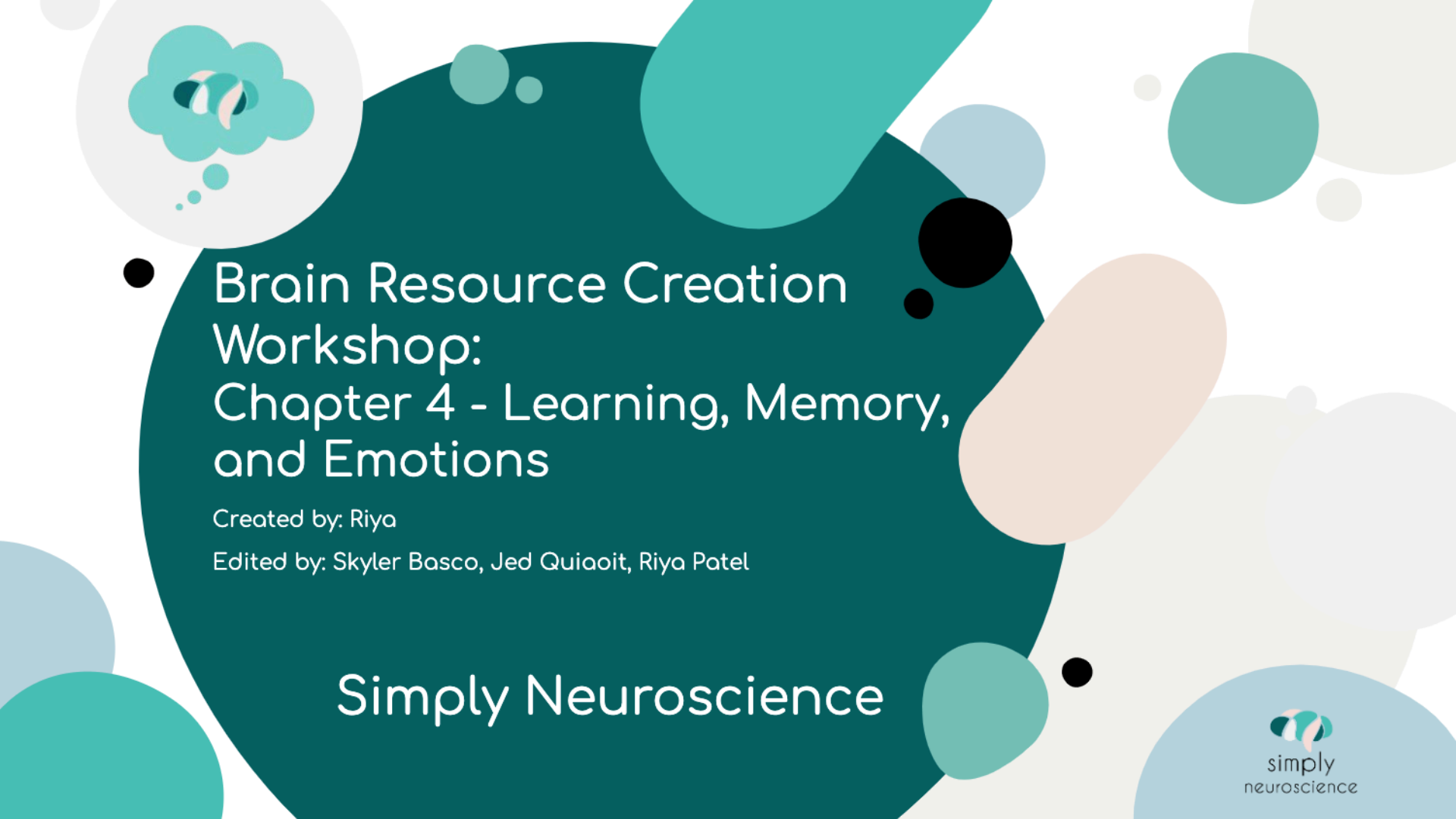




Brain Resource Creation Workshop: Chapter 4 - Learning, Memory, and Emotions

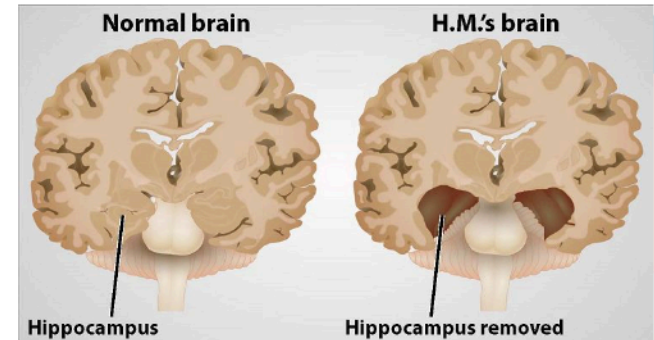
Created by: Riya

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Simply Neuroscience

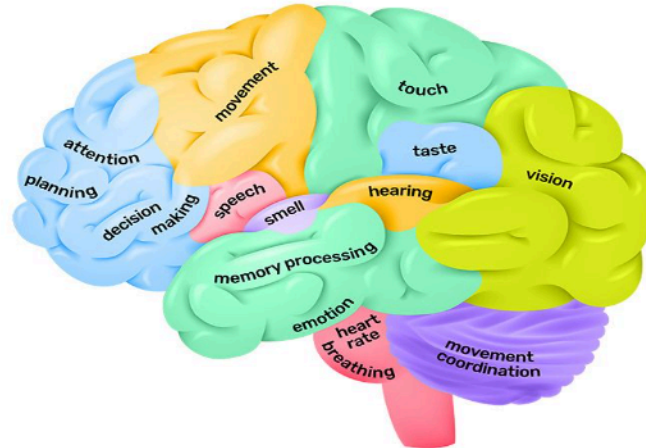
Who was HM?

- Henry Molaison
- Suffered a childhood blow to the head and developed seizures
- Underwent an experimental procedure that removed parts of his hippocampus
- Was left with permanent amnesia
