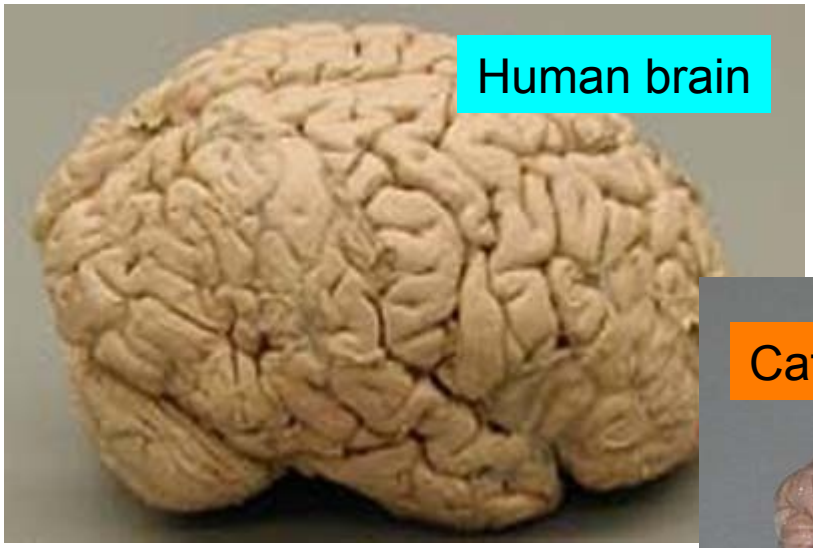
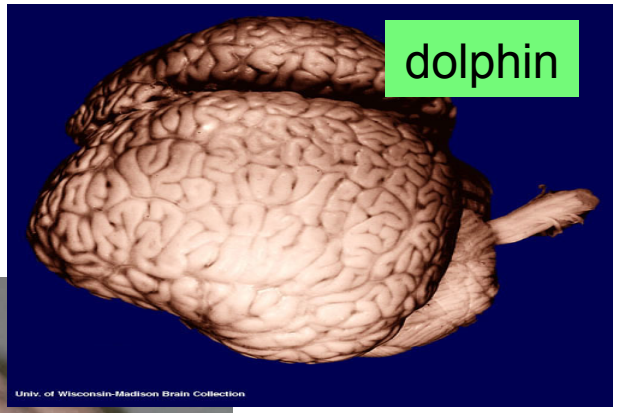
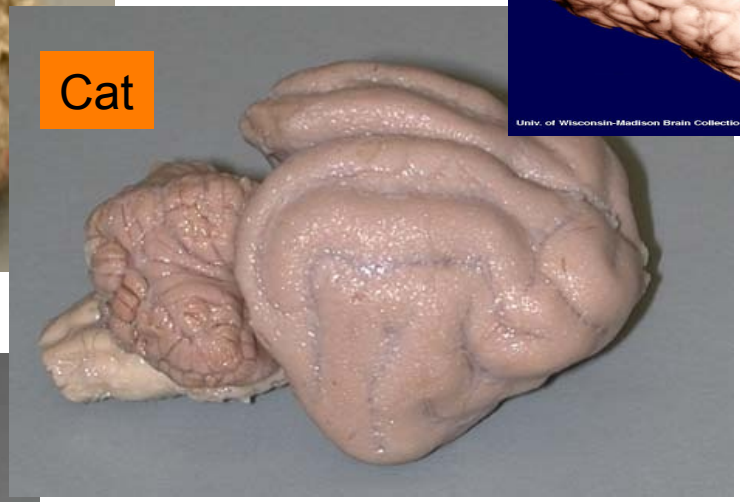
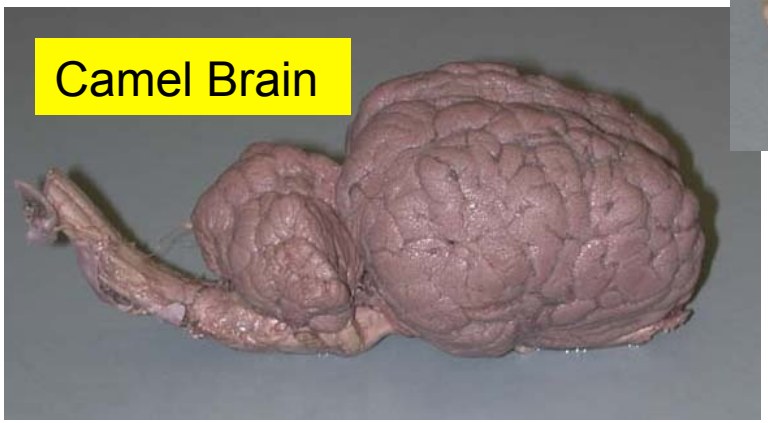
The Brain


Human brain

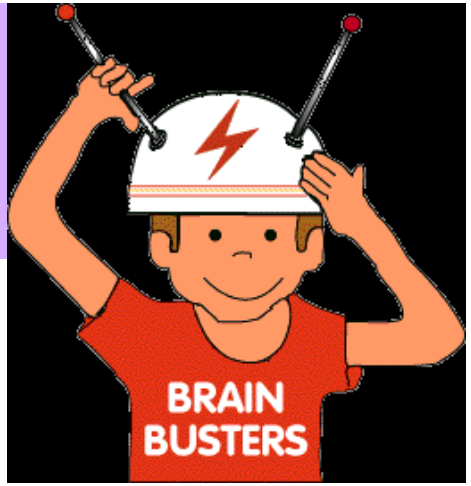

dolphin
Univ. of Wisconsin-Madison Brain Collection


Cat


Camel Brain

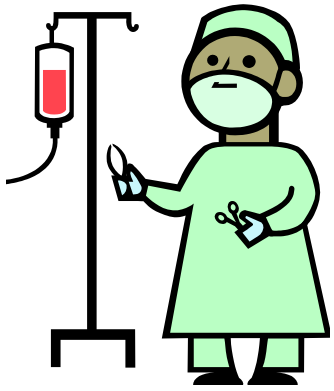

frog

Interesting facts about the human brain!



- The human brain is made up of **85% water.**
- Studies have shown that children who are **breast fed** display IQ's up to 10 points higher by the age of three.
- Do you know why a doctor can operate on your brain while you are awake but you don't feel a thing?

  Your brain is full of nerve cells, but it has **no** pain receptors.

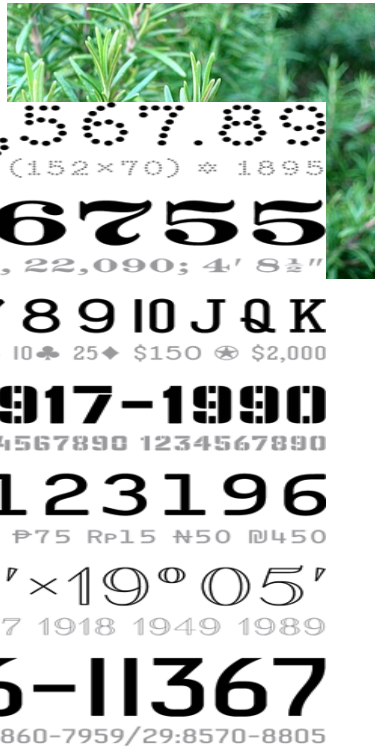


What you may or may not know

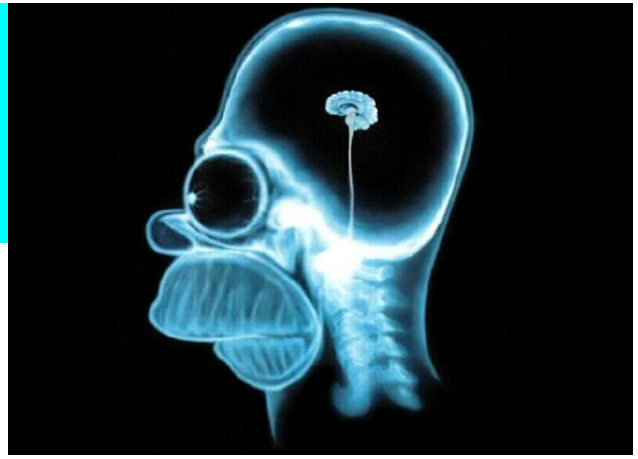
- Preservatives, coloring, dyes and artificial flavors affect IQ
  - When they were removed from the cafeteria menu researchers found that 70,000 students performed two or more IQ grade levels higher than before
- The smell of **rosemary** is said to enhance brain functioning
- Try and remember as many numbers as possible

375919047392

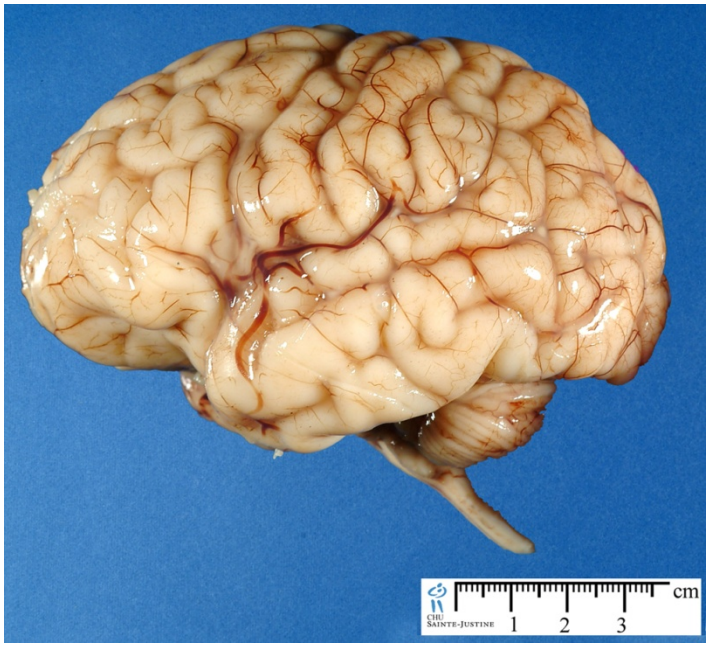
  - Our working memory, short-term memory, can hold on average a maximum of seven digits.



The Central Nervous System

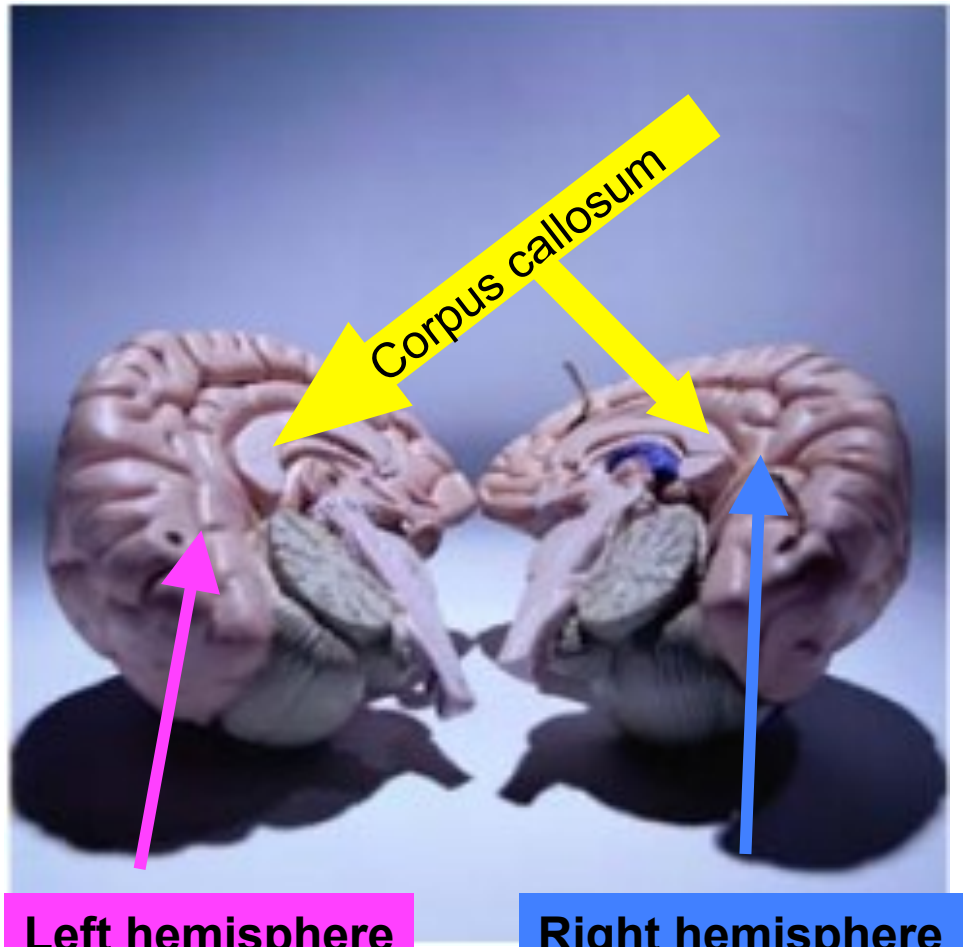


- 2 parts: **brain** and **spinal cord**
- Simply put, the brain is a **concentration** of nerve tissue
- **Location:** inside the skull
- **Purpose:** Coordinating center



