

Usability Engineering

Session 3

Agenda

- Session 3 Topics
- Questions from Session 2?
- Objectives of Session 3
 - Introduction of basic concepts:
 - Memory
 - Attention
 - Review of Remote-control Data/Results
 - Next steps

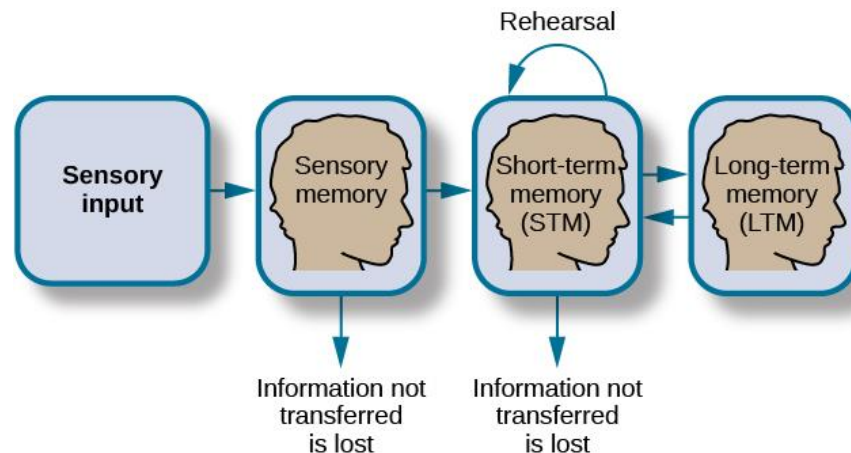
Memory

Memory

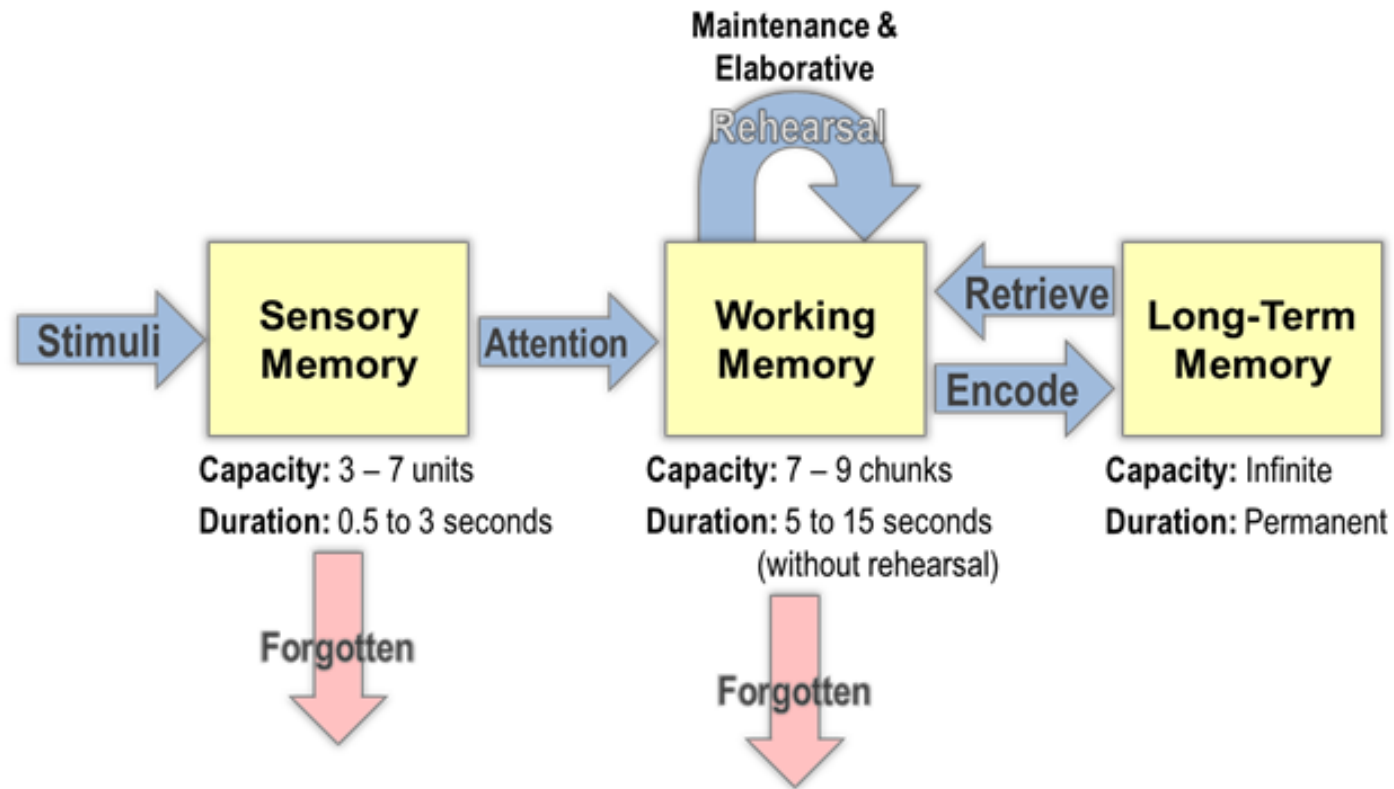
- ▶ Memory is considered a PROCESS.
- ▶ The memory process is divided into three necessary stages: **encoding, storage, and retrieval** (Melton, 1963).
 - ▶ Encoding is defined as the initial learning of information
 - ▶ Storage refers to maintaining information over time
 - ▶ Retrieval is the ability to access information when you need it

