

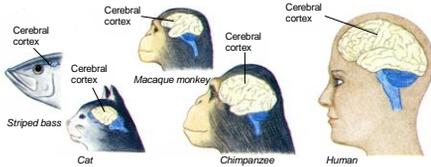
Biological Psychology  
(Chap 2)  
(aka biopsychology, behavioral neuroscience, psychobiology, physiological psychology)

The subarea of psychology focusing on the biological basis of behavior (brain, body chemistry, genetics, hormones)

Biology and Behavior

- Everything psychological—every idea, every mood, every urge, every action—is biological
- Biological psychologists study the links between biology and behavior

Similar nervous system organization in all vertebrates means that we can learn things from animal research that apply to the human nervous system.

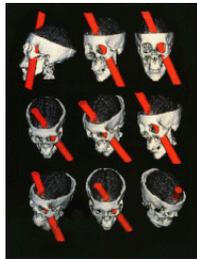


Note: I will not be taking you on a tour of the brain and nervous system. You do that on your own in the assignment & then will use what you learn to compete for EXTRA CREDIT points in a game.

How Have We Learned About Brain-Behavior Relationships?

- Study the effects of brain **damage** on behavior
  - Human case studies of brain damage
  - Experimental brain research in animals
- **Stimulate** or turn on brain regions and see how it affects behavior
- **Monitor brain activity** or differences in anatomy to see how it **correlates** with behavior

Example: The Case of Phineas Gage p. 46  
<http://www.youtube.com/watch?v=jK1sj4JEJ2o>

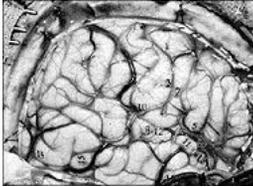


This rat has surgically induced brain lesions (damage) in the hypothalamus leading to overeating until it weighs 5 X normal weight.

In animal research we can repeat this on dozens of animals to make sure that this change occurs consistently.



### Stimulation of Human Cortex Before Neurosurgery



• The neurosurgeon has stimulated the numbered areas of cortex (to determine the effects on the awake patient's behavior) to help choose the route of the surgery.

### Bull Stereotaxic Surgery to Implant a Stimulating Electrode



• In the past there were limited ways to monitor or measure differences in brain anatomy or brain activity – for example, the EEG that we just saw in our sleep unit.

- But now have a variety of new **neuroimaging techniques (p. 48-50)**.
- **Some show brain structure (CAT, MRI)**
- **Some show brain activity (PET, fMRI)**

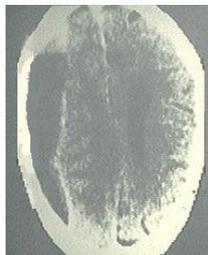
### The Electroencephalogram or “EEG”



Figure 2.8  
From: *Learning Psychology*, 11e, © 2014 South-Western Publishing Company

### CAT or CT Scan of Hematoma

- Computer uses x-ray data to generate hazy images of brain structure. Can see fairly large abnormalities

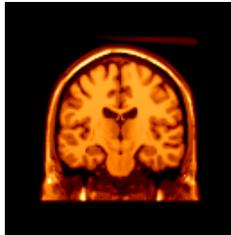


### CT-Scan of Gunshot Thru Brain Showing the Damage

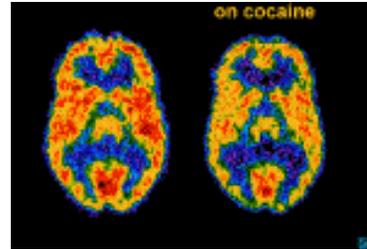


### Magnetic Resonance Imaging (MRI)

- Uses magnets & radio waves, not radiation
- Provides sharper, more detailed anatomy – looks like you actually cut into brain.



### PET Scan- What Areas Are Active?



### Functional MRI or fMRI

- Bright spots indicate regions of brain that are active during a particular behavior
- Can also look at what brain areas are active during mental tasks:



Functional MRI (fMRI)

### The Structure of a Neuron (Fig. 2.1)

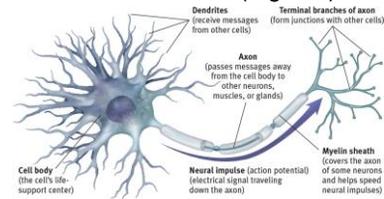


Figure 2.1 Myers, Exploring Psychology, 10e, © 2016 Worth Publishers

<https://www.youtube.com/watch?v=hw-psbNUSXA> go to :45

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### Communication at the Synapse Between One Neuron and Another (Fig 2.4)