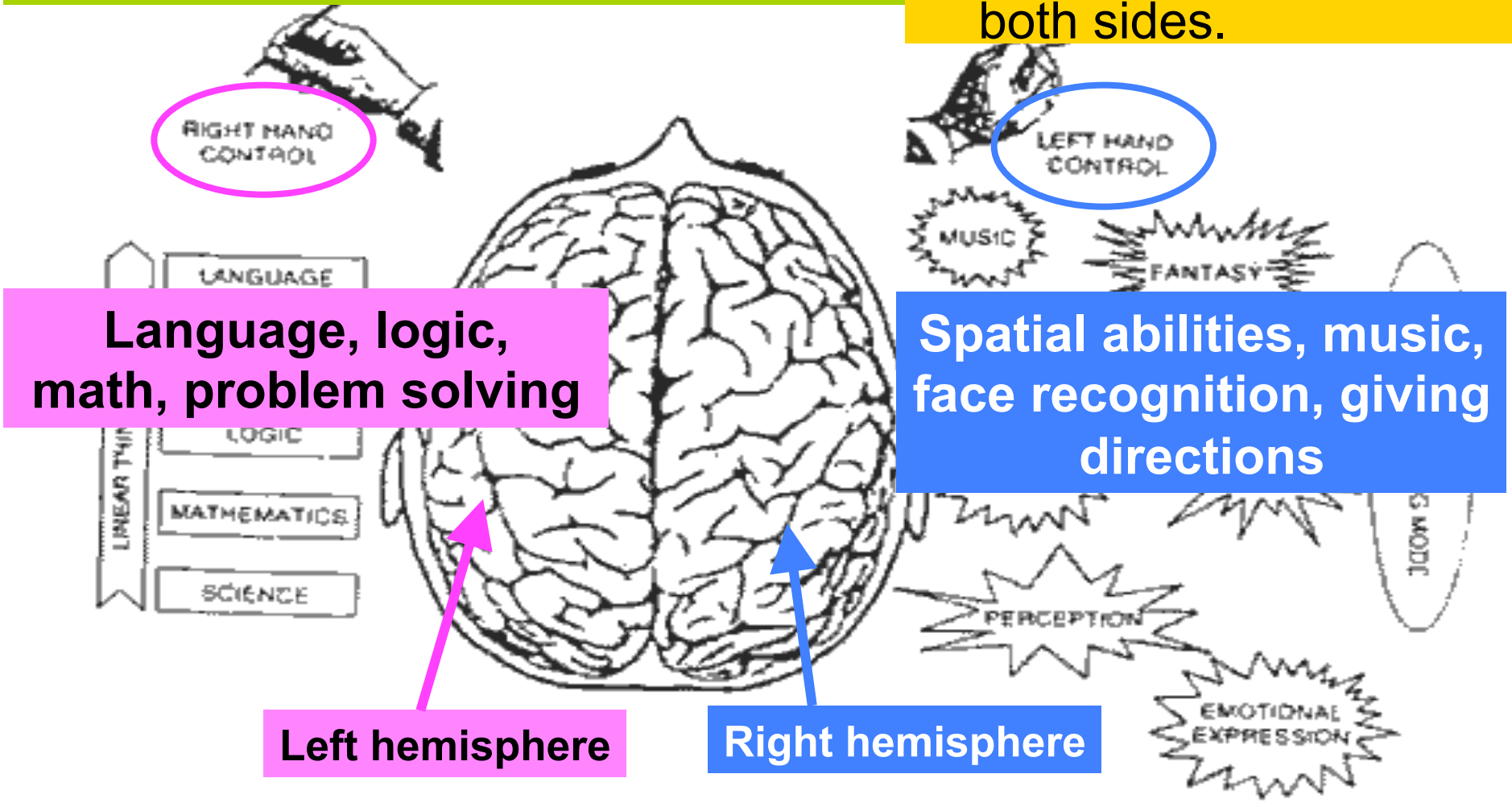
Cerebral Hemispheres

- The brain is divided into two sides, called hemispheres. They are called the left and the right hemispheres.
- The corpus callosum joins the two hemispheres, allowing them to communicate with each other



Are you right handed or left handed?

Males tend to be more left brained, while females have greater access to both sides.



Language, logic, math, problem solving

Spatial abilities, music, face recognition, giving directions

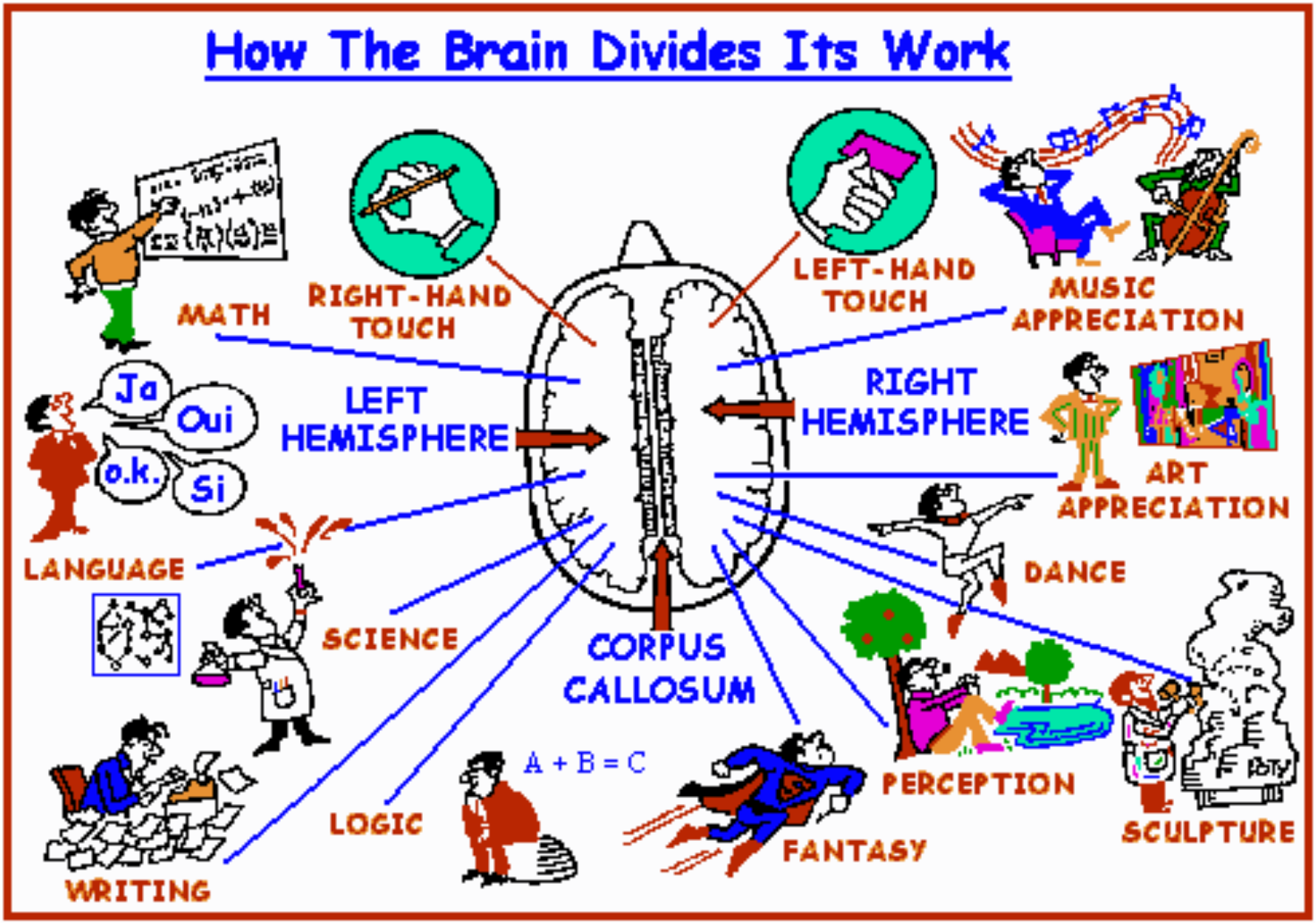
Left hemisphere

Right hemisphere

Sommer's Left Brain vs. Right Brain 30 Second Experiment:

http://en.sommer-sommer.com/braintest/

How The Brain Divides Its Work



Stroop Effect

BLUE	GREEN	YELLOW
PINK	RED	ORANGE
GREY	BLACK	PURPLE
TAN	WHITE	BROWN

Say the ink colours.

Go to youramazingbrain.org for an explanation of this & more!

http://youramazingbrain.org/supersenses/default.htm

COLOR TEST

CONFLICT:

The right side of the brain wants to pick the color that matches the word, the left wants to choose the word written. When you make a mistake, that's the left side of the brain in action.

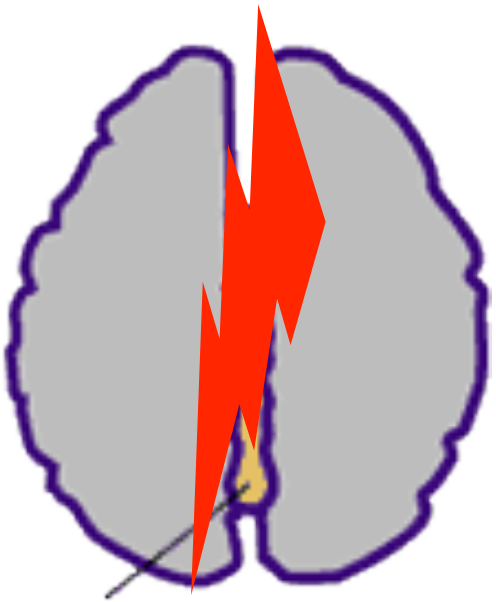
Left is right, right is left

- The **left side** of your **brain** controls the **right side** of your **body** and vice versa
- But, your brain combines information from both sides of your body due to communication via the **corpus callosum.**

How do we know what each hemisphere does?

- People who suffered from **epilepsy** (“brain storm” of excessive neuronal activity) had their corpus callosum cut to prevent the spread of the **"epileptic seizure"** from one hemisphere to the other.
- What happened to communication between the two halves?

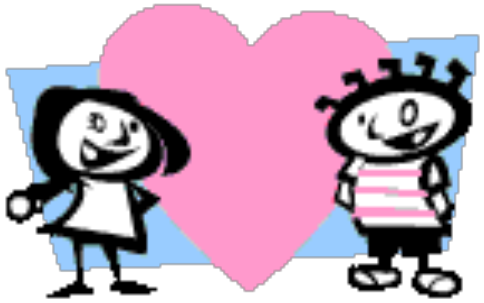
It stopped.

