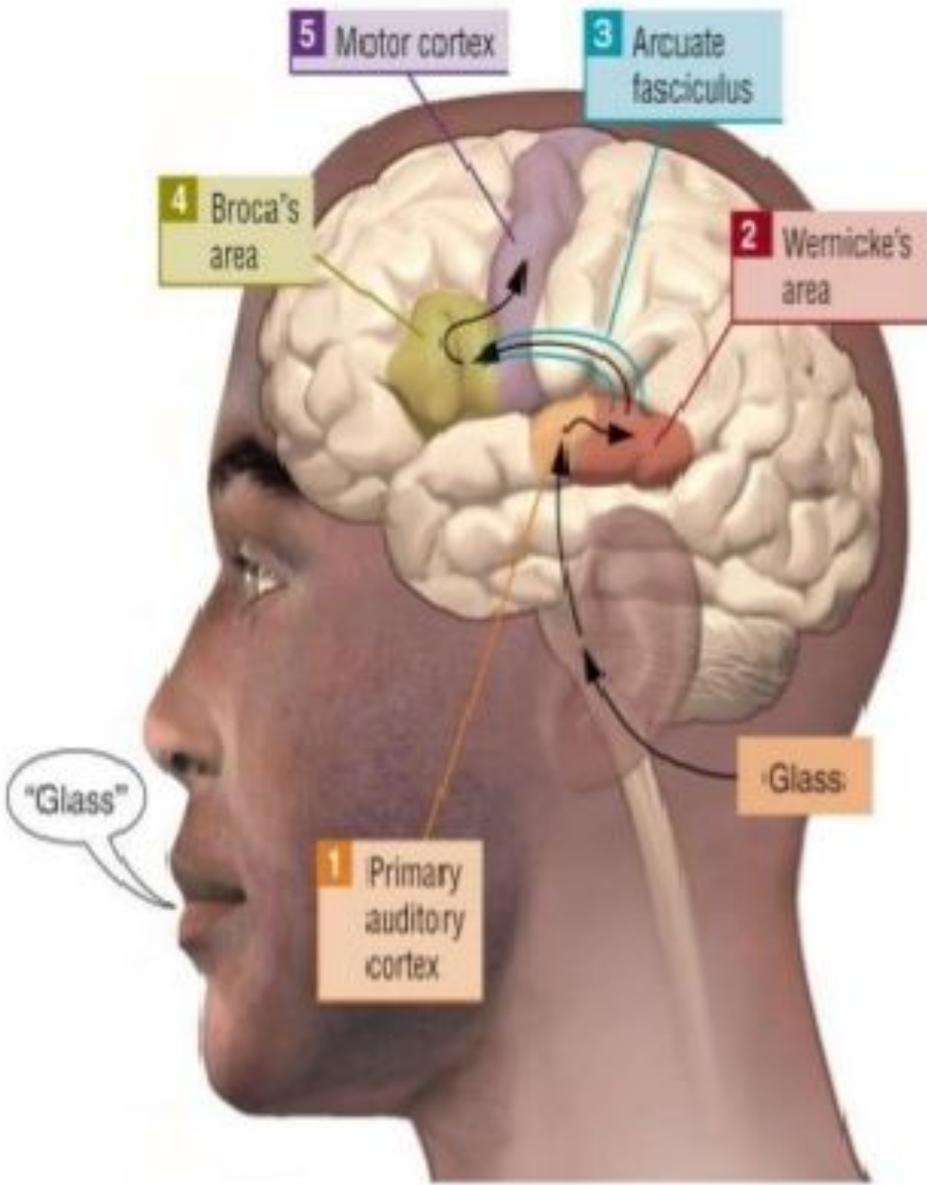
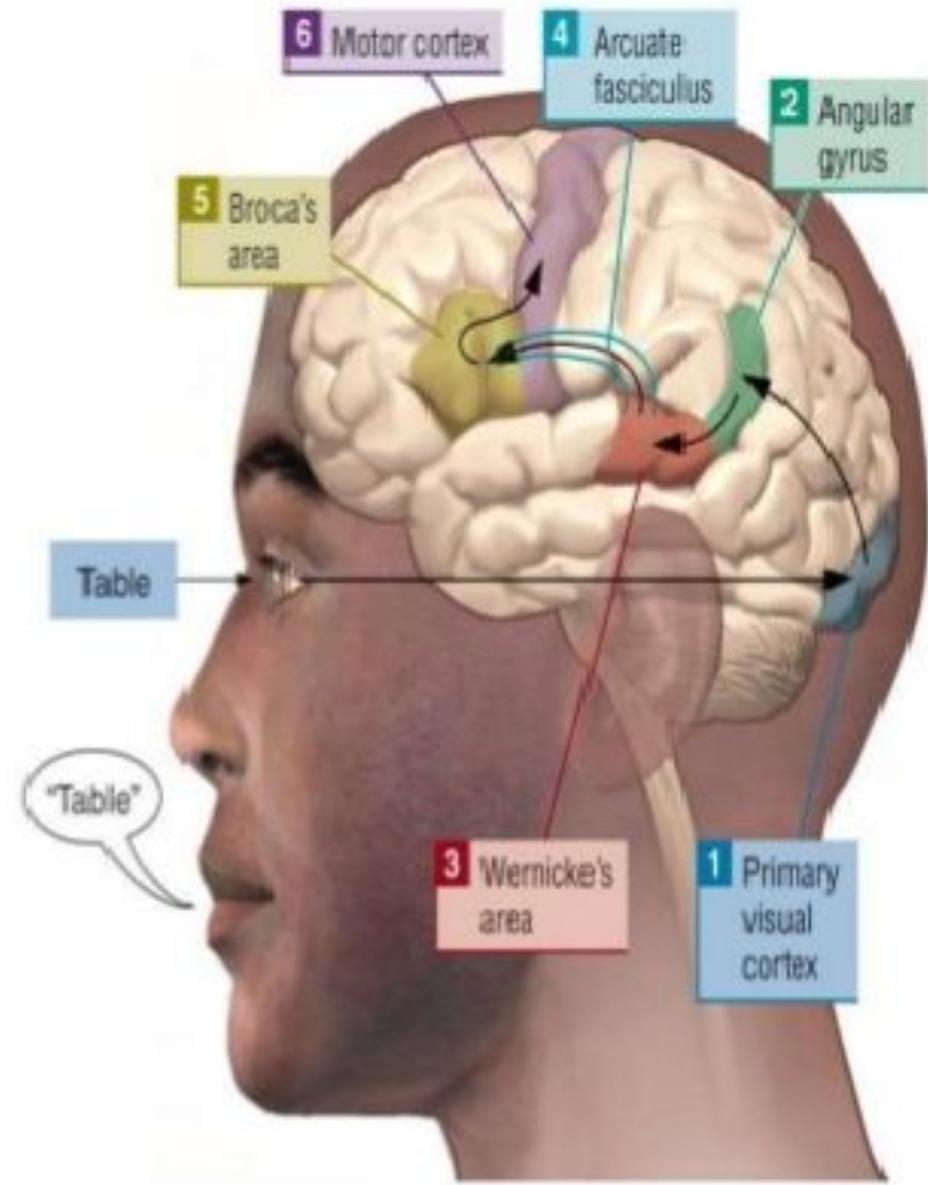


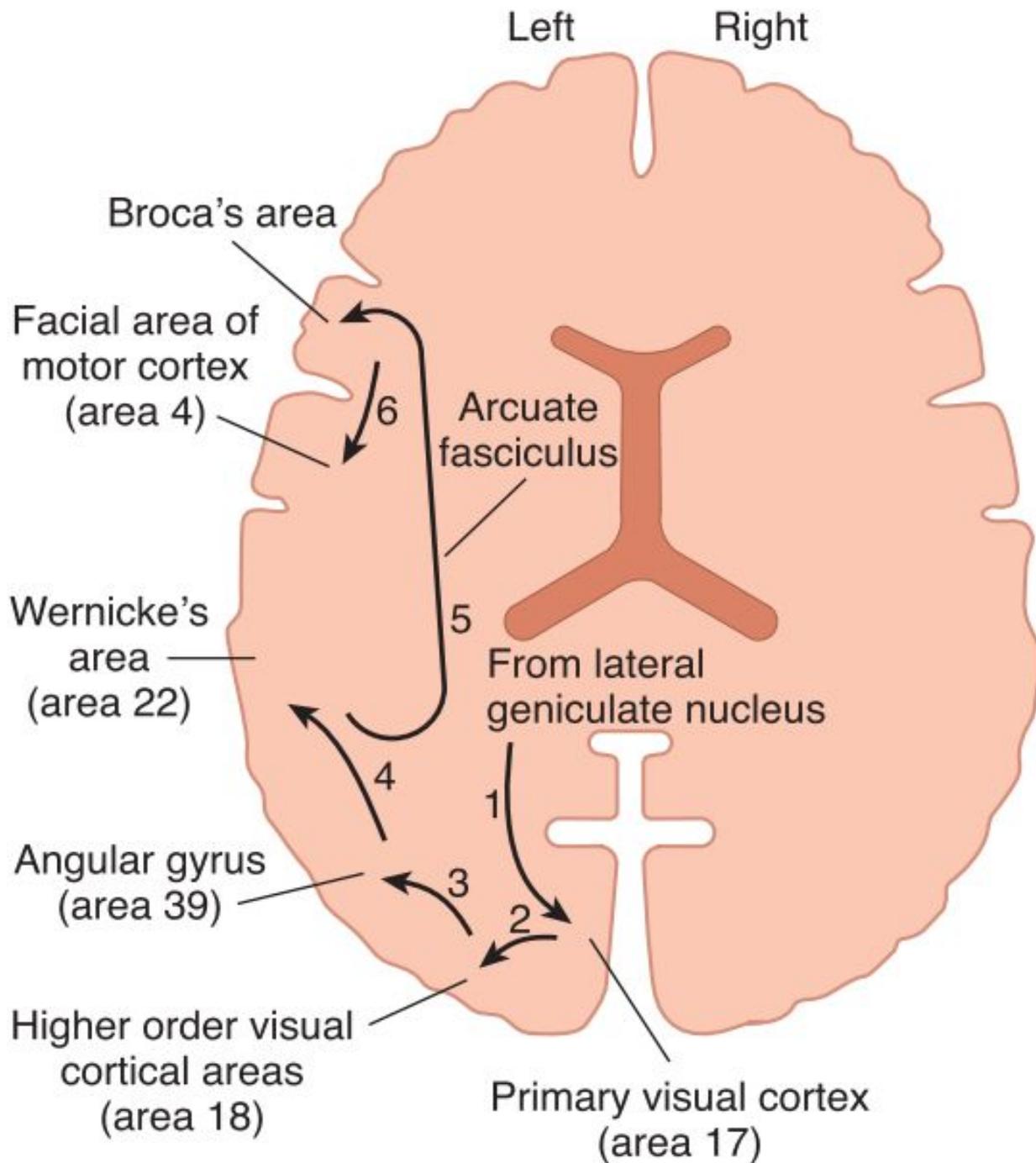
Высшая нервная деятельность  
человека. Физиологические  
основы памяти, сна и эмоций.  
Понятие о функциональных  
системах



