

Slide 1: Biological Basis of Behavior

- * [Film Clip: The Brain #2- Phineas Gage]
- * Integrated Bodily Communications
 - Within Brain (Hemispheres and structures)
 - The remaining Nervous System
 - Endocrine System (Hormonal communication)

- * Our bodies- “a complex communication network in which signals are constantly being received integrated and transmitted”
 - information : nervous system AS blood : circulatory system

Slide 1

Slide 2: Brain & Behavior- CNS

- * The Central Nervous System-
 - Brain and Spinal Cord
- * Exploring the brain-behavior relationship
 - Invasive Methods
 - ◆ Lesioning
 - ◆ ESB
 - Non-Invasive
 - ◆ CT Scan- x ray
 - ◆ MRI- magnetic [overhead]
 - ◆ PET Scan- radioactive glucose [overhead]
 - ◆ Electroencephalography (EEG)- electrical current on cortex
- * [Film clip: The Mind Clip 5 & 6]

Slide 2

Slide 3: Brain Anatomy (3 Brain Levels)

- * Hindbrain- structures making up the “lower brain”
 - Pons “bridge” - helps moderate sleep and arousal signals
 - Cerebellum “little brain” - exercise commands to move, balance and fine motor skills
- * Midbrain- structures between hind and forebrain
 - Parkinson’s Disease
 - The Reticular Formation-
- * Forebrain- largest and most complex region of the brain encompassing many important structures including the thalamus, hypothalamus, the limbic system, and the cerebrum.

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Slide 4: Forebrain Structures

- * Thalamus- “the way station”- integrates multi-sensory information from higher brain centers (the cortical lobes)
- * Hypothalamus- basic arousal for biological needs
 - the 4 F’s
- * The Limbic System- “seat of emotion”
 - hippocampus, amygdala, septum
 - ◆ pleasure centers
 - ◆ opiate and stimulant drugs act strongly on this region
- * The Cerebrum- Seat of Complex Thought
 - The Cerebral Cortex- convoluted outer area of the brain.
 - 40% of brain’s mass;
 - What do you think the surface area of the cortex is?


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Slide 5: 4 Lobes of the Cerebral Cortex

- * Occipital Lobe- visual signals processed here
 - ◆ back of the head
- * Parietal Lobe- sense of touch and awareness of body in space
 - ◆ middle -top of head
- * Temporal Lobe- hearing and language function
 - side of head, by ears
- * Frontal Lobe- higher thinking and action
 - front of head
 - [overhead]
 - [film clip: The Mind #4: Frontal Lobe and Cognitive Function]

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Slide 6: The Cerebral Hemispheres (L & R)

- * Left  Right
- * The Corpus Collusum [overhead]

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Slide 7: Hemispheric Specialization & Split Brains

- * The Left Brain:
 - Hemisphere of Language and Speech
- * Broca's Area (1861)- comprehend, can't produce
- * Wernicke's Area (1874)- produce, can't comprehend
- * [Film Clip: The Brain #3: Broca's/Wernicke's Areas]

- * Split Brain Surgery- cutting the corpus collusum to reduce epileptic seizures
 - the controlling hemispheres- body control, hearing, and sight

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Slide 8: Split Brain Surgery

- * Objects projected to the right visual field- (L.hemisphere)
 - named and described
- * Object projected to the left visual field- (R. Hemisphere)
 - could not be named,
 - but if placed out of view in left hand-- it could be pointed out.
- * The Right Hemisphere-
 - puzzles, copying drawings (even if person was right handed)
 - face recognition, musical appreciation
- * [Film Clip: The Brain #4: Split Brain]

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Slide 9: Rethinking Hemispheric Specialization

- * 1. Hemispheres do not work alone,... integrated sub-units
 - although specialization exists we do not see it in intact brains
 - can be switched, especially in left handed people
- * 2. No empirical evidence to suggest that some people are "left brained" or "right brained".
 - e.g., PET scan
- * 3. Cannot teach to one side of the brain to the exclusion of the other hemisphere.

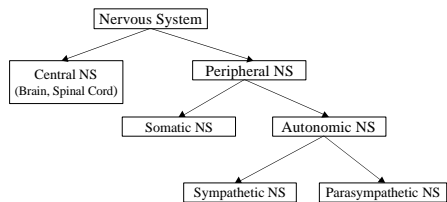
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Slide 10: PNS: The Other Nervous System

- * The Nervous System: Step 1: Central and Peripheral
- * The Peripheral Nervous System (PNS)
 - ▀ Afferent nerves
 - ▀ Efferent Nerves
- * Autonomic Nervous System (ANS): a division of the PNS
 - ▀ nerves that connect to heart blood vessels, smooth muscles and glands
 - ▀ primarily involuntary functions
- * Sympathetic and Parasympathetic Nervous Systems:
 - ▀ the "accelerator and the brake".
 - ▀ SNS- fight/flight PSNS- conservation

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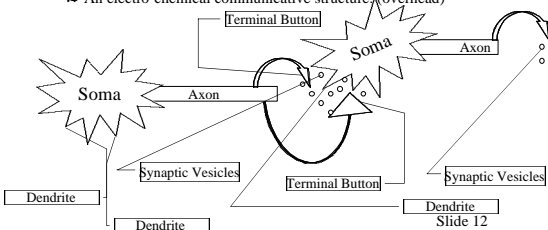
Slide 11: Divisions of the Nervous System



Slide 11

Slide 12: Neurons- Basis of Nervous Communication

- * The Neuron: individual cells in the nervous system that receive, integrate and transmit information to other cells.
 - ▀ An electro-chemical communicative structure (overhead)



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Slide 13: Parts of the Neuron

- * Soma: The cell body
- * Axon: a long thin fiber that transmits signal toward other neurons, muscles, or glands
- * Terminal buttons: small knobs branching out at the end of the axon that secrete neurotransmitters (chemical messengers like EPI, NE, DA, ACh) [Neurotransmitters- lock and key binding]
- * Dendrites: feeler like structures that branch out from the neuron toward other neurons. They take on neurotransmitters from other neurons.
- * Synapse (Synaptic Cleft): the space between the terminal button of N#1 and dendrites of N#2) into which neurotransmitters are released and flow from N#1 to N#2. [up to 15,000 per neuron]

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Slide 14: Neural Transmission

- * Action Potential: a brief change in the neuron electrical charge which occurs with stimulation from other neurons or from sensory information.
 - increase in "potential for for action", that is, the cell may "fire".
 - "the spark along on a line of gunpowder"
- * What causes a change in the Action Potential?
 - Taking on neurotransmitters which result in the neuron either pushing charged particles (Ions) out or taking them in.
- * Neural Impulse: a wave of electricity moving through the cell body and axon as a result of a change in action potential (the ignited trail of gunpowder).

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Slide 15: Neurotransmitters

- * Neurotransmitters (NTRs): chemicals that transmit information from one neuron to another.
 - "chemical couriers"
- * Synaptic Vesicles- vehicles that carry the NTRs to next site.
- * Common NTRs:
 - Epinephrine- excess related to over arousal and stress
 - Norepinephrine- absence related to depression
 - Dopamine- excess related to schizophrenia
 - Acetylcholine- important for muscular release

Slide 15