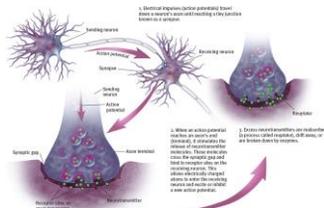


Figure 2.4 Myers, Exploring Psychology, 10e, © 2016 Worth Publishers

NOTE: Brain Game Notes due Mon.  
Best Known Neurotransmitters see Table 2.1

- Acetylcholine (ACh) – contracts muscles; memory
  - Alzheimer's – too little ACh
- Norepinephrine (NE) – sympathetic N.S.; arousal
- Dopamine (DA)- movement; reward system
  - Parkinson's – too little DA; schizophrenia – overactive DA
- Serotonin (5HT) – mood, emotional balance
- Endorphin – pain suppression; mood
- GABA – calm nervous system & emotions

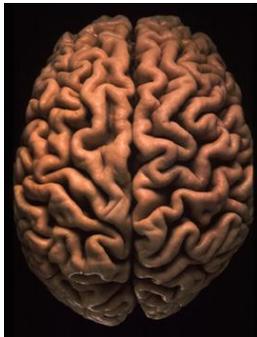
## How Neurotransmitters Influence Us (Table 2.1)

Neurotransmitter	Function	Examples of Malfunctions
Acetylcholine (ACh)	Enables muscle action, learning, and memory	With Alzheimer's disease, ACh-producing neurons deteriorate.
Dopamine	Influences movement, learning, attention, and emotion	Oversupply linked to schizophrenia. Undersupply linked to tremors and decreased mobility in Parkinson's disease.
Serotonin	Affects mood, hunger, sleep, and arousal	Undersupply linked to depression. Some drugs that raise serotonin levels are used to treat depression.
Norepinephrine	Helps control alertness and arousal	Undersupply can depress mood.
GABA (gamma-aminobutyric acid)	A major inhibitory neurotransmitter	Undersupply linked to seizures, tremors, and insomnia.
Glutamate	A major excitatory neurotransmitter, involved in memory	Oversupply can overstimulate brain, producing migraines or seizures (which is why some people avoid MSG, monosodium glutamate, in food).
Endorphins	Neurotransmitters that influence the perception of pain or pleasure	Oversupply with opiate drugs can suppress the body's natural endorphin supply.

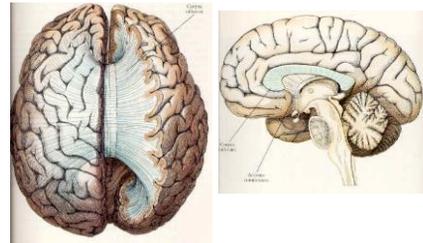
## “Split Brain” Research

Learning about  
right brain/left brain differences

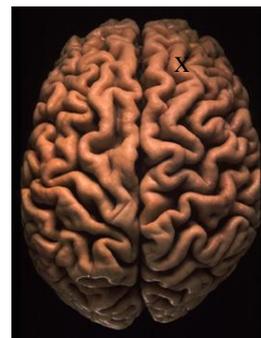
Two Cerebral Hemispheres Seen From Above



Joined by the Corpus Callosum

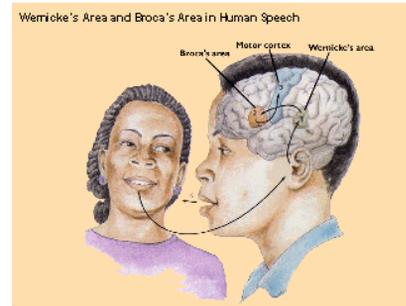
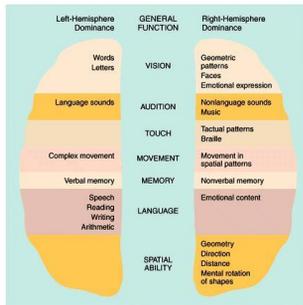


- Seizure – period of abnormal firing in brain or brain area
- **Epilepsy** - Recurring seizures; only about 1 in 100 has epilepsy
- Occurs in many forms
- May be inherited or may follow some injury to the brain
- In the latter case, seizures usually begin at the injured spot (the “focus”) and it is called “focal epilepsy”





► ADMMIES THAT Display Cerebral Lateralization of Function



Aphasia: language problems due to brain damage

- Broca's aphasia – damage to Broca's area makes producing speech difficult
- Wernicke's aphasia – damage to Wernicke's area disrupts speech comprehension & comprehensibility
- <http://www.youtube.com/watch?v=f2liMEbMnPM&feature=related> B
- <http://www.youtube.com/watch?v=gocIUW3E-go>
- <http://www.youtube.com/watch?v=aVhYN7NTIKU&feature=related> W