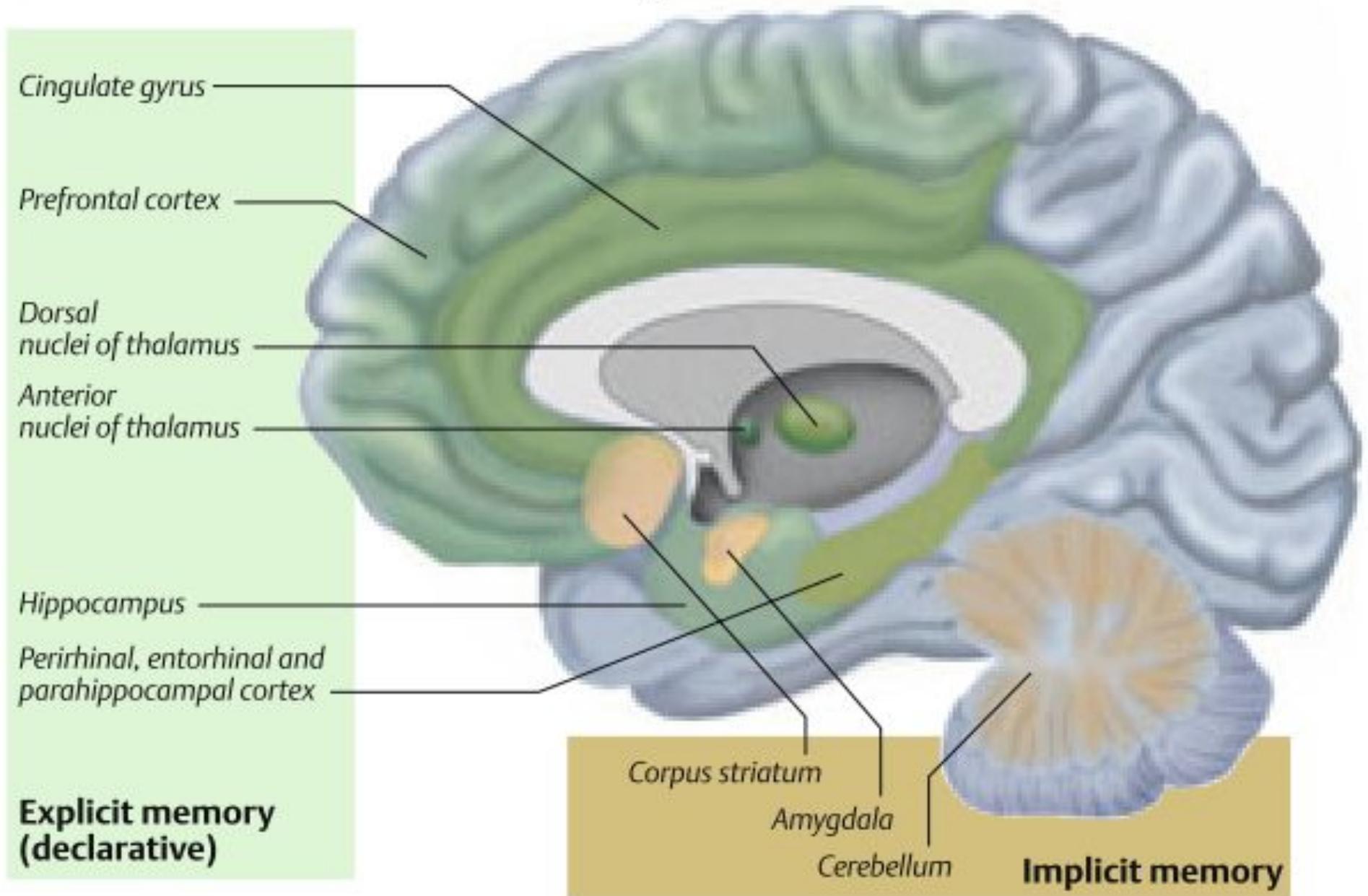
(a) Repeating a Spoken Word



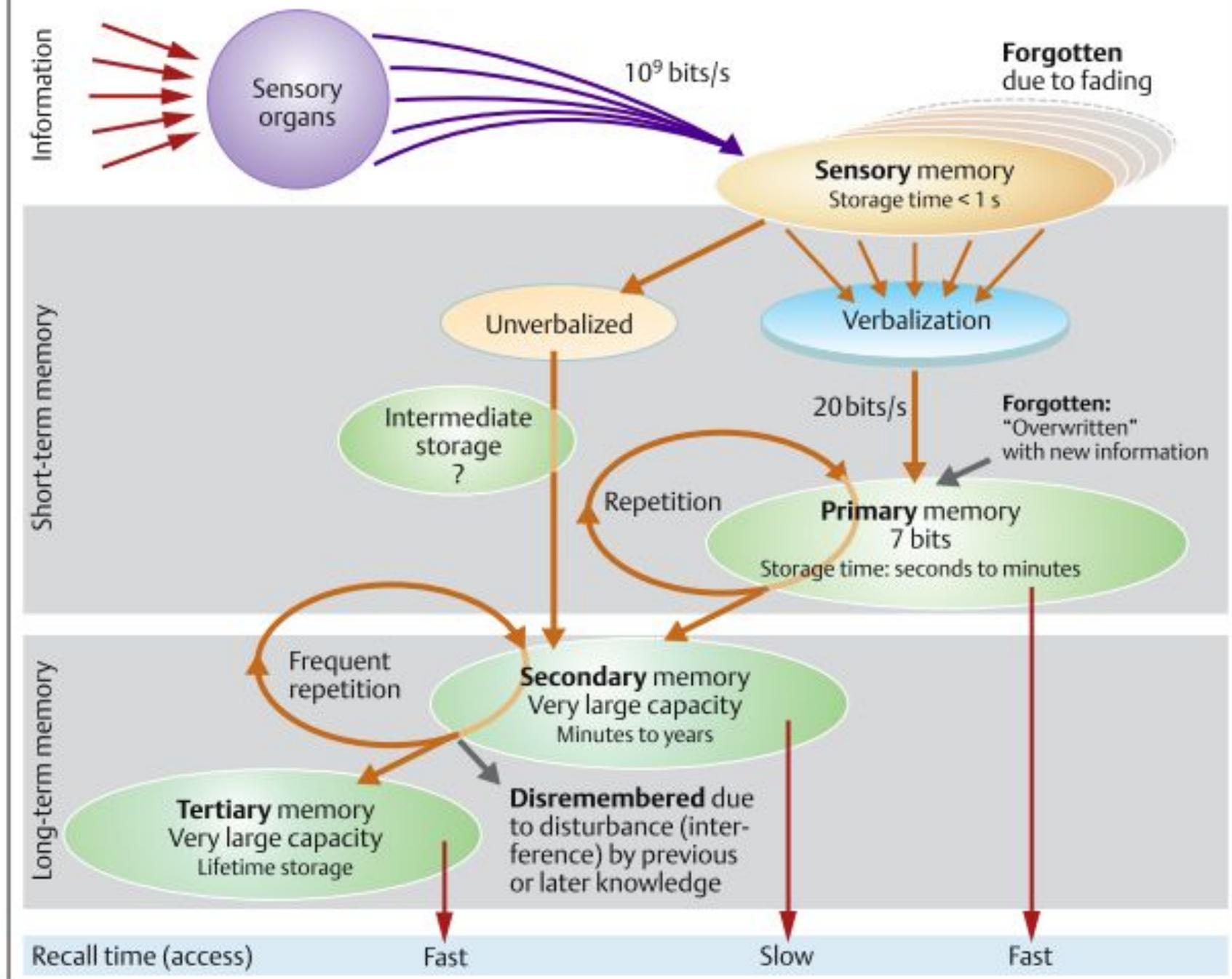
(b) Reading a Word Out Loud



## B. Areas of the brain involved in memory



### C. Storage of information in the brain (explicit memory)



Two forms of long term memory

Explicit (declarative)

Implicit (nondeclarative)

Facts (Semantic)      Events (Episodic)

Priming      Procedural (skills and habits)      Associative learning: classical and operant conditioning      Nonassociative learning: habituation and sensitization

