

Module 8: Organization of Cognitive Domains

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Cognition

Cognitive Functioning is the mental action or process of acquiring knowledge and understanding through thought, experience and the senses

Includes:

- Reasoning
- Memory
- Attention
- Language

Language



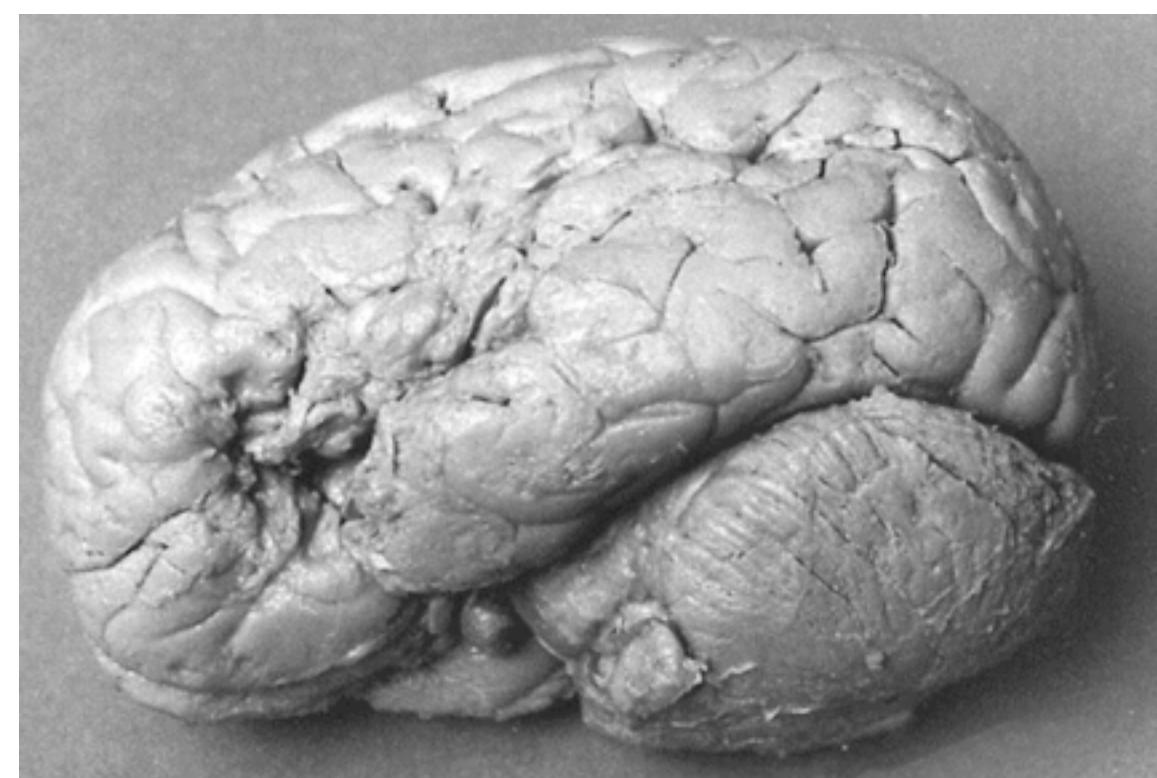
Pierre Paul Broca a french surgeon and anatomist described two patients:

Leborgne: Unable to produce any words or phrases (1861)

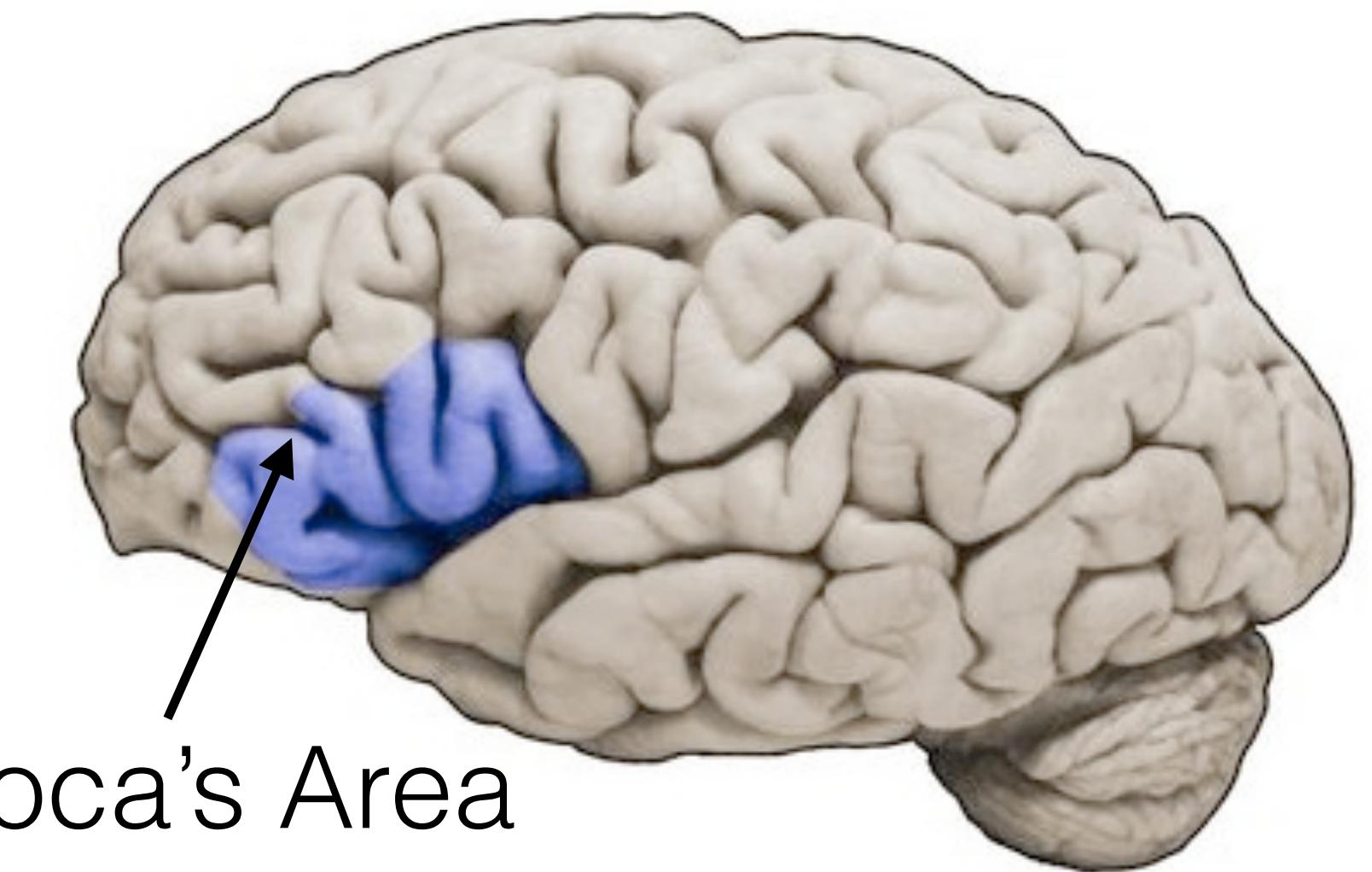
Lelong: Severely reduced ability to produce speech

Known as Broca's aphasia:

- Patients understand words and simple sentences
- Know what they want to say
- Unable to generate fluent speech