 - Could only remember scenes from childhood, but was unable to form new memories
- Taught scientists and researchers that the hippocampus has a role in converting memories from short-term to long-term



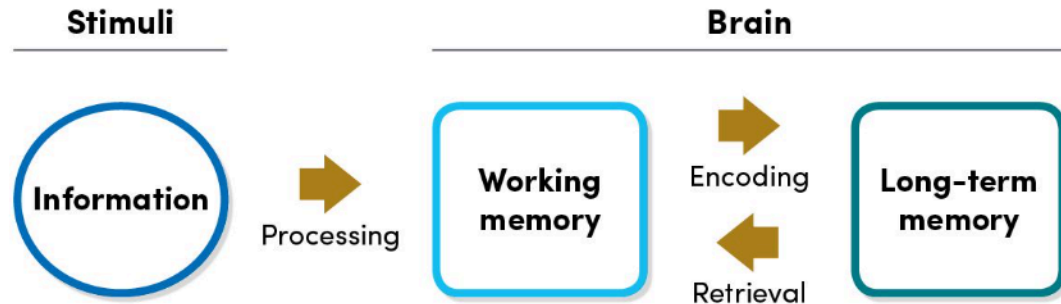
Learning and Memory

- Medial temporal lobe (including hippocampus)
 - Works with other regions of the cerebral cortex to organize, consolidate, and retrieve memories
- 4 major lobes of the cerebral cortex: process senses
 - Frontal
 - Parietal
 - Temporal
 - Occipital



