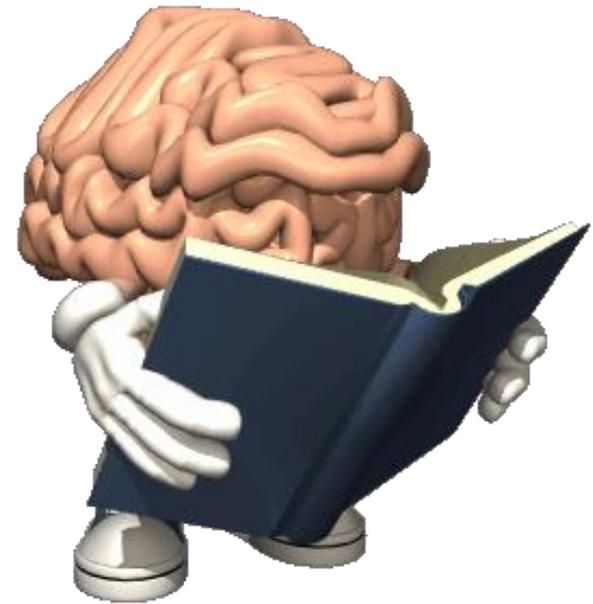


# The Brain



# Ways we Study the Brain

- Accidents
- Lesions
- EEG
- CAT Scan
- PET Scan
- MRI
- Functional MRI



# Accidents

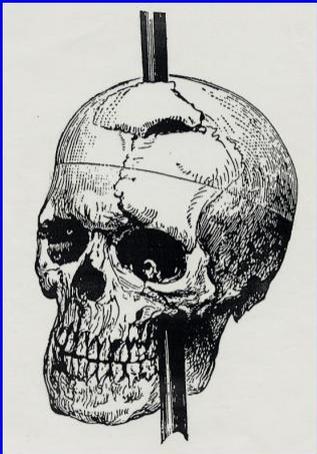


## Phineas Gage Story

- Personality changed after the accident.

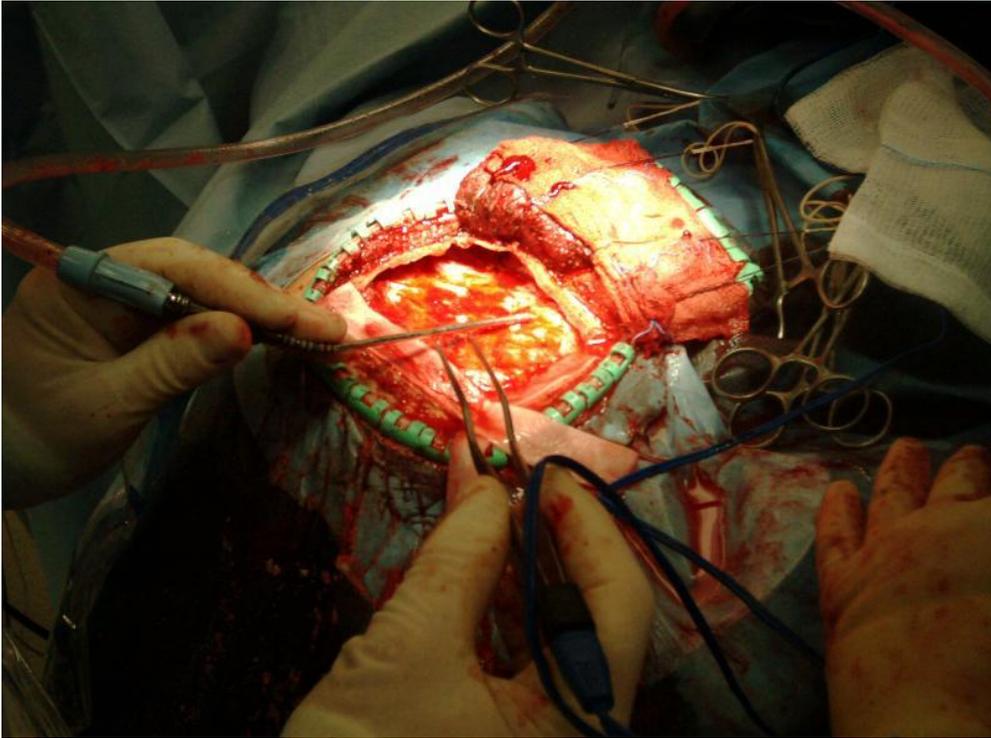
What does this tell us?

- That different part of the brain control different aspects of who we are.