Medial temporal lobe  
Hippocampus

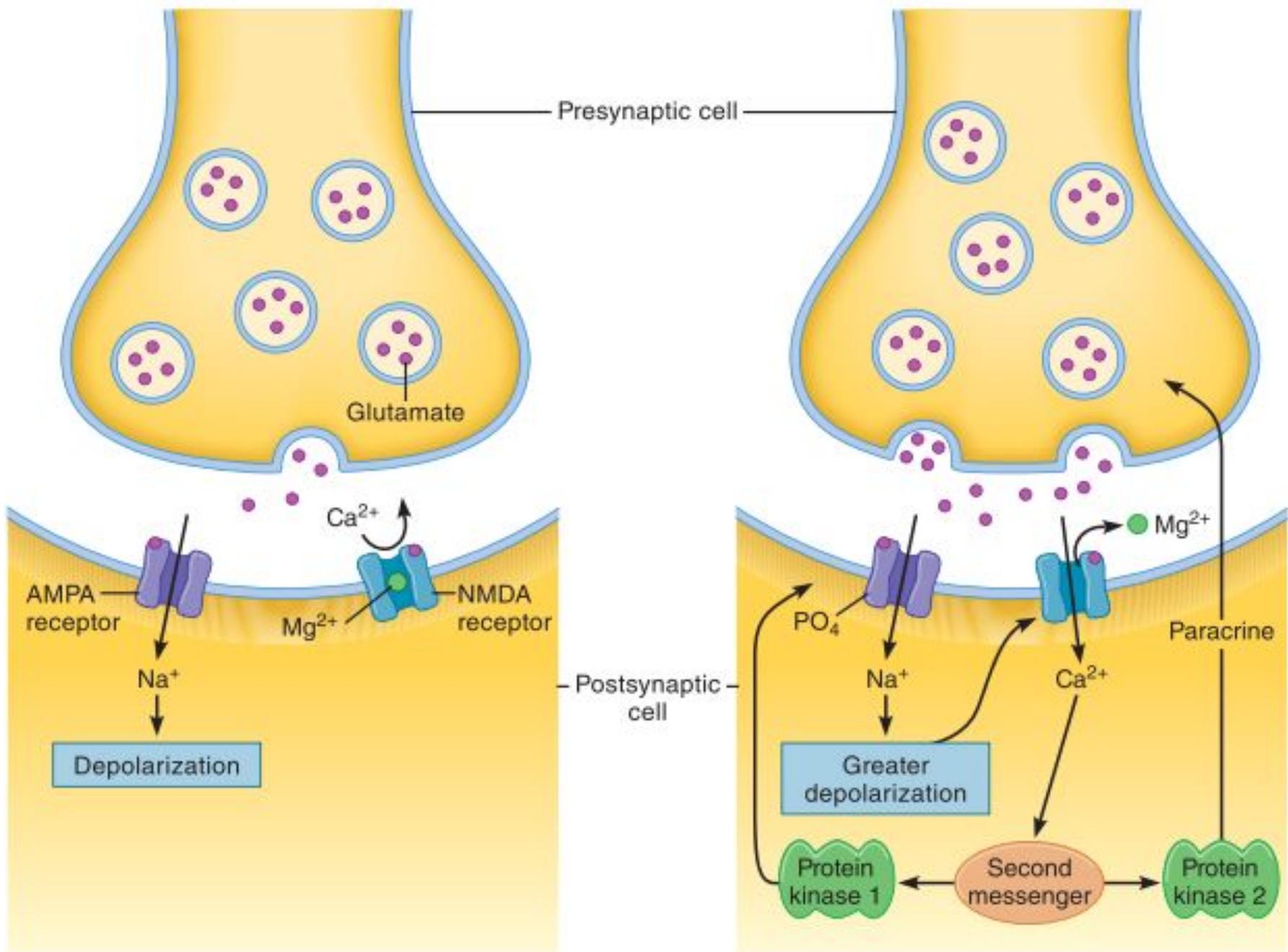
Neocortex

Striatum

Emotional responses  
Amygdala

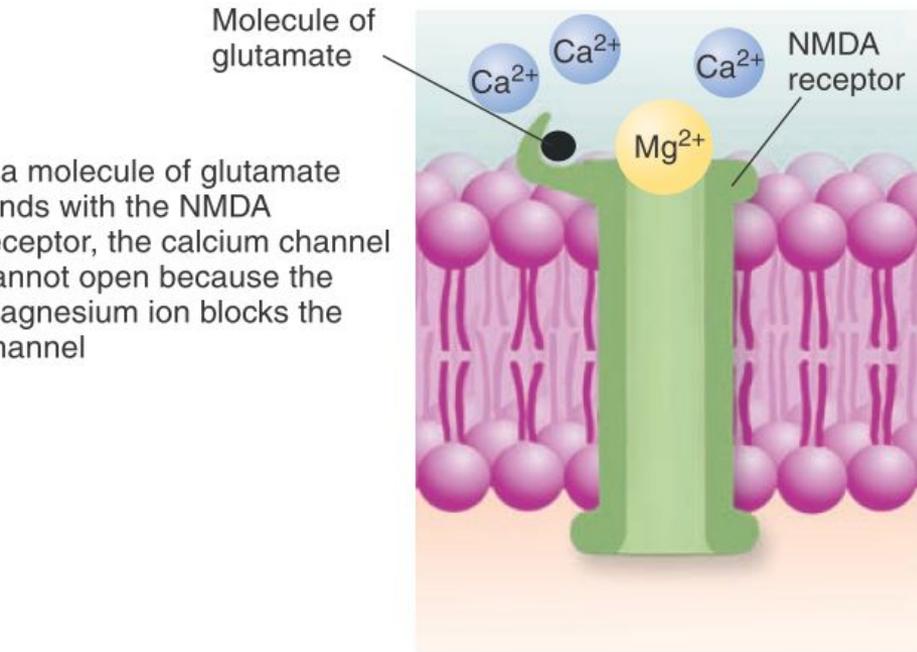
Skeletal musculature  
Cerebellum

Reflex pathways



(a) Low levels of activity in presynaptic cell

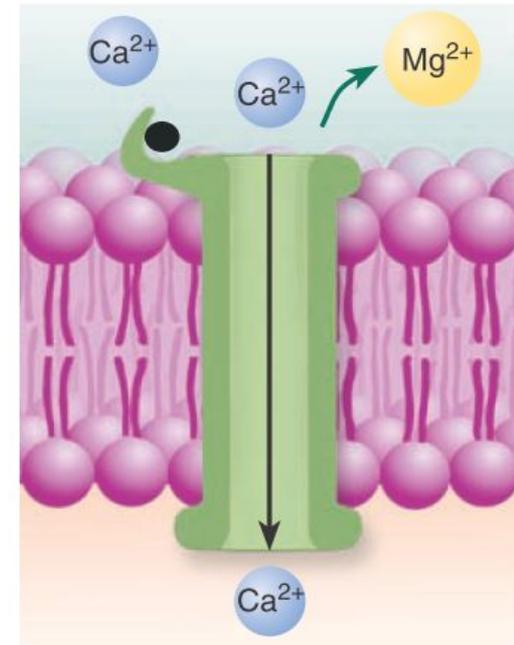
(b) High levels of activity in presynaptic cell



(a)

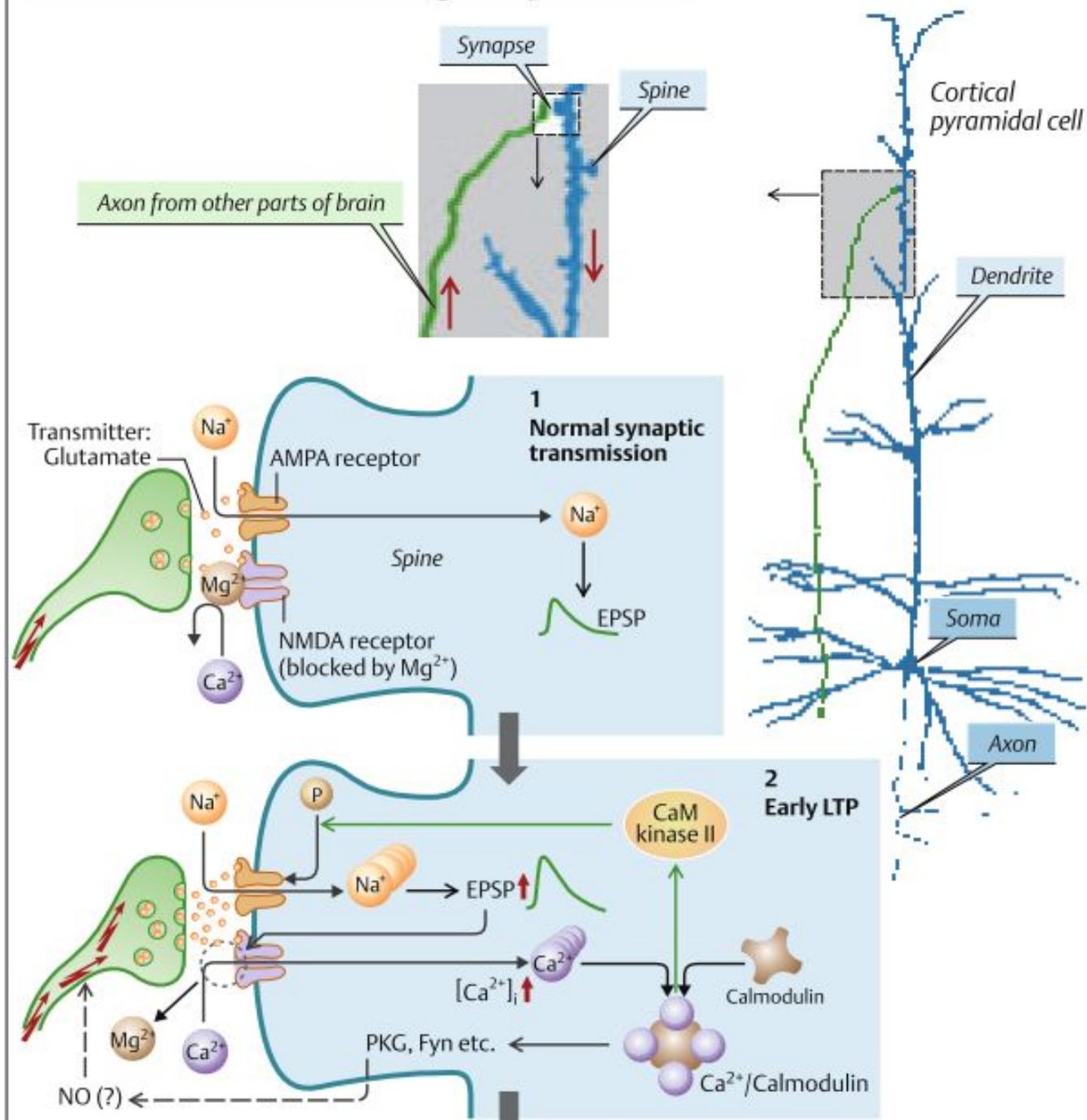
Depolarization of the membrane evicts the magnesium ion and unblocks the channel. Now glutamate can open the ion channel and permit the entry of calcium ions.

