

General Psychology

Biology and Behavior



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What We Will Cover in This Section

- Overview
- Genetics
- The nervous system.
 - Neurons.
 - Nervous system.
 - Brain
- Endocrine System.



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Overview

- Much of your behavior is determined by how you are built.

$$B = f(P :: E)$$

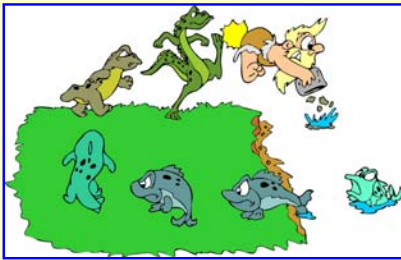
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Evolution, Biology, & Behavior



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Overview

- Focus on internal (physiological) aspects of behavior.
- Emphasis on.
 - Genetics.
 - Natural selection and evolutionary processes.

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Sociobiology

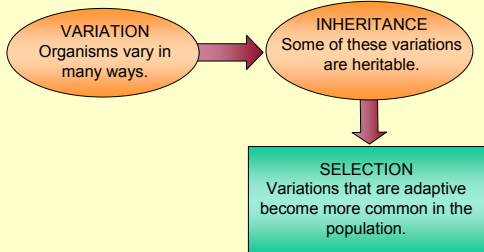
The systematic study of the biological bases of all social behavior in animals.

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Evolutionary Model



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Evolutionary Theory

1. Living organisms can produce more offspring than environmental resources can support.
2. This leads to Struggle for Survival.
3. Organisms that compete better to reach reproductive maturity produce offspring (Survival of the Fittest).
4. The heritable characteristics that allow organisms to survive will be passed on to offspring.

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Inclusive Fitness

The biological goal of living creatures is to ensure that their genes (their own and those of their offspring) get carried on.

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Basic Assumptions

1. We live to pass copies of our genes into the next generation and to ensure their survival.
2. Natural selection influences social behavior as well as anatomical and physiological structures.

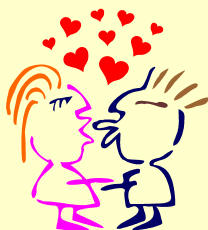
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Ideas About Human Nature



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Cultural Universals

If a class of social behavior occurs in every culture, it is probably genetically determined.

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Question?

What social behaviors occur in all human cultures?



Biogrammar

The innate, genetic programming that structures our social behavior.

- This is a template for behavior.
- Provides a potential, not the implementation.



Behavioral Interaction

Biological Predispositions



Environmental Experiences



Key Terms

- **Genotype**
The genetic structure an organism inherits from its parents.
- **Phenotype.**
The observable characteristics of an organism that results from the interaction between its genotype and the environment.

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The Nervous System

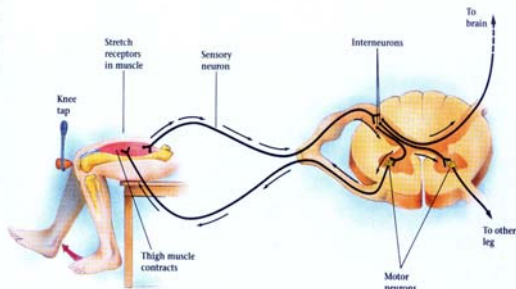


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Pathways

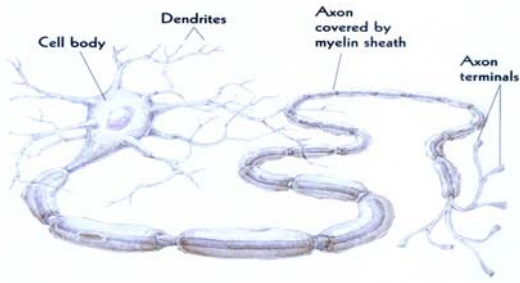


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The Neuron

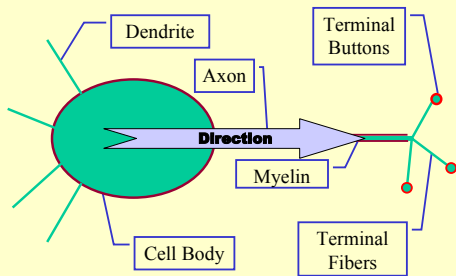


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The Neuron



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Anatomy of the Neuron

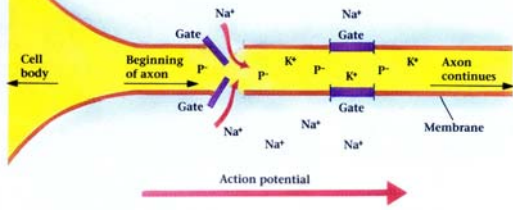
- Dendrites
 - Parts of the neuron that receive the message.
- Axon
 - Parts of the neuron that transmit the message.
- Terminal buttons.
 - Parts of the neuron that communicate the message to other parts of the body.
- Myelin Sheath
 - The fatty coating on a nerve.