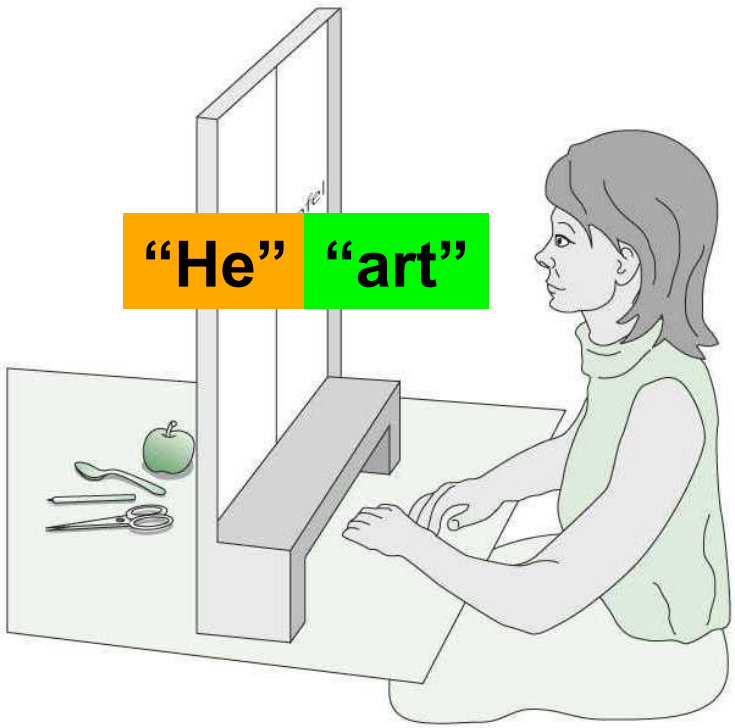


The Great Split-Brain Experiment

- **Roger Sperry** was awarded the Nobel Prize in Physiology or Medicine in 1981 for the discovery of **cerebral dominance**
- He studied patients who had the surgery
- At first he noticed that the patients could walk, talk and looked normal
- **BUT……..**

http://www.nobelprize.org/educational/medicine/split-brain/splitbrainexp.html





“He” “art”

- The patient could only see **“he”** with her **left eye** and **“art”** with the **right eye**
- The word **“he”** went to the **right side** of the brain and **“art”** went to the **left side** of the brain
- When asked what the patient saw, she said….
  - **“art”**

  When asked to write down what she saw, she wrote he.

Chimeric faces

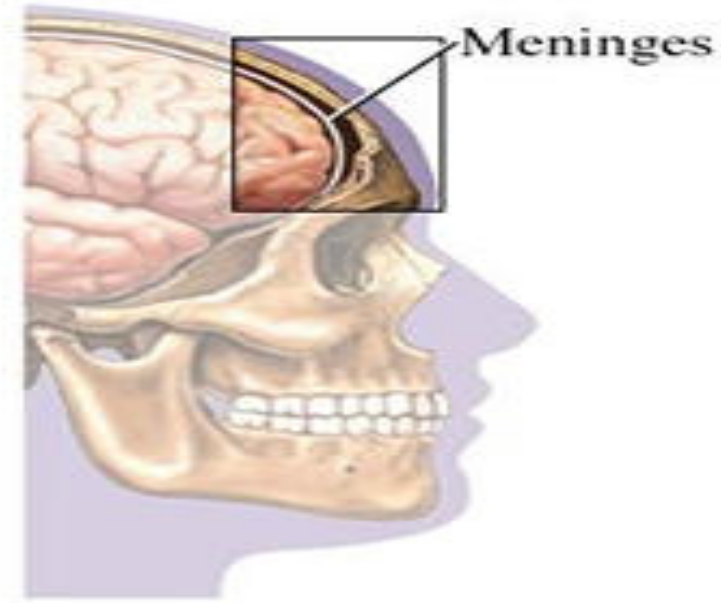
Left hemisphere

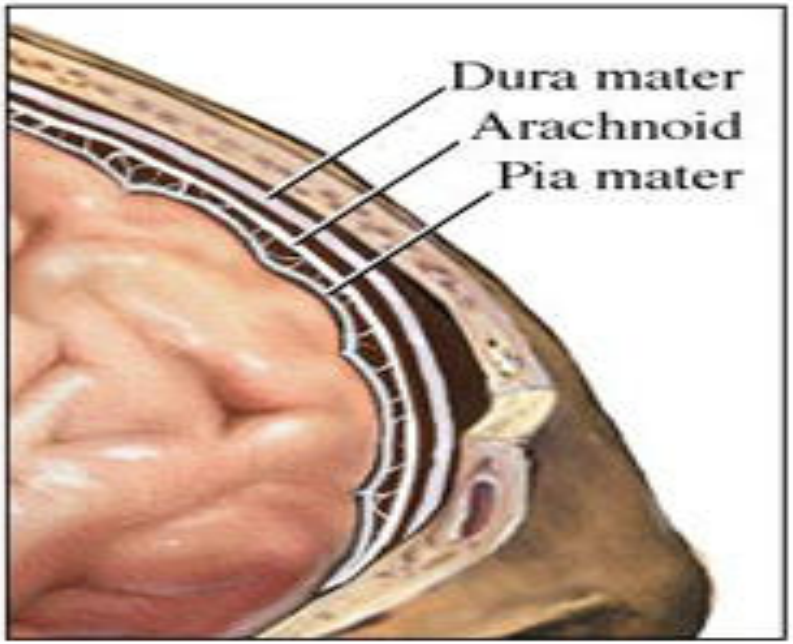
Right hemisphere

- If the patient focuses on the dot in the middle of the forehead, the visual information about the **woman's face** will go to the **right hemisphere** and information about the **man's face** will go to the **left hemisphere**
- When the patient is asked to point to a whole, normal picture of the face that was just **seen**…
  - the patient picked out the **woman's picture** (remember, information about the woman's face went to the **RIGHT cerebral hemisphere**).
  - When asked to **say** whether the picture was a man or a woman, the patient will SAY that the picture was of a **man.**

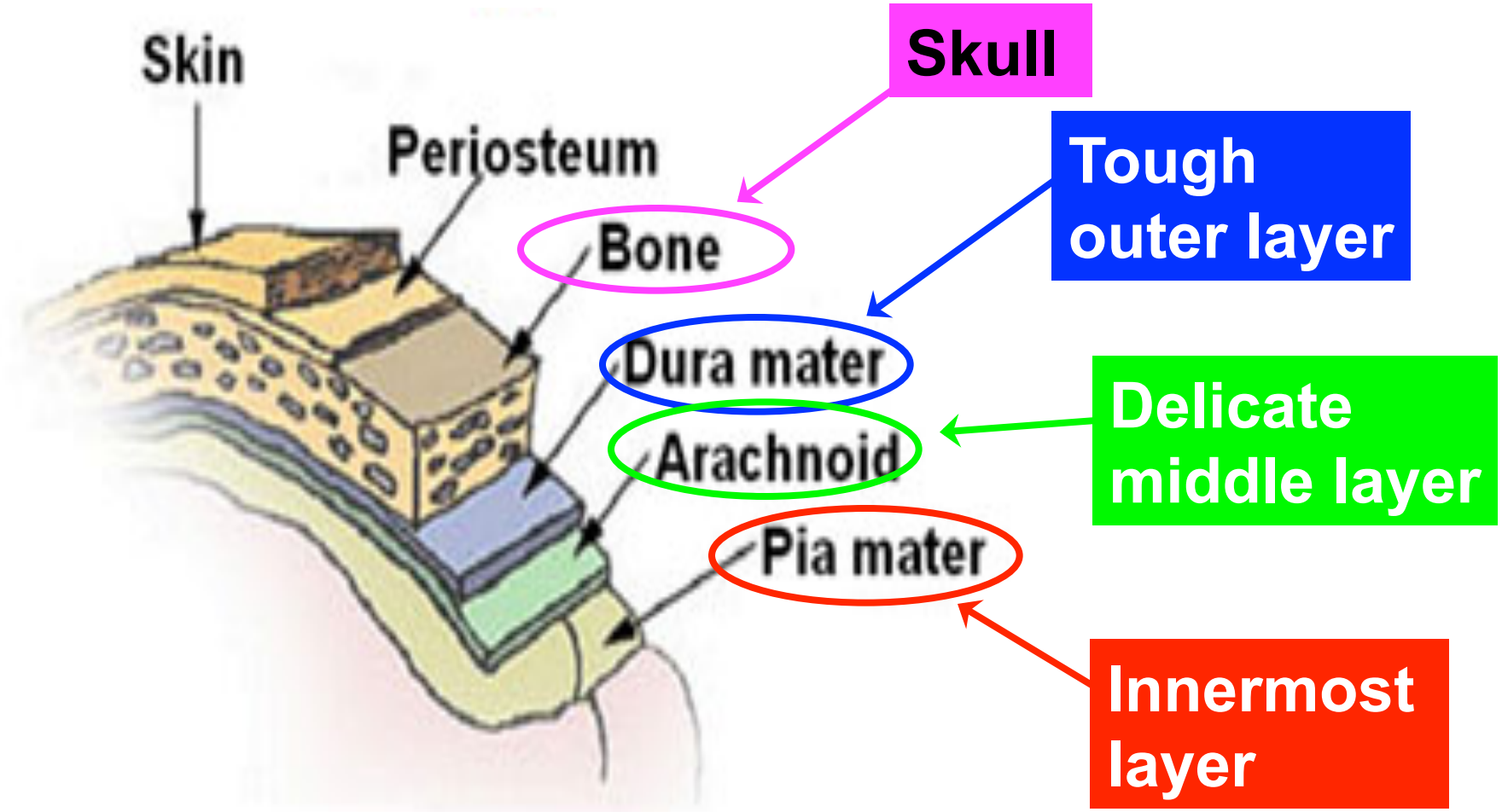
Meninges? What are they?

- **Location:** Between the **brain** and the **skull**
- **Make up: 3 layers** (**dura mater, arachnoid and pia mater**) (Don't memorize names of layers!)

