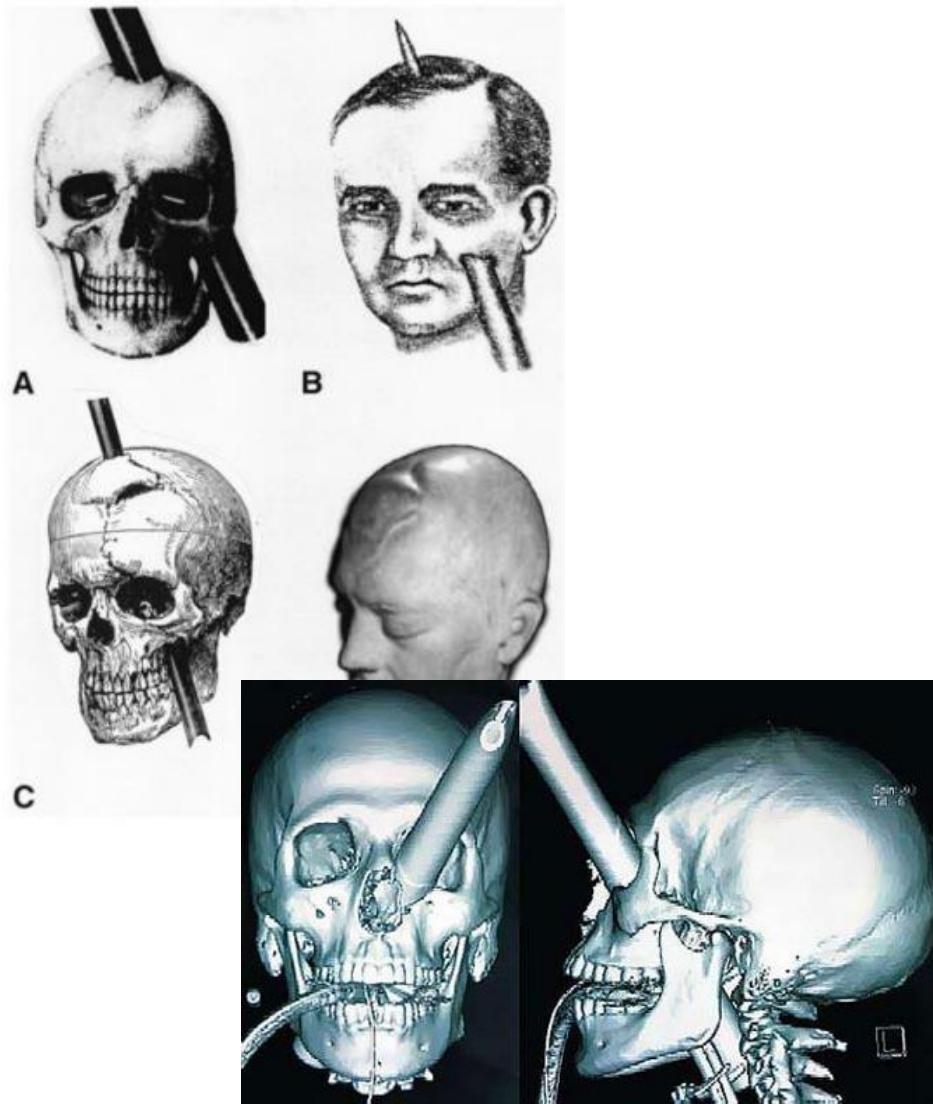
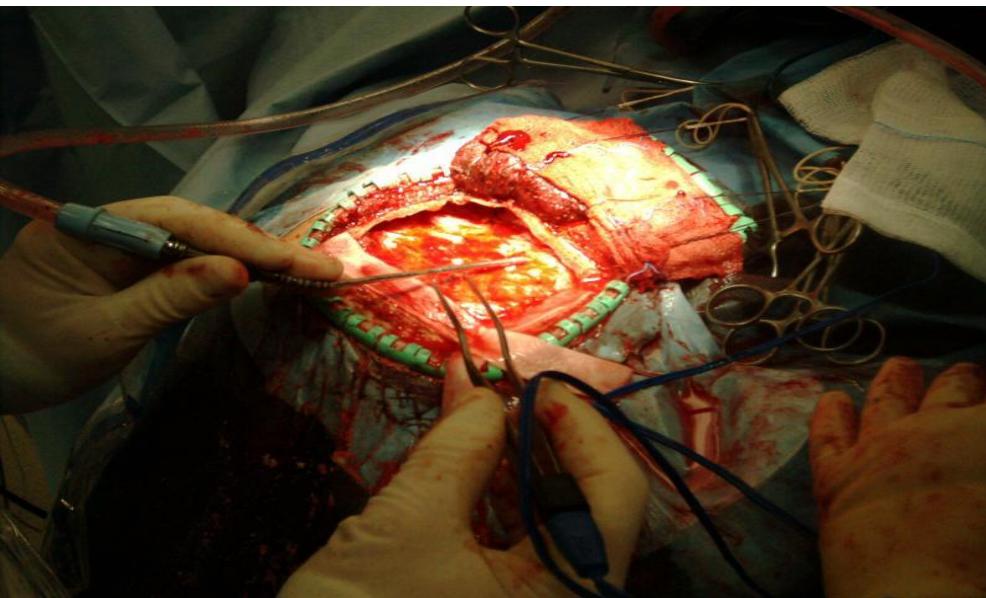