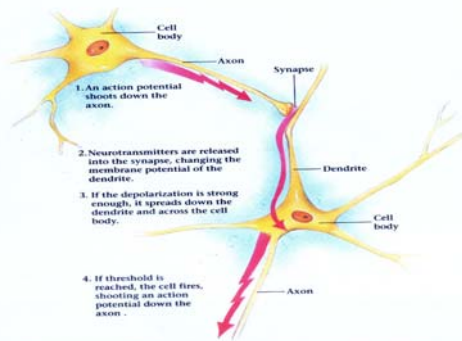
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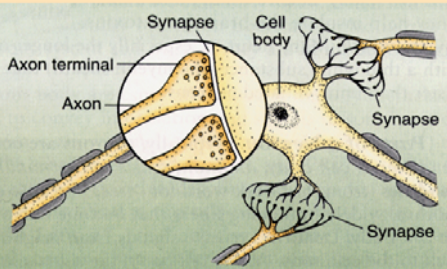
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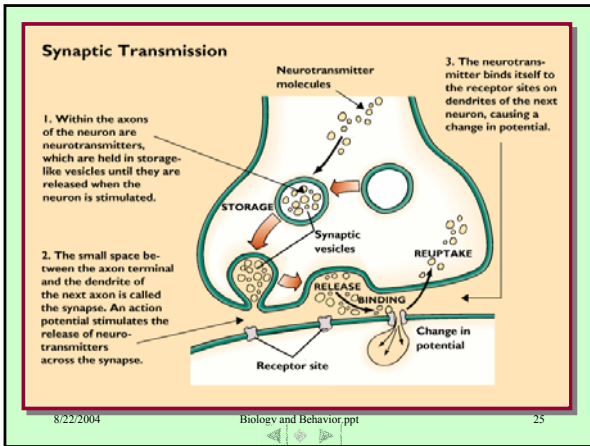
How the Neuron Works

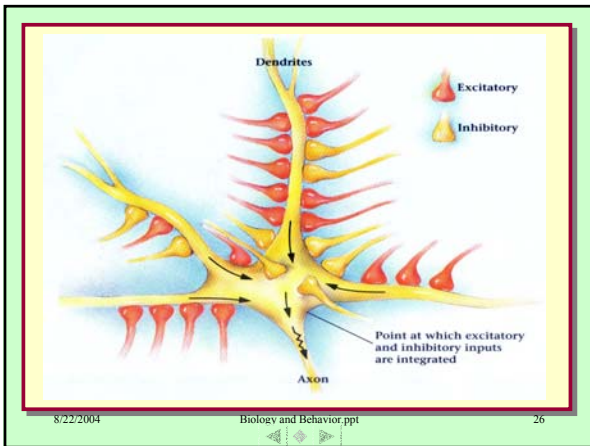




The Synapse







Neuron Signals

- All-or-None
 - Each neuron fires completely or not at all.
- Strength of the signal is determined by
 - the number of neurons firing.
 - the frequency of the firing.

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Neurotransmitters

The chemicals released into the synapse that either excite or inhibit activity.

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Acetylcholine

- Excitatory transmitter found throughout the brain and body.
 - Influences memory in the brain.
 - Alzheimer's disease destroys cerebral neurons that secrete acetylcholine.
 - Causes muscles to contract.
 - Botulism poisoning works by blocking acetylcholine release in the lungs.
 - Curare is used in open heart surgery.

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GABA

- Most common inhibitory transmitter in the brain.
 - Works as a transmitter in 30% of the brain synapses.
 - When there are low levels some forms of emotional problems occur.
 - Related to anxiety disorders.

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Catecholamines

- Norepinephrine
 - Related to mood states.
 - Low levels related to depression.
- Dopamine.
 - Related to psychoses.
 - High levels related to schizophrenia.
- Serotonin
 - Found in neurons in the brain stem.
 - Related to arousal and autonomic processes.
 - Related to mood disorders.

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Endorphins

- Play a role in controlling emotional behaviors.
 - Enhance pleasure.
 - Inhibit pain.
 - Reduce anxiety.
- Opiate drugs mimic endorphins.

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How Drugs Work

1. Block the release of the neurotransmitter from the sending neuron.
2. Block the receptor site of the receiving neuron.
3. Block the reuptake of the neurotransmitter from the synaptic gap.

