Carlson (7e)

PowerPoint Lecture Outline

Chapter 1: *Introduction*

Overview Of Course Topics

- Foundations of physiological psychology
  - Neurophysiology and neuroanatomy
  - Methodology
- Sensation and movement
- Physiology of behavior
  - Sleep and circadian rhythms
  - Ingestion: feeding and drinking
  - Sexual behavior
  - Memory

Physiological Psychology

- Physiological psychology seeks to describe the physical mechanisms of the body that mediate our movements and our mental activity
- What is the relationship between mind and body?
  - Two major views of the mind-body problem:
    - "Dualism": mind and body are separate but interacting
    - "Monism": mind is a property of the physical nervous system (body)

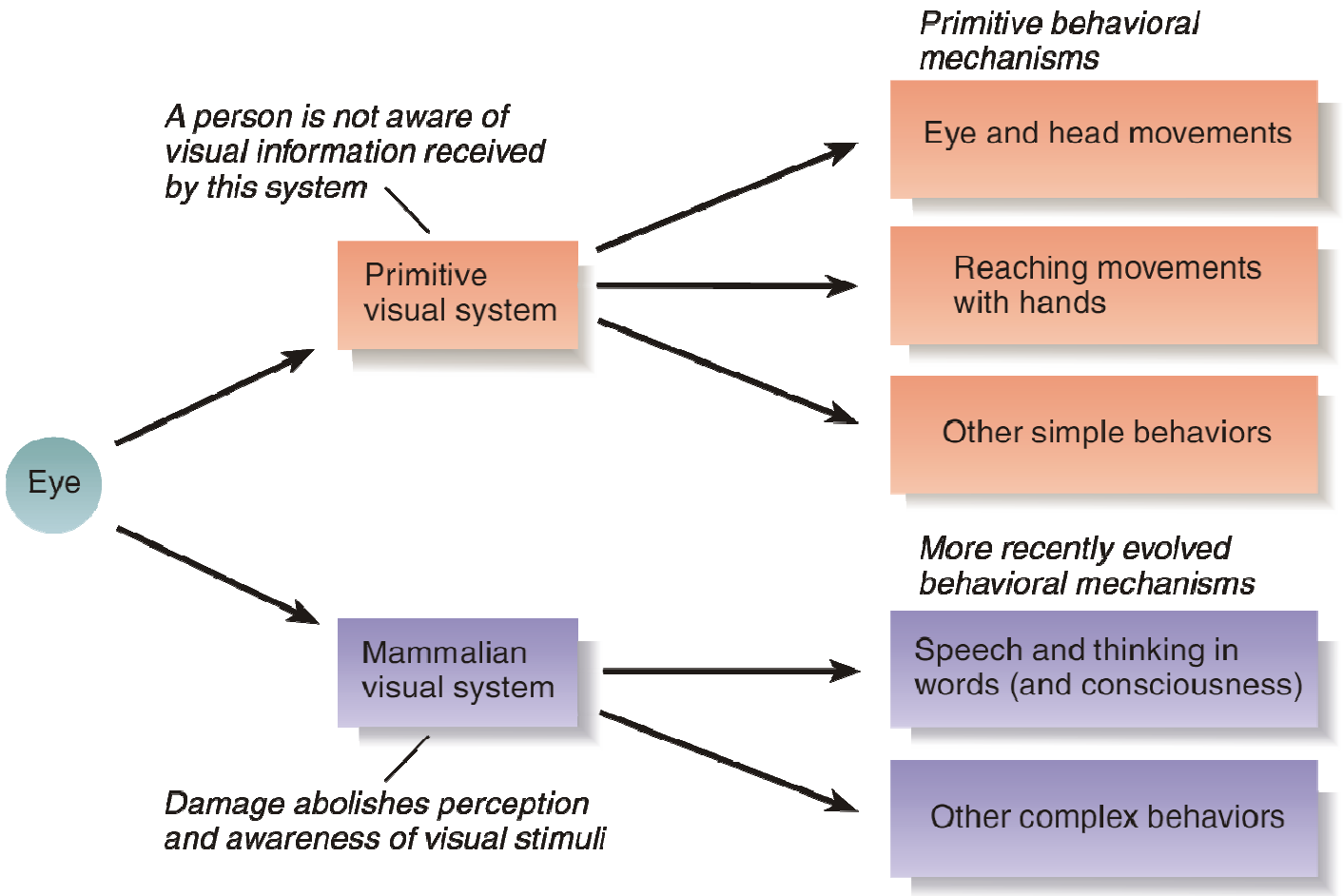
Consciousness

- Consciousness refers to self-awareness and the ability to communicate our thoughts, perceptions, feelings, and memories
- Consciousness can vary across the day/night cycle (sleep and dreaming are special states of consciousness)