Damage to posterior inferior frontal gyrus



Broca's Area

Language



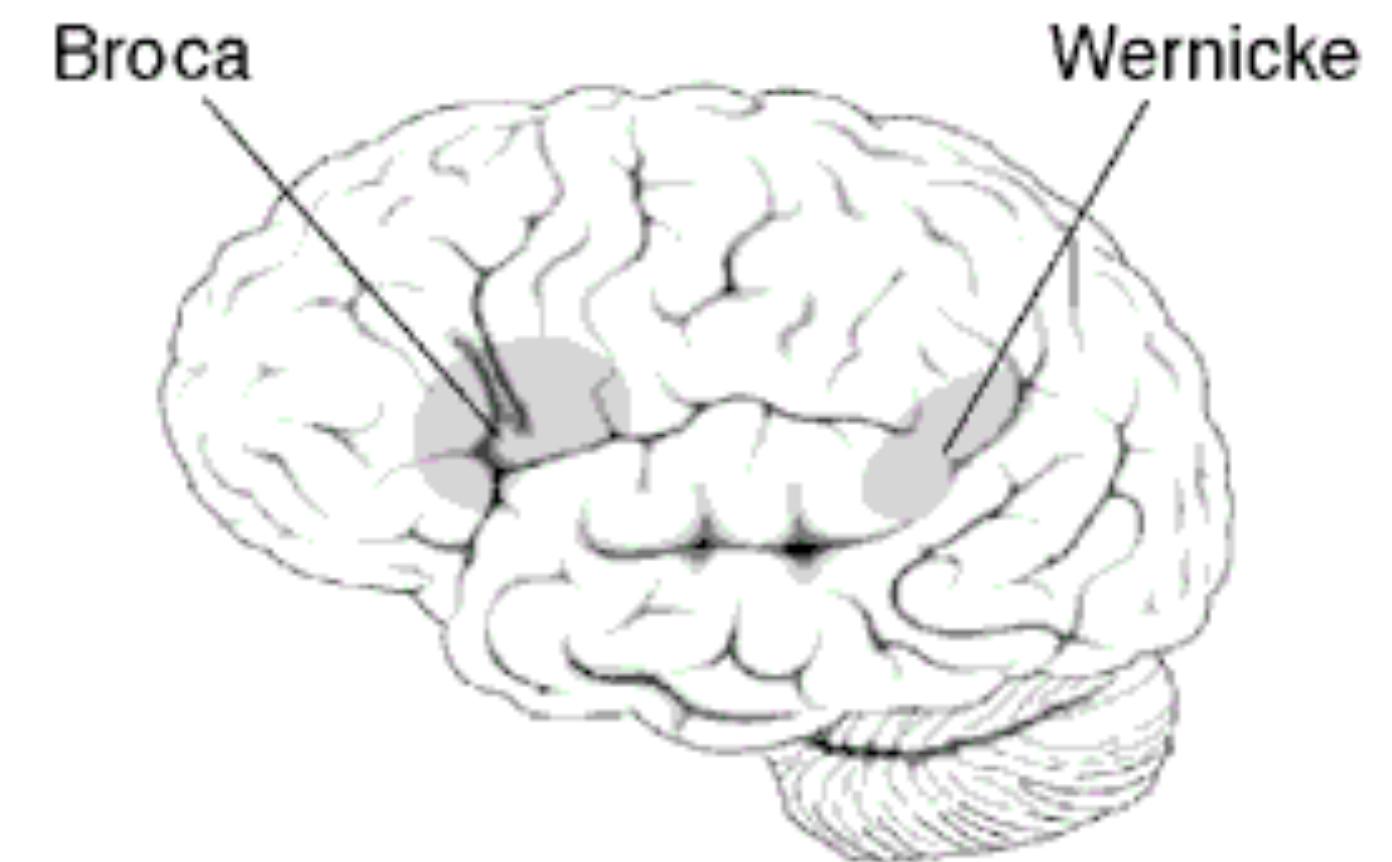
Carl Wernicke, a german psychiatrist and neuropathologist noted certain patients had language problems without damage to Broca's area

Known as Wernicke's aphasia:

- Receptive aphasia
- Impaired comprehension of spoken and written word



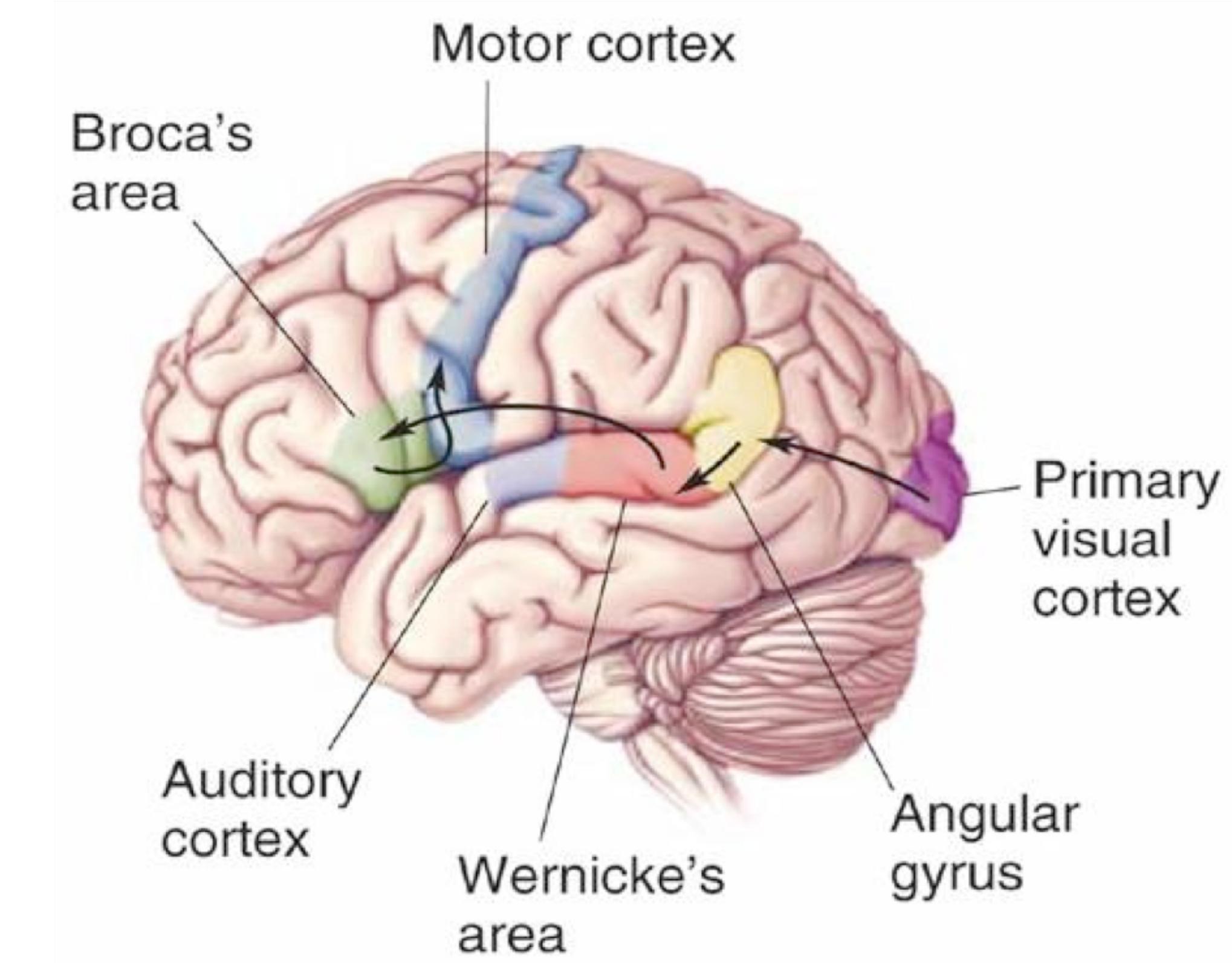
Damage to posterior section of the superior temporal gyrus



Language

Language

- Receptive language / what was said or read (Wernicke)
- What to say
- Expressive language / how to say or write it (Broca)
- Silent or writing or speaking (Wernicke / motor cortex)

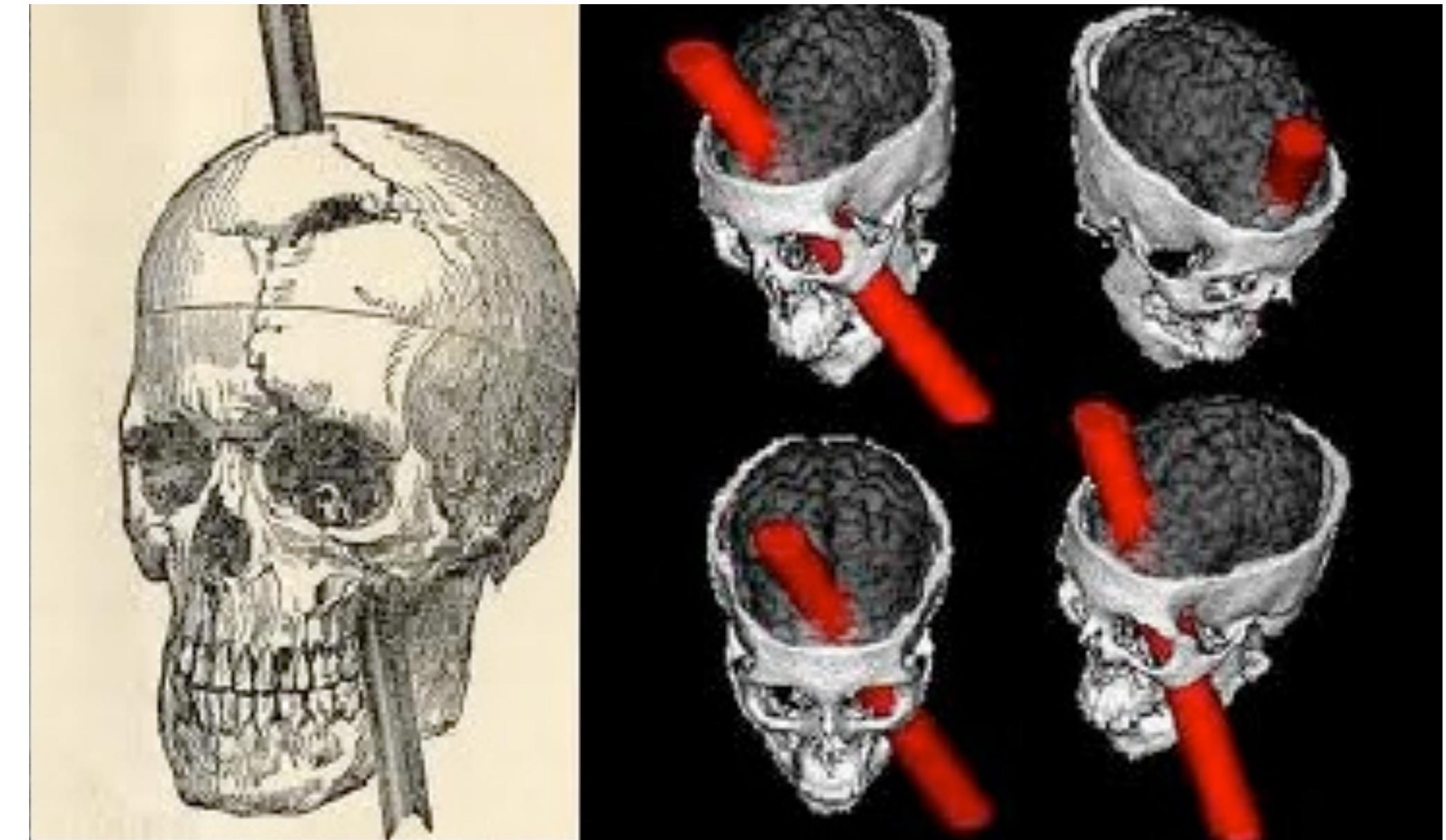


Cognition



Phineas Gage was a railroad worker in 1848 involved in an accident damaging his left frontal lobe

