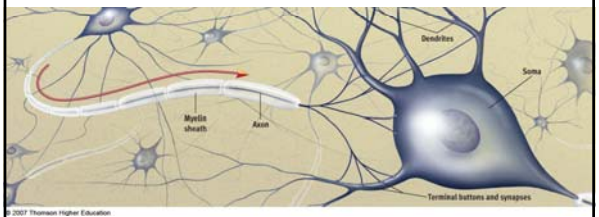
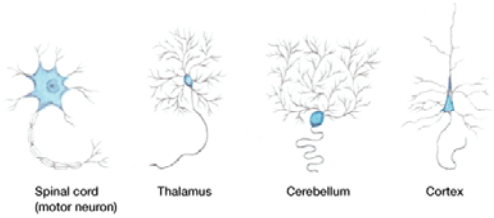
Biological Bases of Behavior

What do neurons look like? I

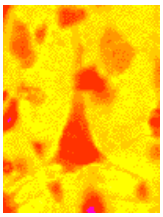
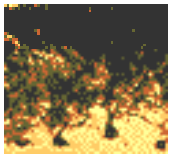
- These are the basic parts…



Types of Neurons



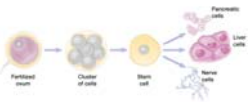
What do neurons (really) look like?

What do neurons do?

- Collect inputs on their _____
- If sufficient input then produce an _____
- Send action potential down _____ where it can influence other _____
- _____ process with _____ effects (like a battery)
- Neurons die and _____

Neurons in the News

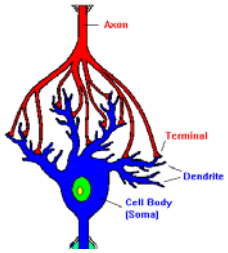


- _____
  - The production of new neurons from immature stem cells.
- _____ cells
  - Immature cells that renew themselves and have the potential to develop into mature cells.

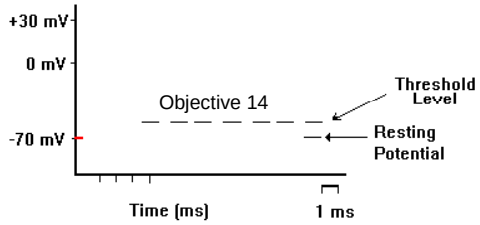
How do neurons communicate?

The _____ :

The axon of one neuron connects with the dendrites of the next:



What's an _____? I



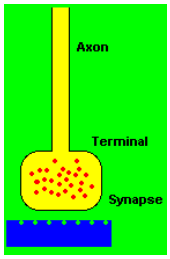
What's an _____? II

- An '_____' electro-chemical event
- A '_____'
- Like a digital computer 1 or 0

How do _____ communicate?

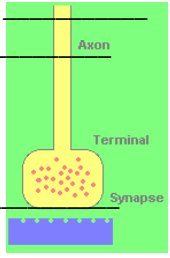
- _____ are chemical junctions between neurons.

How do _____ work?



How do _____ work?

- Action potential comes down _____
- Action potential arrives at _____
- Causes _____
- _____ is released
- Into _____ cleft
- _____ absorbed on _____



Three Major Chemical Messenger Classes

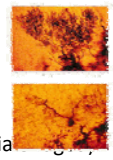
- _____
  - Released by neurons, cause other neurons to fire
- _____
  - Aka "Endogenous opioid peptides"
  - Also function as _____, or neurotransmitter modifiers
- _____
  - Released by _____ glands into _____
  - Help regulate normal bodily functioning

Major neurotransmitters (a selection)

- Acetylcholine
- Dopamine
- Endorphins
- Norepinephrine
- Serotonin
- GABA

_____

- First identified _____
- Involved in:
  - _____ control
  - _____
- Disorders implicated in:
  - _____ disease (dementia
  - _____ loss
  - _____(poison – black widow spider)



Drugs affecting _____

- _____
  - Promotes release of acetylcholine, can cause paralysis & death
- _____ toxin
  - Poisonous agent produced by bacteria
  - Blocks release of acetylcholine
  - Reduces breathing rate, can cause death

- _____
  - Binds to and activates cholinergic receptors
- _____
  - Blocks cholinergic receptors
  - Quick acting, quickly cleared from the body