- Drugs can alter consciousness
  - Alcohol
  - LSD

Consciousness and Blindsight

- Damage to the visual system on one side of the brain will produce blindness in the opposite (contralateral) visual field
- Blindsight: blind patients are unable to see, but are able to reach for objects placed in their blind visual field
  - Implies that we need not be conscious of a stimulus in order to act on that stimulus

Blindsight

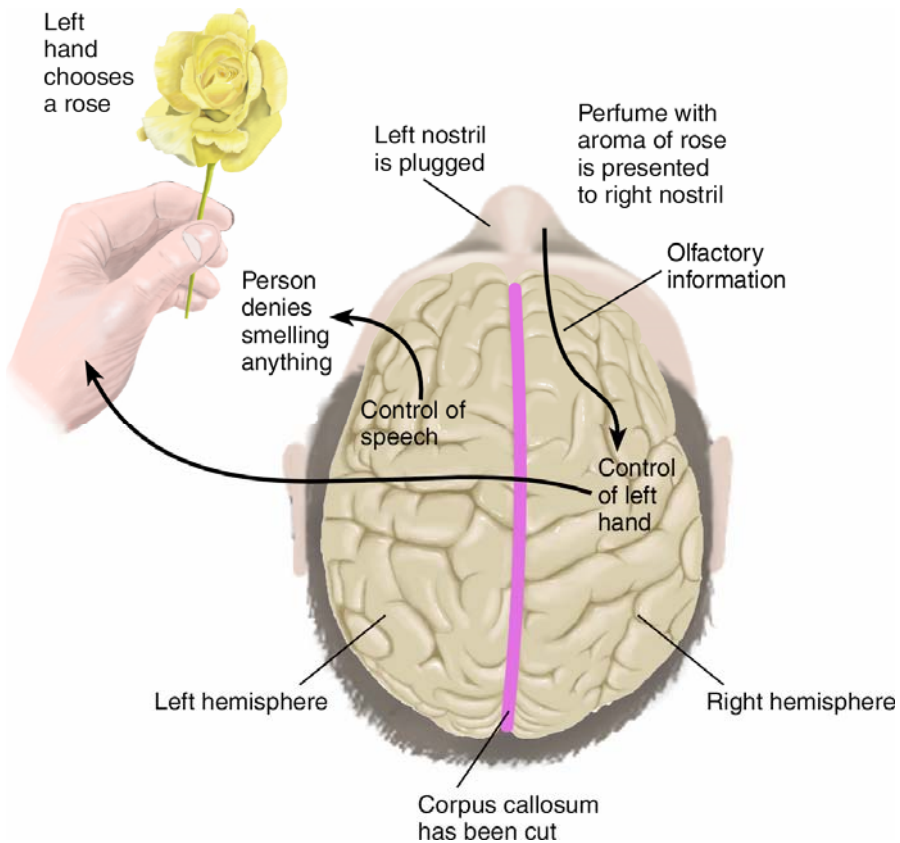


The Split-brain Procedure

- The corpus callosum is a bundle of axons that interconnects the two cerebral hemispheres
  - Callotomy involves cutting the corpus callosum to alleviate epileptic seizures
  - Without a corpus callosum, the left and right cerebral hemispheres are unable to directly communicate
  - Information that does not reach the left hemisphere of a callotomy patient does not enter consciousness: the person cannot verbalize it