- Able to function in many ways
- Speech, motor preserved
- Severe personality change



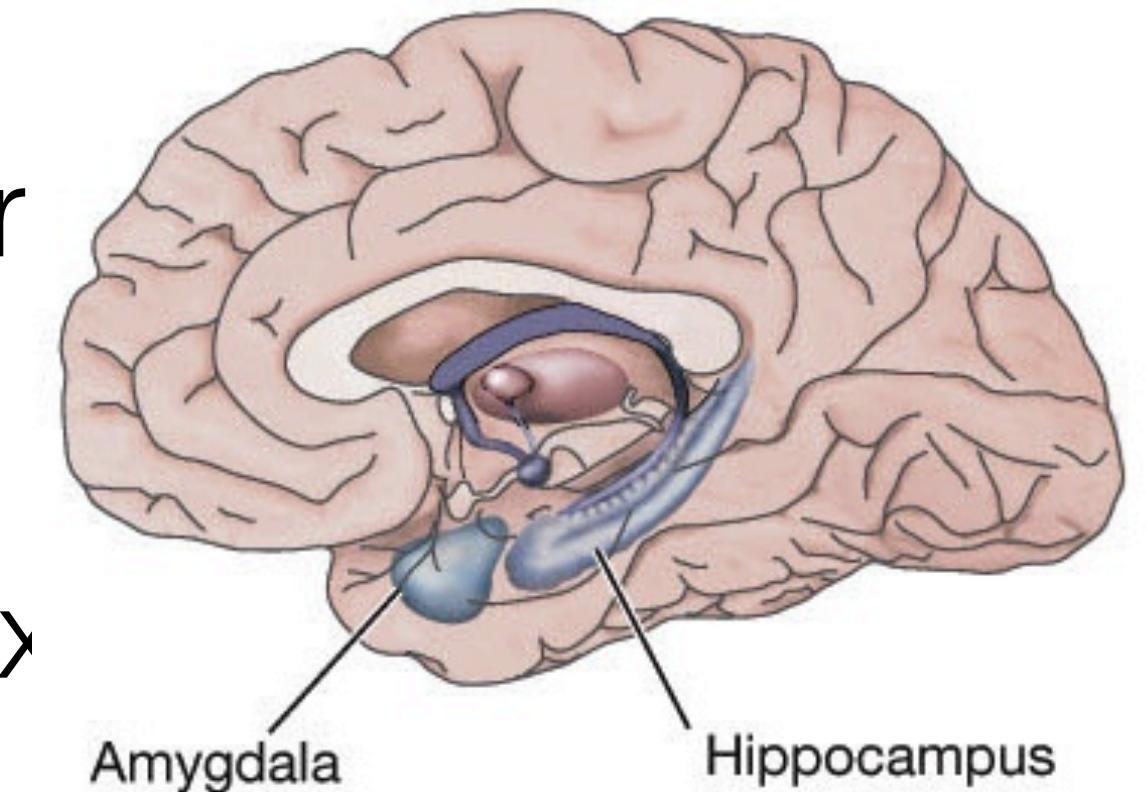
Gage damage to frontal lobe

Memory



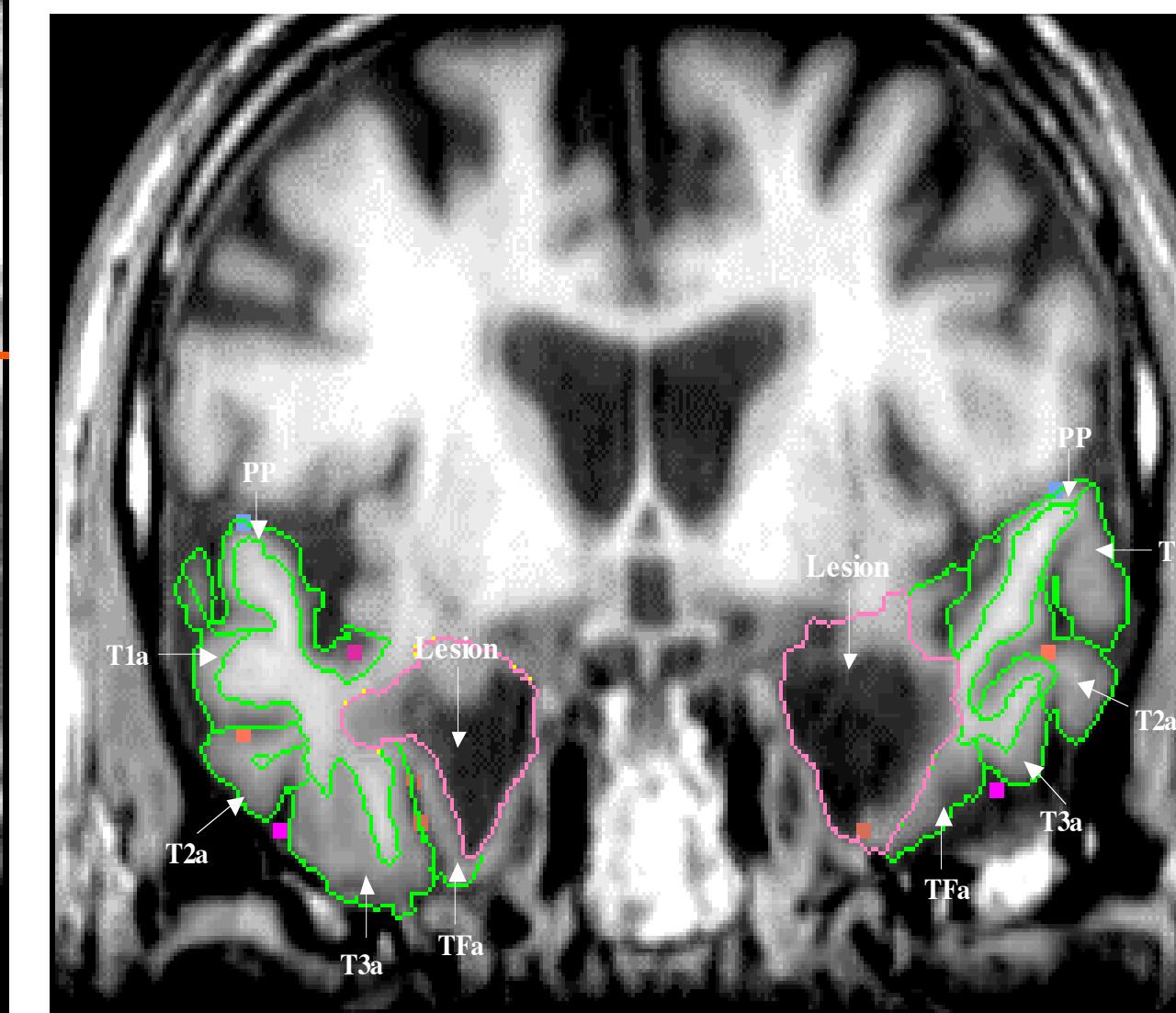
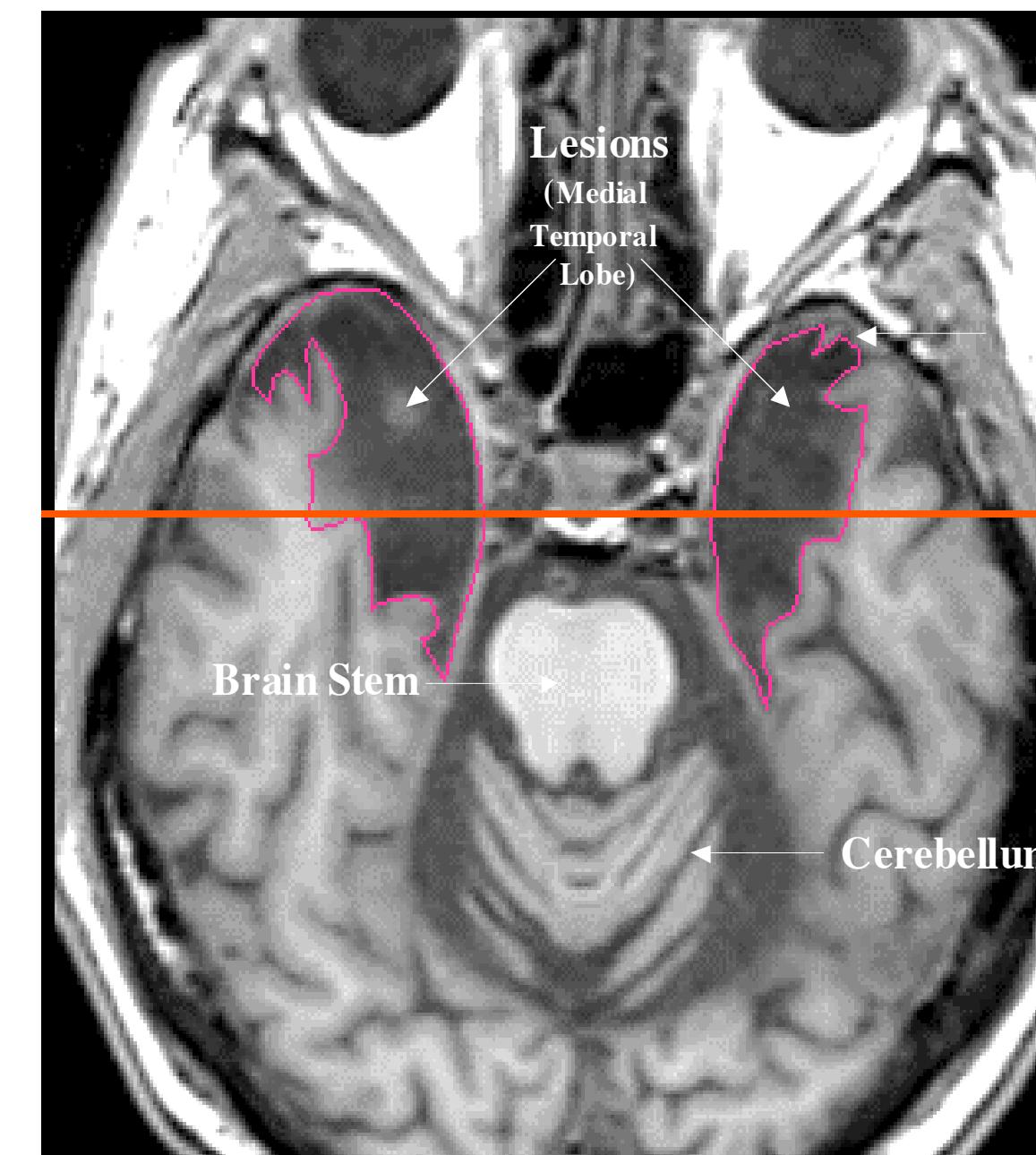
Patient H.M suffered from severe epileptic seizures