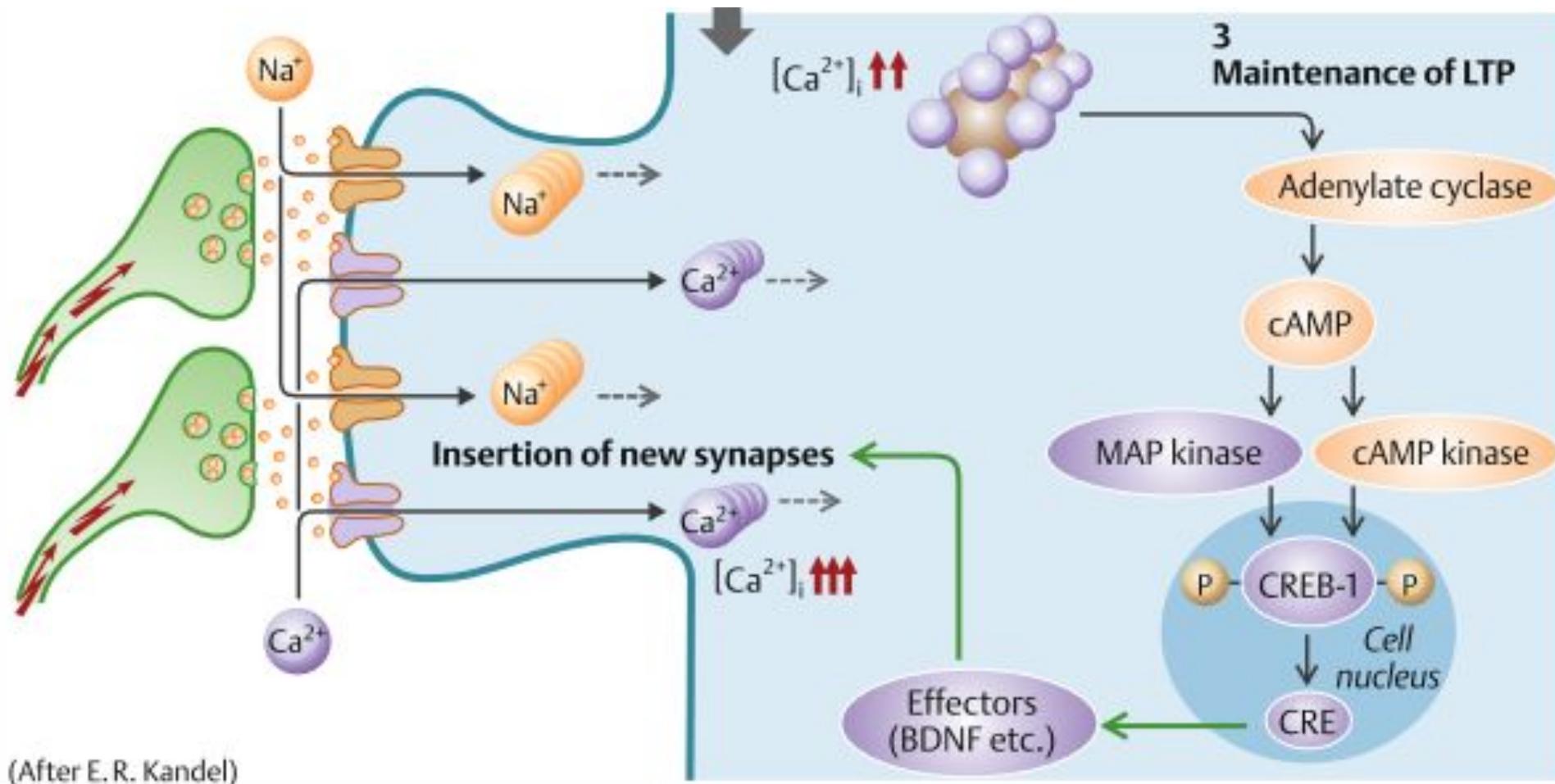
Depolarization →

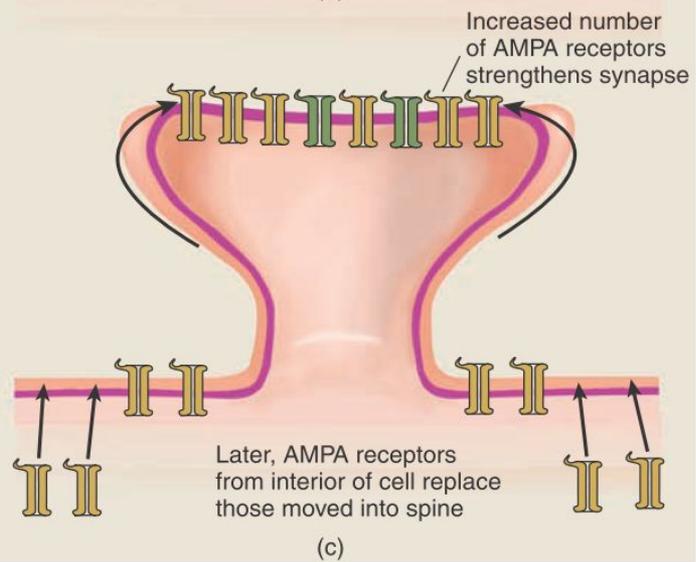
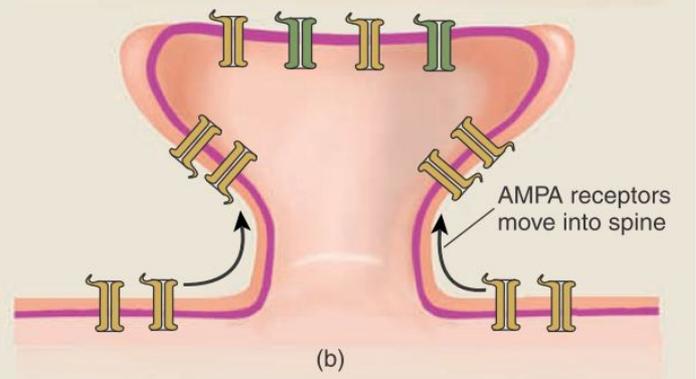
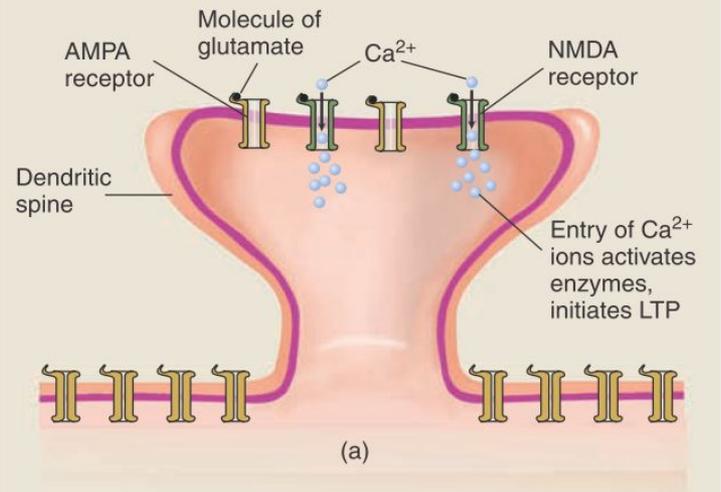


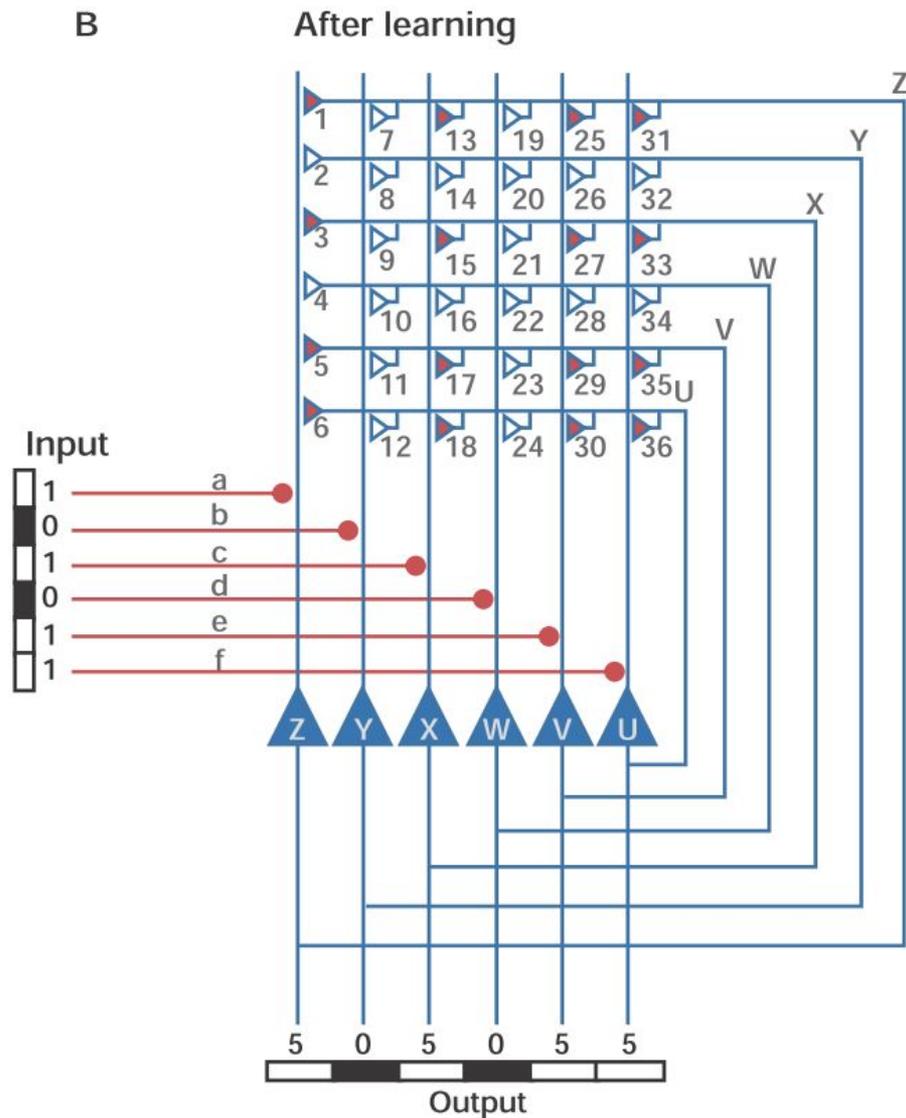
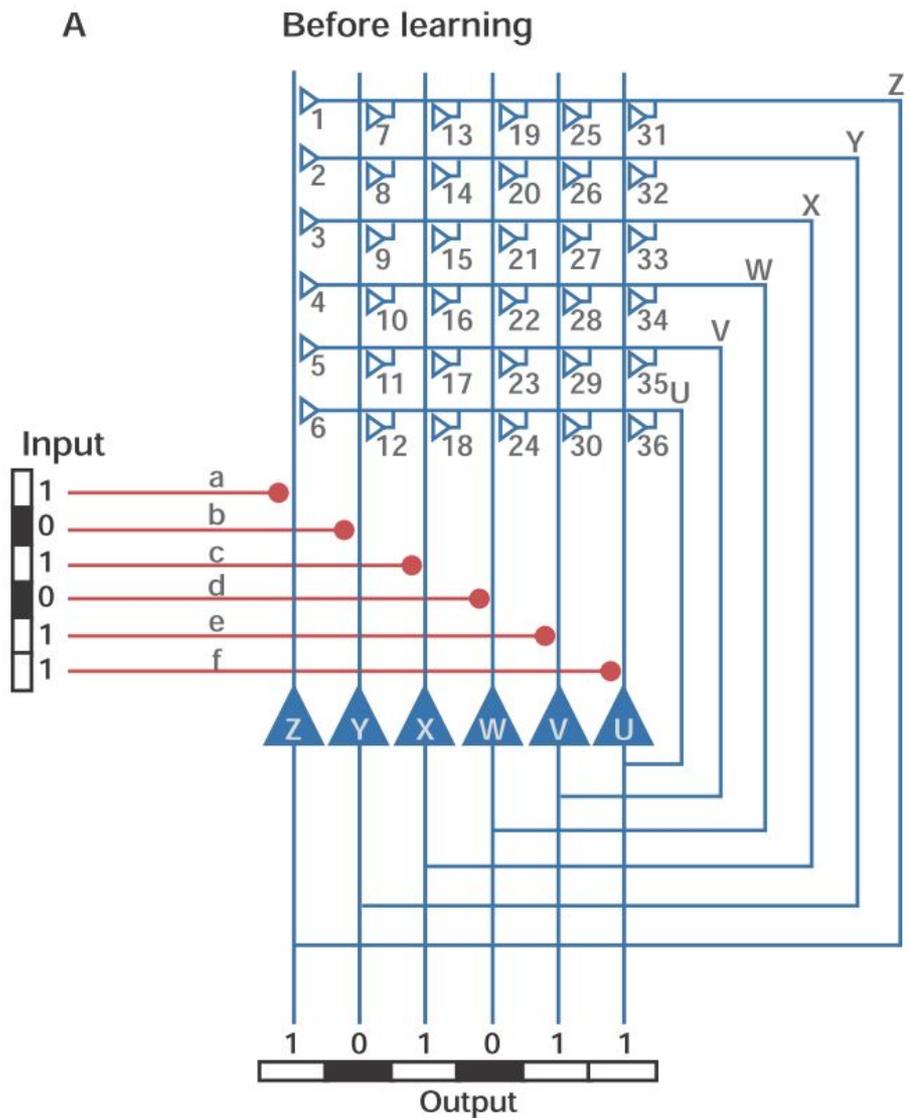
(b)