Testing a Split-brain

- An odor presented to the right nostril only is not named because the information does not reach the left hemisphere
- Yet, the person can use their left hand to reach for the source of the odor



Research Goals

- The goal of science is to explain the phenomena under study
- Explanation involves two processes:
  - Generalization is the deduction of general laws, using results from experiments
  - Reduction is the use of simple phenomena to explain more complicated phenomema

Descartes' View of Behavior

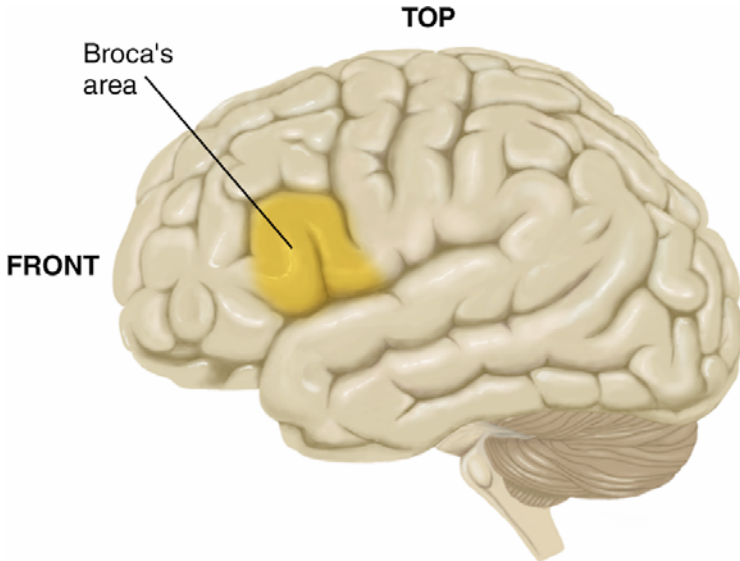
- Descartes viewed the world as mechanistic and viewed human behavior in terms of reflexive mechanisms elicited by stimuli in the environment
  - Descartes proposed that the mind interacted with the physical body through the pineal body
  - Descartes viewed hydraulic pressure within nerves as the basis for movement
    - Galvani soon showed that stimulation of isolated frog nerves will evoke muscle contraction

Localization of Function

- Muller noted that nerves carry messages via different channels (Doctrine of Specific Nerve Energies)
- Fluorens used ablation (removal of discrete brain areas) in animals to assess the role of brain in the control of behavior
  - Flourens reported discrete brain areas that controlled heart rate and breathing, purposeful movements, and visual and auditory reflexes

Broca's Area

- Patient "Tan" showed major deficit in speech (aphasia) following a stroke
  - Broca's autopsy of Tan's brain (1861) noted damage in the left hemisphere
  - Broca's paper can be viewed at: http://www.yorku.ca/dept/psych/classics/Broca/perte-e.htm