Dr. Scoville performed bilateral resection of the hippocampus, amygdala and surrounding cortex



Patient H.M

- Intact language, IQ, working memory and motor control
- Inability to learn new facts and events
- Unable to remember anything since the surgery or some period before the surgery

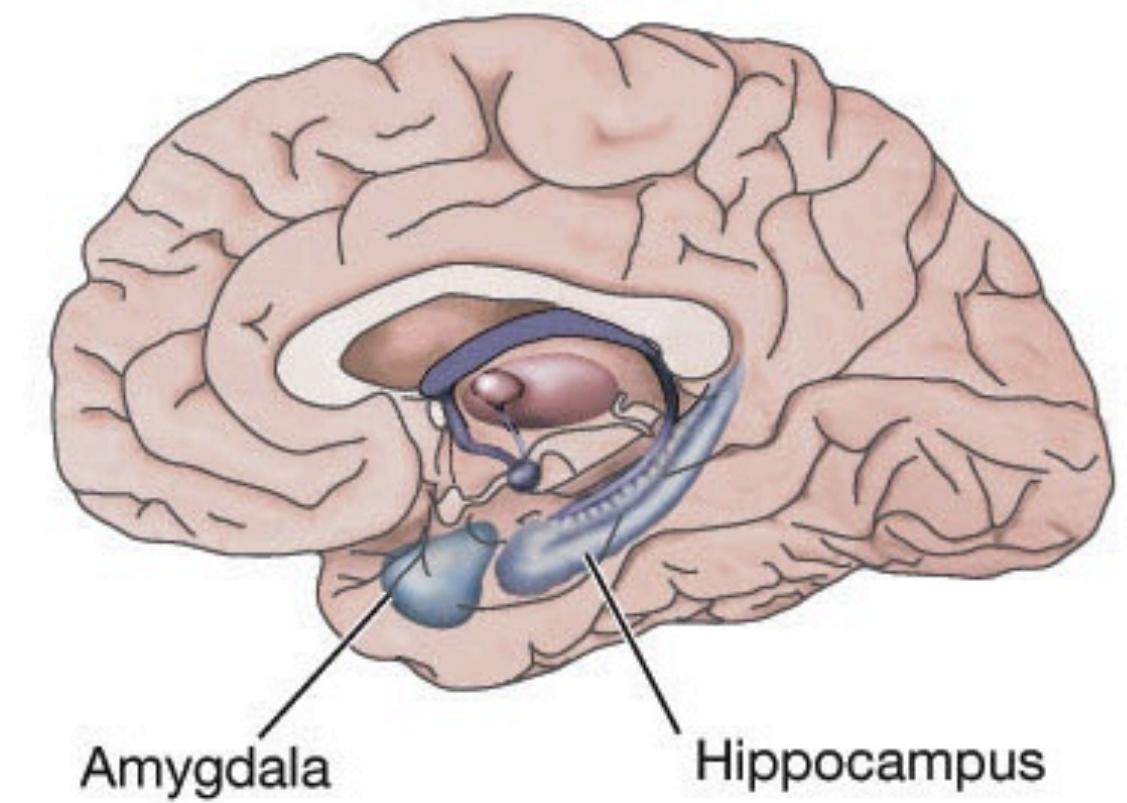


Memory



“Right now, I’m wondering. Have I done or said anything amiss. You see at this moment everything looks clear to me, but what happened just before? That’s what worries me. It’s like waking from a dream; I just don’t remember.”

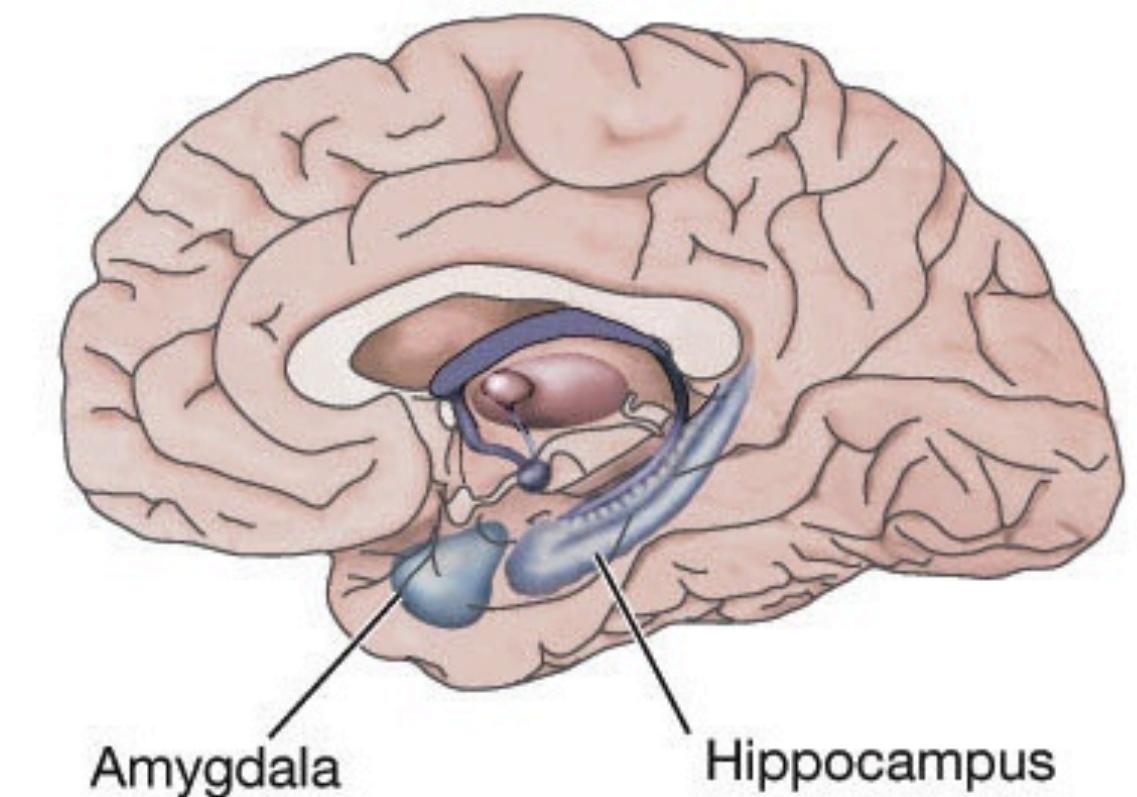
—H.M., quoted by Brenda Milner.



