

Behavioral Neuroscience 3313H
Exam Three Material

Learning

- Learning is a relatively permanent CHANGE in BEHAVIOR due to experience
- Nature of Learning
 - **Learning** = process that EXPERIENCES change our NERVOUS SYSTEM and hence our BEHAVIOR
 - PLASTICITY idea that the NERVOUS SYSTEM is always adapting to environment
 - Experiences not stored → change the way we perceive, perform think and plan
 - Change nervous system by changing neural circuits (planning, performing, thinking, perceiving)
 - 4 Basic forms:
 - **Perceptual Learning**
 - Ability to learn to recognize STIMULI that have been perceived before
 - Function = IDENTIFY and CATEGORIZE OBEJECTS AND SITUATIONS
 - Learn to recognize something → learn how to behave → profit from our experiences with it
 - Sensory systems is capable of PERCEPTUAL LEARNING
 - Visual, sound, smell
 - SENSORY ASSOCIATION CORTEX
 - Learning to recognize a visual stimuli causes changes in visual association
 - Learning to recognize auditory stimuli → changes in the auditory association cortex
 - **Stimulus-Response Learning**
 - Ability to learn to perform a particular behavior when a particular stimulus is present
 - Learn to AUTOMATICALLY make a particular response in the presence of a certain stimulus
 - Classical conditioning
 - Response more automatic
 - Instrumental / Operant
 - Consequences of you actions
 - Punishment → decrease behavior
 - Reward → increase
 - Involved in connections between circuits of PERCEPTIONS and those involved in MOVEMENT
 - Direct connections of Parietal (where pathway) and Prefrontal areas

- Can also be HOW pathway between parietal and PFC
 - Sensory and motor circuits
- Can be an automatic response or a defensive reflex
 - Ex) DEFENSIVE EYEBLINK RESPONSE
 - Close eye
- **Classical conditioning →**
 - Eye blink stimulus example
 - Unconditioned stimulus (UCS) = airpuff
 - Unconditioned response(UCR) = eyeblink
 - Conditioned stimulus CR = tone
 - Conditioned response = eye blink
 - Conditioned stimulus is neutral at first but pairing the CS with the UCS will eventually cause you to blink your eye at the tone
 - UCS → elicits a response without prior experience
 - CR → learned reaction to a conditioned stimulus
 - And unconditioned response → is an unlearned reaction to the UCS
- Studying the Neural Basis of Eye Blink Conditioning
 - PET Study (PET scan before condition and after)
 - **LATERAL INTERPOSITUS NUCLEUS (LIP)**
 - Deep area of cerebellum is activated when conditioned stimulus
- Anatomy of Classical Conditioning (Eye Blink Ex.)
PATHWAYS
 - US pathways Unconditioned Response pathway
 - US (air puff) → trigeminal nucleus → oculomotor nucleus → eye blink (UR & CR)
 - Conditioned Response (CONDITIONING PATHWAY)
 - Tone → cochlear nucleus → pontine nucleus → lateral interpositus nucleus → red nucleus → oculomotor nucleus → eye blink (UR / CR)
 - **Condition →**
 - **Cerebellar cortex (purkinje cells) → lateral interpositus nucleus**
 - **Purkinje cells → INHIBITORY SYNAPSE**
 - Hear a sound → sometimes will go up to cerebellar but it may be INHIBITED by purkinje cells