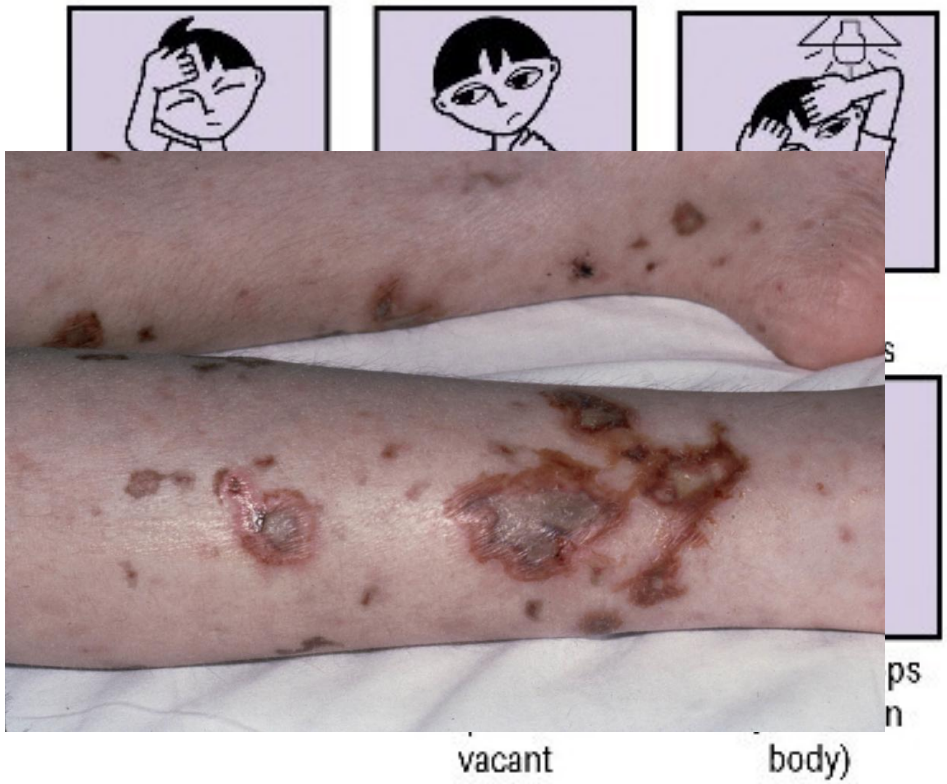




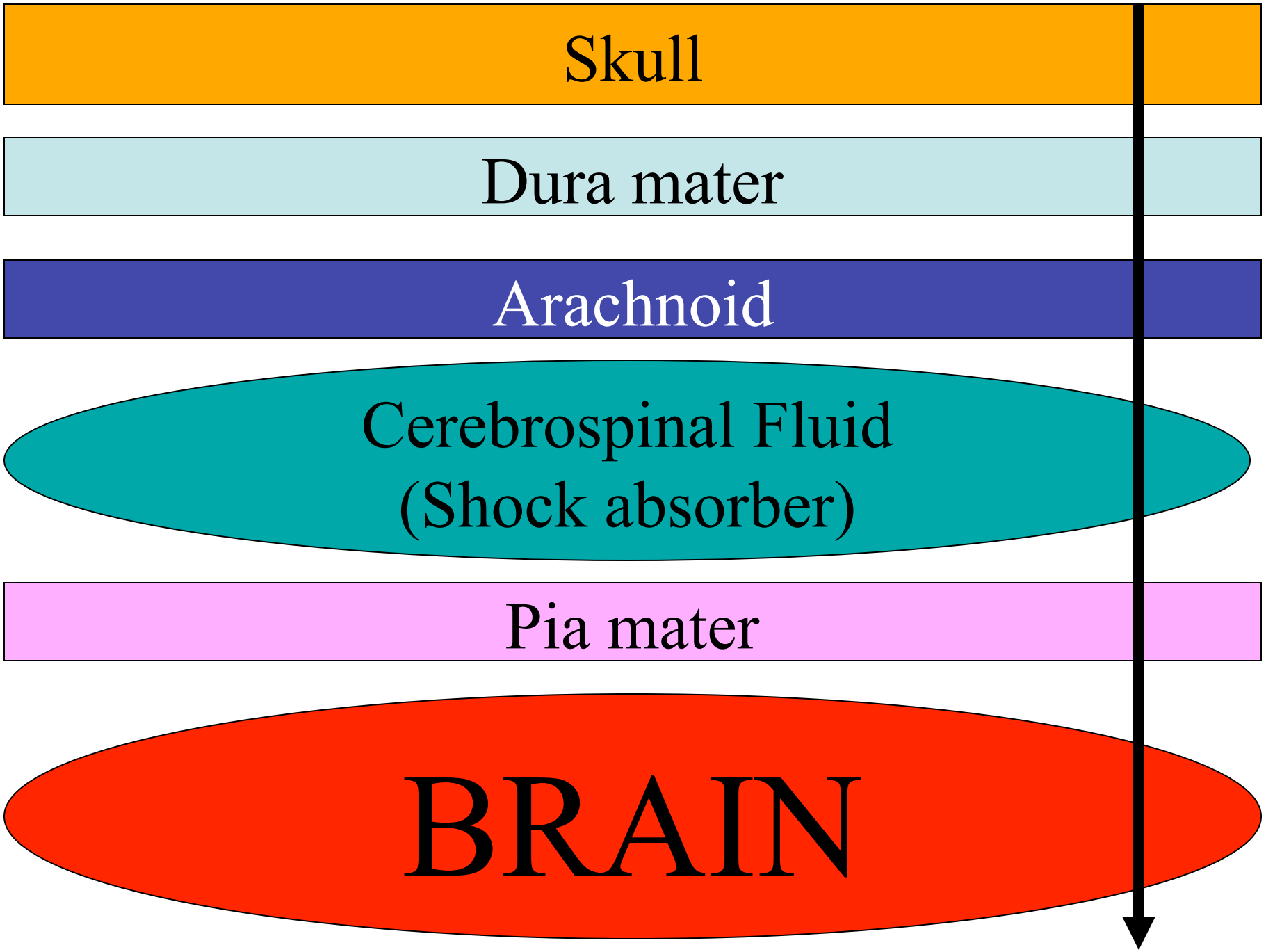
The meninges are 3 layers of tough, elastic tissue that directly enclose the brain and spinal cord. They act as a shock absorber and protect your brain!



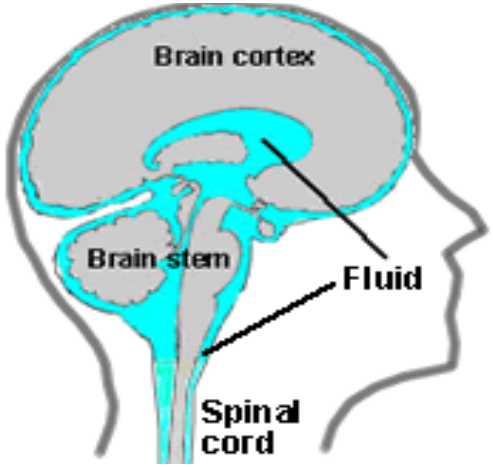
Meningitis



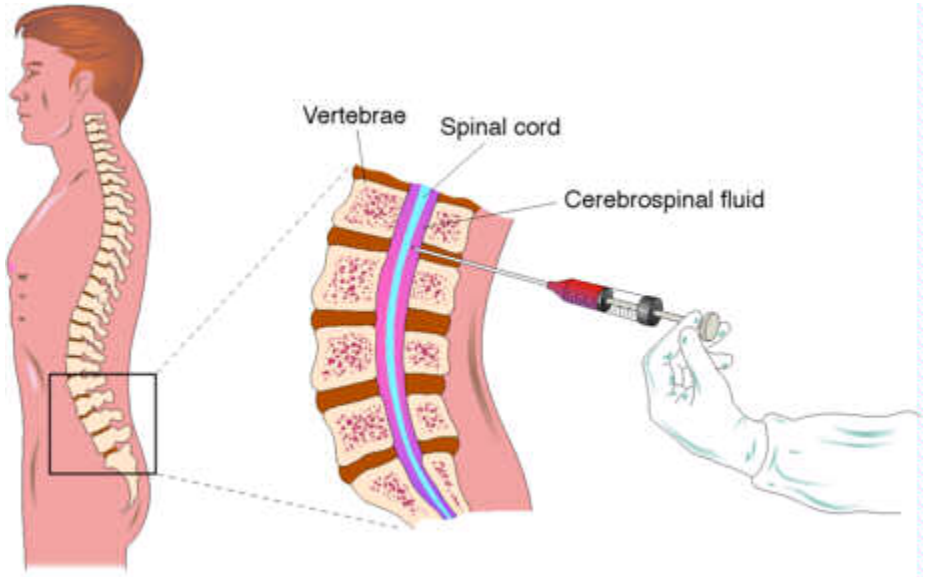
- **Inflammation of the meninges**
- Meningitis is caused by **bacterial or viral infection** of the meninges
- **"Meningitis Belt"** in Africa is where meningitis is very common

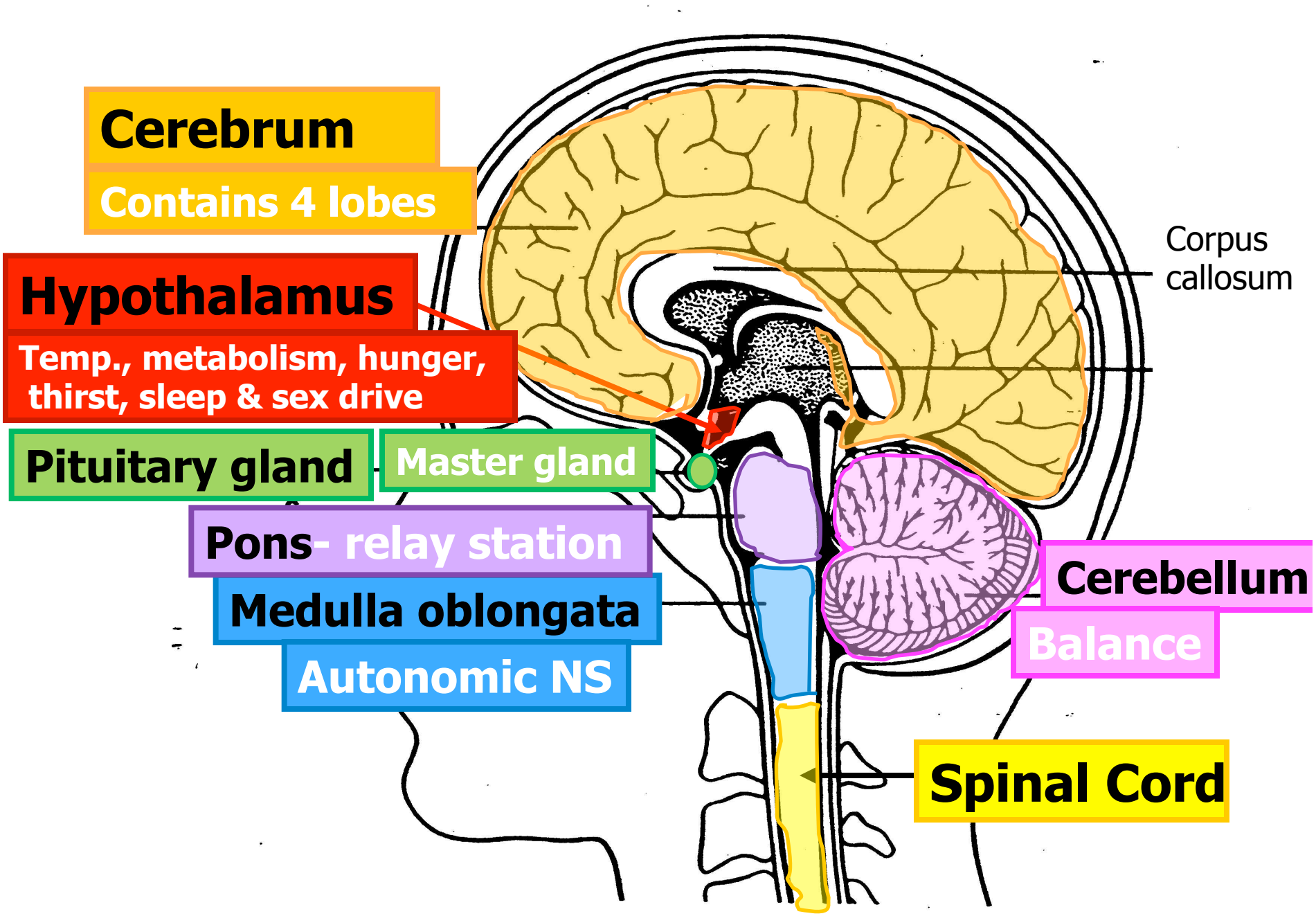

Skull
Dura mater
Arachnoid
Cerebrospinal Fluid
(Shock absorber)
Pia mater
BRAIN

Cerebrospinal Fluid

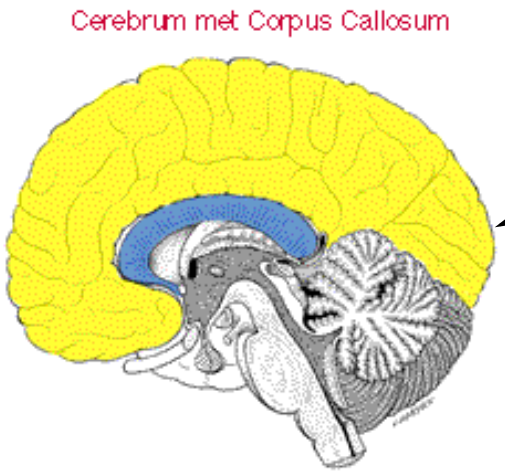


- **Location:** Circulates between the **arachnoid** and **pia matter**
- **Function:** **acts as a shock absorber and helps to transport nutrients to the brain and wastes away from the brain**
- **Spinal tap?** This is when a doctor extracts cerebrospinal fluid for examination
- Also found in the **spinal cord**

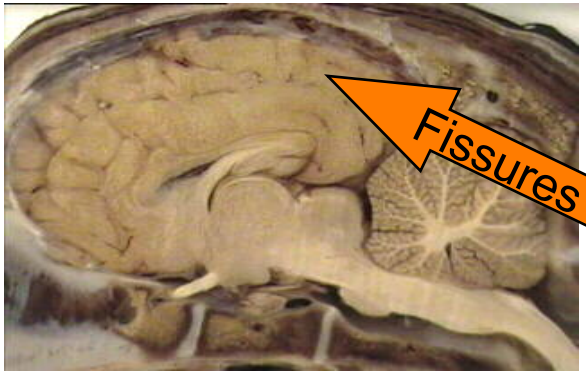



Cerebrum
Contains 4 lobes
Hypothalamus
Temp., metabolism, hunger, thirst, sleep & sex drive
Pituitary gland
Master gland
Pons- relay station
Medulla oblongata
Autonomic NS
Corpus callosum
Cerebellum
Balance
Spinal Cord