Memory

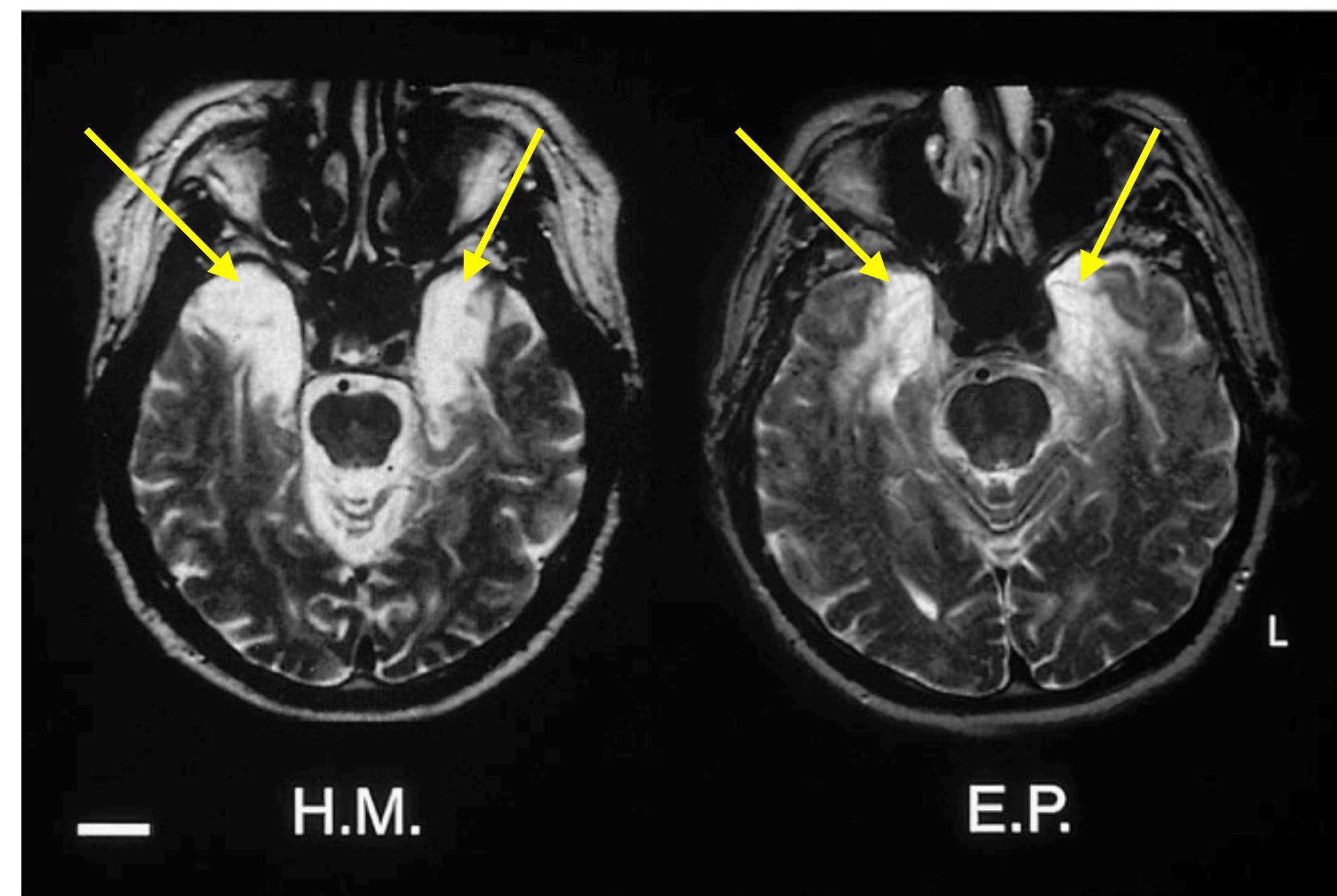
Patient E.P suffered from Herpes Simplex encephalitis

Severe damage to the medial temporal lobe including hippocampus

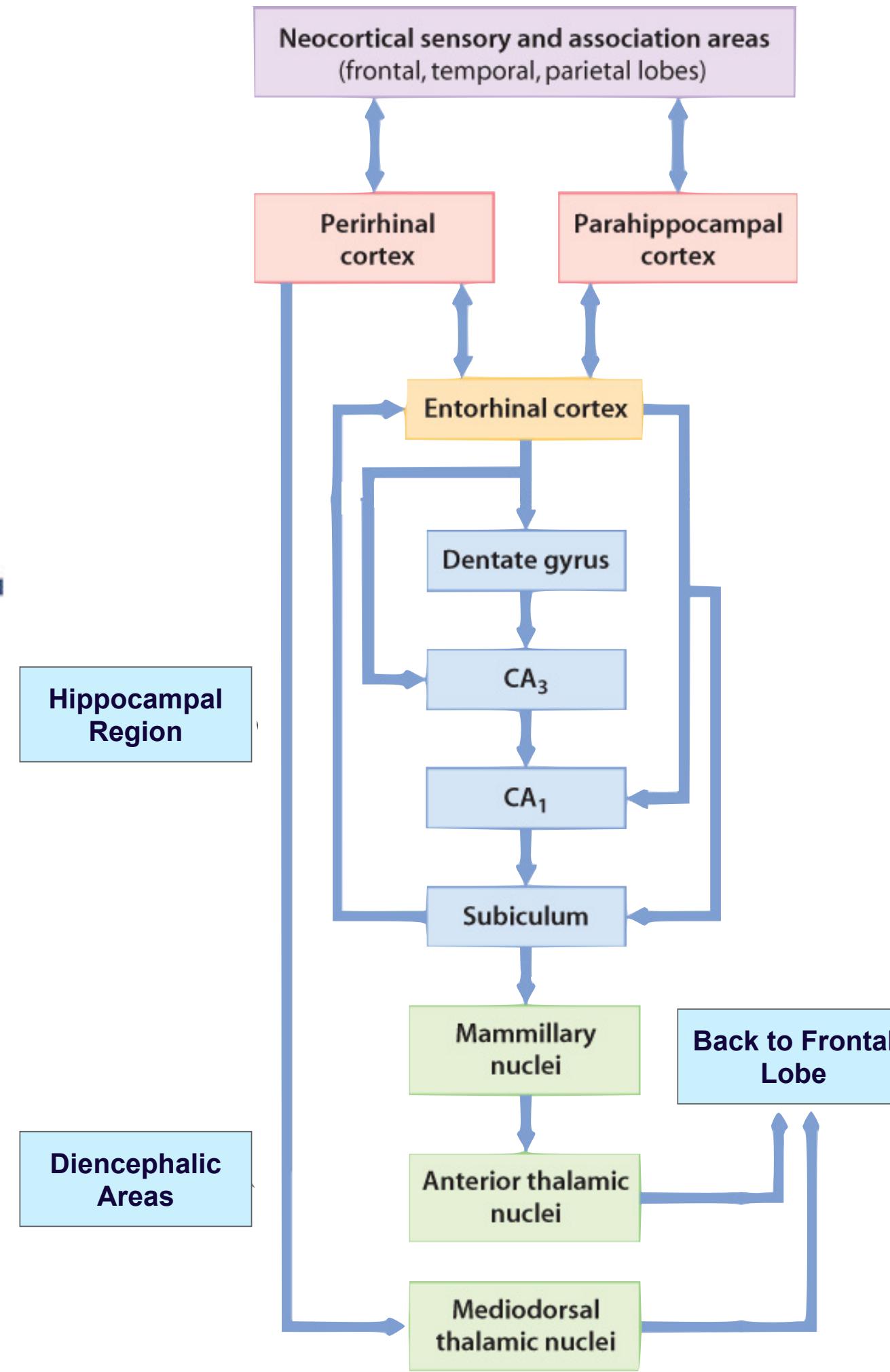
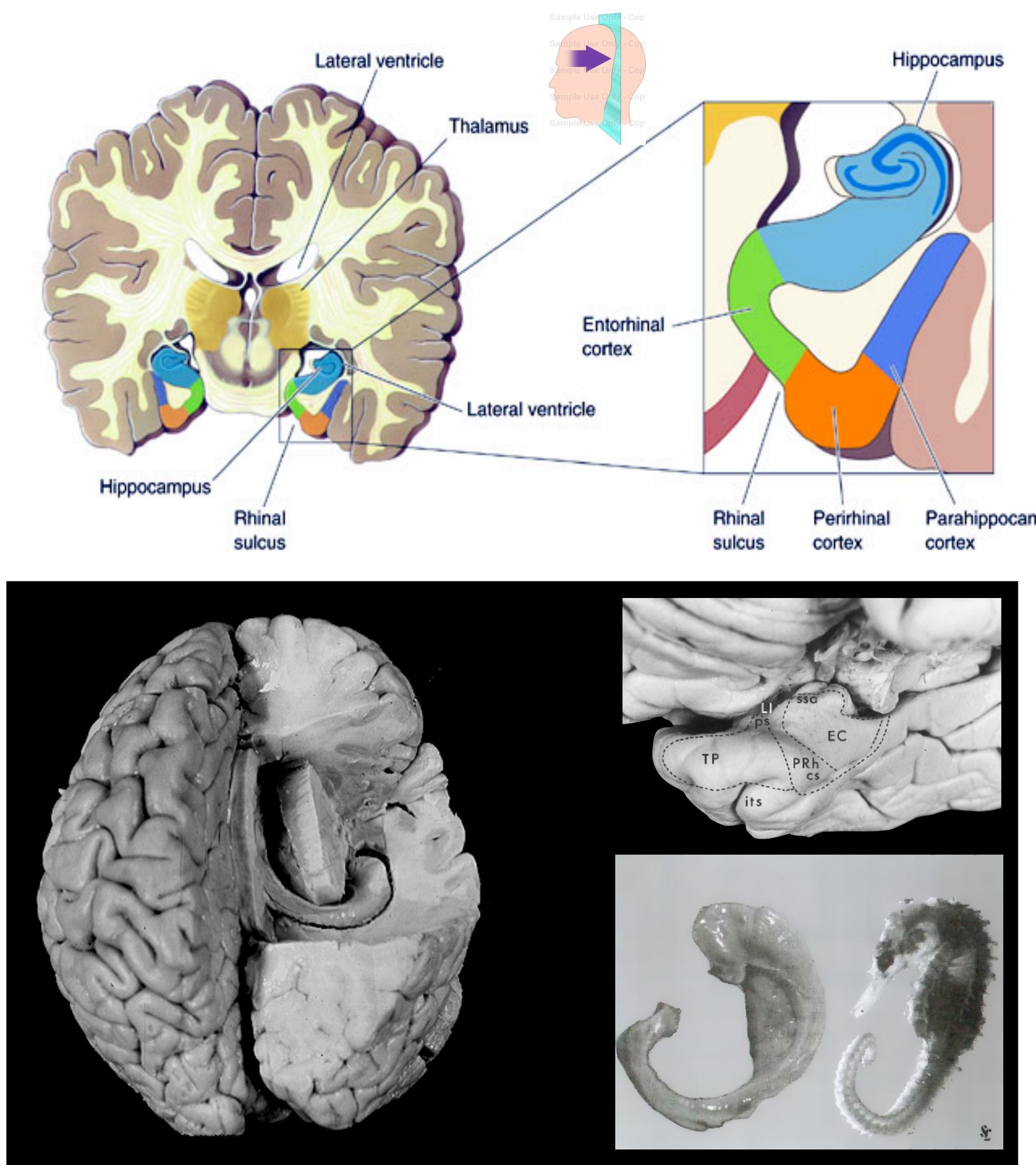