# Ways to study the Brain!!!

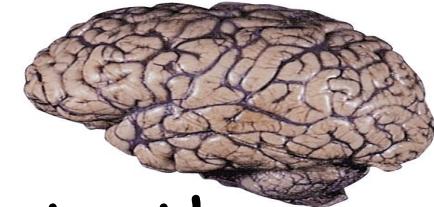


- **Accidents:** damage to brain regions can tell us about their functions
- **Phineas Gage.**

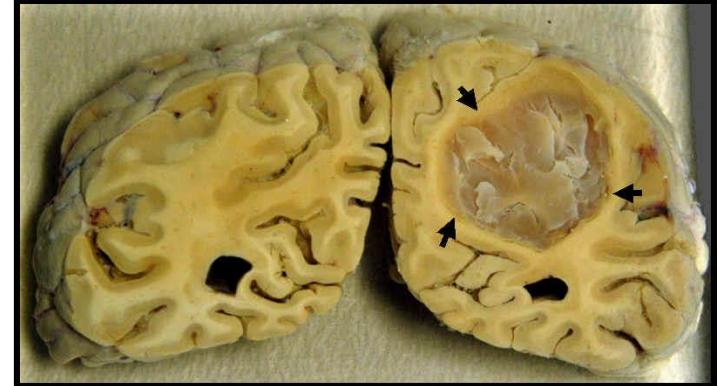
# Lesions: tissue destruction



Brain tumors also lesion brain tissue.



Cutting into the brain and looking for change.



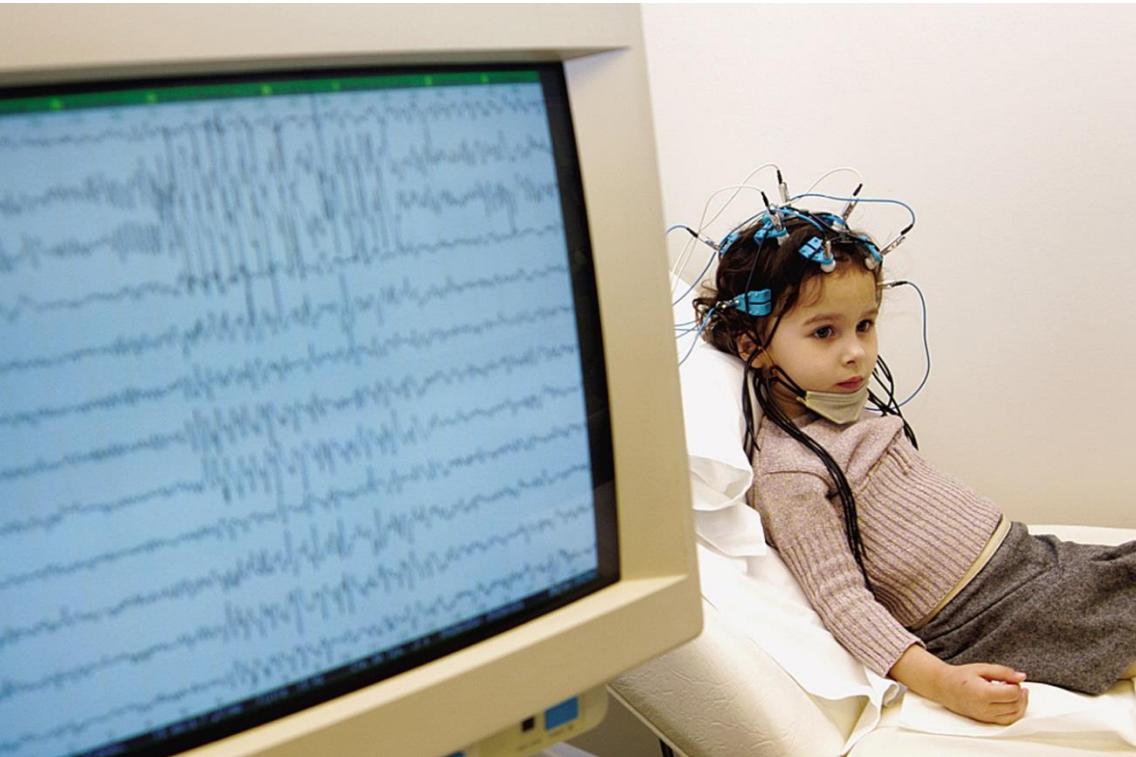
**Did you know?** Nazis used to lesion the brains of Jews during experiments to see how their behavior would change. We know much of what we do today about the brain because of these experiments...