## D. Molecular mechanisms of long-term potentiation



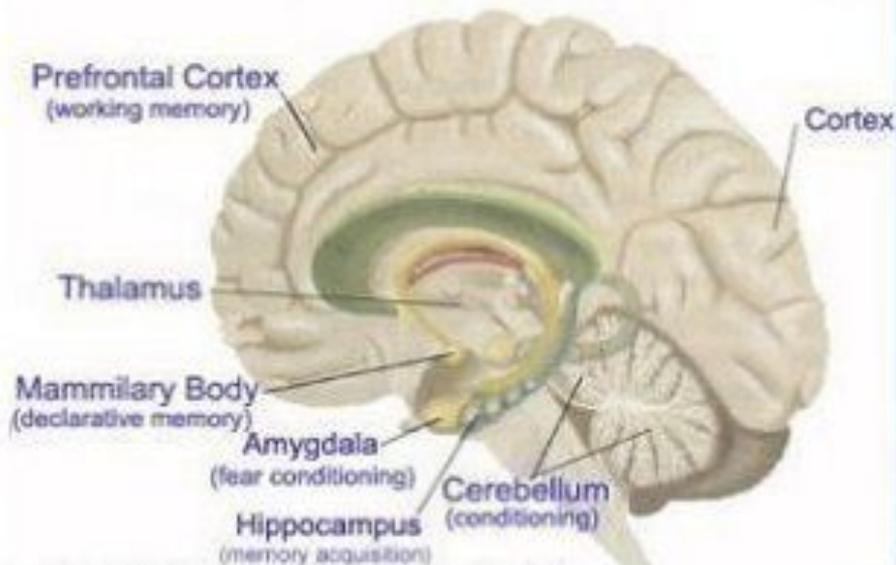




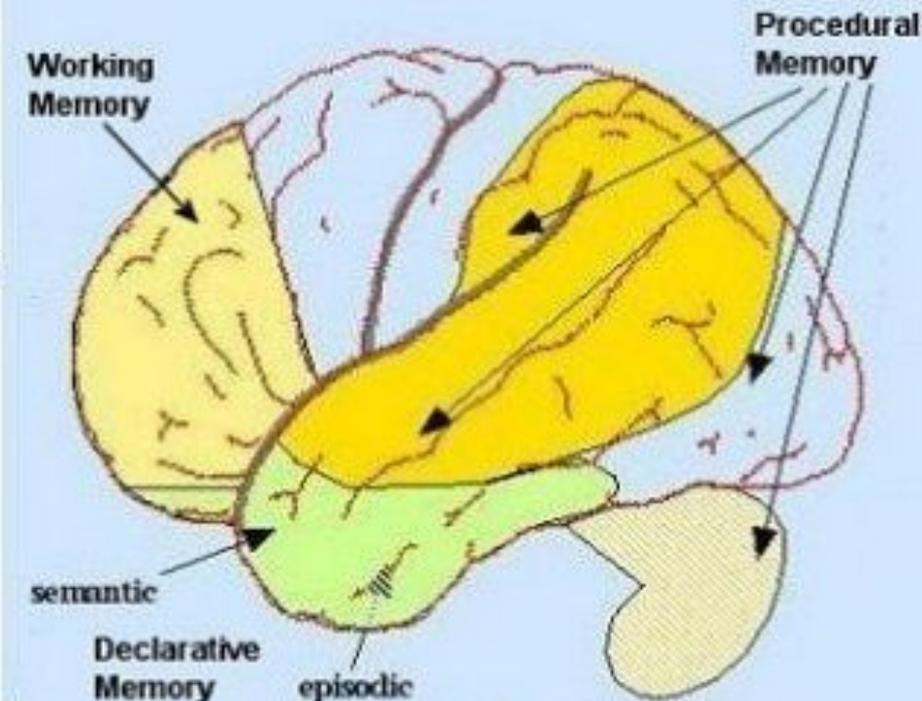


- Strong synapse
- △ Modifiable synapse
- ▴ Modified synapse

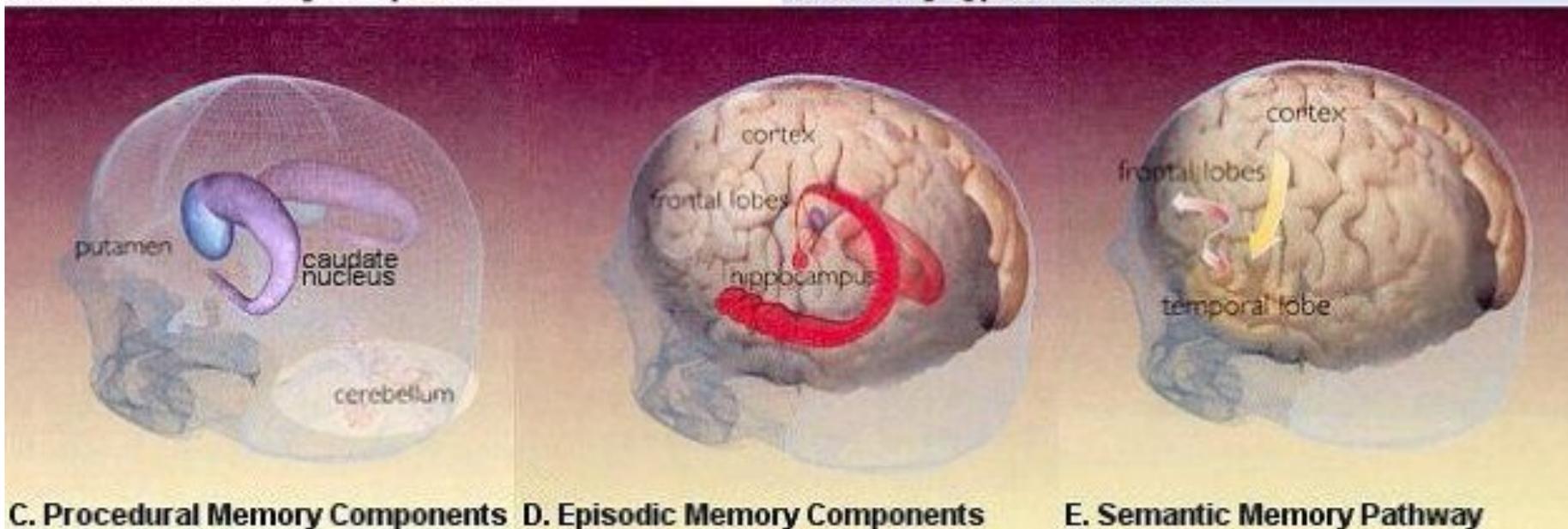
# The Brain and Memory



**A. Inner Brain Memory Components**



**B. Memory Types in the Cortex**



**C. Procedural Memory Components**

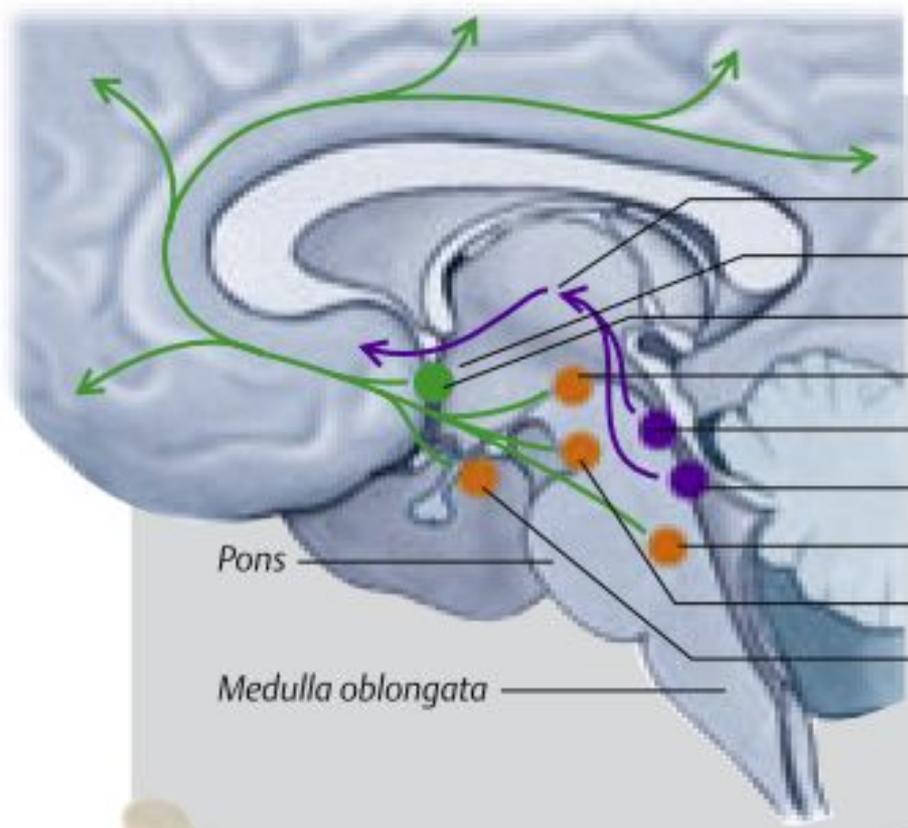
**D. Episodic Memory Components**

**E. Semantic Memory Pathway**

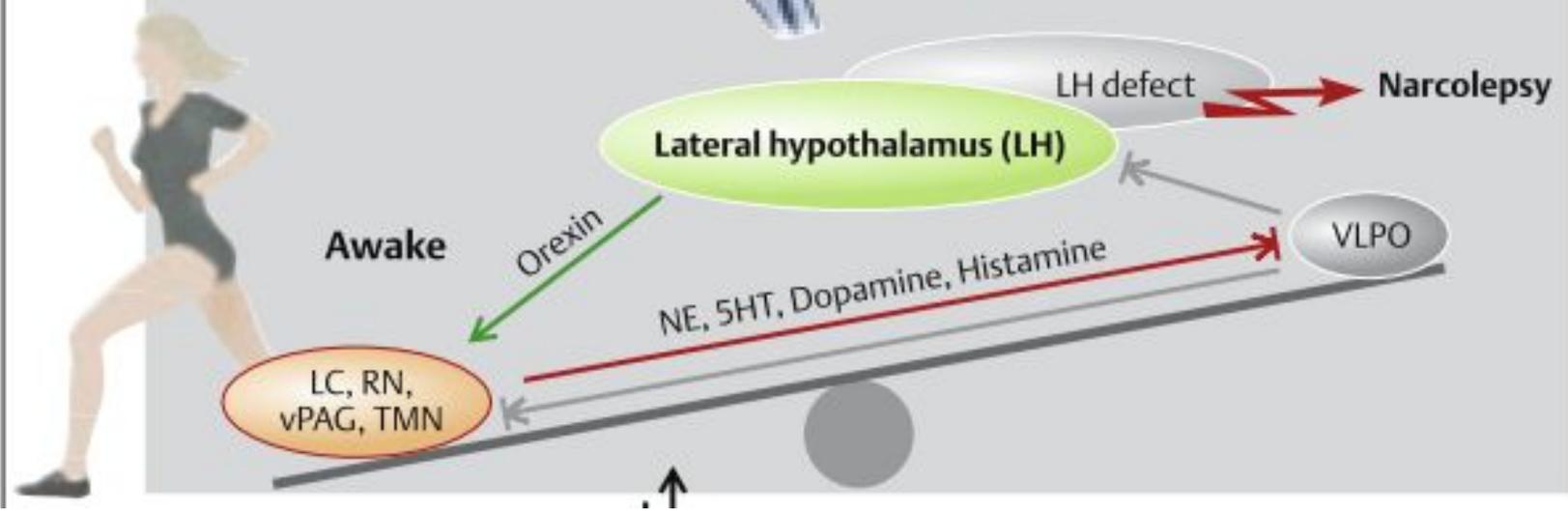
# A. Control of sleep-wake cycle

1

ARAS: activating impulses



- Thalamus
  - Hypothalamus