Patient E.P

- Intact language, IQ, working memory and motor control
- Impaired ability to learn new facts and events



Memory

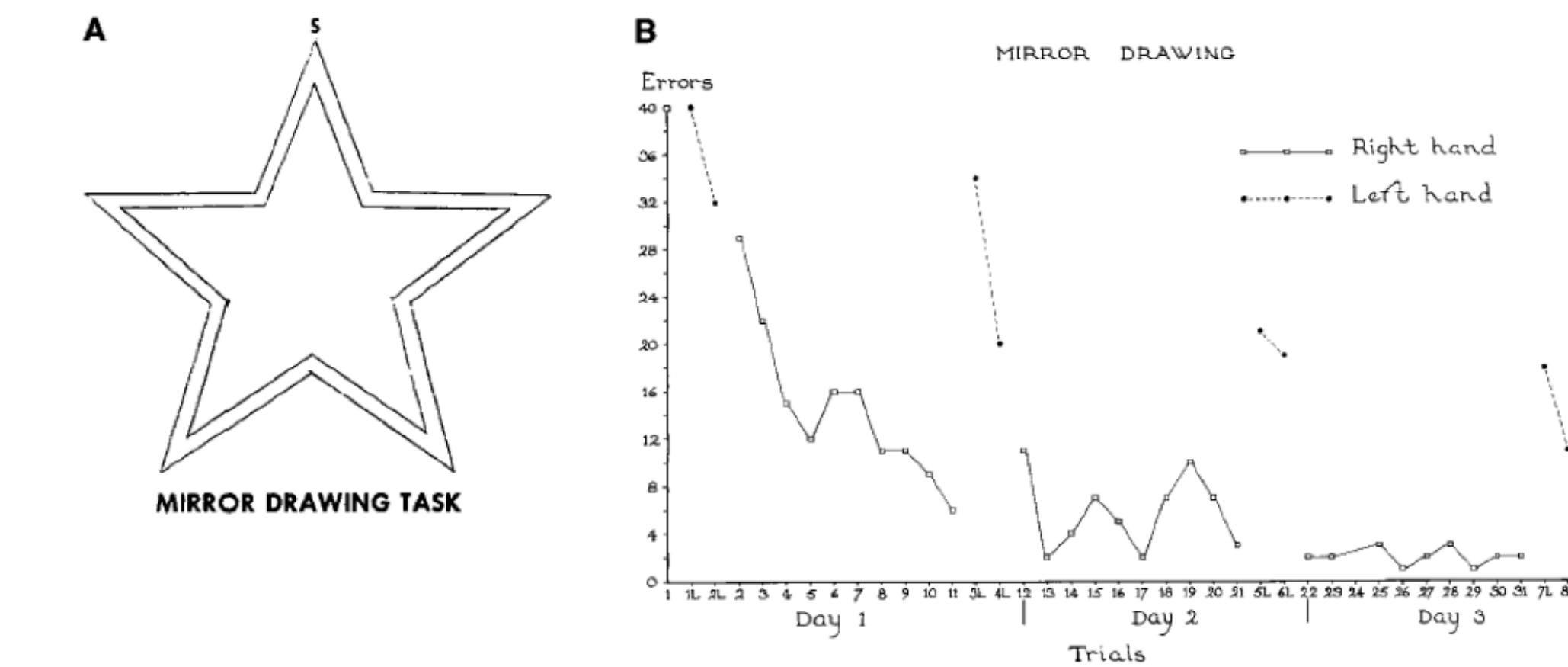
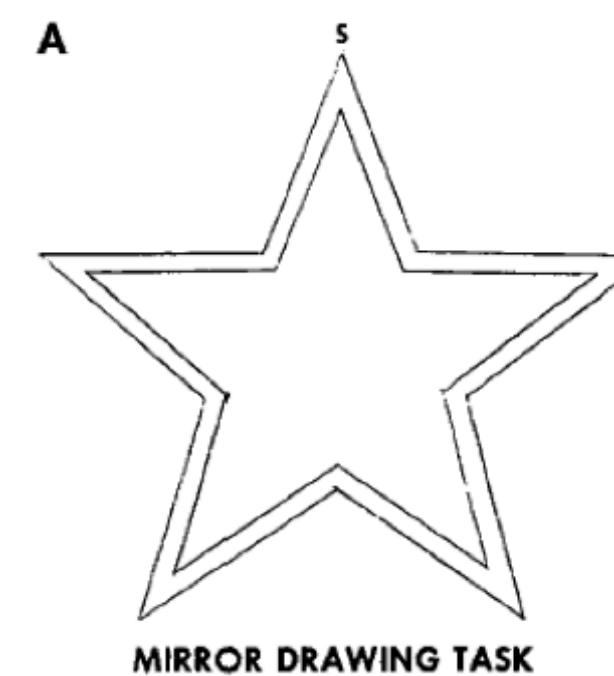
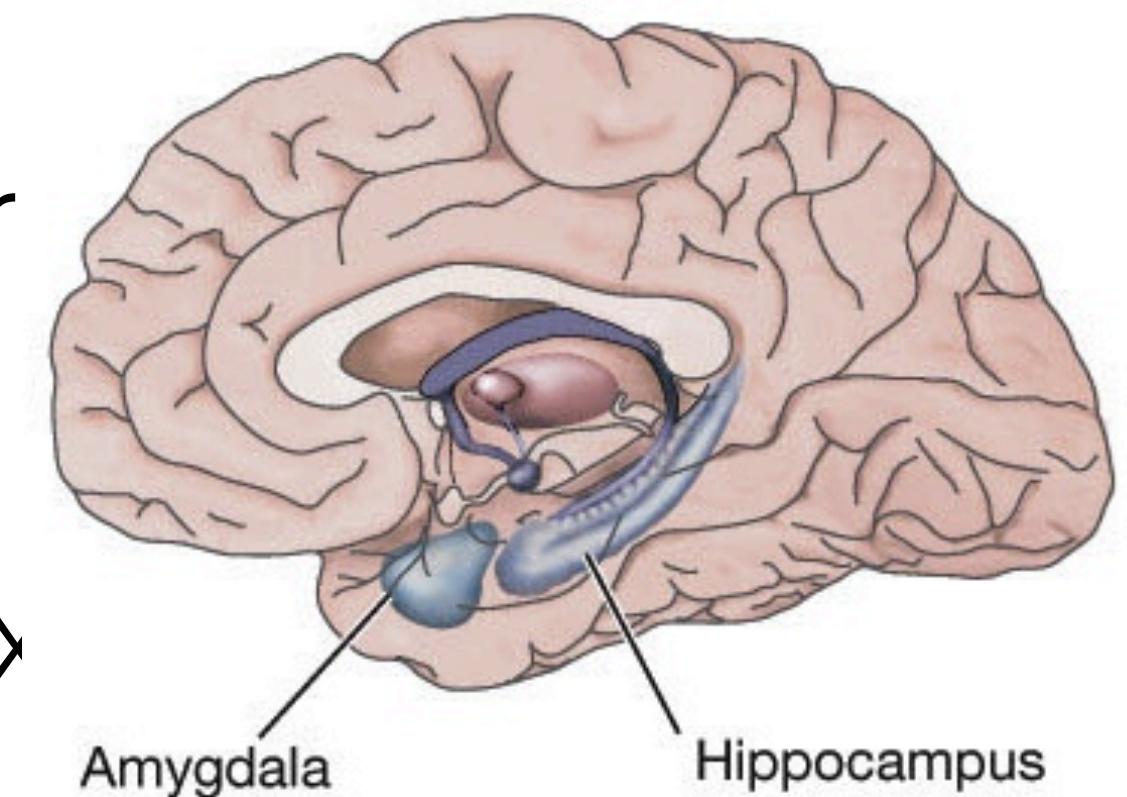


