

10/2 Motor Control (Ch.5)

- Brain stem

- Motor neurons + muscle fiber = motor unit, neuromuscular junction - axons - acetylcholine
 - Controlled by primary motor areas of brain
- Cerebellum: modulates motor activity, fine grained control of muscle movements/coordination
 - Ballistic (throwing a ball) vs controlled loop motions (guided motions, batting a ball)
 - Damage: overshooting (cant turn off muscle groups precisely), cerebellar ataxia (effecting speech= dysarthria), action tremors.
 - Forward model (ex updated eye movements)
- Basal ganglia: posture control (center of gravity moves) initiating voluntary motor actions (advance preparation)
 - Damage: akinesia (inability to initiate voluntary motor acts), tremors, hyperkinesia (excessive activity/huntingtons), bradykinesia (slowly initiating/modulating).

- cortex

- Supplimentary motor area (SMA): bilateral movements, complex/sequential activities (ex: playing guitar not simple acts like clapping)
 - Coordinates each side of the body
- Anterior singulate: (stroop task) novel/complex tasks
- Frontal eye fields: frontal lobes move eyes around to gain info-voluntary eye movements.
- Saccadic eye movements: jumping around
- Pursuit eye movements: smooth/passively tracking
- EMDR (eye movement desensitization and reprocessing) 1989: to help patients deal with PTSD/distressing memories
 - Potential Mechanism:
 1. Frontal lobes: emotional regulation/memory retrieval
 2. Eye movements controlled by frontal lobes
 3. Activation of frontal lobes/hemispheres
 - Hemispheres phase in and out, eye movements might activate them at the same speed.
 - Memory problem/retrieval

- o Saccadic (frontal eye fields) vs smooth pursuit (superior colliculus)
- o Direction of eye movements
 - Horizontal (R-L) strong bilateral activation
 - Bilateral (up-down) weaker activation
- Memory study
 - o d' (d prime): counts hits and false alarms
 - o control: arousal effect (moving eyes any direction/way better than nothing)
 - o horizontal saccadic eye movements best performance
- Real world memories
 - o Eye movements resists false memories, rate drops dramatically
 - o Earlier childhood memory retrieval
 - o Smaller benefit for mixed handers
- EM summary
 - o Enhance retrieval, enhance attention, enhance ability to ignore irrelevant info, enhance persuasion, belief updating
 - o Effects persist 3-9 minutes
 - o Assymetry of emotional expression
 - o Inconsistent handers: EM no effect or harms performance
 - o Yerkes-dodson law: optimal level of arousal= not too aroused or no too weakly aroused.
 - o Thrill seekers (lower base line levels of arousal)