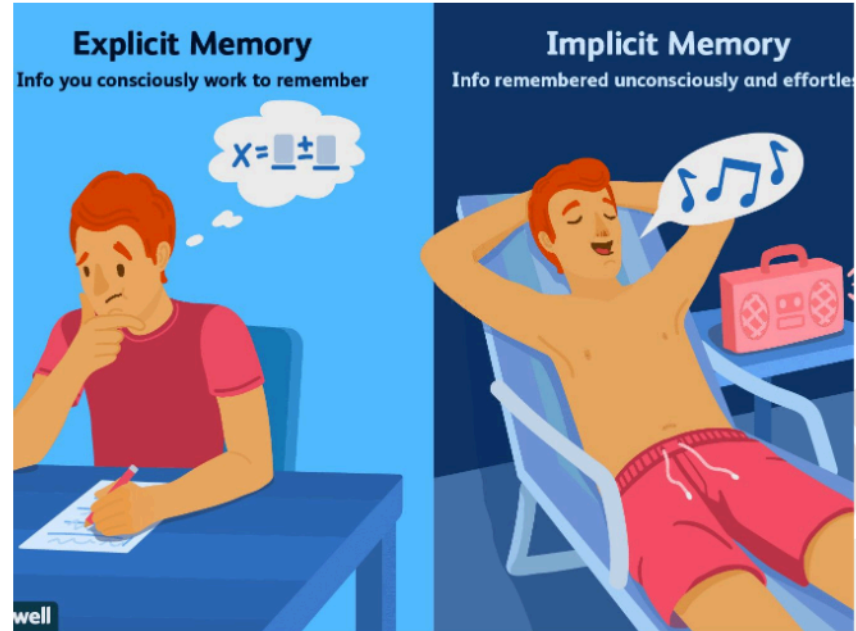
Working Memory & Long Term Memory

- Working Memory
 - Type of Short Term memory
 - Prefrontal Cortex
 - Ex. Phone Numbers or a Data Point
- Long Term Memory
 - When Short Term memory is considered important and consolidated



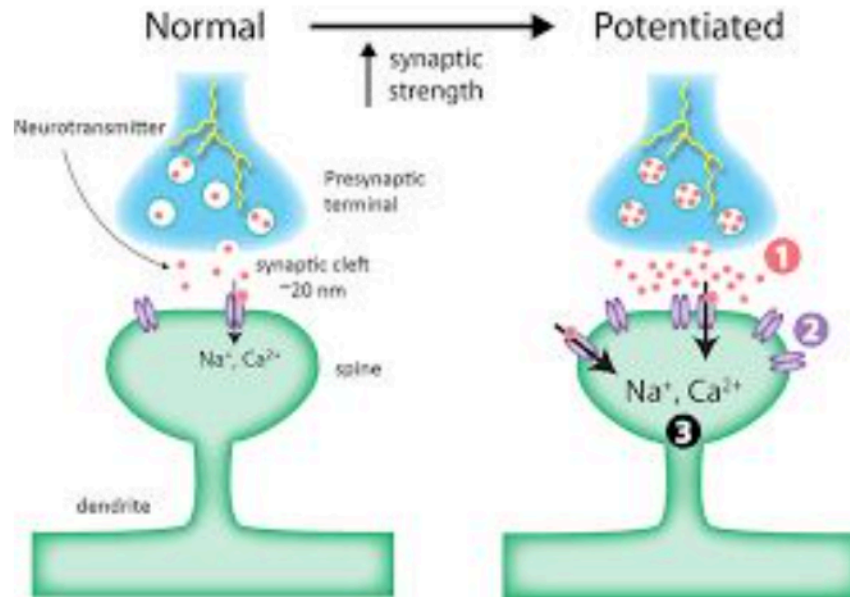
Explicit and Implicit Memory

- Explicit Memory
 - Declarative Memory
 - Facts, data, and events
 - Semantic Memory
 - Cultural knowledge, ideas, and other society-acquired knowledge
 - Episodic Memory
 - Representations of personal experiences
- Implicit Memory
 - Unconscious memory//Nondeclarative memory
 - Habits and Skills
 - Everyday Actions



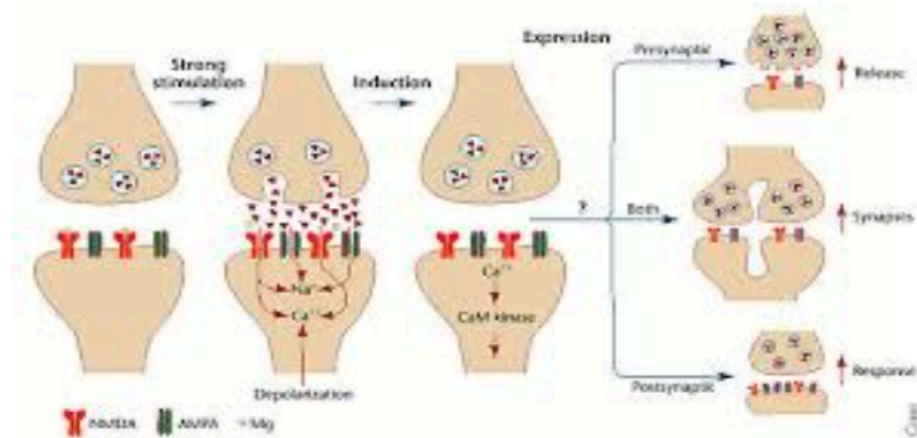
Synaptic Plasticity

- Controls how effectively two neurons communicate
- Contributes to learning and memory