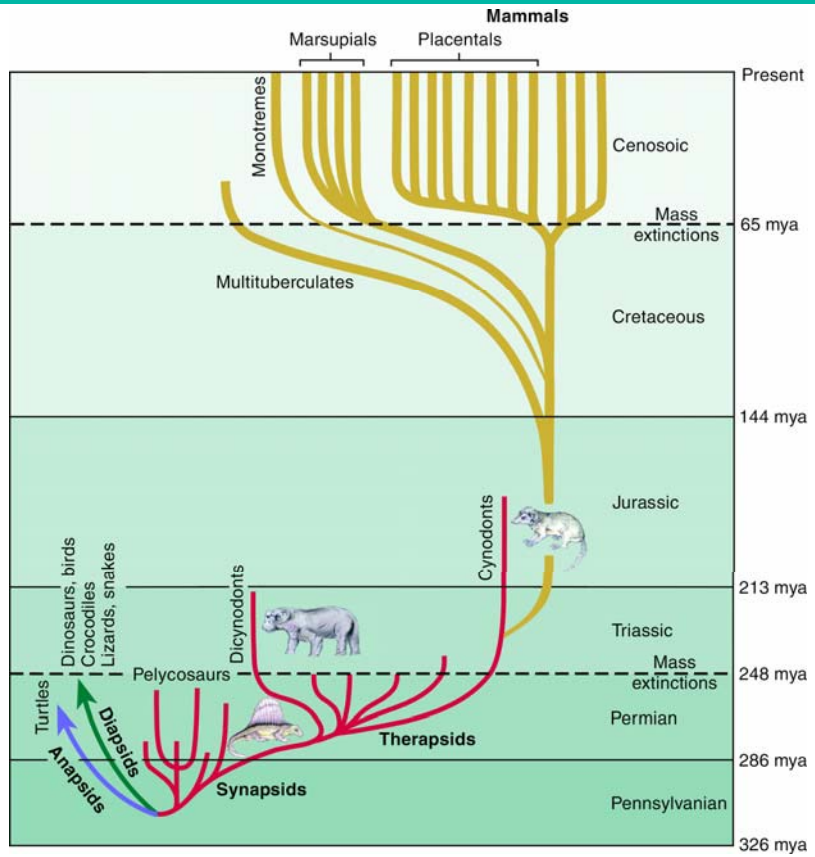
Electrical Stimulation of Brain

- Fritsch and Hitzig applied electrical stimuli to cortex in dogs to elicit muscle contraction on opposite body side (notion of contralateral)
  - Identified primary motor cortex, a region of cortex that activates discrete muscles on the opposite side of the body
  - Other brain regions control movements via connections with primary motor cortex

Natural Selection and Evolution

- Functionalism is the belief that the characteristics of an organism serve some useful function
  - Hands allow for grasping
    - Skin color can allow an organism to blend into the background (avoid predators)
    - Color vision allows for detection of ripe/rotten food
- Natural selection suggests that characteristics that allow an organism to reproduce more successfully are passed on to offspring
  - A consequence is that these characteristics will become more prevalent in a species
- Evolution is the gradual change in structure and physiology as a result of natural selection

Evolution of Vertebrates



Redrawn from Carrol, R. Vertebrate Paleontology and Evolution. New York: W.H. Freeman, 1988

Human Evolution

- Hominids are humanlike apes that first appeared in Africa
  - Humans evolved from the first hominids
  - There are four surviving species of hominids:
    - Humans, chimpanzees, gorillas, and orangutans
    - Humans and chimpanzees share 98.8% of DNA
- Humans evolved a number of characteristics that enabled them to fit into their environment and to successfully compete
  - Color vision, upright posture/bipedalism, language abilities required a larger brain
  - Human brains are large relative to body weight

Ethics of Animal Research

- Physiological psychologists study animals to learn of the relation between physiology and behavior
  - Animal research must be humane and worthwhile
- Animal studies are justified on the basis of
  - Minimized pain and discomfort
  - The value of the information gained from the research
    - Progress in developing vaccines
    - Progress in preventing cell death immediately after a stroke
  - The importance of science for understanding ourselves and animals
- APA animal use guidelines can be viewed at: http://www.apa.org/science/anguide.html

Careers in Neuroscience

- Physiological psychologists study the physiology of behavioral phenomena in animals
  - Physiological psychology is also known as psychobiology or behavioral neuroscience
  - Most physiological psychologists have earned a doctoral degree in psychology or in neuroscience
- Neurologists are physicians who diagnose and treat nervous system diseases