Exam 2 Study Guide

Disclaimer: This is intended as a study aid. It is not a complete description of everything discussed in class, nor an exhaustive list of information that might be tested on an exam. This is not intended to be a substitute for class attendance.

****REVISED 4/27/2015****

LECTURE OUTLINES

Sensation

- I. Properties of sensation
 - A. How many senses?
 - B. Receptor cells and transduction
 - 1. Types of receptors
 - a. photoreceptors
 - b. chemoreceptors
 - c. mechanoreceptors
 - d. thermoreceptors
 - e. nociceptors
 - C. Important properties of sensory systems
 - 1. highly selective
 - 2. highly adaptive
 - D. From sensation to perception
 - 1. stage 1: receptors sense part of the world
 - 2. stage 2: transduction of sensory information into neural impulses
 - 3. stage 3: interpretation of sensory information
 - 4. stage 4: conscious perception
- II. Example of sensation: Vision
 - A. Physics of light
 - 1. wave length -- color
 - 2. wave amplitude -- brightness
 - B. Anatomy of eye
 - 1. lens
 - 2. retina
 - C. Anatomy of the retina
 - 1. two areas: fovea and periphery
 - 2. type of photoreceptors
 - a. rods

located in periphery, insensitive to changes in wavelength, highly sensitive to light of any brightness, not good at seeing detail

b. cones

located in fovea, sensitive to changes in wavelength, less sensitive to light, good at seeing detail

D. After photoreceptors transduce light ...

- 1. rods and cones send signal to bipolar cells
- 2. bipolar cells send messages to ganglion cells
- 3. the axons of the ganglion cells comprise the optic nerve, which leaves the eye and travels to the brain

Perception

- I. General observations about perception
 - A. perceptual systems often misperceive the world
 - B. perceptions are strongly influenced by context
 - C. perceptions are influenced by our prior beliefs about the world

II. Object perception: Principles of perceptual organization

Gestalt Psychologists -- "The whole (of a perception) is greater than the sum of its parts (the sensations)

A.Figure-ground discrimination

- B. Grouping
 - 1. proximity
 - 2. similarity
 - 3. closure

III. Object perception: Perceptual constancies

A. size constancy

Consciousness

- I. Sleep
 - A. Effects of reduced sleep
 - B. Tools for studying sleep and dreaming
 - 1. electroencephalograph/electroencephalogram
 - C. Two aspects of brain waves
 - 1. frequency (in cycles/sec, or Hz)
 - 2. amplitude (in microvolts)
 - D. synchronous vs desynchronous brain activity
 - E. Misconceptions about sleep
 - 1. we sleep so that our brains can rest
 - 2. sleep is a unitary state
 - 3. waking and sleeping are passive responses to the external world
 - F. Sleep-wake cycle
 - 1. Awake states
 - a. awake and alert (beta waves)
 - b. awake and relaxed, eyes closed (alpha waves)
 - 2. Sleep states
 - a. stage I (theta waves)
 - b. stage II (theta waves mixed with sleep spindles)
 - c. stage III (theta and delta waves)
 - d. stage IV: (delta waves)

- e. REM sleep
 - 1. rapid eye movements
 - 2. paralysis of voluntary muscles
 - 3. dreams
- G. Sleep disorders
 - 1. insomnia
 - 2. narcolepsy
 - 3. sleep apnea
 - 4. SIDS
 - 5. REM-BD
- H. Disruptions of circadian rhythms
- II. Dreams
 - A. Content of dreams
 - B. Characteristics of dreams (REM and Non-REM)
 - C. Freud's Psychoanalytical theory of dreams
 - 1. Manifest content
 - 2. latent content
 - D. Hobson's activation-synthesis model of dreams
 - 1. reticular formation of brainstem activates cortex, limbic system
 - 2. frontal lobe tries to interpret the random pattern of activity that results
 - 3. explaining characteristics of dreams
 - a. intense emotions: limbic system is active
 - b. illogical content: activation is random
 - c. amnesia: mechanisms that lead to permanent memories don't operate during REM sleep

<u>Learning</u>

- I. Association as a means for learning
 - A. Pavlov and classical conditioning
 - 1. Terms
 - a. unconditioned stimulus (UCS)
 - b. unconditioned response (UCR)
 - c. conditioned stimulus (CS)
 - d. conditioned response (CR)
 - 2. Rules of classical conditioning
 - a. acquisition
 - b. extinction (and spontaneous recovery)
 - c. generalization
 - d. discrimination
 - 3. Applications of classical conditioning
 - a. bedwetting
 - b. treatment for bad habits
 - c. treatment for phobias
 - d. attitude formation (advertising, politics)
 - e. overcoming anticipatory nausea in chemotherapy

- f. getting coyotes to not eat sheep
- B. F. Skinner and operant conditioning
 - 1. Principals of operant conditioning
 - a. major concepts
 - 1. reinforcement
 - a. positive
 - b. negative
 - 2. punishment
 - 2. Schedules of reinforcement
 - a. continuous
 - b. partial
 - 1. interval vs ratio
 - 2. variable vs fixed
 - 3. Applications of operant conditioning
 - a. teaching dogs for the handicapped
 - b. token economy for hard-to-control kids
- C. Long-term potentiation (LTP) as a neurobiological explanation for associative learning

Language

- I. Ape language vs human language
 - A. Properties of ape language
 - 1. noncompositional
 - 2. two-level system
 - 3. finite number of utterances
 - B. Properties of human language
 - 1. compositional
 - 2. three-level system
 - 3. infinite number of utterances
- II. Language development in children
 - A. Effects of "mt=other's language" on earliest baby sounds
 - B. Babbling (5-12 months)
 - C. One-word stage (12-18 months)
 - D. Two-word stage (18-24 months)
 - E. Grammatical competence (2-4 years)
- III. Efforts to teach "language" to other species
 - A. Chimps (Washoe etc)
 - B. Bonobos (Kanzi etc)

IV. Language and the brain

A. disorders of speech, meaning, and grammar, location in brain of typical damaged areas to produce these syndromes

Hints about what to study (Major concepts): REVISED 4/27/2015

Sensation/perception -

Transduction & types of receptors; retina (photoreceptors and other types of neurons), optic nerve; thalamus; perceptual properties of light; color vision (cone types; Young-Helmholtz theory; opponent process theory); Gestalt psychologists; size/distance in perception; figure/ground; monocular & binocular cues to depth

Consciousness --

Circadian rhythms, sleep cycle (stages as described IN CLASS, not TEXT; brain waves; duration and changes of sleep cycle through the night; effectiveness of sleeping meds; role of suprachiasmatic nucleus; sleep disorders); dreaming

Learning ****Generally the most difficult questions**** --

Classical conditioning (including UCS/UCR, CS/CR, generalization, discrimination, extinction, spontaneous recovery; conditions for best learning; applications); operant conditioning (types of reinforcers; punishment; schedules of reinforcement; applications; reinforcement vs punishment)

Language --

language learning, animals vs humans, Washoe and Kanzi, aphasic syndromes following brain damage