# Less Invasive ways to study the Brain

- Electroencephalogram (EEG)
- Computerized Axial Tomography (CAT)
- Positron Emission Tomography (PET)
- Magnetic Resonance Imaging (MRI)
- Functional MRI



# Electroencephalogram (EEG)



- Electrodes placed on the scalp create an amplified recording of the waves of electrical activity that sweep across the brain's surface

# CT scan

- CT (computed tomography) Scan
  - a series of x-ray photographs taken from different angles and combined by computer into a composite representation of a slice through the body; also called CAT scan

During a computerized tomography (CT) scan, a thin X-ray beam rotates around an area of the body, generating a 3-D image of the internal structures



# PET Scan

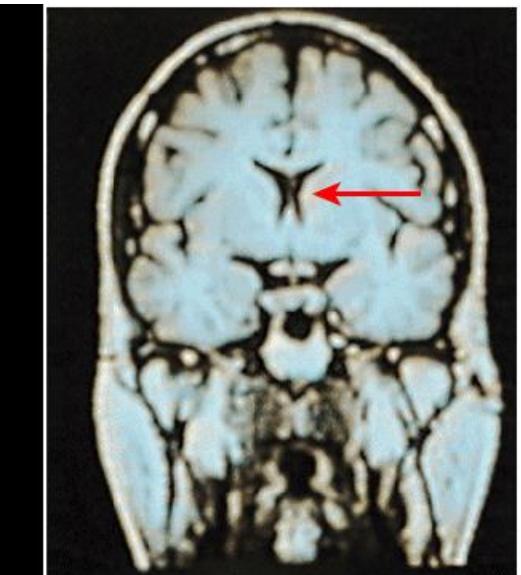
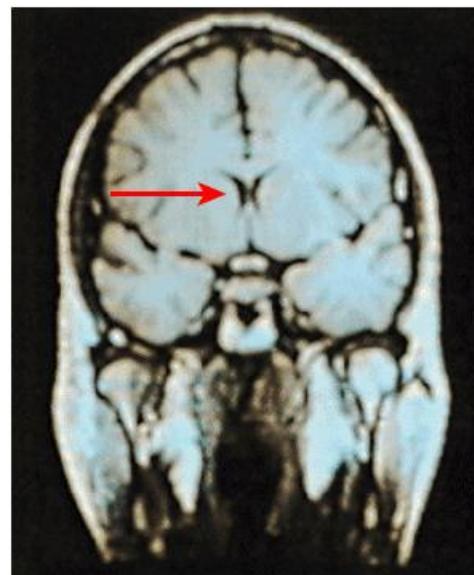
- PET (positron emission tomography) Scan
  - a visual display of brain activity that detects where a radioactive form of glucose goes while the brain performs a given task



# MRI Scan

- (f)MRI – (functional) magnetic resonance imaging
  - a technique that uses magnetic fields and radio waves to produce computer-generated images that distinguish among different types of soft tissue; allows us to see structures within the brain