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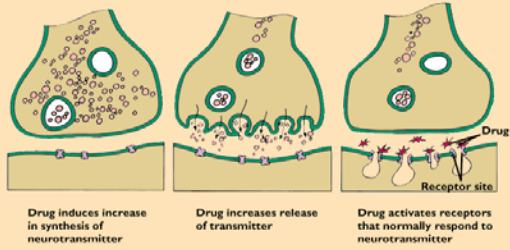
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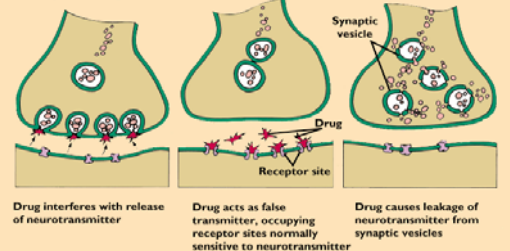
How Drugs Affect Synaptic Transmission (Part I)

Agonistic Effects



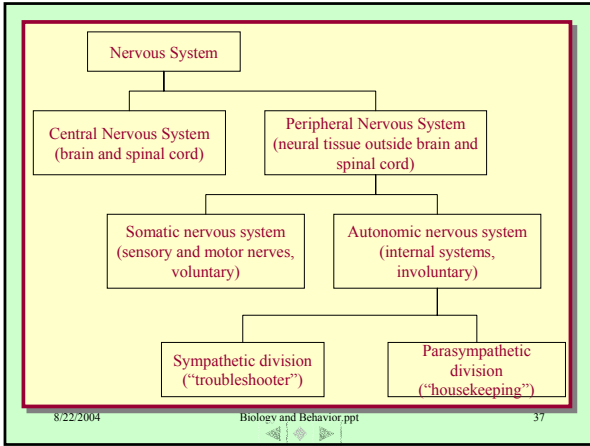
How Drugs Affect Synaptic Transmission (Part II)

Antagonistic Effects



The Nervous System





Sympathetic and Parasympathetic Systems

Fight or Flight	Relax
Dilates pupils	Constricts pupils
Relaxes bronchi	Constricts bronchi
Slows digestion	Stimulates digestion
Accelerates heart	Slows heart
Constricts capillaries	Relaxes capillaries

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Question?

Have you ever been in a situation where you were terrified?

What sensations did you feel?

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Leslie Lemke

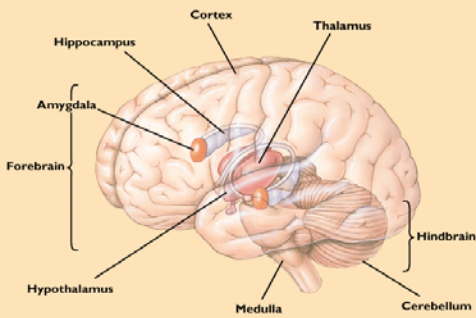


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Structures of the Brain



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Functions of Basic Brain Elements

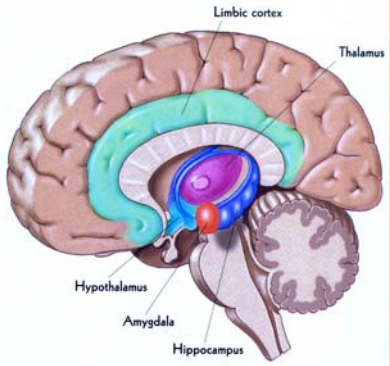
Spinal Cord	Connects the brain to rest of the body; controls some simple reflexes.
Medulla	Controls heart rate, breathing, waking; cross over point for spinal nerves.
Cerebellum	Controls muscle coordination, posture, balance.
Midbrain	Switching area for signals to and from the brain.
Forebrain	Advanced thinking
Cortex	Outer surface of the brain where all of the 'thinking' takes place.

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The Limbic System

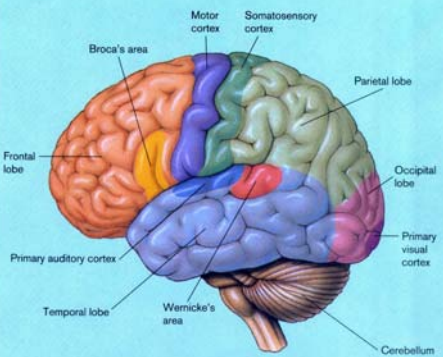


The Limbic System

Controls and coordinates motivated behavior, emotional states, and memory.

Hippocampus	Mediates the acquisition of memory; involved in storing new explicit memories.
Thalamus	Relays sensory impulses to the correct place in the cerebral cortex.
Hypothalamus	Regulates homeostasis; Hunger and thirst.
Amygdala	Controls emotion, aggression, and the formation of emotional memory.