Cerebrum



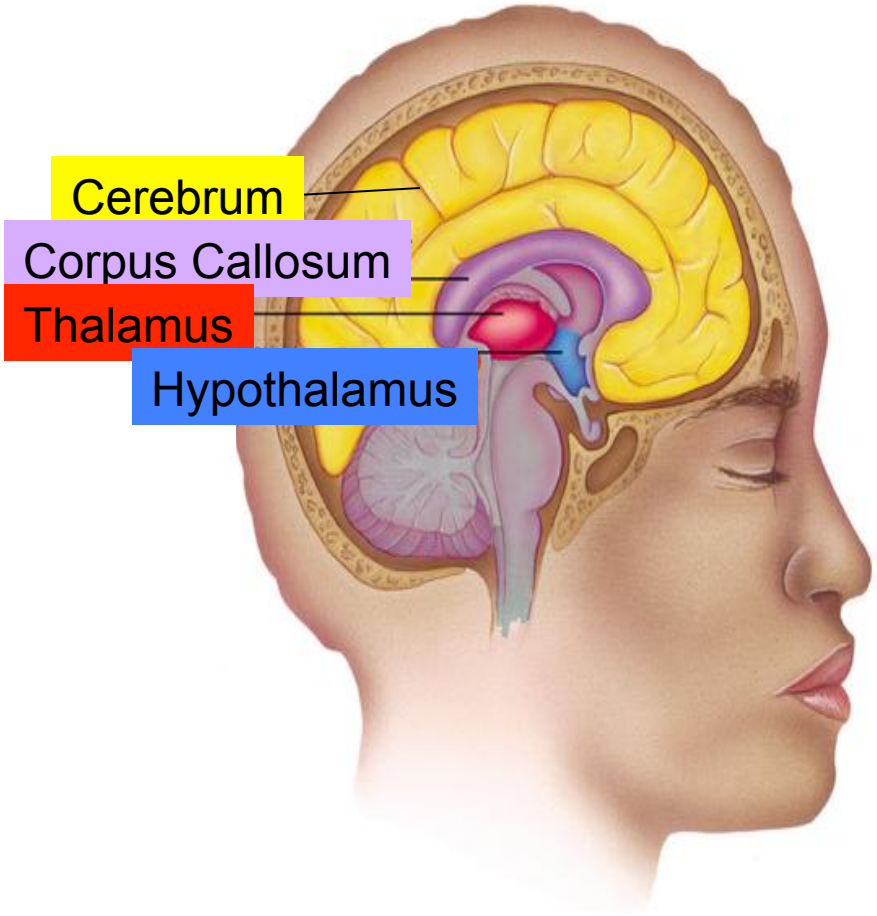
- Largest part of the brain
- Most highly developed part of the brain
- Role: **speech, reasoning, memory, personality**
- **4 lobes: occipital, temporal, parietal and frontal**
- Is divided into **2 cerebral hemispheres**



Cerebral cortex: surface of the cerebrum

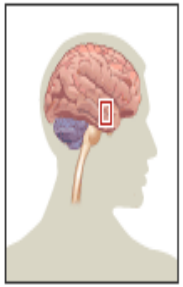
- **Grey matter**
- Lots of folds **(fissures/folds)** to increase surface area

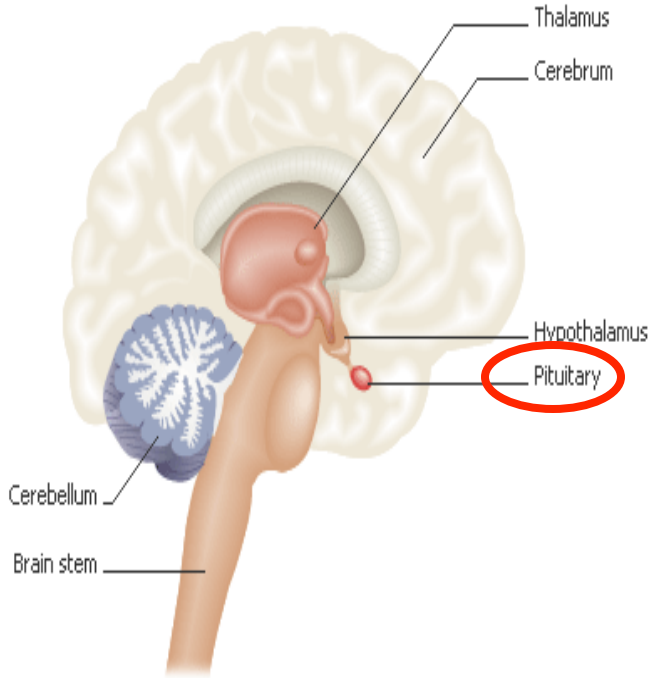
Hypothalamus



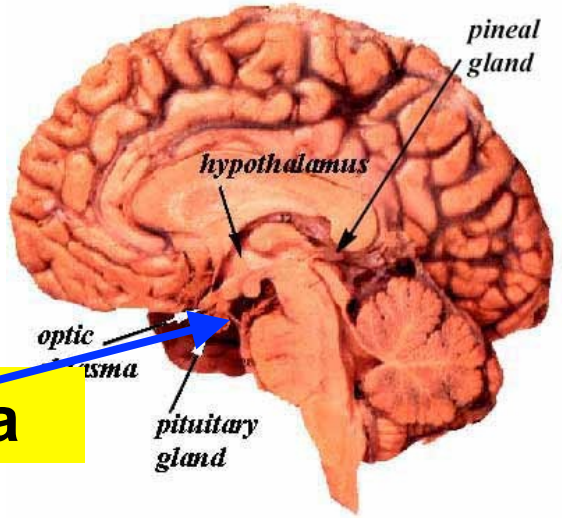
- **Hypothalamus**
  - **Regulates body temperature and metabolism**
  - **Controls hunger, thirst, sleep and sex drive**

Pituitary Gland





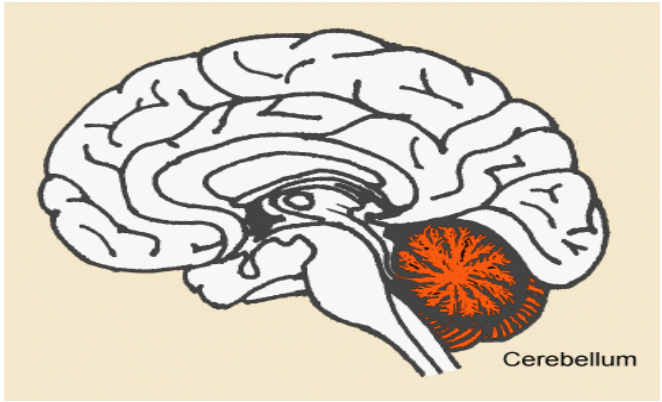
- **"Master gland"** of the body
- **It controls most other glands (tropic hormones)**
- Controlled by the hypothalamus

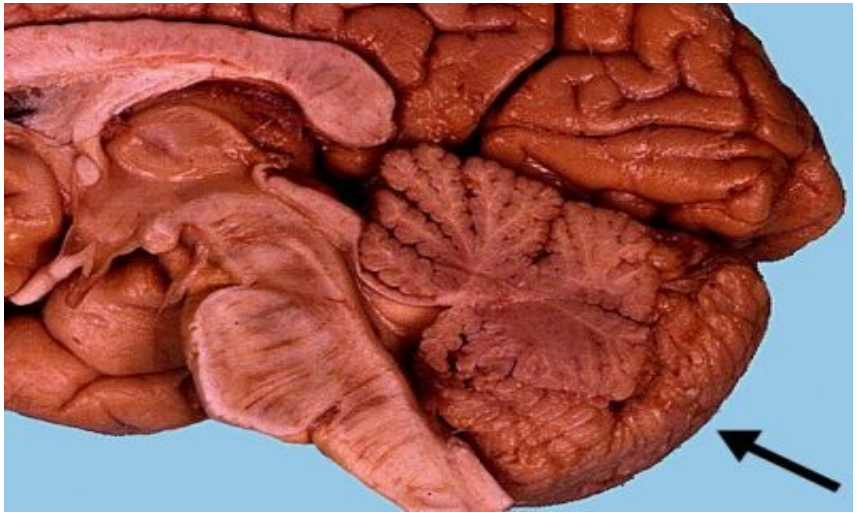


Shape and size of a pea

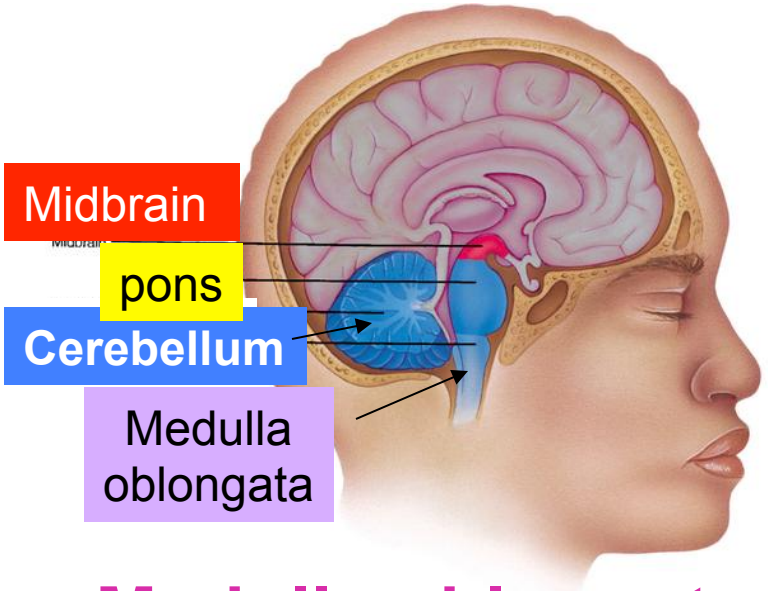
Cerebellum

- **Controls limb movement, balance, and muscle tone**
- **Largest section** of the hindbrain
- **dubbed "Little brain"**
- Only **10% of the mass** of the brain, but contains **50% of the neurons**
- **Has "the tree of life" appearance**