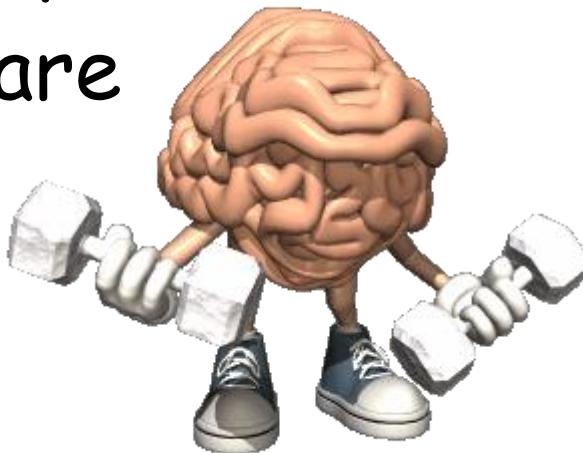
MRI scan of a healthy individual (left) and a person with schizophrenia (right). Note the enlarged fluid-filled brain region in the image on the right.



# Plasticity

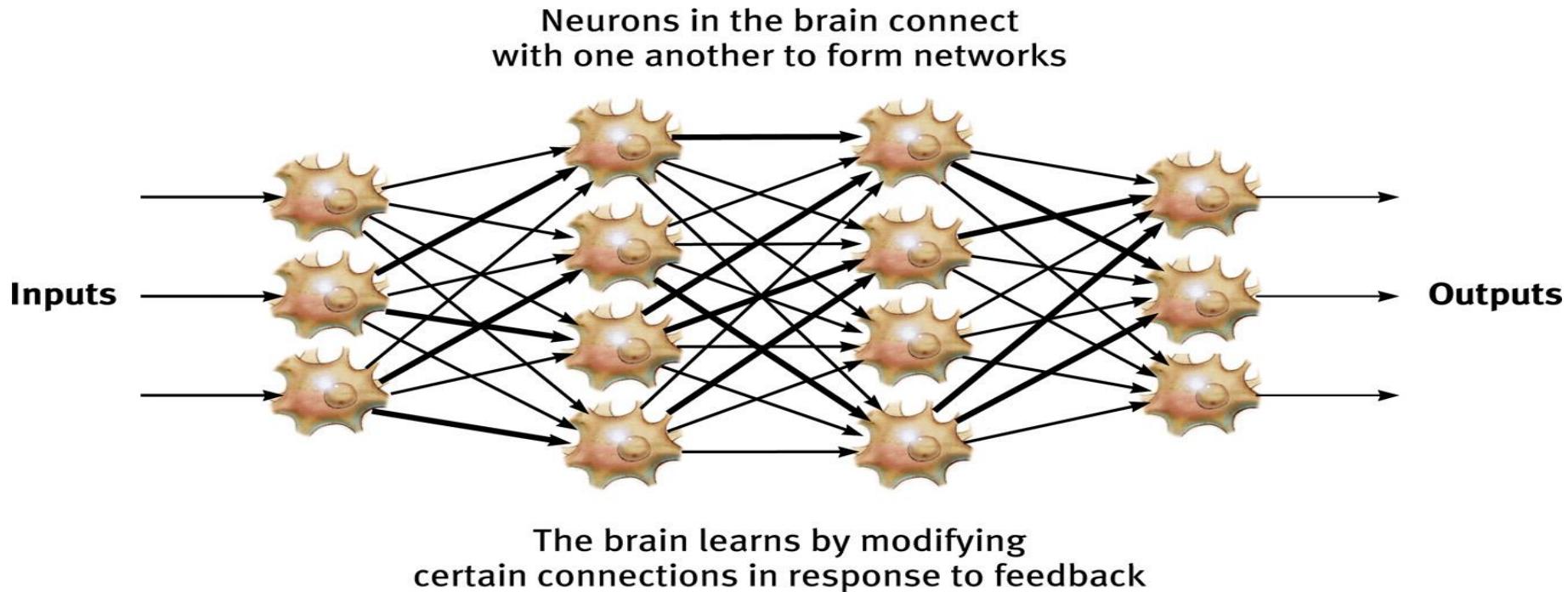
- The ability for our brains to form new connections after the neurons are damaged.

- The younger you are, the more plastic your brain is.