  - Lateral hypothalamus (LH)
  - vPAG (ventral periaqueductal gray matter)
  - LTN (lateroposterior tegmental nucleus)
  - PPN (pedunculopontine tegmental nucleus)
  - LC (locus ceruleus)
  - RN (raphe nuclei)
  - TMN (tuberomamillar nucleus)
- ascending activating impulses to cortex  
→ ascending activating impulses via thalamus



Awake

Orexin

LC, RN, vPAG, TMN

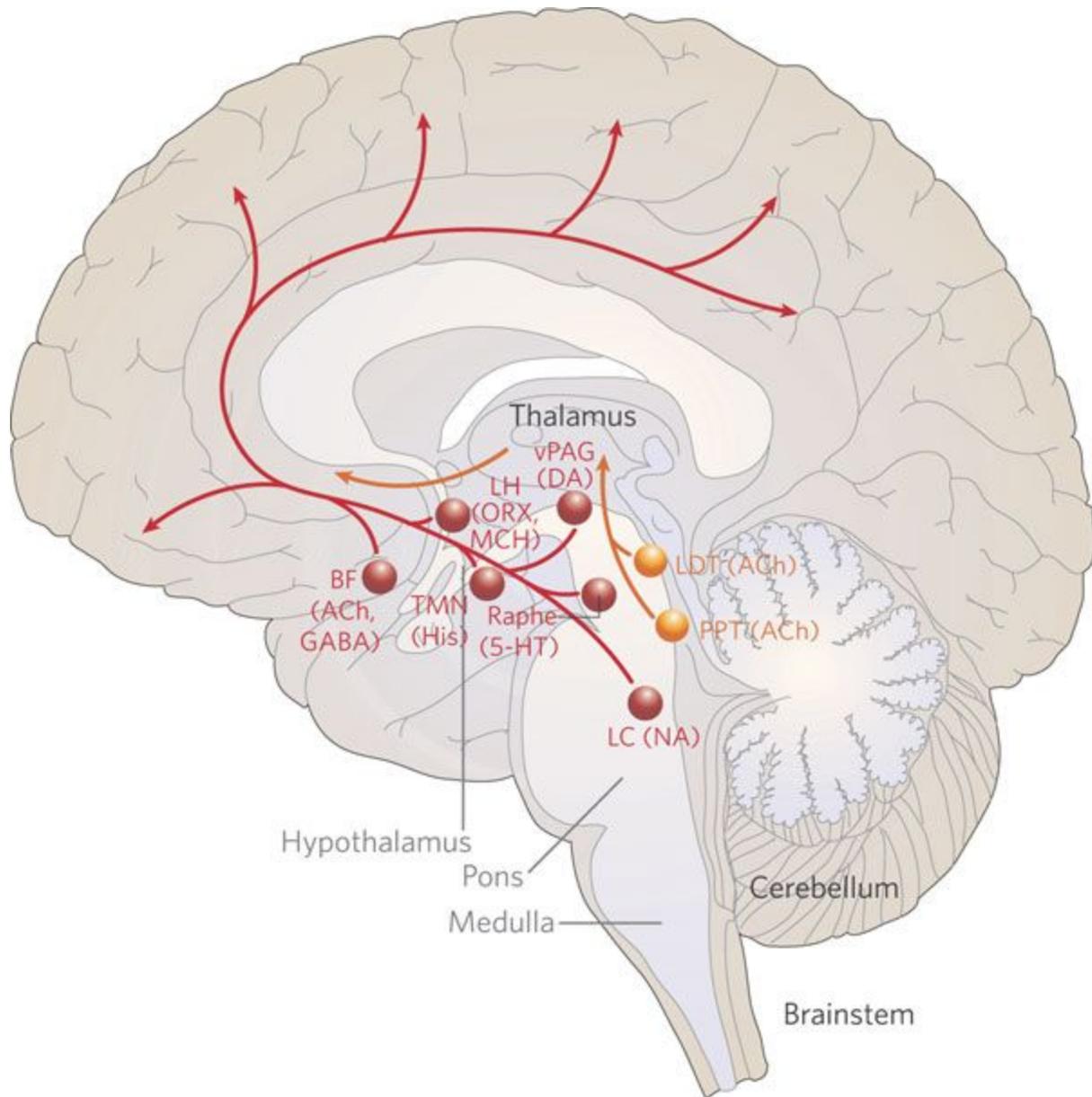
NE, 5HT, Dopamine, Histamine

Lateral hypothalamus (LH)

LH defect

Narcolepsy

VLPO



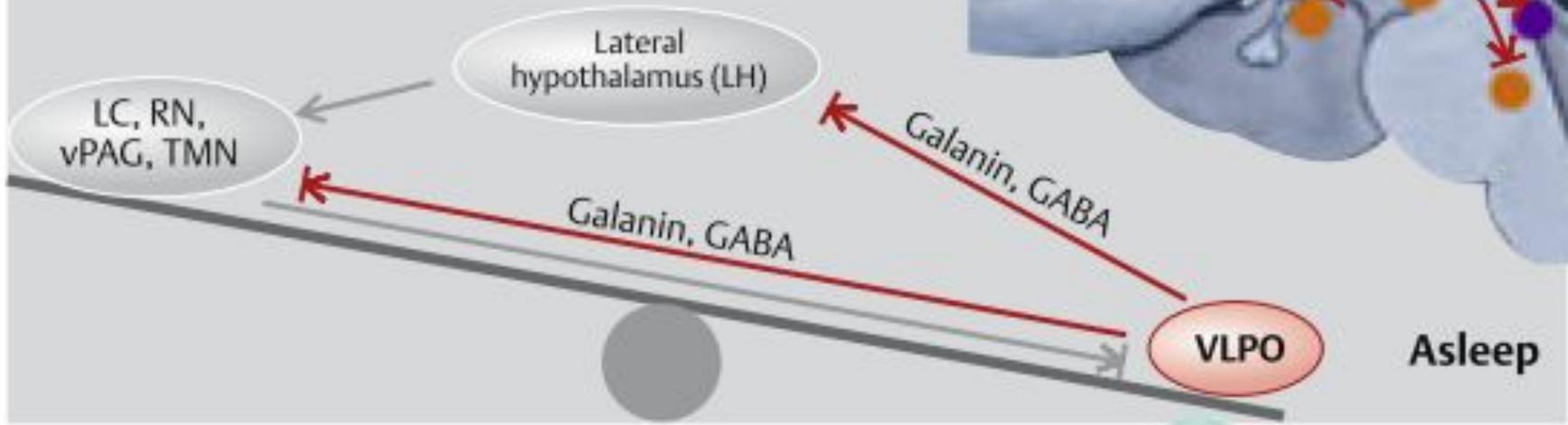
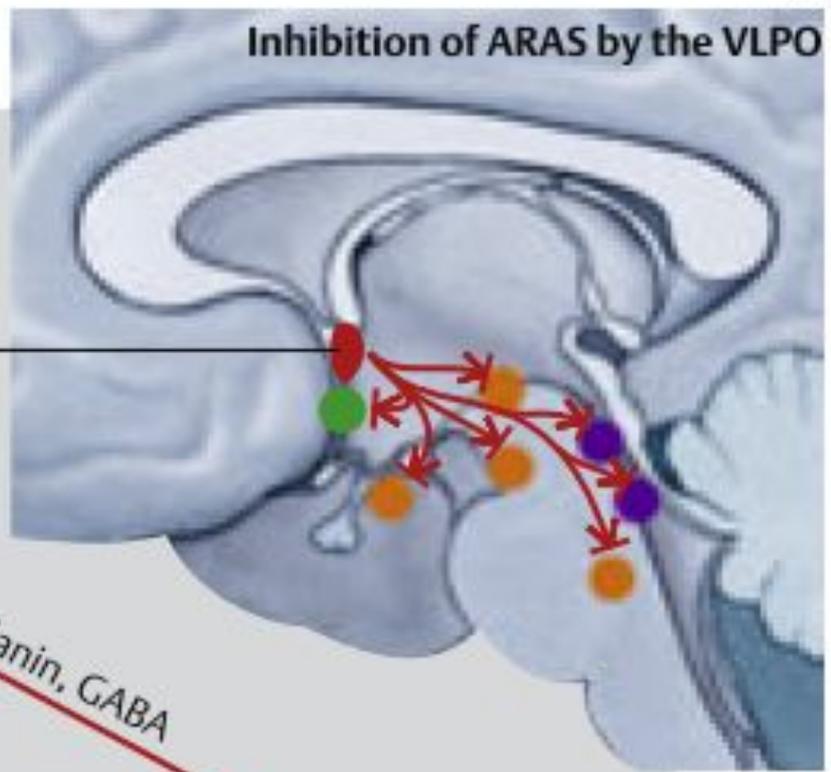
3  
Flipping of  
sleep-wake switch

