Memory

- What is memory?
- How does information get into memory?
- How is information maintained in memory?
- How is information pulled back out of memory?
- Various types of memory
- Modal Model of memory
- Amnesia and Demntia

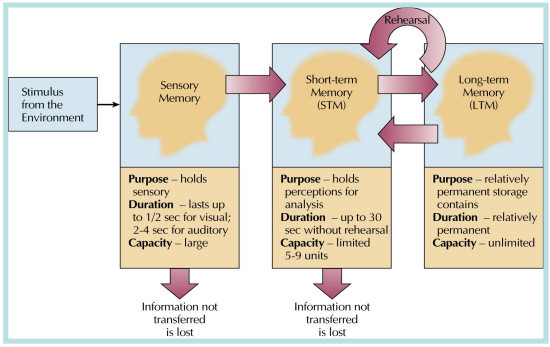
Memory

- Memory is the process of maintaining information over time
- It is internal record of some prior event or experience; a set of mental processes that receives, encodes, stores, organizes, alters, and retrieves information over time

Basic Process of Remembering

- **Encoding**: process of translating information into neural codes (language) that will be retained in memory
- **Storage**: the process of retaining neural coded information over time
- **Retrieval**: the process of recovering information from memory storage

Overview of Memory Model



The Multi Store Model

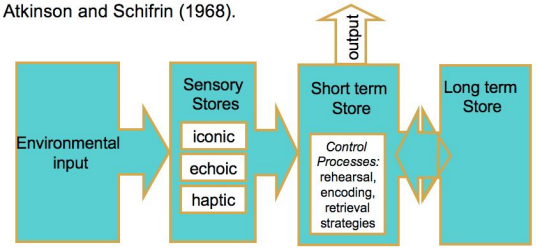
- In the sensory stores, information and knowledge that comes to us from the senses is stored momentarily. After processing, some of this information is sent on to the short term store.
- Some of the information in the short term store is then passed on to the long term store.
- The multi store model posits that the long term storage of information often depends on rehearsal, with a direct relationship between the amount of rehearsal in the short term store and the strength of the memory in the long term store

Sensory

- Sensory memory is our ability to retain impressions of sensory information after the original stimulus has ceased
- Iconic memory
- Echoic memory

Continue

Atkinson and Schifrin (1968).



Iconic Memory

- How much information can we get from a single glimpse?
- George Sperling (1960)
  - When stimuli consisting of a number of items are shown briefly to an observer, only a limited number of the items can be correctly reported. The fact that observers assert they can see more than they can report suggests the memory sets a limit on a processes that is otherwise rich in information

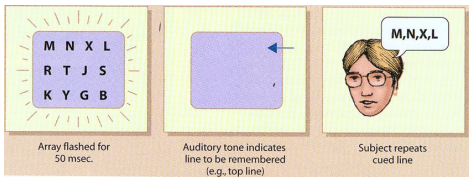
Experiment

- Subjects are presented with a brief glimpse (50 msec) of letter matrix.
- Asked to give a "Full Report".
- 7 (+/- 2)

• X L W F
• J B O V
• K C Z R

Continue

- Asked to give a "**Partial Report**".
- All letters from any row



Conclusion

- We can see a great deal and can have access to all the information. However, we can only recall a portion of the information.

Duration of Iconic Memory

- Determined by adjusting time the cue is given.
- Depends on what you are looking at.
- Brightness effects the decay of Iconic Memory.
- The majority of information decays between 300 and 500 msec
  - Iconic Memory keeps our consciousness from being overwhelmed
  - We can select the information that is most important to us at a given moment

Continue

- Memory traces do last longer than 1 sec.
- Only if Recognition is tested
- Information is available only for 1 sec. under Full Report or Partial Report conditions

Echoic Memory

- the ability to remember and reproduce a sound in the two or three seconds after it is heard

Experiment

- Simultaneously presented sequences of consonants from four different locations
- When cued to recall one location the estimated total amount of material stored was greater than when Full Recall was requested
- Same as Sperling

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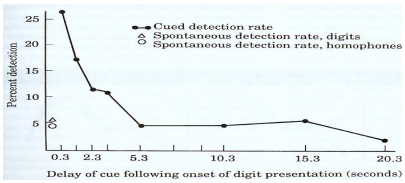
- Four-eared man" technique
- Delay of cue (0, 1, 2, 3 or 4 seconds)
- Information was lost after about 4 seconds