Theories of Memory Processing: Multi-store model (Atkinson and Shrifin, 1968)

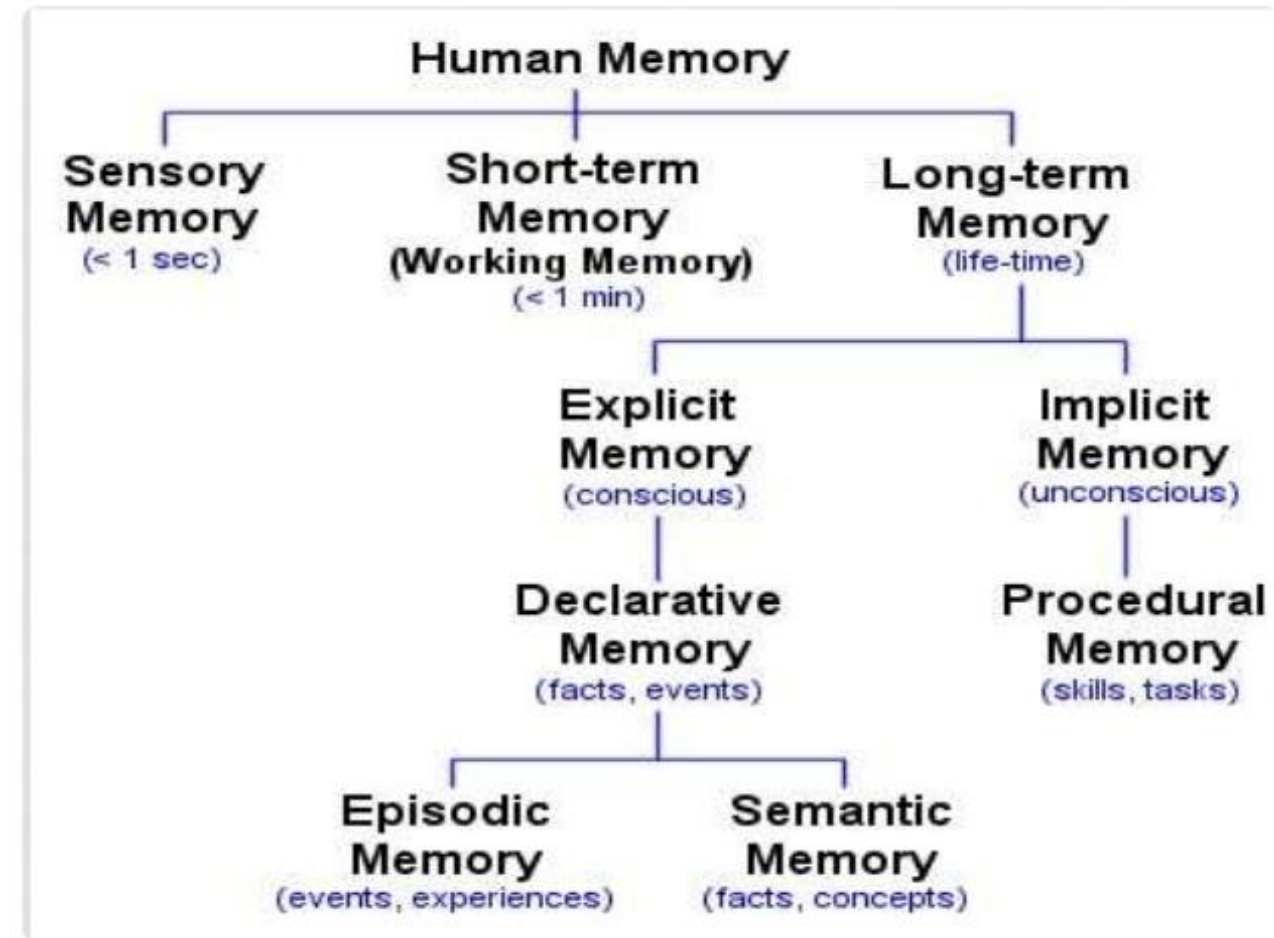
- ▶ This model suggested that information exists in one of 3 states of memory:: the **sensory, short-term and long-term stores**. Information passes from one stage to the next the more we **rehearse** it in our minds, but can fade away if we do not pay enough attention to it.