2

- Inhibition
- NE Norepinephrine
- GABA Gamma-aminobutyric acid
- 5-HT 5-Hydroxytryptamine = serotonin

Ventrolateral preoptic nucleus (VLPO)

Inhibition of ARAS by the VLPO



Sleeplessness ← VLPO defect

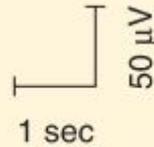


Drowsy (8 to 12 Hz) alpha waves



Stage 1 (3 to 7 Hz) theta waves

Theta waves



Stage 2 (12 to 14 Hz) sleep spindles and K complexes

Sleep spindle

K complex

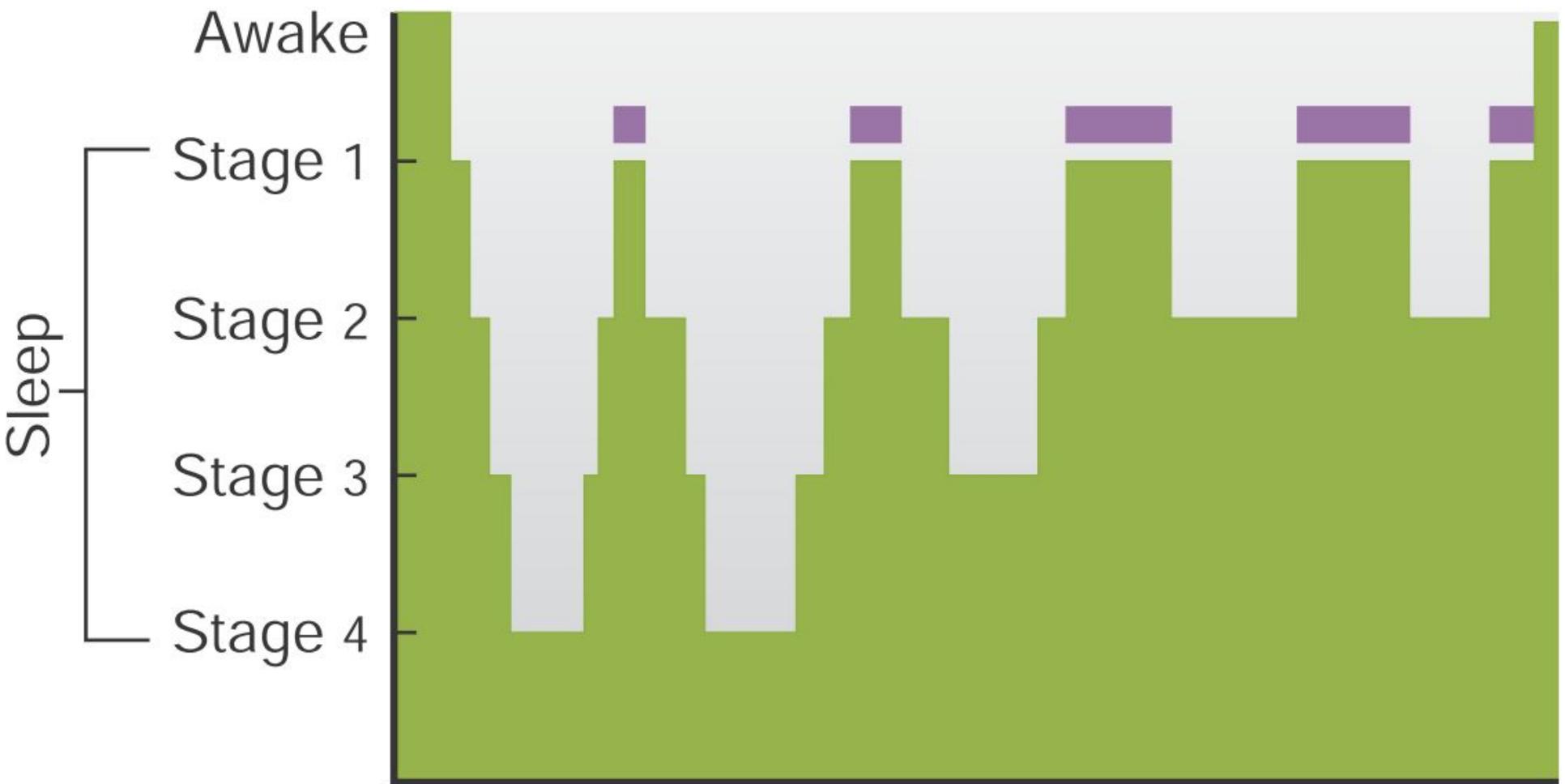


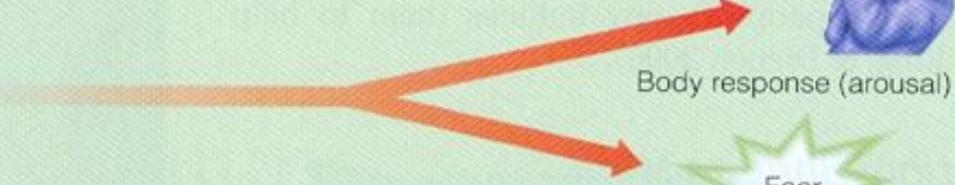
Stage 4 ( $\frac{1}{2}$  to 2 Hz) delta waves

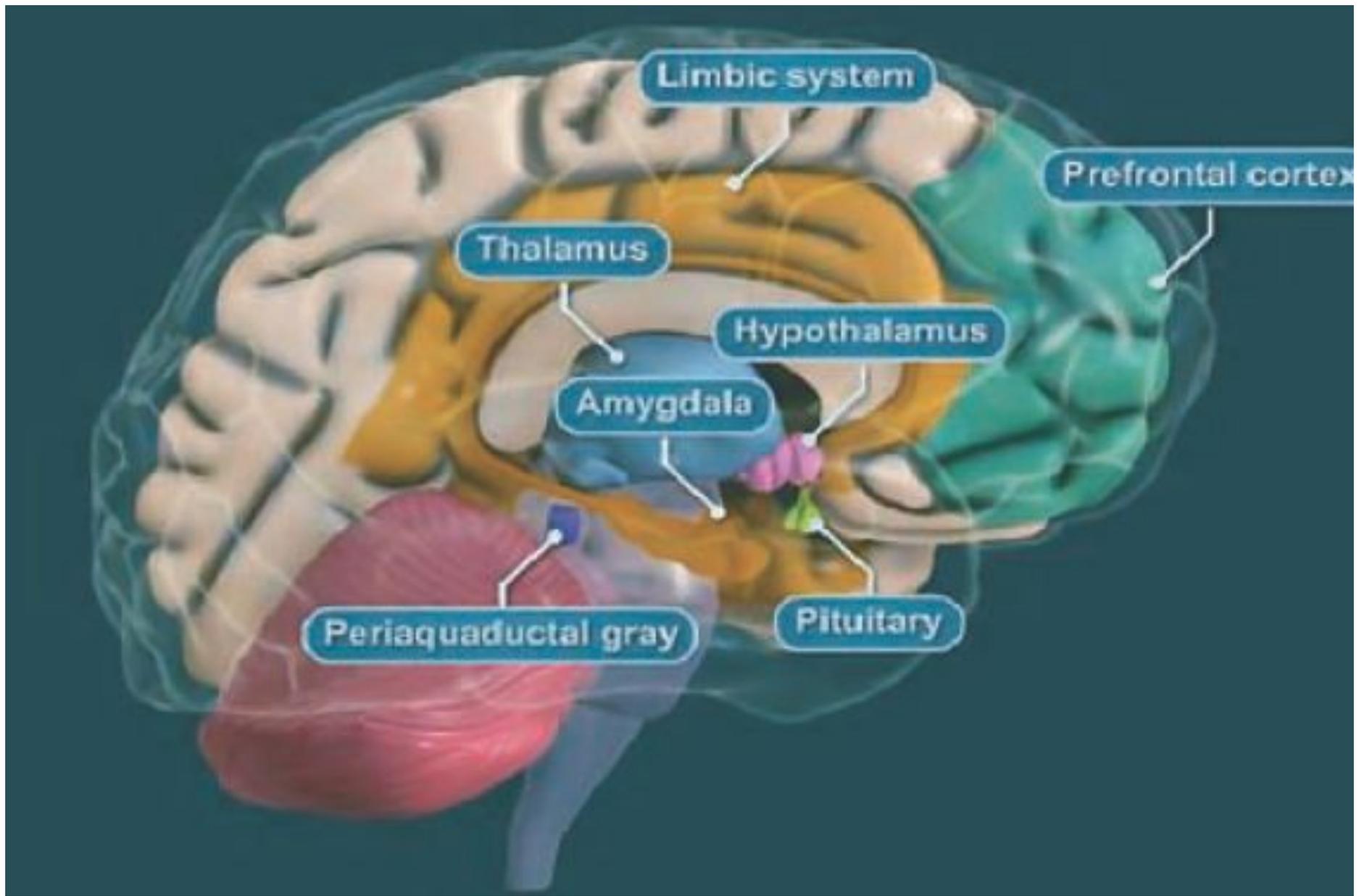


REM sleep





Theory	Stimulus	Response			Report
Common sense		 Subjective experience	 Body response (arousal)	"My heart is pounding because I feel afraid."	
James-Lange		 Body response (arousal)	 Subjective experience	"I feel afraid because my heart is pounding."	
Cannon-Bard					"The dog makes me feel afraid and my heart pounds."
Schachter		 Body response (arousal)	 Interpretation	 Subjective experience	"My pounding heart means I'm afraid because I interpret the situation as dangerous."