Memory



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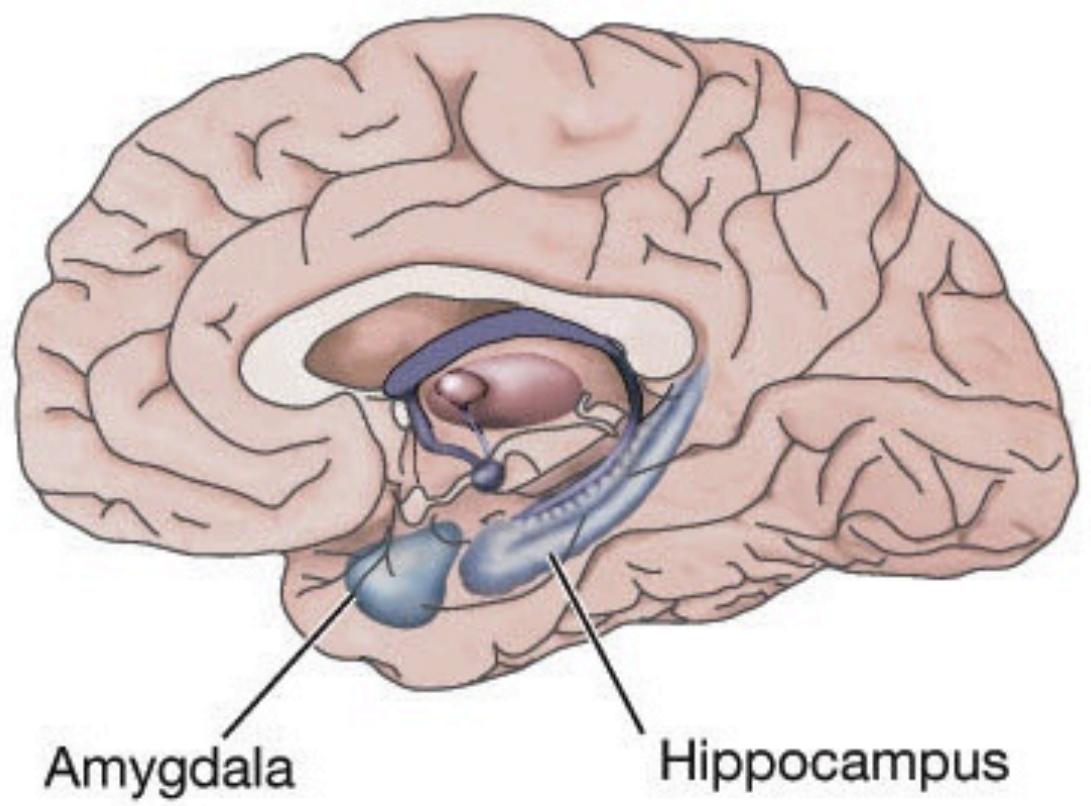
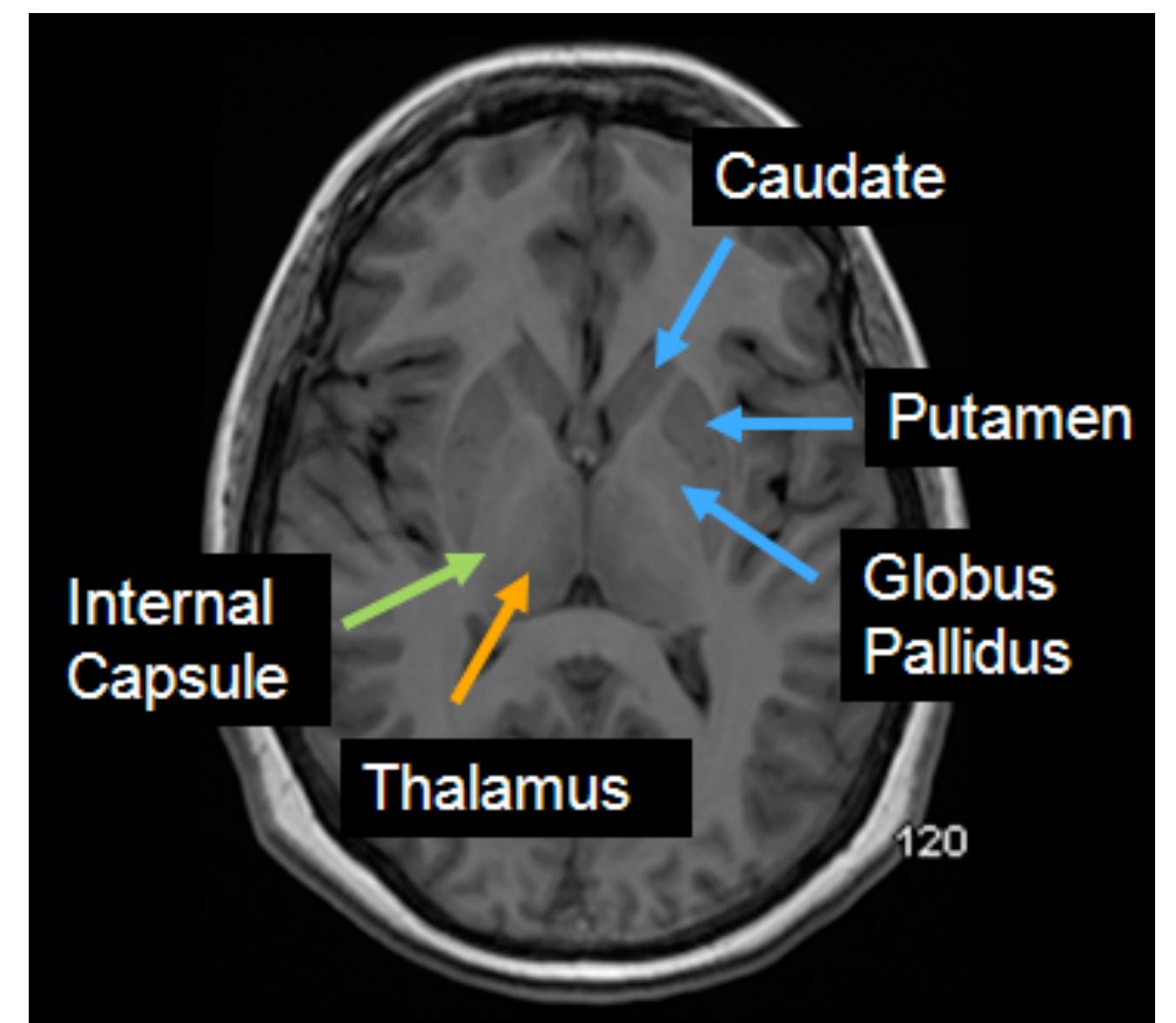
Memory

The brain has multiple systems that support memory function:

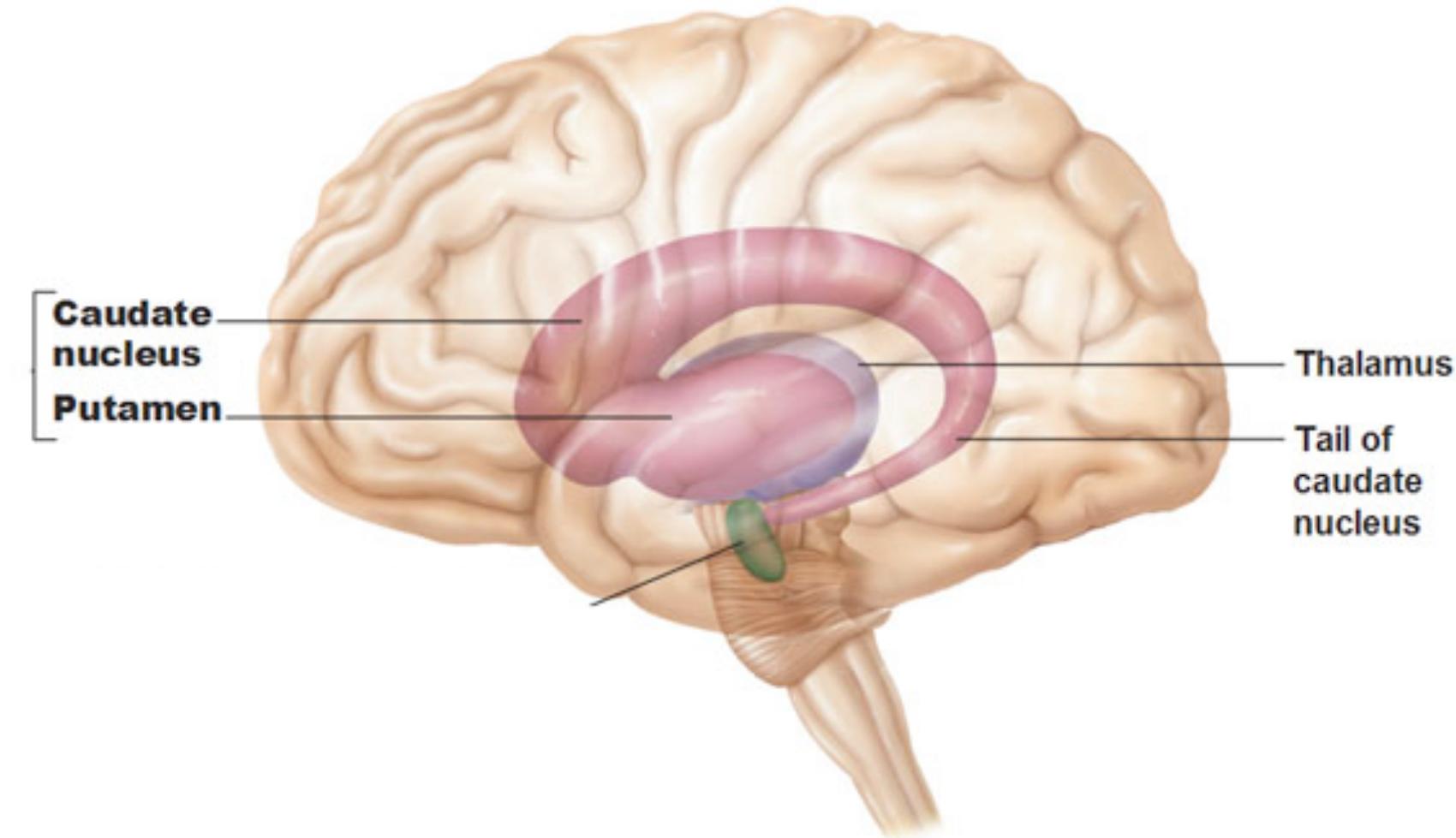
- Medial temporal lobe
- Basal ganglia

Basal ganglia:

- Fine motor planning and movements
- Striatum involved in reward, reinforcement
- Involved in some forms of learning



Basal Ganglia



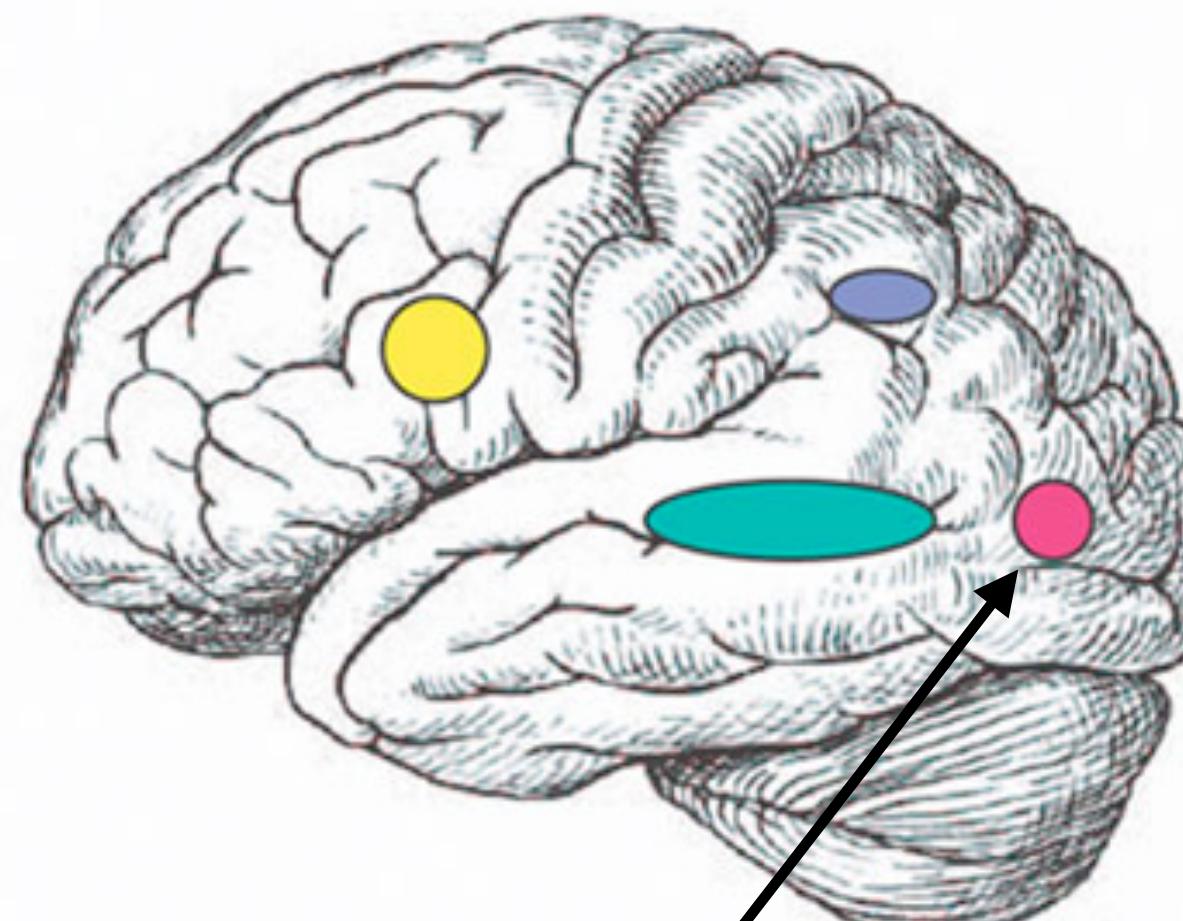
Cognition

The brain contains certainly highly specialized areas that support very specific functions.

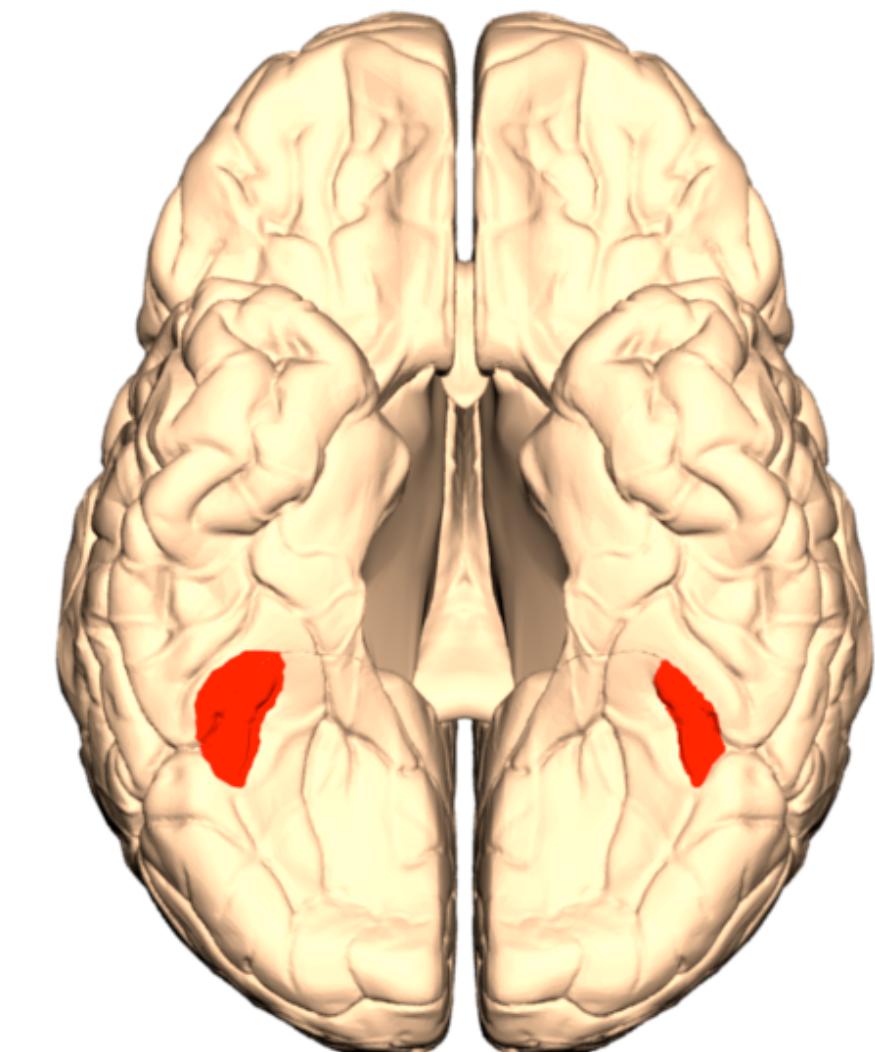
- Fusiform face area
- Extrastriate body area

Prosopagnosia:

- Known as face blindness
- Inability to recognize familiar faces



Extrastriate Body Area



Fusiform Face Area

Functional Anatomy