Cerebral Cortex



Elements of the Cerebral Cortex

Visual Cortex	Processes visual information.
Auditory Cortex	Receives and processes auditory information.
Broca's Area	Involved with speech production.
Wernicke's Area	Language understanding and interpretation
Motor Cortex	Controls voluntary muscle movement.
Somatosensory Cortex	Processes sensory input from the body.

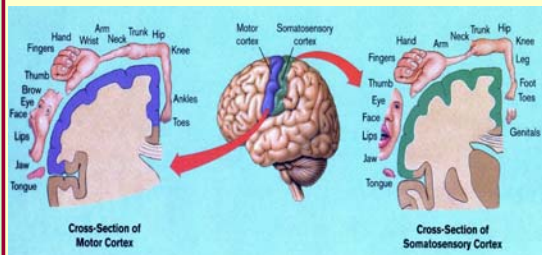
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Motor and Somatosensory Cortex



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Brain Lateralization

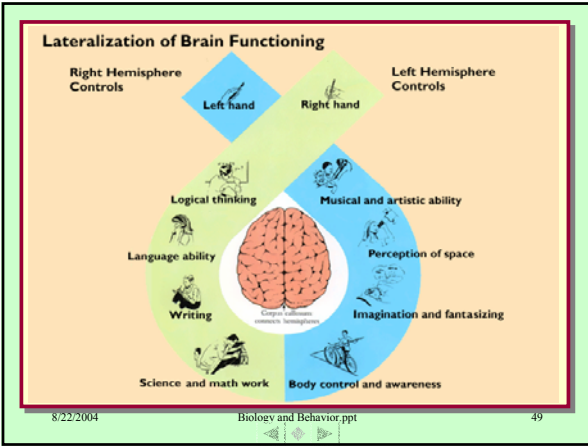


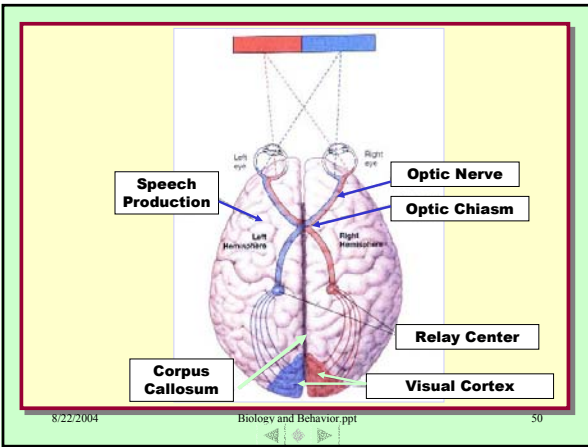
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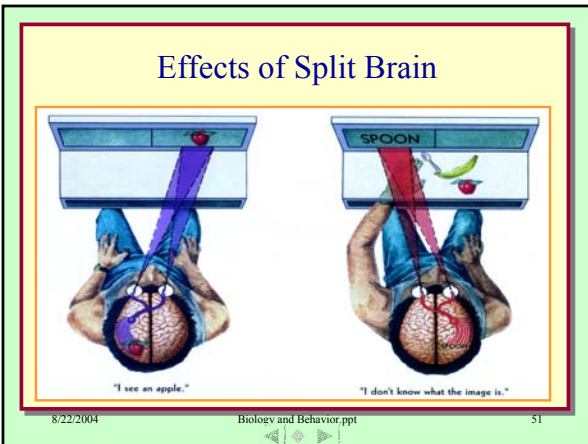
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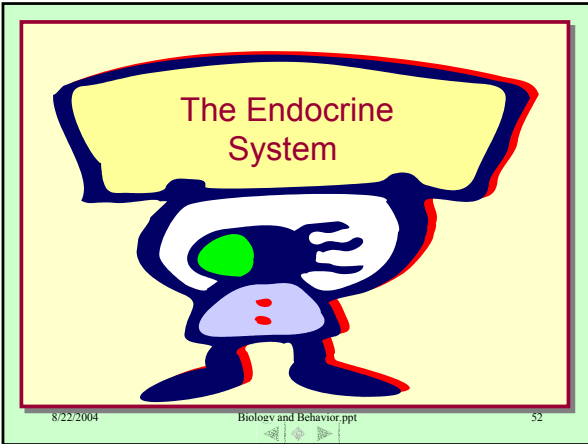
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Endocrine System

- What is it?
Network of glands that secrete hormones into the bloodstream.
- What are hormones?
Chemical messengers that regulate mood, influence growth, sexual characteristics, etc.

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Common Hormones

- Testosterone.
 - Male sex hormone that stimulates production of sperm and the development of male secondary sex characteristics.
- Estrogen.
 - Female sex hormone responsible for the release of eggs, maintenance of female reproductive system, and development of female secondary sex characteristics.

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