Limbic system

Prefrontal cortex

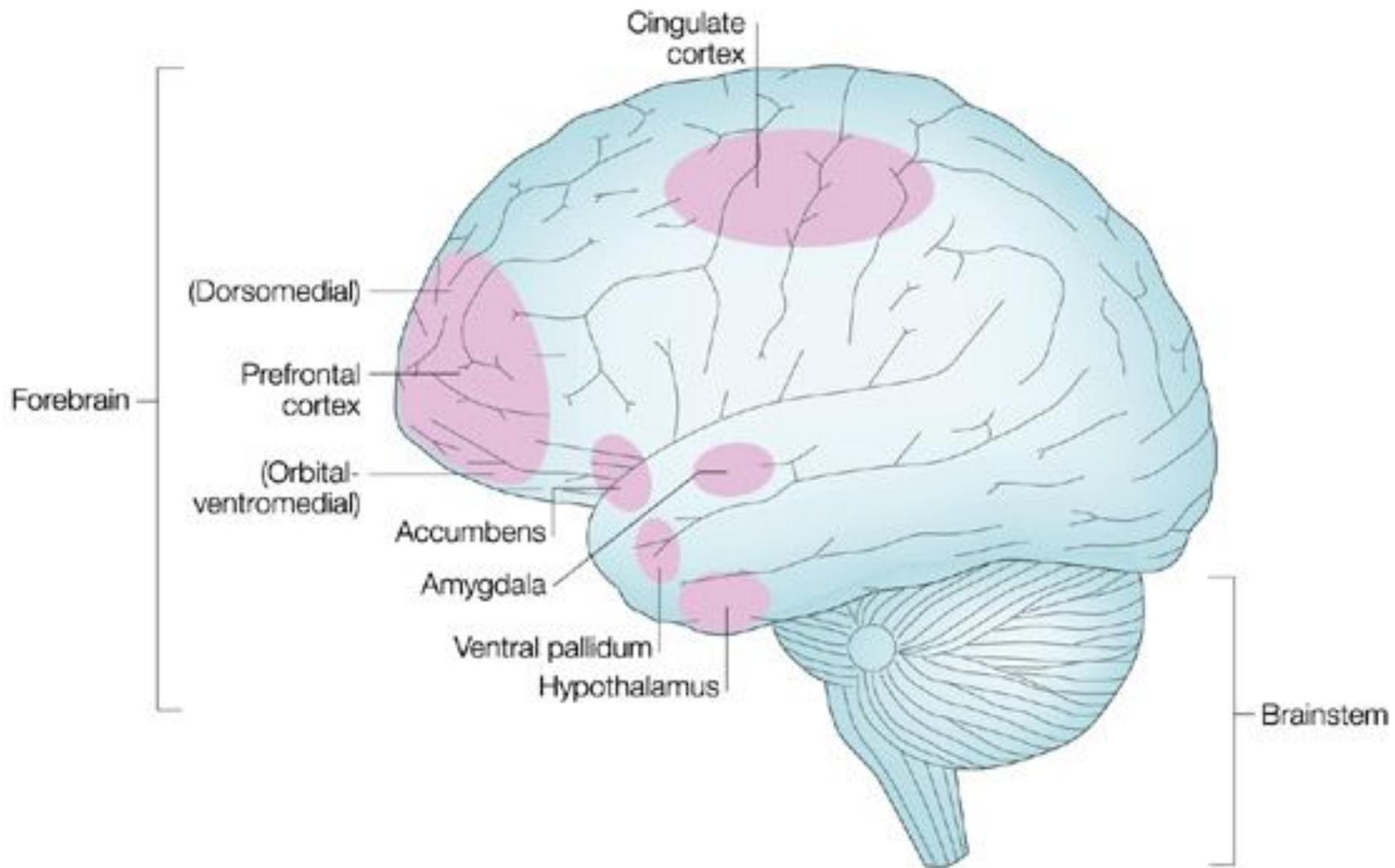
Thalamus

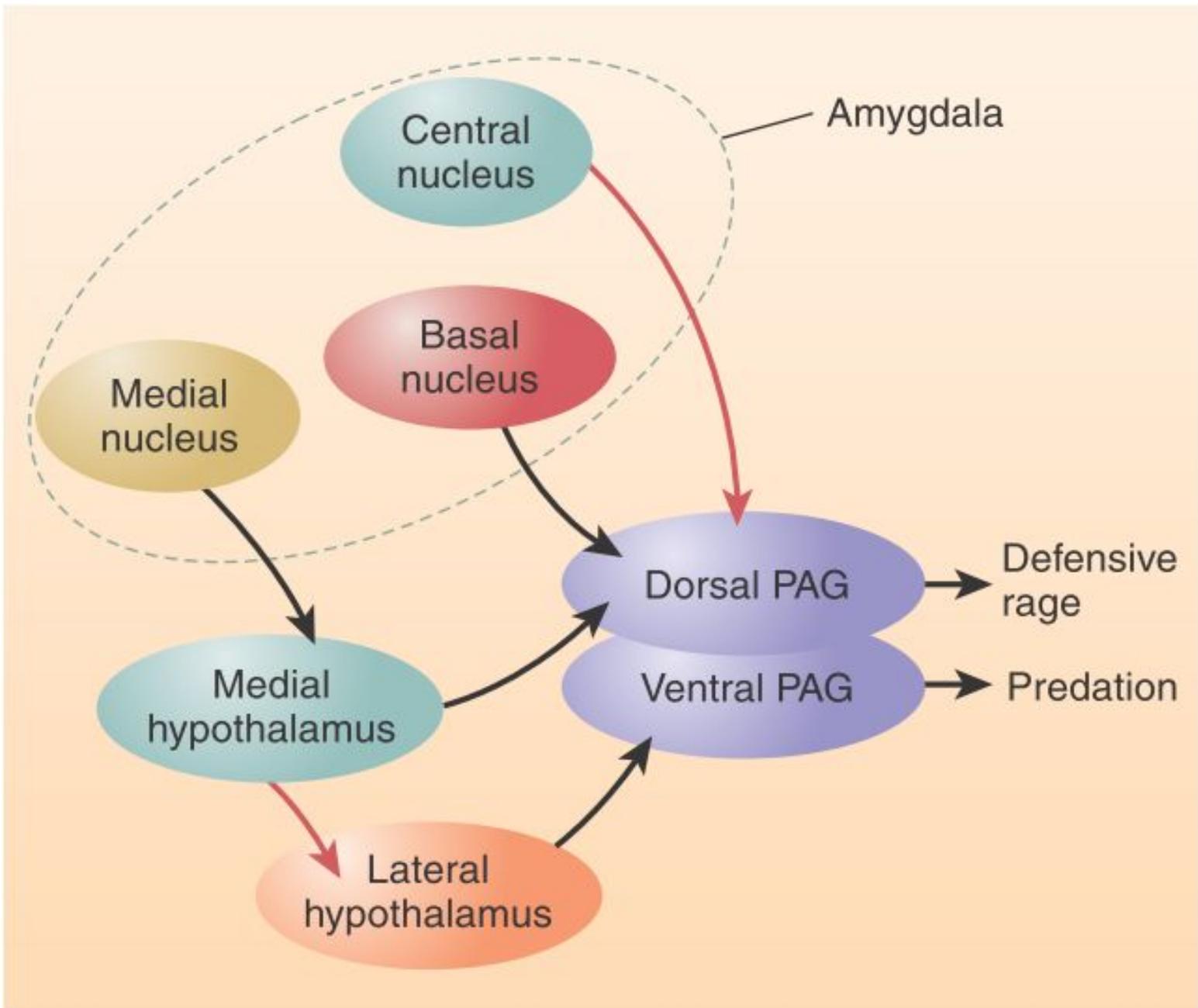
Hypothalamus

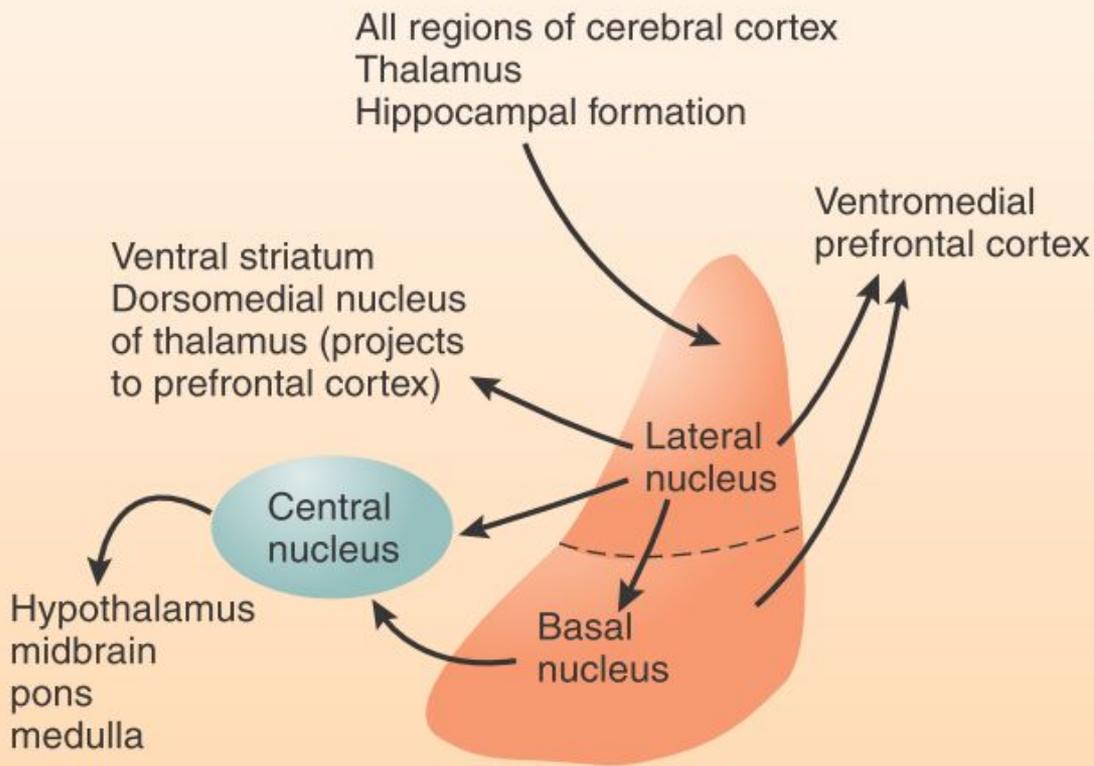
Amygdala

Pituitary

Periaqueductal gray







<i>Brain Regions</i>	<i>Behavioral and Physiological Responses</i>
Lateral hypothalamus	Sympathetic activation: increased heart rate and blood pressure, paleness
Dorsal motor nucleus of vagus	Parasympathetic activation: ulcers, urination, defecation
Parabrachial nucleus	Increased respiration
Ventral tegmental area	Behavioral arousal (dopamine)
Locus coeruleus	Increased vigilance (norepinephrine)
Dorsal lateral tegmental nucleus	Cortical activation (acetylcholine)
Nucleus reticularis pontis caudalis	Augmented startle response
Periaqueductal gray matter	Behavioral arrest (freezing)
Trigeminal, facial motor nuclei	Facial expressions of fear
Paraventricular nucleus	ACTH, glucocorticoid secretion
Nucleus basalis	Cortical activation

# The Reward Circuit