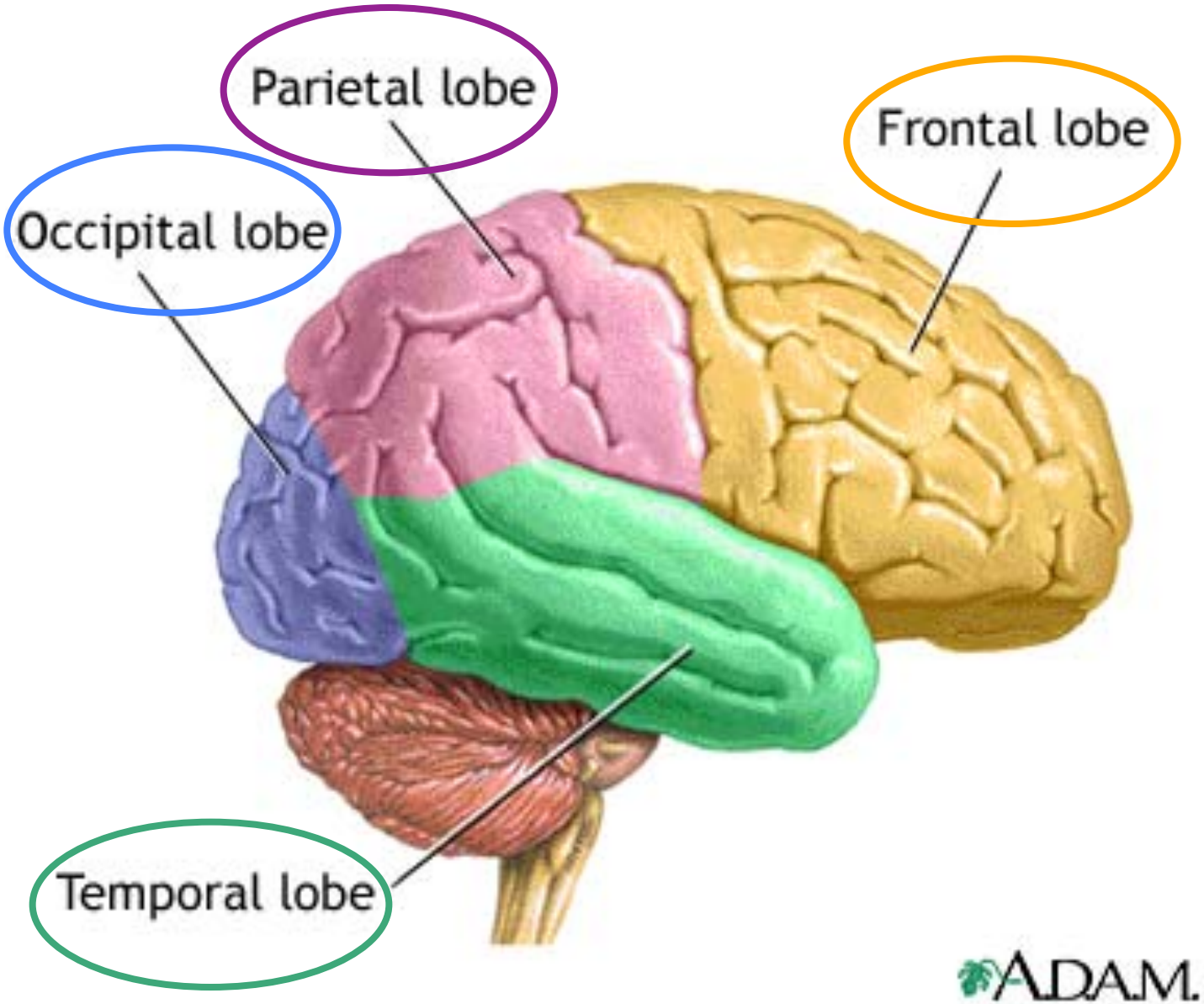
Pons and Medulla Oblongata

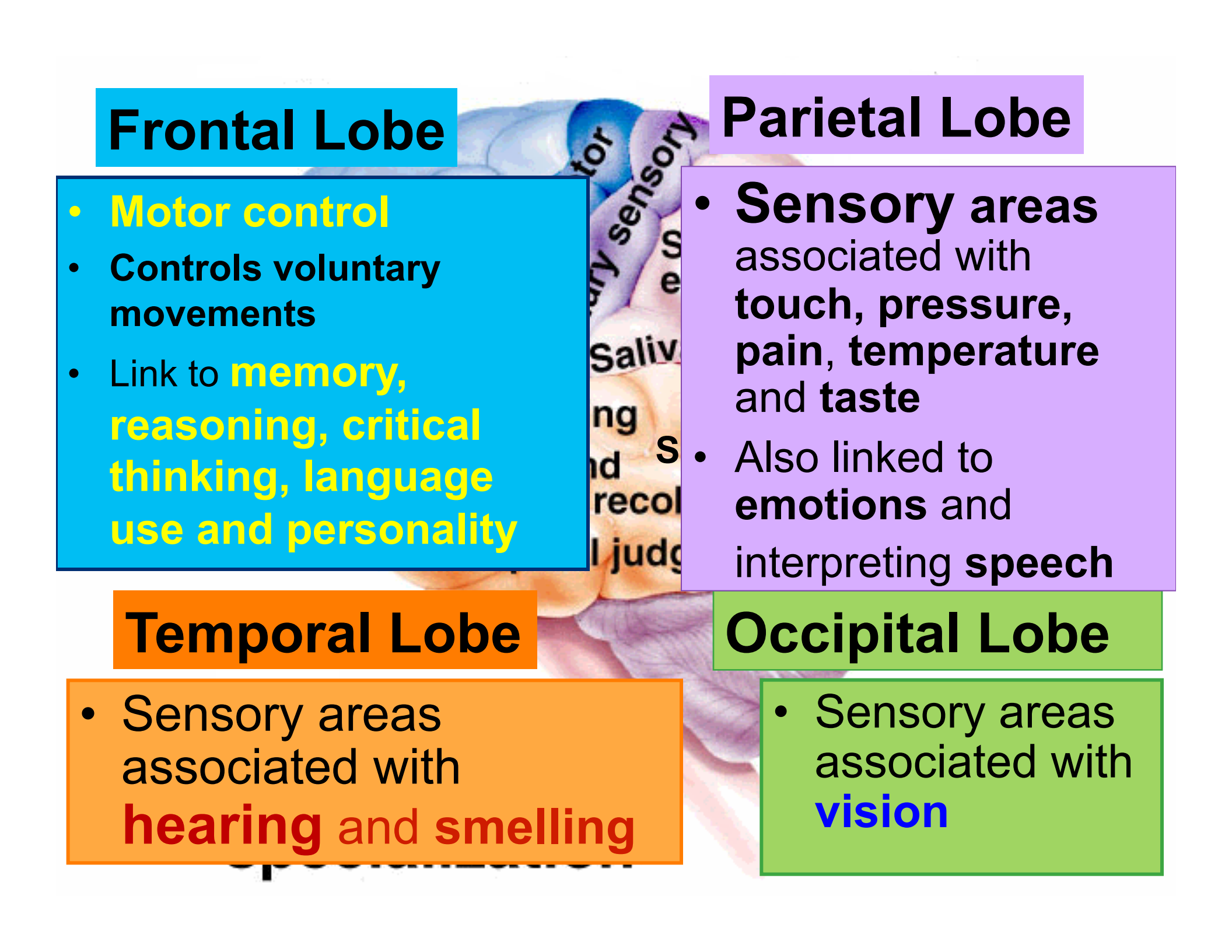


- **Pons – relay station** between
- A) two sides of the cerebellum and
- B) the cerebellum and the medulla oblongata

- **Medulla oblongata**
  - **autonomic nervous system**
  - **sympathetic and parasympathetic nervous system**
  - **heart rate, breathing, blood pressure**

The Cerebral Cortex: 4 lobes!





Frontal Lobe

- **Motor control**
- **Controls voluntary movements**
- Link to **memory, reasoning, critical thinking, language use and personality**

Parietal Lobe

- **Sensory areas** associated with **touch, pressure, pain**, **temperature** and **taste**
- Also linked to **emotions** and interpreting **speech**

Temporal Lobe

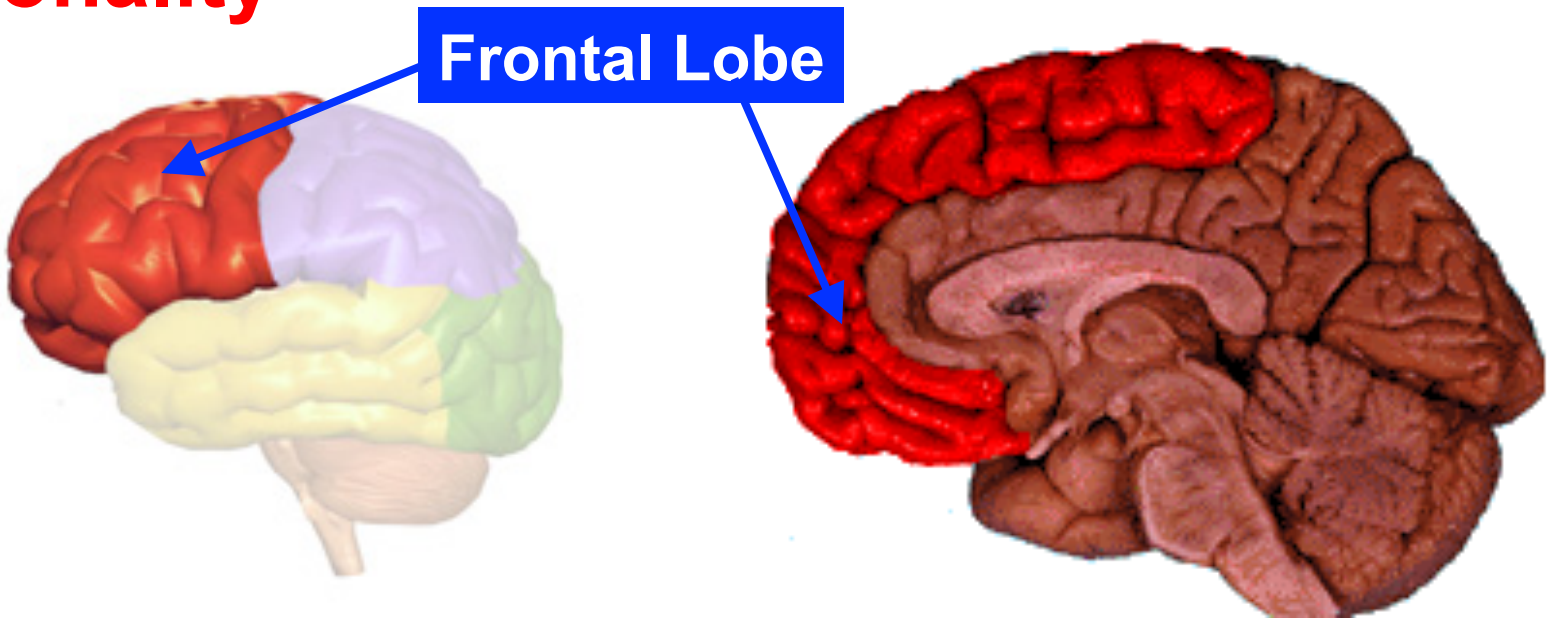
- Sensory areas associated with **hearing** and **smelling**

Occipital Lobe

- Sensory areas associated with **vision**

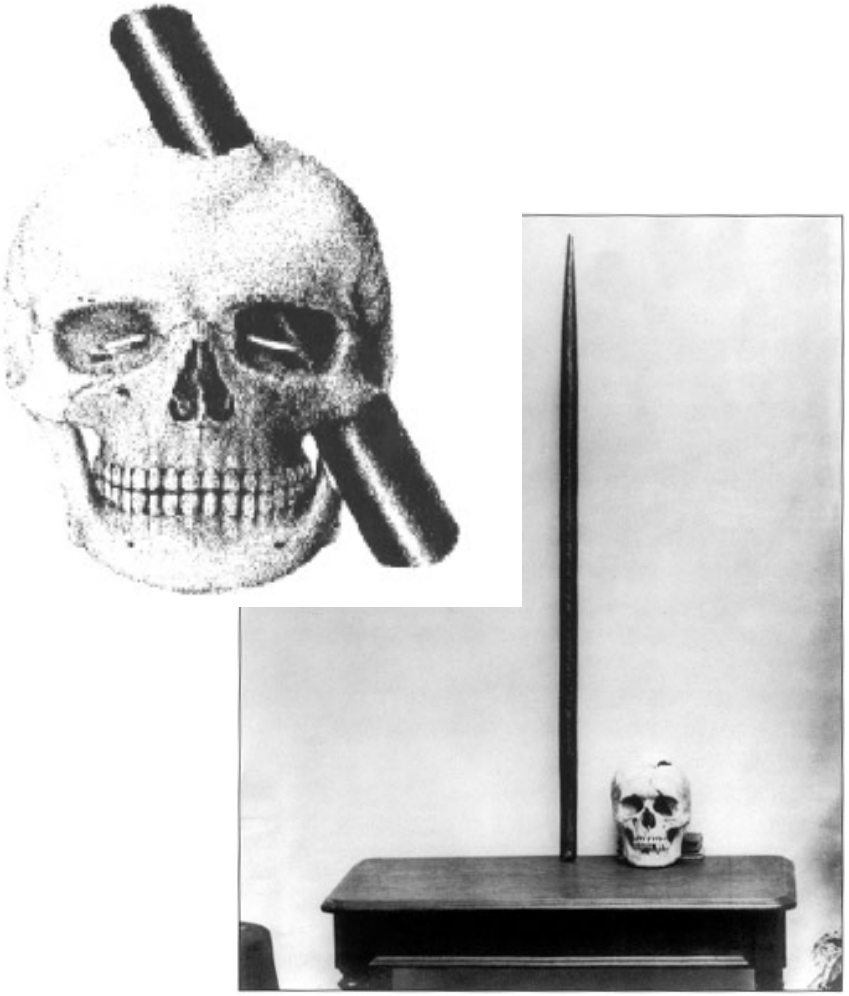
Frontal lobe

- **Motor control**
- **Controls voluntary movements**
- Link to **memory, reasoning, critical thinking, language use and personality**