# Neural Networks

- **Neural networks**: connected neurons; increases speed and efficiency of communication

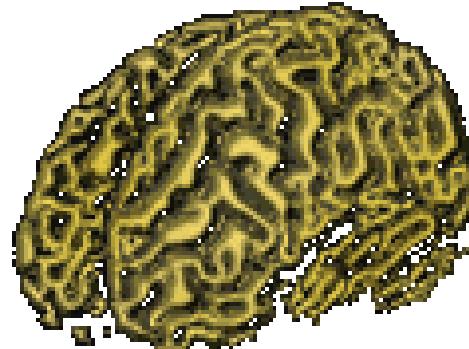


**Did you know?** Synapses are less than a millionth of an inch wide!!

# Brain Restoration

## Glial Cells

- Cells in the nervous system that support, nourish, and protect neurons



Neurons are like queen bees; on their own they cannot feed or sheathe themselves, glial cells are worker bees that provide for the neuron

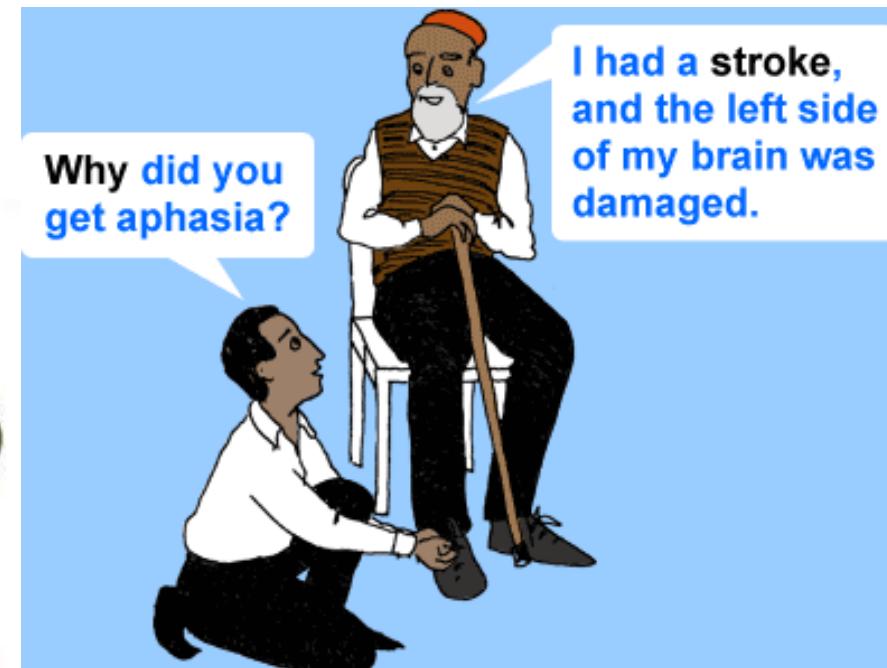
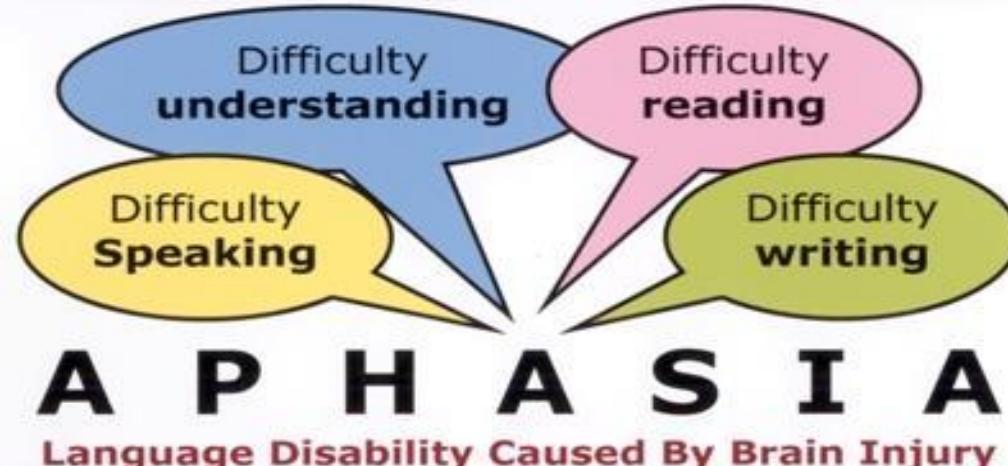
# Language and the Brain

