What do neurons look like? I

- These are the basic parts...

Types of Neurons

- Spinal cord (motor neuron)
- Thalamus
- Cerebellum
- Cortex
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

- Objective 14

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?

• 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:
  - ________
  - ________
  - “magic mushrooms”

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(Gamma-aminobutyric acid)

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

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Structure of the Nervous System

• ________
  - Brain
  - Spinal Cord
• ________ Nervous System
  - ________
  - ________
    • Sympathetic NS
    • Parasympathetic NS
The brain can be divided into ________: the ________, ________, and ________.
Brain Damage: Phineas Gage

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

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)...

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The ________ Callosum

• Millions of ________ connecting the brain’s hemispheres.
• Provides a pathway for ________ between hemispheres.
• If surgically severed to treat ________ hemispheres cannot ________ directly.
**Two Hemispheres – Split Brains**

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.
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

Reflex Arc

Objective 5
Autonomic Nervous System

ANS - Sympathetic

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

Darwin's Finches

Natural Selection: ____________

• Every human gene has ____________ features
  – Many features “come along for the ride”
    • Associated or linked to adaptive traits
  – Examples
    • __________
    • __________
    • Any others??