_____

- Involved in:
  - _____
  - _____
  - Reward
  - _____ control
  - _____
- Disorders implicated in:
  - _____ disease (mainly motor but also emotional blunting)
  - _____ disease
  - _____(cognitive confusion)
  - _____

_____ : Drugs that stimulate

- _____
- _____
- Alcohol (indirectly)
- _____
- _____(indirectly)
- _____(indirectly)

_____

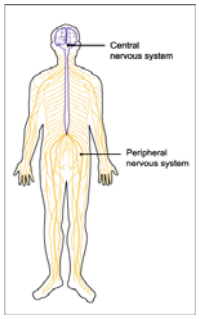
- Involved in
  - _____ cycles
  - _____
  - _____ state (happy/ sad)
- Disorders implicated in:
  - _____?
  - _____
  - _____
- Drugs that alter:
  - _____
  - LSD
  - _____
  - "magic mushrooms"

_____
(Gamma-aminobutyric acid)

- Major _____ neurotransmitter in the brain
- Involved in _____ disorders
- Drugs that affect:
  - _____(major tranquilizers)
  - _____(minor tranquilizers)
  - _____(Gamma hydroxybutyrate)
  - _____

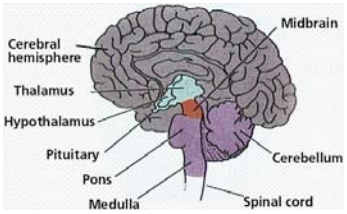
Structure of the Nervous System

- _____
  - Brain
  - Spinal Cord
- _____ Nervous System
  - _____
  - _____
    - Sympathetic NS
    - Parasympathetic NS

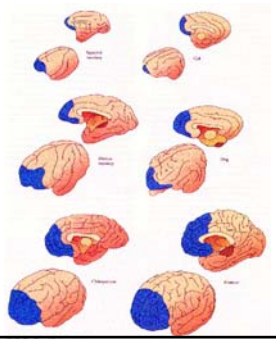


_____ Nervous System

- _____
- _____ Cord

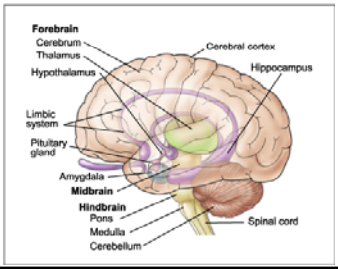


_____ cortexes compared

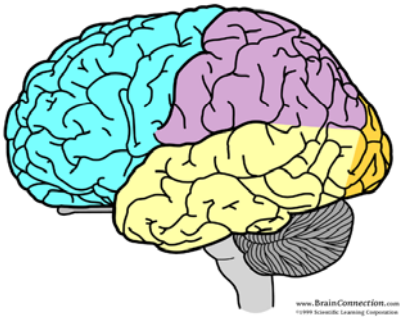


The Structure of the Brain

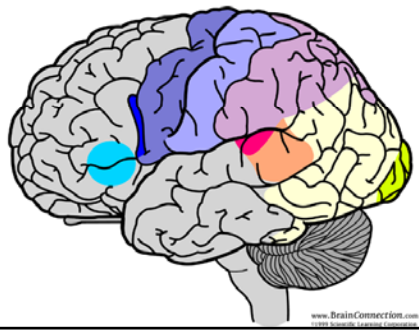
The brain can be divided into _____ : the _____ , _____ , and _____ .



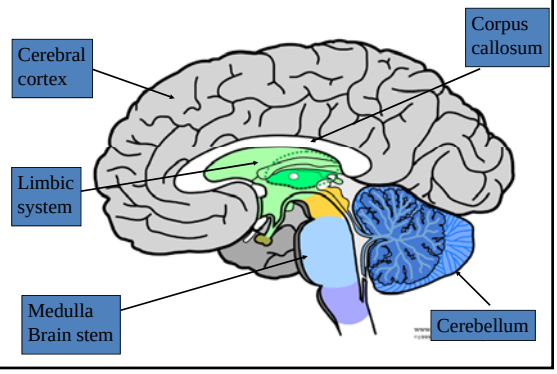
Cortex: I



Cortex: II

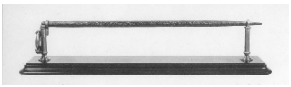


Saggital Section

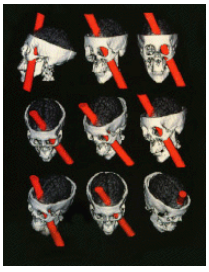


Brain Damage: Phineas Gage

- Phineas Gage
- Tamping iron blew up in his face:



Phineas Gage

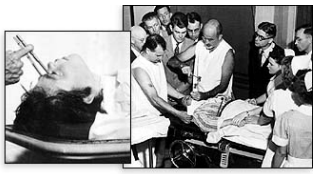


Phineas Gage

- Took two years to recover
- Changed personality
- “Gage was no longer Gage” (Doctor)

_____

- Dogs with “cut brains” were calmer (late 1890’s)
- 1930’s: _____ lobes are severed using a variety of _____

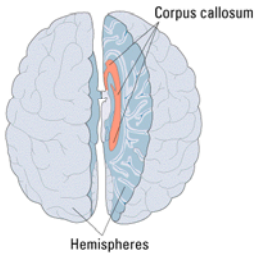


_____ Results

- Patients generally calmer, less _____
- Patients have difficulty _____ things, planning, or following through on activities
- Suggests functions of _____ lobe
- Many patients have rather extensive brain damage (more than was purposeful)…

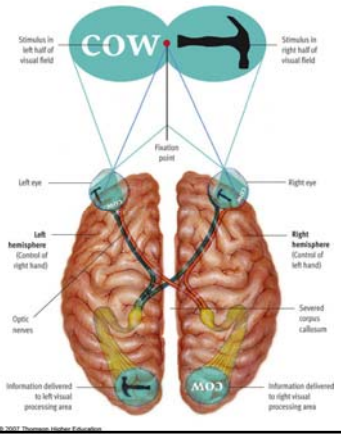
The _____ Callosum

- Millions of _____ connecting the brain’s hemispheres.
- Provides a pathway for _____ between hemispheres.
- If surgically severed to treat _____ , hemispheres cannot _____ directly.

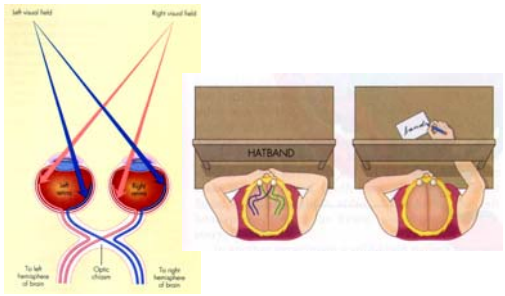


_____ Experiment

- Subjects were presented information to one or the other side of their brains.
- Patients identified _____ the pictures to the _____ (i.e., boy).
- When asked to _____ to the face seen, the patients pointed to the _____ picture.



Two Hemispheres – Split Brains



The Two Hemispheres: Allies or Opposites?

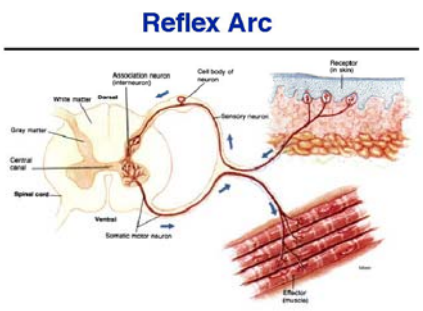
- Research on split brain patients show us:
  - Nearly all right-handed and the majority of left-handed individuals process _____ mainly in the _____ hemisphere.
  - Many researchers believe in _____ dominance.
  - Others insist _____ important for spatial visual problem solving, comprehending non-verbal sounds, and some language abilities.

Peripheral Nervous System

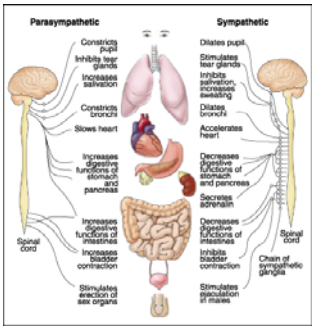
- _____ Nervous System
  - Sensory – afferent – inputs
  - Motor – efferent – outputs
- _____ Nervous System
  - _____
  - _____