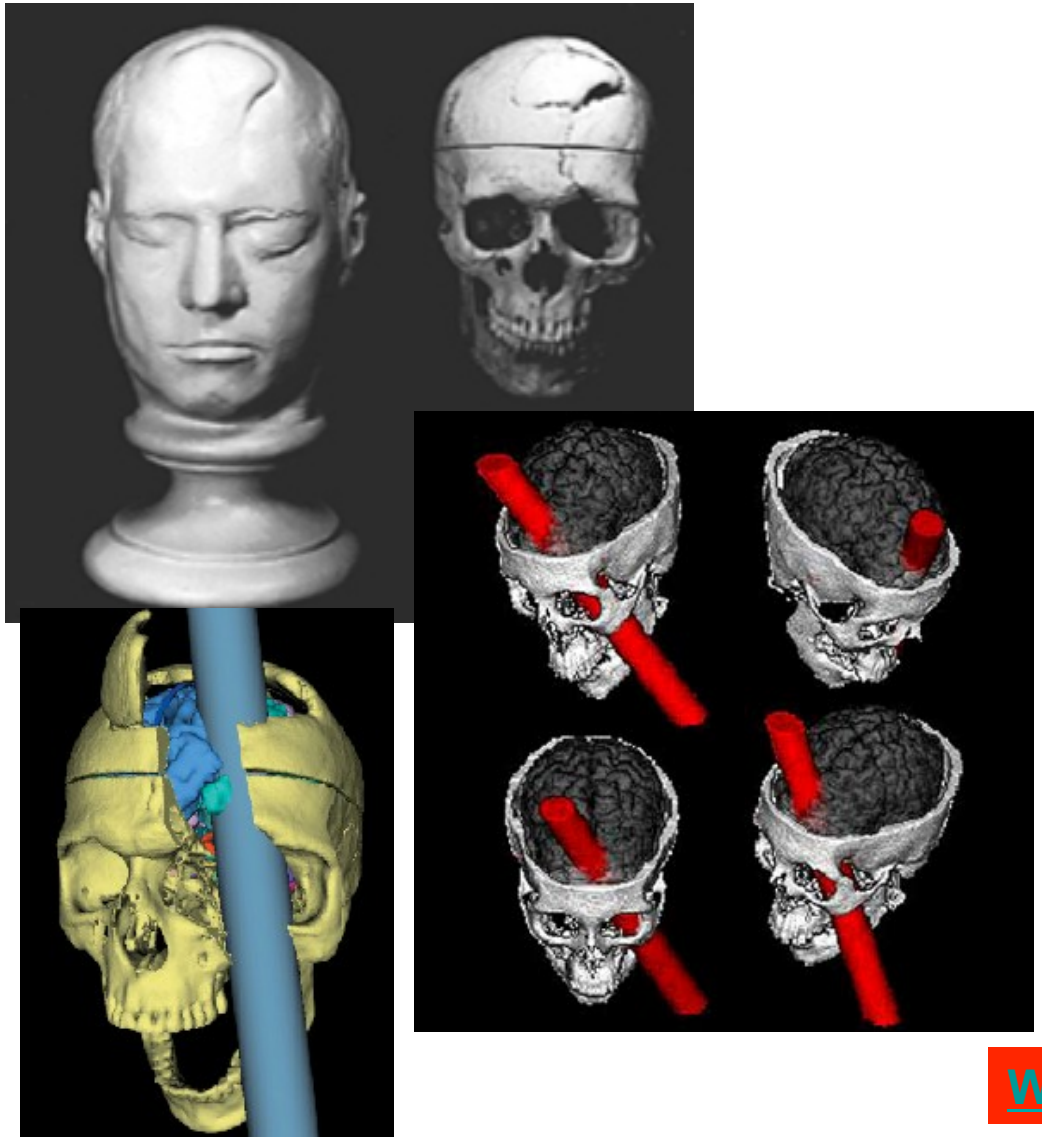


Phineas Gage (1823 – 1860)

- Construction foreman
- Blasted a 13 pound tamping rod through his head
- Not only did he live, but he lived for 12 more years AND even walked to the oxcart taking him to the hospital
- Damage to the frontal lobe and his left eye



Did anything bad come out of his accident?

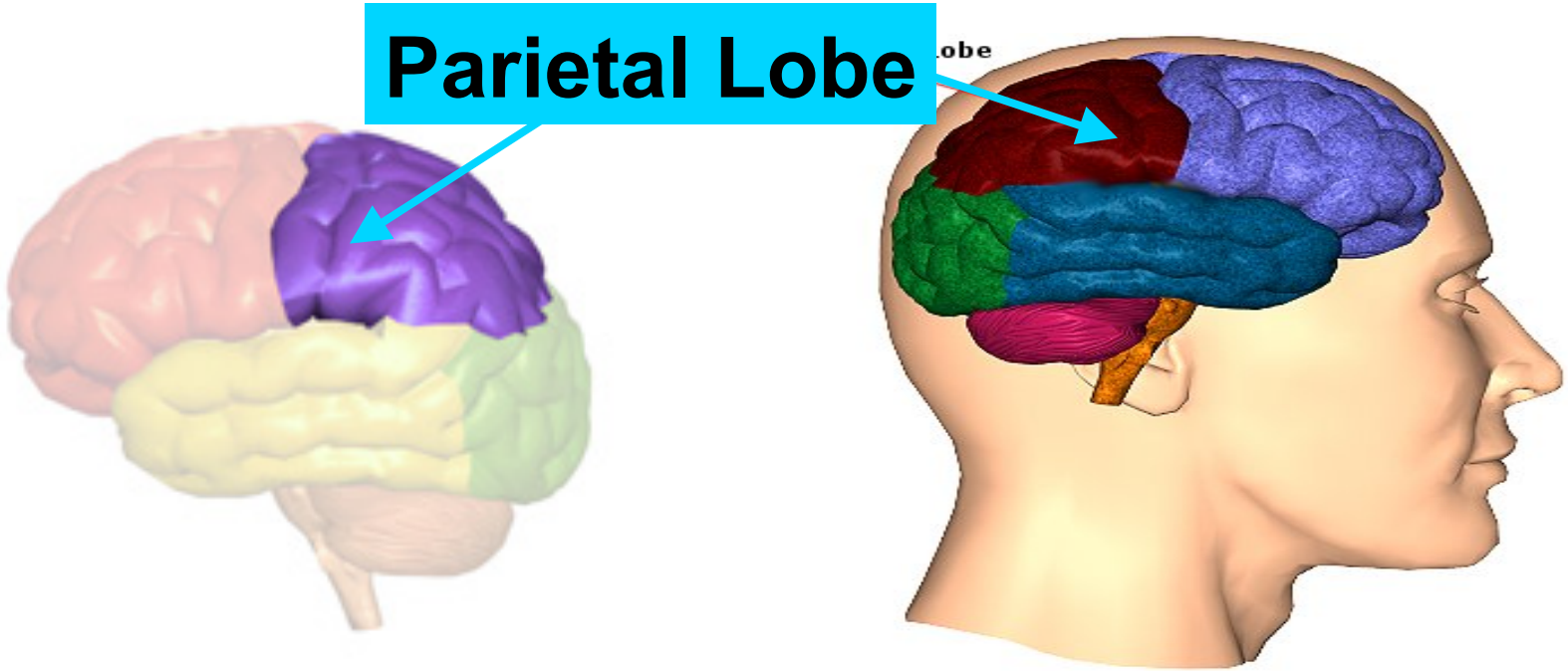


- Underwent drastic personality change (polite and well liked to short tempered and rude)
- Lead to greater understanding of the brain
- Idea later used for lobotomies

Want to know more about Phineas?

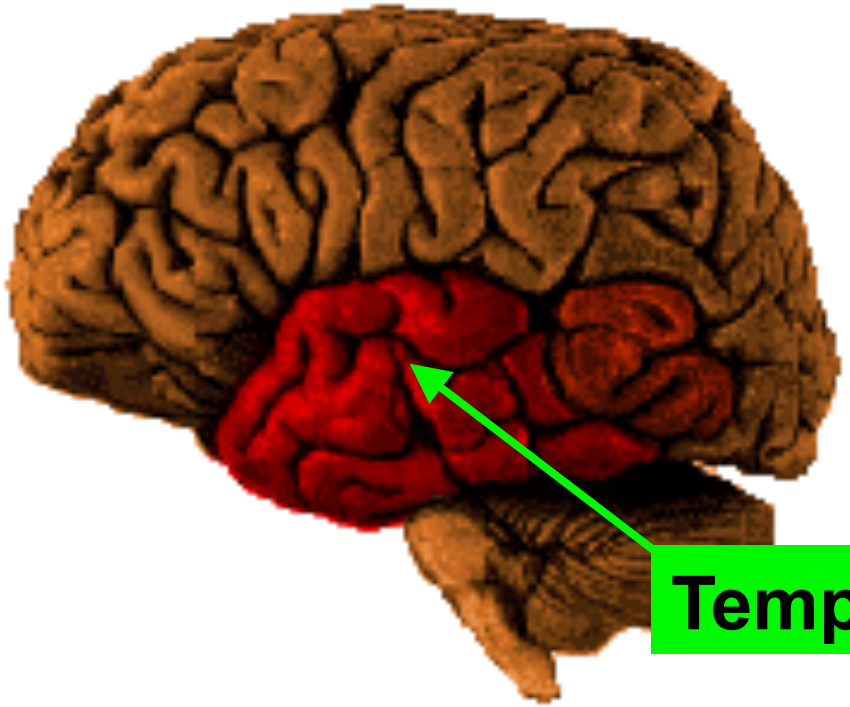
Parietal Lobe

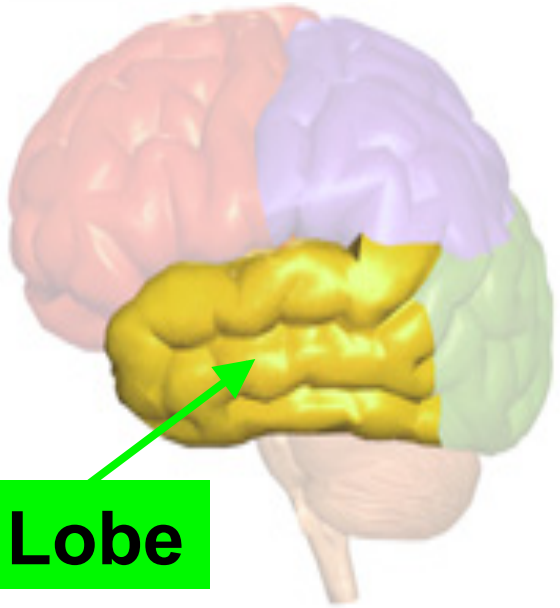
- **Sensory areas** associated with **touch, pressure, pain**, **temperature** and **taste**
- Also linked to **emotions** and interpreting **speech**