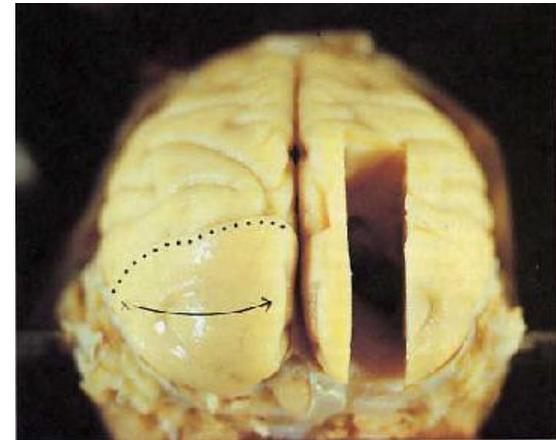


# Lesions

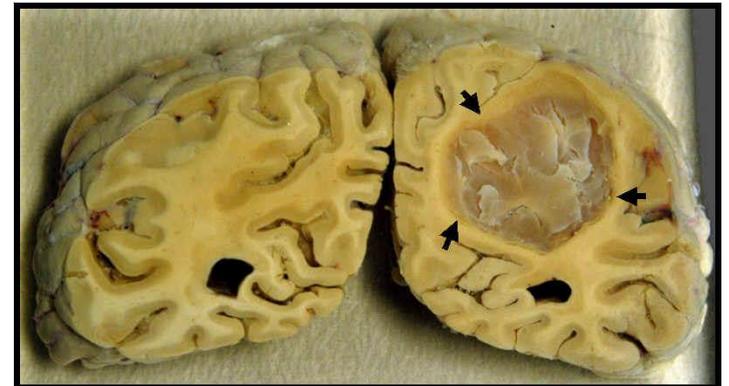
Cutting into the brain and looking for change.



Tissue destruction; a brain lesion is a naturally or experimentally caused destruction of brain tissue.



Brain tumors also lesion brain tissue.



# What is brain imaging?

- Brain imaging allows scientists and doctors to view and monitor the areas of the brain.
- Structural imaging techniques -
  - MRI (Magnetic Resonance Imaging)
  - CAT (Computed Axial Tomography)
- Designed to identify abnormalities such as strokes, bleeding, and tumors

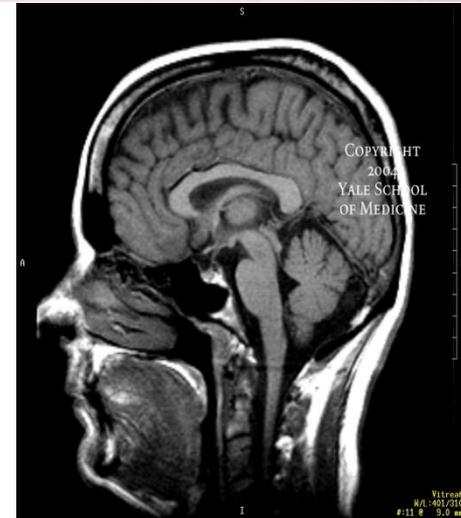
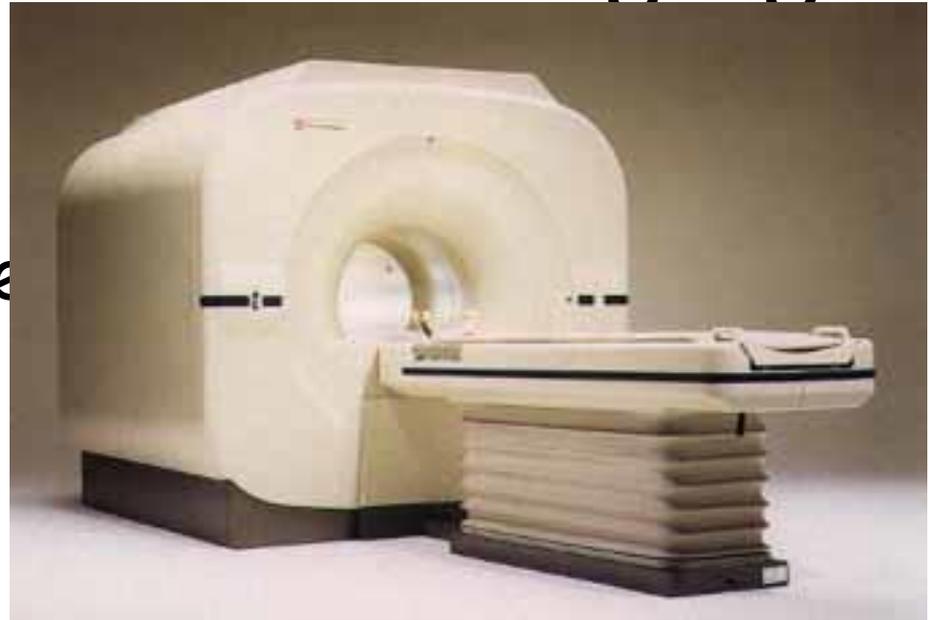
# Computerized Axial Tomography



- CAT Scan
- Cross-sectional 3D X-Ray of the brain.
- Good for tumor locating, but tells us nothing about function.