Somatic Nervous System – Reflex Arc

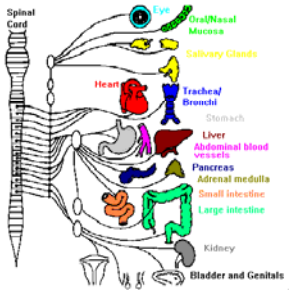
Objective 5



Autonomic Nervous System

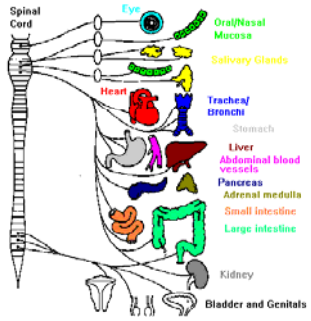


ANS - Sympathetic



Fight or Flight

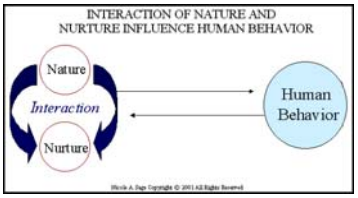
ANS - Parasympathetic



Genes, Evolution, and Environment

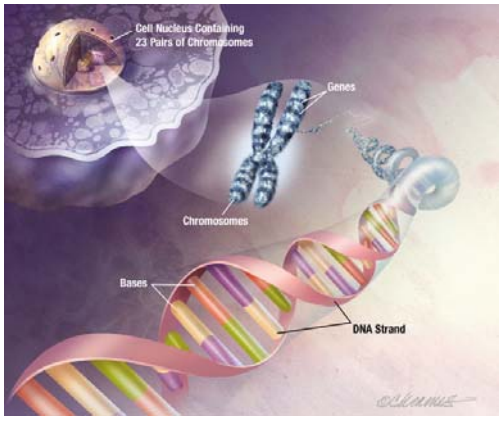
Gene/environment _____

- Both _____ and _____ play a role in behavior
  - Nature/nurture debate still strong
    - Focused on the DEGREE of influence



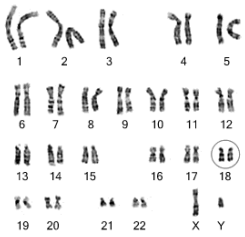
Unlocking the Secrets of Genes

- _____
  - _____ structures within cells that carry genes.
- _____
  - functional units of heredity which are composed of _____ and specify the structure of proteins.
- _____(_____ acid)
  - transfers _____ characteristics by way of coded instructions for the structure of proteins.



_____

- Each human has _____ of chromosomes
  - _____
  - Sex chromosomes (X & Y)
- Differences in _____
  - Can have too many or too few chromosomes
  - E.g., Down's Syndrome



_____

- _____ structure
- Joined by pairs of 4 amino acids
  - Adenine
  - Thymine
  - Cytosine
  - Guanine
- Errors in DNA can cause problems
  - _____
  - _____
  - _____ disease

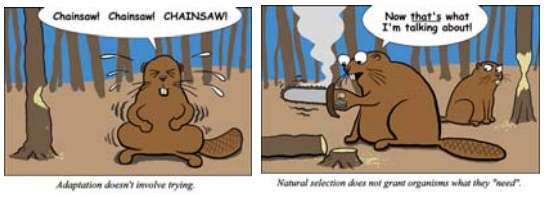
_____

- Definitions:
  - A change in _____ within a population over many generations;
  - A _____ by which genetically influenced characteristics of a population may change.
- Changes may occur due to :
  - _____ or errors occurring during copying of original DNA sequence.
  - _____ selection.

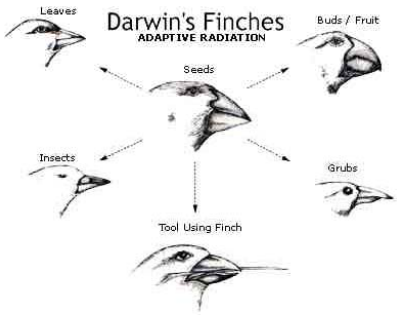
Evolution: _____ Selection

- Individuals with genetically influenced traits that are adaptive in a particular environment:
  - tend to _____ ; and
  - to _____ in greater numbers.
  - As a result, their traits become more _____ in the population.

Natural Selection: Misconceptions



Natural Selection: Fitness



Natural Selection: _____

- Every human gene has _____ features
  - Many features "come along for the ride"
    - Associated or linked to adaptive traits
  - Examples
    - _____
    - _____
    - Any others??