Temporal Lobe

- Sensory areas associated with **hearing** and **smelling**

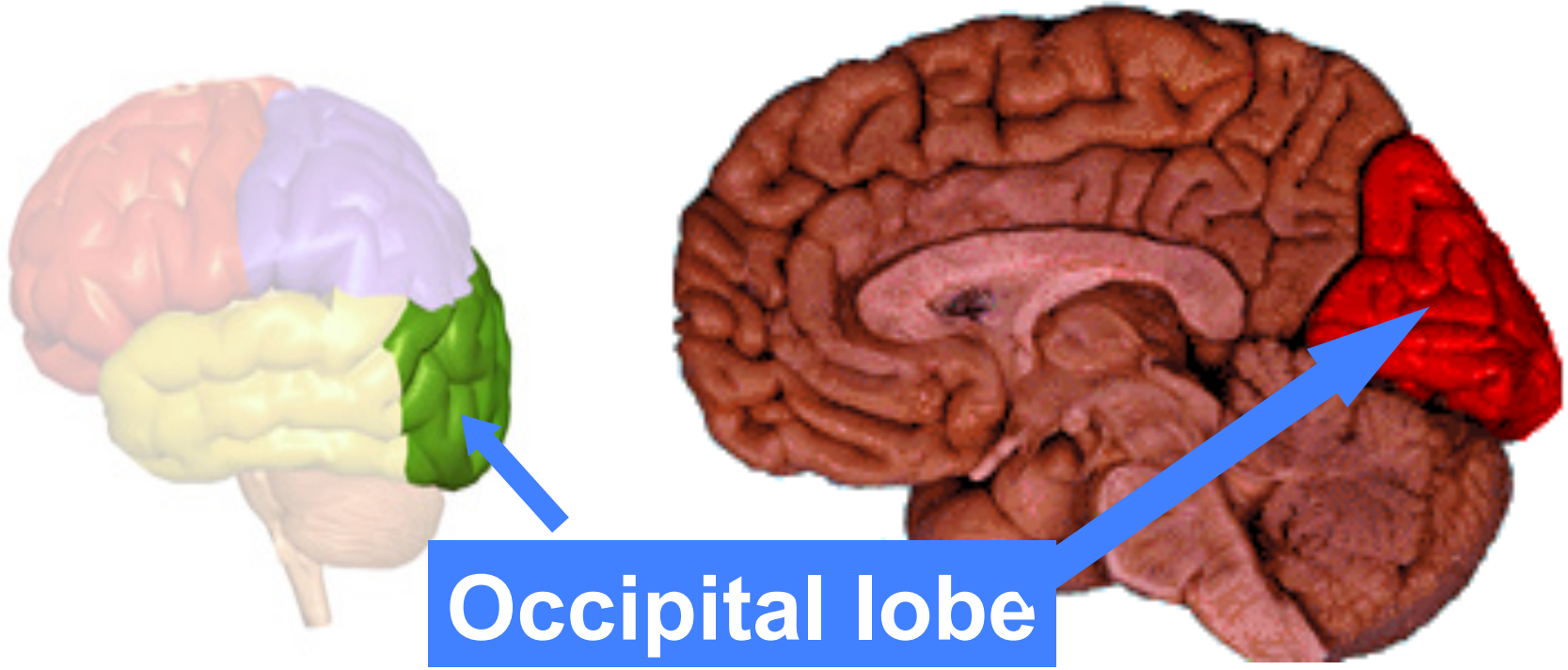




Temporal Lobe

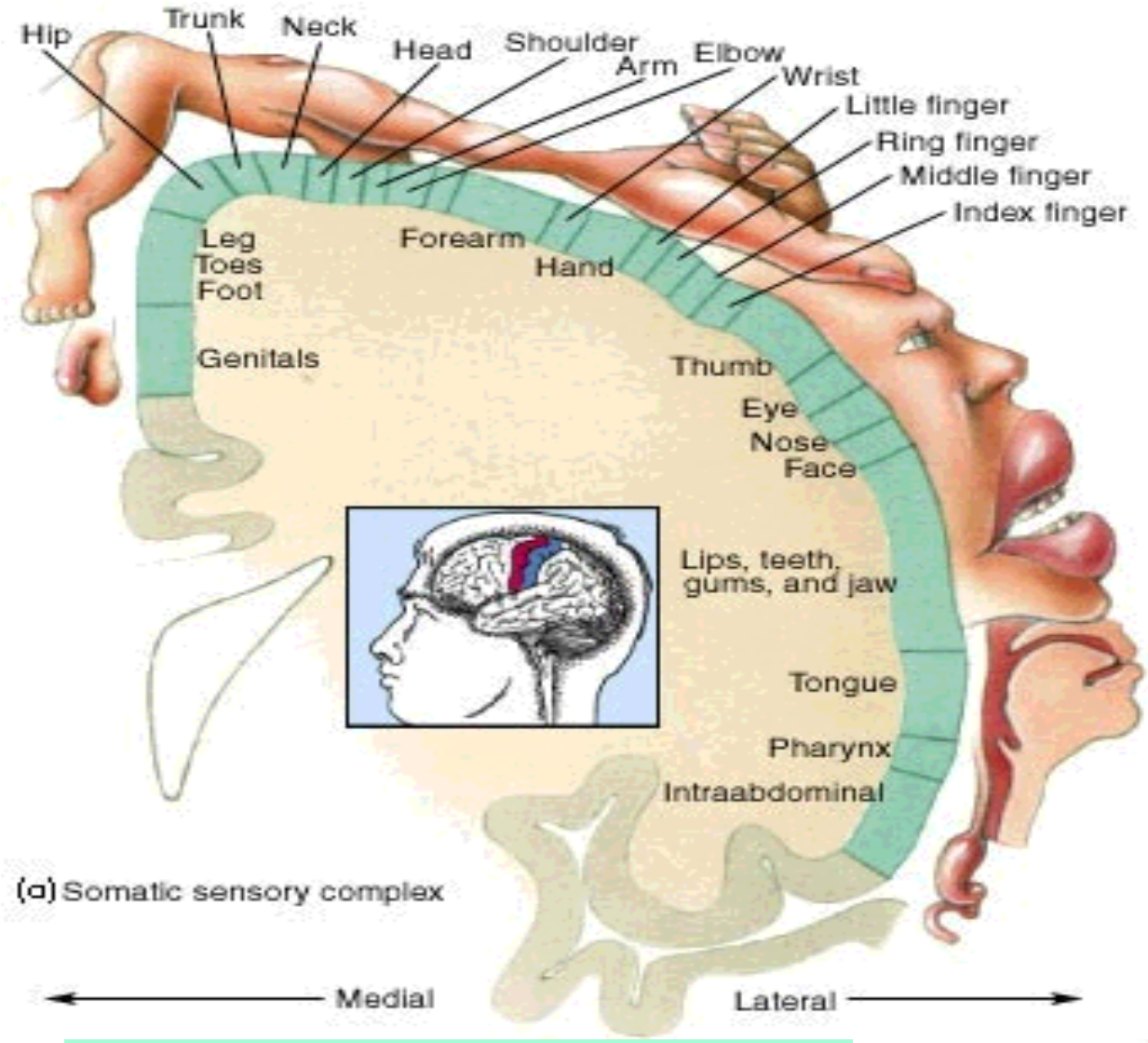
Occipital lobe

- Located at the back of the brain
- Sensory areas associated with **vision**
- Damage may cause loss of vision



Bozeman: The Brain 13:55 http://www.youtube.com/watch?v=kMKc8nfPATI

What the body would look like according to the cerebral cortex?



This model shows what a man's body would look like if each part grew in proportion to the area of the cortex of the brain concerned with its sensory perception. The hands and lips dominate – but the feet are also disproportionately large, indicating their sensory importance.

Who has bigger brains?

Cell numbers

- **Males have 4% more brain cells than females, and about 100 grams more of brain tissue.**

She Brains He Brains

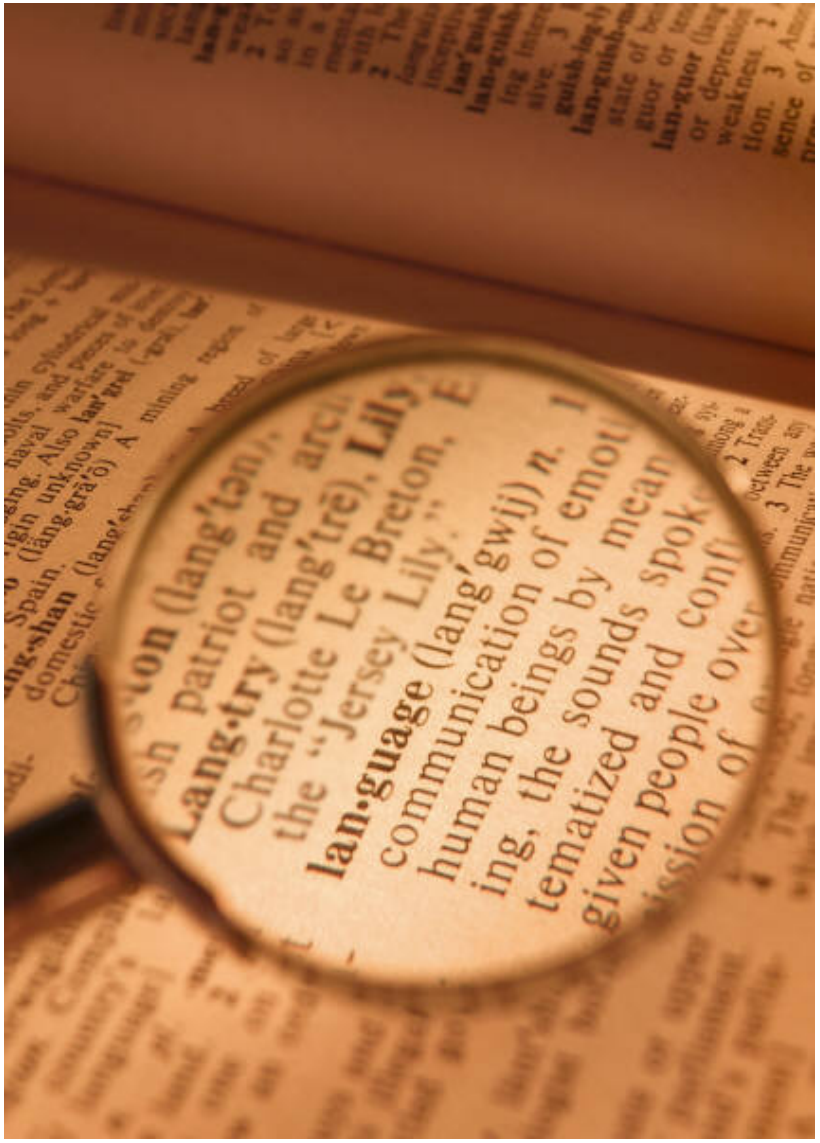
Check website

Does that mean boys are smarter?

- Even though males seem to have more brain cells, females tend to have **more** dendritic connections between brain cells.
- A female's brain has a larger corpus callosum
- This means that females can transfer data between the right and left hemisphere faster than males.

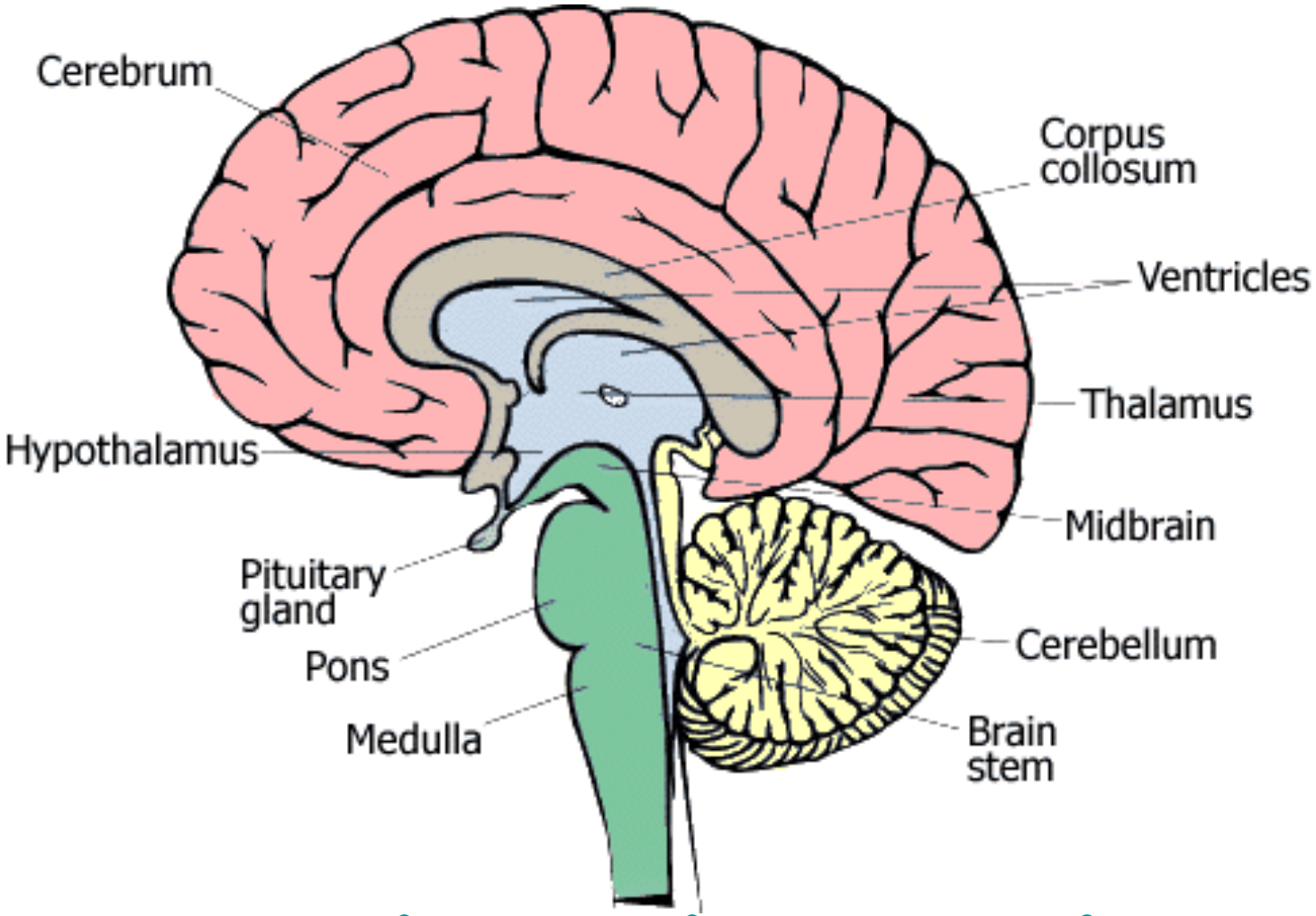
Is it better to be a girl?

- For males, language is most often just in the dominant hemisphere (usually the left side)
- A larger number of females seem to be able to use both sides for language.
- This gives them a distinct advantage.
- If a woman has a stroke in the left front side of the brain, she may still retain some language from the right front side.
- Men who have the same left sided damage are less likely to recover as fully.



Why do girls seem to be more emotional?

- Current research has demonstrated that females, on average, have a **larger deep limbic system** than males.
- **This gives females several advantages and disadvantages.**
  - women are more in touch with their feelings, they are generally better able to express their feelings than men.
  - They have an increased ability to bond and be connected to others - which is why women are often the primary caretakers for children



Brain Review Page!

http://faculty.washington.edu/chudler/nsdivide.html

Brain Song

News reporter has stroke on air?