# Magnetic Resonance Imaging

- MRI
- More detailed picture of brain using magnetic field to knock electrons off axis.
- Takes many still pictures and turns images into a movie like production.

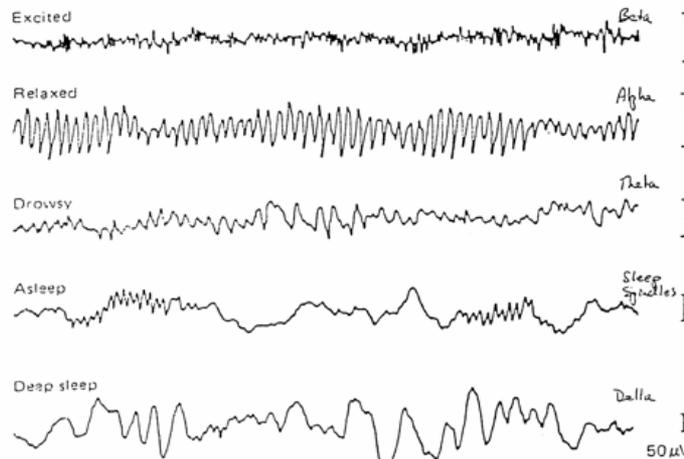


# What is brain imaging?

- Functional imaging strategies -
  - Electroencephalogram (EEG)
  - PET (Positron Emission Tomography)
  - functional MRI (fMRI)
- Evaluates how the brain is working.
- Studies the brain at rest, or during an activity such as when a person is hearing, seeing, feeling, moving, talking and thinking.
- Measurements are based on the flow of blood in the brain, and changing levels of oxygen in specific brain regions depending on that flow.

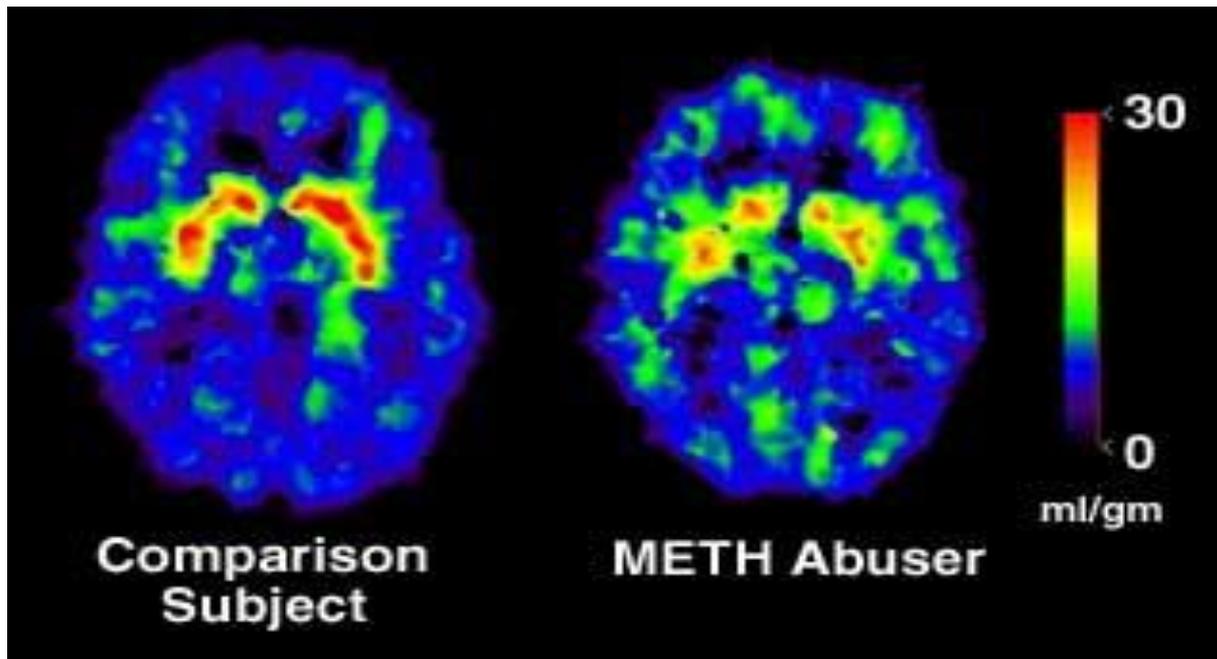
# Electroencephalogram

- EEG
- Detects subtle changes in brain waves through their electrical output.
- Used mainly in sleep research.



# Positron Emission Tomography

- PET Scan
- Measures how much of a chemical the brain is using (usually glucose consumption.)
- Glucose is the main "fuel" of the brain. Where glucose is concentrated is where the brain is most active.
- Mainly used for research.



# fMRI

- Instead of only showing structure, this shows structure *and* function.
- Can be used to detect early onset of CNS disorders, psychiatric disorders
- **Problems:** scans require the patient to remain completely still for period of time up to twenty minutes