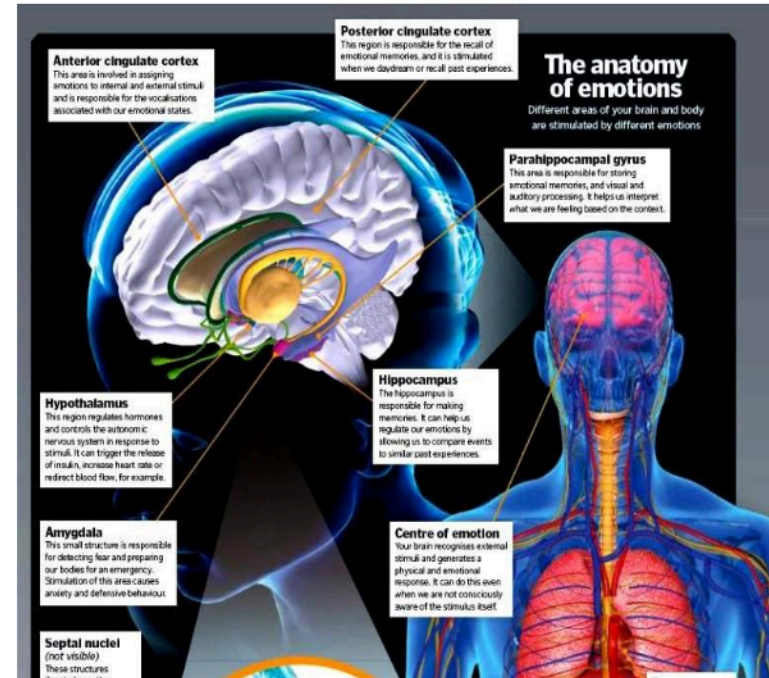
Long Term Potentiation

- Strengthening of synapses between neurons = memories
- Stronger synapse = stronger memory
- More memory:
 - More receptors in neuron membrane
 - More neurotransmitters released
 - More action potentials
 - More dendrites



Anatomy of Emotion

- Amygdala
 - Emotions, emotional behavior, and motivation
 - Fear and social rewards
- Insula/Insular Cortex
 - Disgust
 - Ex. Smells
 - Feeling and Anticipating Pain
- Periaqueductal Gray
 - Pain Perception and Stress Responses
 - Defensive and Reproductive Behaviors



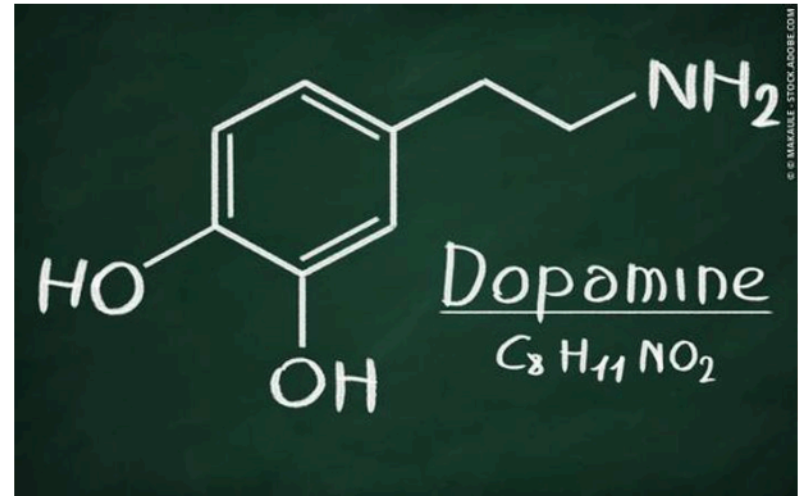
Motivation: Affective Decision-Making

- Actions driven by necessities
 - Food, Sleep, Sex, Avoidance of Pain
- Actions also driven by rewards
- Emotional decision-making changes with age
 - Lateral Prefrontal Cortex: matures over time
 - Older adults might make more risky decisions



Motivation: Dopamine and Reward Pathways

- When something is rewarding, we are more likely to remember it
 - Dopamine: influences synapses in reward pathway to create emotional associations
- Dopamine-releasing neurons
 - Activated in response to signals saying a reward will be given
- Reward learning = in response to something unexpected
- Can lead to inappropriate aggression





We hope you enjoyed the workshop!

Any questions?

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