**Did you know?** After his accident, Phineas Gage made a living as a fairground exhibit.

# Language and the Brain

## ▪ Aphasia

- impairment of language, usually caused by left hemisphere damage either to **Broca's area** (impaired speaking) or to **Wernicke's area** (impaired understanding)



# Language and the Brain

## ▪ **Broca's Area**

- an area of the left frontal lobe that **directs the muscle movements involved in speech**
  - BROKEN SPEECH  
(often telegraphic speech) Clip

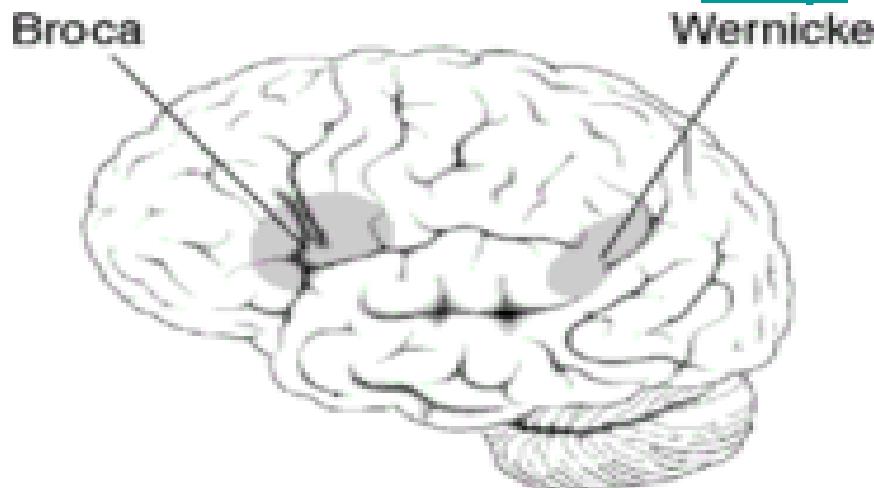
# Clip



# Language and the Brain

- Wernicke's Area

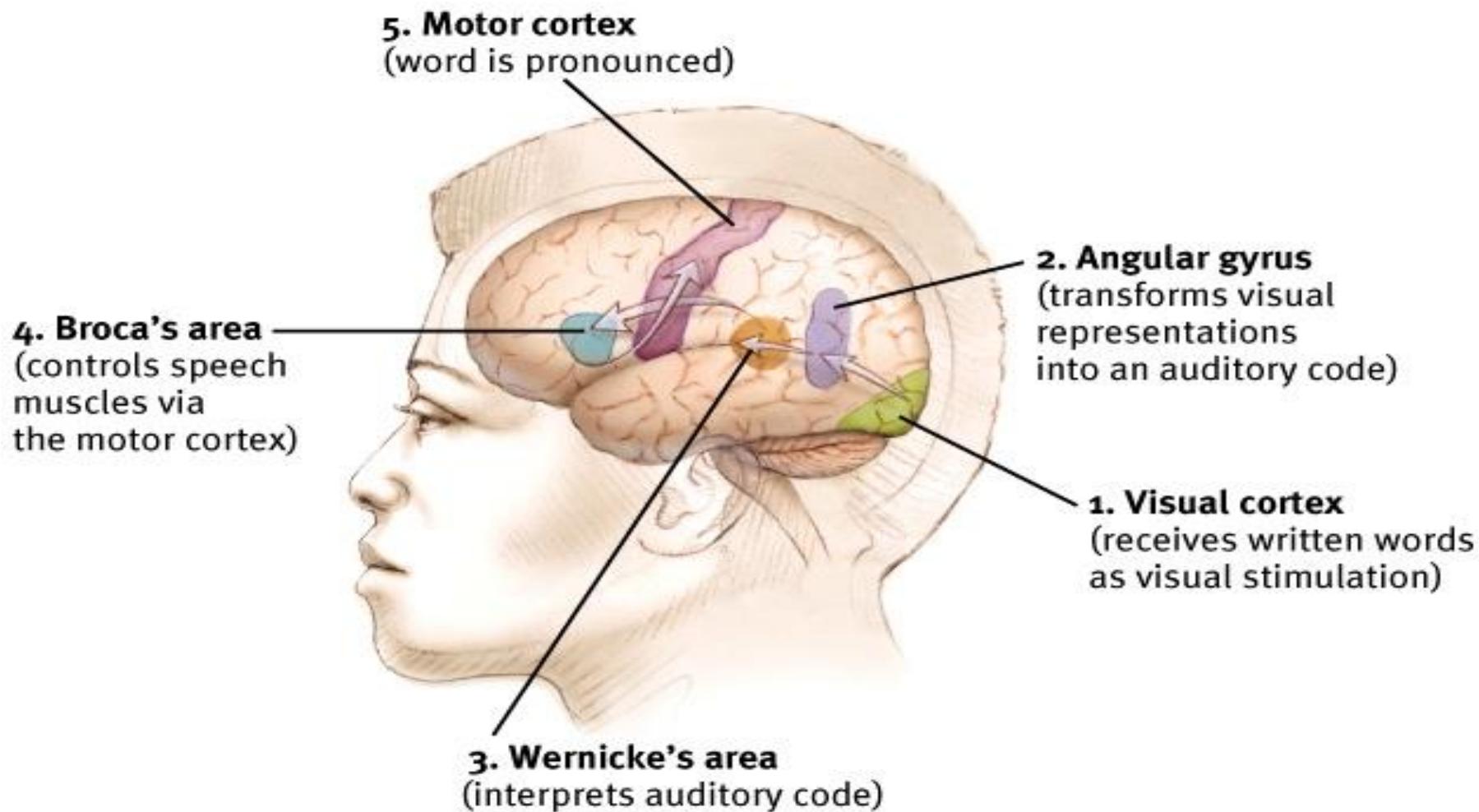
- an area of the left temporal lobe involved in language comprehension and expression
- MEANINGLESS WORDS Clip