Theories of Memory: Working Memory (Baddeley and Hitch, 1974)



Types of Memory



Memory recall

- ▶ There are three main types of recall: **free recall, cued recall and recognition..**
 - ▶ Free recall
 - ▶ Cued recall
 - ▶ Recognition
- ▶ How to increase recall
 - ▶ Capacity
 - ▶ Pneumonics
 - ▶ Imagery
 - ▶ Rehearsal

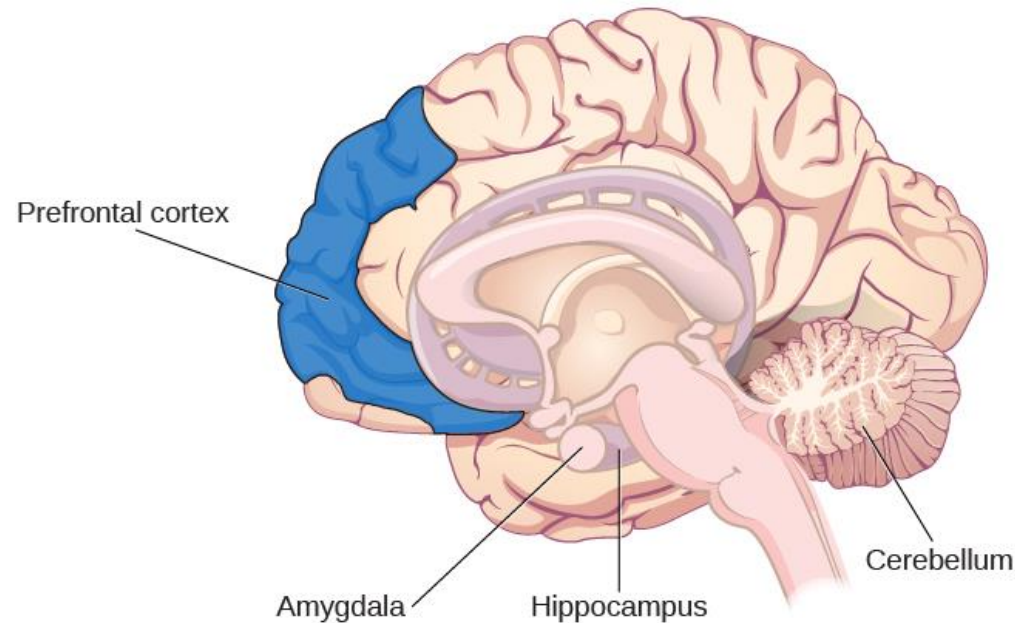
Memory and Neuroscience

Neurological Process

- ▶ Memories are made by changes in collections of neurons and the connections or synapses between them.
- ▶ A memory may be laid down in one group of neural circuits, but recalled in another.
- ▶ Each time we recall a memory it may change depending on the neural circuits that are engaged at that particular moment.

Areas of the Brain that are involved in memory

- The amygdala is involved in fear and fear memories.
- The hippocampus is associated with declarative and episodic memory as well as recognition memory.
- The cerebellum plays a role in processing procedural memories, such as how to play the piano.
- The prefrontal cortex appears to be involved in remembering semantic tasks.



Forgetting

- ▶ Definition
 - ▶ Forgetting is the loss or change in information that was previously stored in short-term or long-term memory.
- ▶ Theories that account for forgetting:
 - ▶ Displacement theory
 - ▶ Decay theory
 - ▶ Interference theory
 - ▶ Retrieval failure theory
 - ▶ Consolidation theory

Attention

What is Attention?

- ▶ Attention is the link between perception and memory,
- ▶ Types of Attention:
 - ▶ Selective Attention: The ability to attend to a specific stimulus or activity in the presence of other distracting stimuli.
 - ▶ Alternating Attention: The ability to change focus attention between two or more stimuli.
 - ▶ Divided Attention: The ability to attend different stimuli or attention at the same time.

Attention Theories

- ▶ The bottleneck theory suggests that **individuals have a limited amount of attentional resources that they can use at one time**. Therefore, information and stimuli are 'filtered' somehow so that only the most salient and important information is perceived.
- ▶ Capacity theory is the theoretical approach that pulled researchers from Filter theories with Kahneman's published 1973 study, Attention and Effort positing attention **was limited in overall capacity**, that a person's ability to perform simultaneous tasks depends on how much "capacity" the jobs require.
- ▶ In single resource theory (Wickens, 1992:366–374), cognitive mechanisms, including those used for memory and decision making, are **viewed as a single, undifferentiated resource pool**.

Attention Theories (cont.)

- ▶ In single resource theory (Wickens, 1992:366–374), cognitive mechanisms, including those used for memory and decision making, are **viewed as a single, undifferentiated resource pool**.
- ▶ Multiple resource theory as described by Wickens (1984) is **based on the idea that multiple attentional resources exist and in some cases are separate from one another** (i.e., can perform different attentional tasks at the same time without interference).

Remote control data and results

Next Steps