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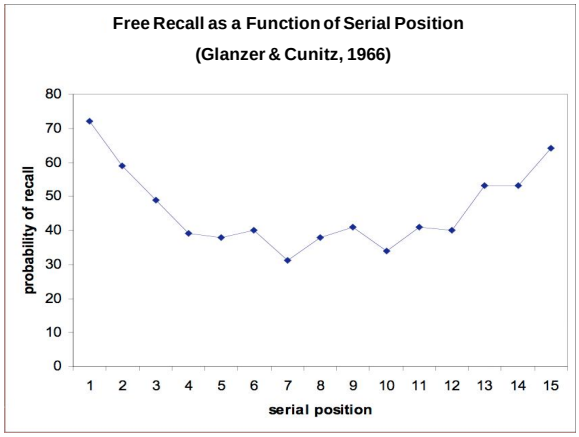
- Echoic memory is similar to Iconic memory in that there is more information accessible than can be Recalled
- Echoic memory is different in that the trace lasts longer than a second

Short-term Memory

- Atkinson and Schifrin proposed that information that had been attended to in the sensory stores went into a **short-term store** (also called **short-term memory**)
- Short term memory is of limited capacity and is fragile (Remembering phone no. or directions)
- Capacity of 5-7 items
  - Lists of letters/numbers used in experiments
  - Serial or free recall
  - Chunks are groups we know already

Free-recall Memory Experiments

- In free recall experiments, participants can recall the items presented to them in the list in any ordering.
- Typically, these experiments involve people being presented with a series of words, usually consisting of about 15 to 30 words, read a rate of about 1 per second.
- Immediately after the task, people are asked to repeat back as many words as they can.



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- The graph of probability of recall against serial position is a U-shaped curve, known as the serial position curve**.**
- Participants had a higher probability of recall on items that were near the start of the list (i.e. early serial position). This is called the primacy effect.
- Participants had a higher probability of recall on items that were near the end of the list (i.e. late serial position). This is called the recency effect.

Recency effect and MSM

- During the presentation of the list of words, people are trying to keep these words in their short term memory.
- Therefore, as new words come into short-term memory, older words must be bumped out of short term memory.
- At the end of the task, the only words that are left in short term memory are the ones that have just been heard and therefore have not been bumped out.
- This explains why people have better recall of the more recent items.

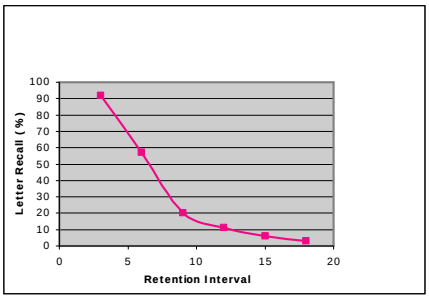
Primacy Effect and MSM

- Suppose the first word in the list is “doctor”. Short-term memory can give the word the full attention of the rehearsal mechanism.
- Suppose that the second word is “sandwich”. Then short term memory must give half its attention to the first word and half its attention to the second word.
- When the third word is presented, short term memory will only be able to assign it one third of the attention available.
- Words experienced earlier in the list will have more rehearsal, and therefore will have a greater chance of making it to long term memory, and therefore will be more likely to be recalled

Modified Version

- After the full list of items had been presented to the experimental participants, but before they were asked to recall them, the participants were asked to count backwards from 10.
- Counting backwards from 10 involves the use of short term memory, and therefore, according to the multi-store model, the last few words in the list would be bumped out of short term memory
- Therefore, the multi-store model would predict no recency effect in this task.

Peterson & Peterson, 1959



Evaluating the Multi Store Model

Strengths	Weaknesses
• On a conceptual level the model makes sense. We can understand the different functions and recognise the different capabilities of the systems • Each store differs in a number of ways, suggesting that they are separate entities • Temporal duration • Capacity • Forgetting mechanisms • Brain injury evidence	• Evidence that the Short term Memory is not unitary (Warrington & Shallice, 1972) • Long term memory store holds different types of memories • Declarative – Episodic – Semantic Remembering yesterday 2 + 2 = 4 • Non-Declaritive – Implicit How to cycle a bike

Levels of Processing Theory

- Craik & Lockhart (1972)
- The amount of cognitive processing carried out on an item determines its memorability, not the amount of rehearsal
- Memory is linked with attention
- Rather than being mental items purposely constructed and stored, memories are after effects of the processing of a stimulus/event

Rehearsal

- Maintenance Rehearsal
  - sheer repetition
  - mechanical
  - no attention to meaning
  - little effort
- Elaborative rehearsal
  - focus on meaning
  - relations between items
  - organization

Continue

- Craik and Tulving (1975, Experiment 1): Participants answered questions about words presented to them. The questions were designed to engage four different levels of processing from shallow to deep
  - Graphemic: Is the word in capital letters?
  - Phonetic: Does the word rhyme with *'weight'?*
  - Semantic Is the word a type of fish?
  - Elaborative semantic Would the word fit in the sentence: The man peeled the _____ ?

Levels of Processing theory

- Strengths
  - Gives importance to the circumstances at time of learning (e.g. environment, attention, previous experience)
  - Explains fMRI data showing increased activity for semantic treatment of stimuli (Gabriele et al. 1996)
- Weaknesses
  - It is hard to decide the level of processing being used by someone in a given real world situation
  - It does not offer any explanation for implicit learning