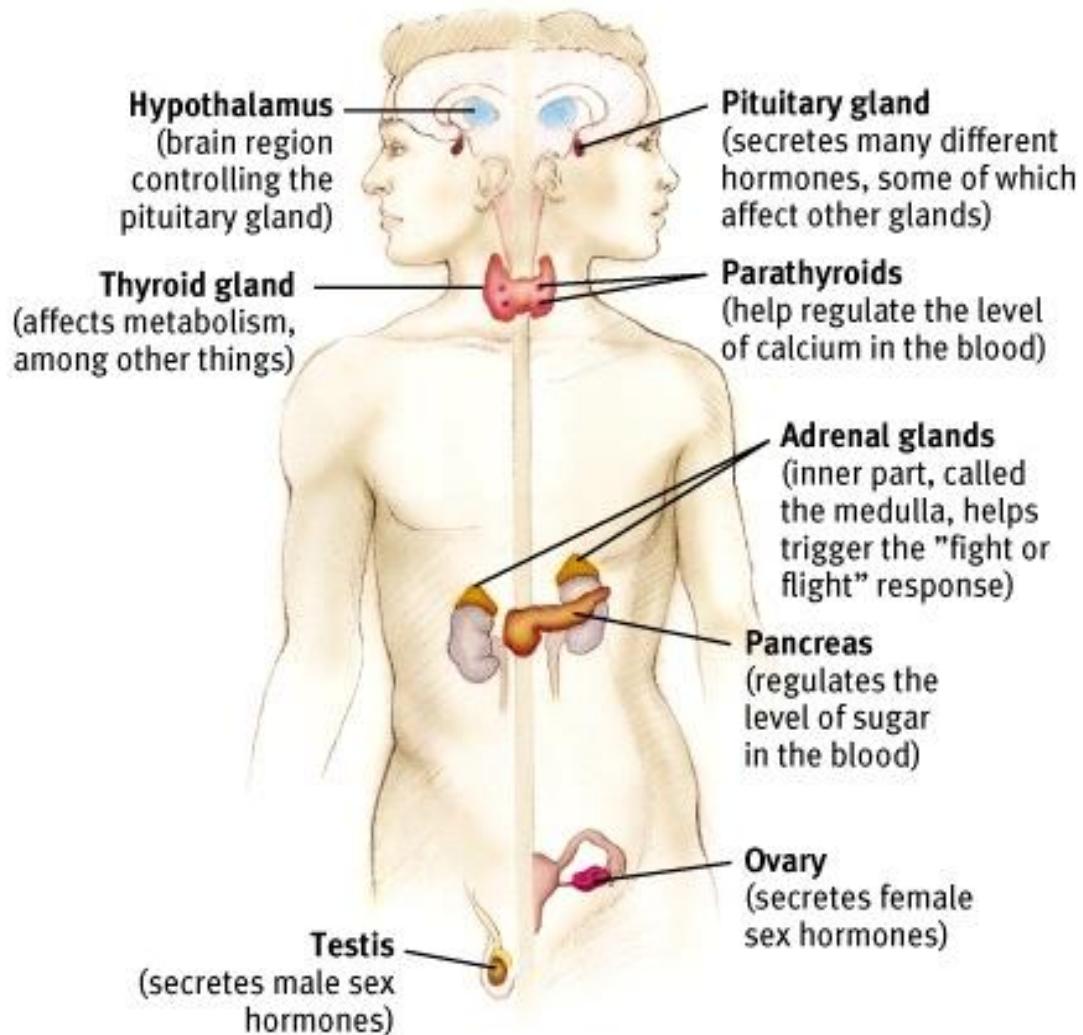
- **Is this caused by damage to Broca's area or Wernicke's area?:**
- "Mother is away her working her work to get her better, but when she's looking the two boys looking the other part. She's working another time." - \_\_\_\_\_

