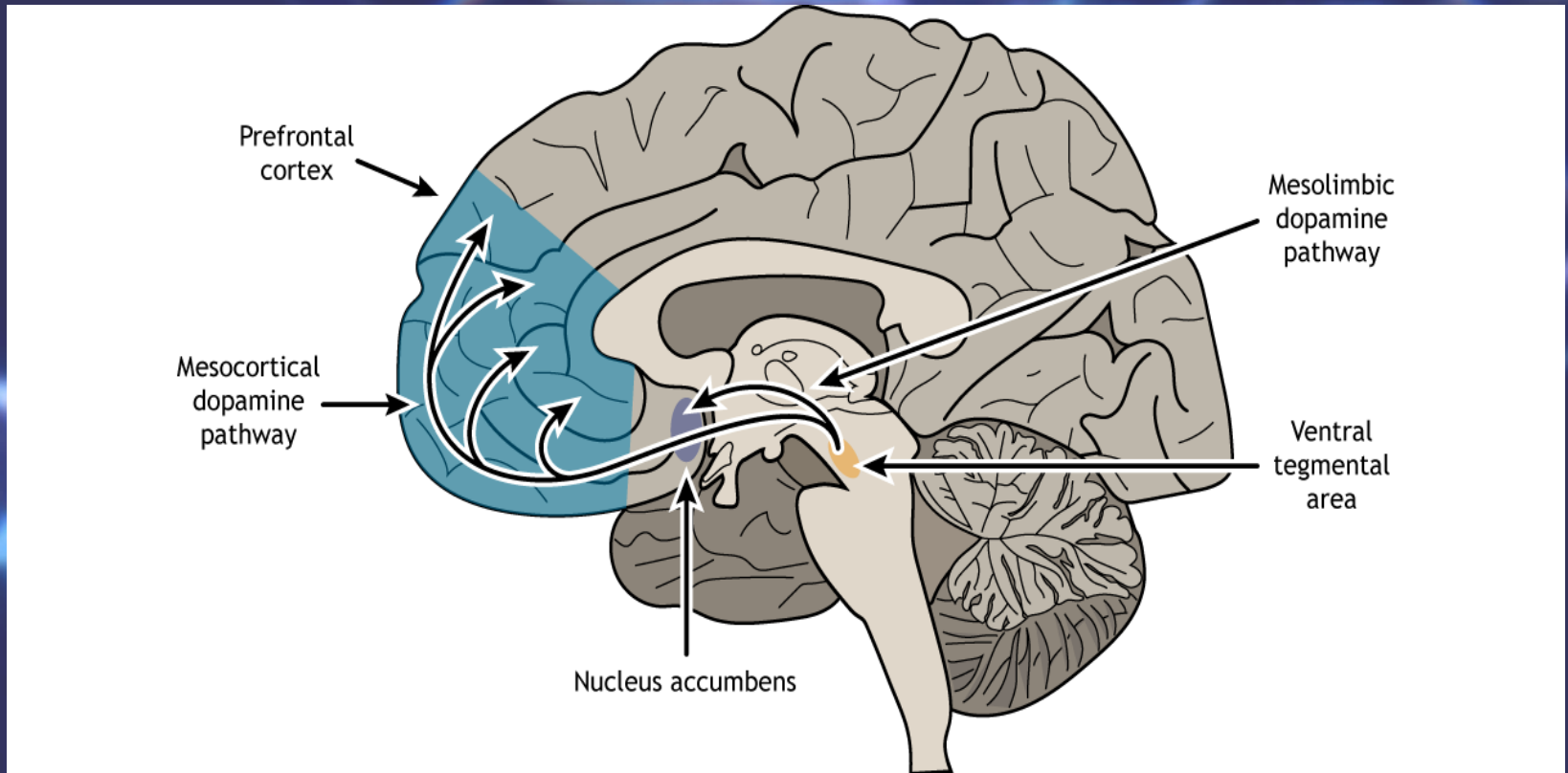




**Better retention of information is possible thanks to:**

- the use of various techniques that stimulate the hippocampus and the production of neurotransmitters such as norepinephrine and dopamine**
- creating surprises, using humor, movement, and gamification elements,**
- keeping in mind the primacy and recency effects.**
- remembering to take breaks, eat, drink water, and maintain a friendly atmosphere 😊**

# Motivation and Reward



The reward circuit depends on the action of dopamine. Dopamine is synthesized and released by neurons located in the ventral tegmental area (VTA), a midbrain region adjacent to the substantia nigra. There are two primary pathways from the VTA that are important for reward. The mesolimbic pathway connects the VTA to the nucleus accumbens, a region located in the ventral striatum. The mesocortical pathway connects the VTA with the prefrontal cortex.



# Motivation

**The motivational system in the brain monitors the current state of satisfaction of goals and activates behaviors to meet any needs that arise. The motivational system works largely by a reward–punishment mechanism. When a particular behavior is followed by favorable consequences, the reward mechanism in the brain is activated, which induces structural changes inside the brain that cause the same behavior to be repeated later, whenever a similar situation arises. Conversely, when a behavior is followed by unfavorable consequences, the brain's punishment mechanism is activated, inducing structural changes that cause the behavior to be suppressed when similar situations arise in the future.**

# Mimicry in humans reflects social cues





## **A quick review**

**What important insights can we draw from this knowledge?**

- 1. Using work methods and techniques that stimulate different areas of our brain improves learning effectiveness.**
- 2. Our brain has certain limitations, such as attention span, so the following helps us:**
  - stimulating various senses**
  - focusing on the physical characteristics of a stimulus**
  - avoiding information interference (background noise)**
  - separating information and presenting it in an organized manner**
  - emphasizing the significance/importance of information**
  - using humor, surprises...**
- 3. Humor, a friendly atmosphere, mnemonics, gamification, case studies, visualization, etc., help us better remember information and retrieve it from memory.**

Sources -  
Rad more here:

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THANK YOU 😊

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