- **Is this caused by damage to Broca's area or Wernicke's area?:**
- "To be.... but... long time.... if.... allowed to...not.... today." - \_\_\_\_\_

# Specialization and Integration



# The Endocrine System

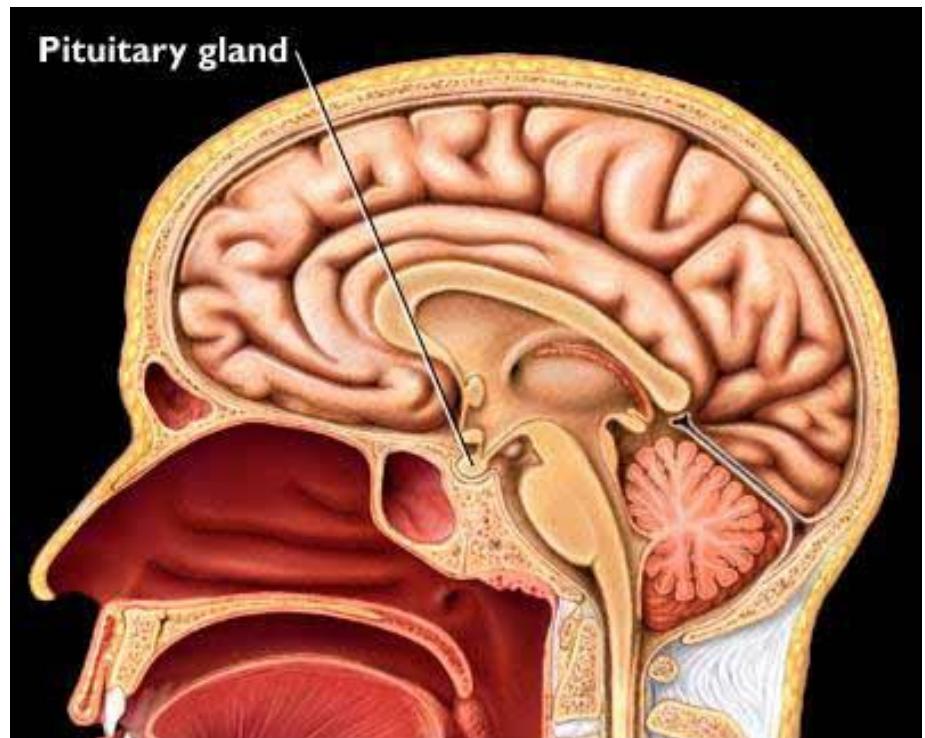


## ▪ Endocrine System

- a set of glands that secrete hormones into the bloodstream
- the body's “slow” chemical communication system
- Snail mail (ES) vs. E-mail (NS)

# Endocrine System

- **Pituitary Gland** – the “master” gland
  - under the influence of the hypothalamus, the pituitary regulates growth and controls other endocrine glands



# Endocrine System

## ▪ Hormones

- chemical messengers, mostly those manufactured by the endocrine glands, that are produced in one tissue and affect another

- Can influence our interest in sex, food, and aggression
- Next picture is a **little graphic...** hormone info

## ▪ Testosterone and Estrogen



# Endocrine System

- Adrenal Glands

- secrete adrenaline to arouse body in times of stress

