Multi Store Model of Memory

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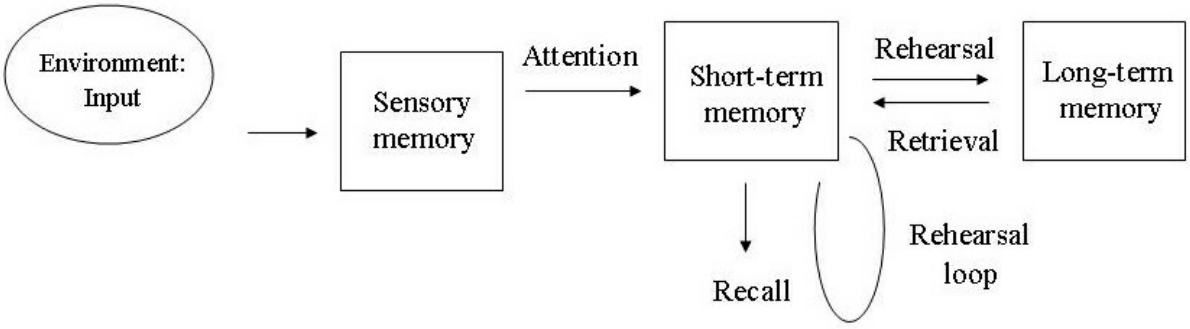
Saul McLeod, published 2007

The multistore model of memory (also known as the modal model) was proposed by Atkinson and Shiffrin (1968) and is a structural model. They proposed that memory consisted of three stores: a sensory register, short-term memory (STM) and long-term memory (LTM).

Information passes from store to store in a linear way, and has been described as an information processing model (like a computer) with an input, process and output.



> Information is detected by the sense organs and enters the sensory memory. If attended to this information enters the short term memory.

Information from the short-term memory is transferred to the long-term memory only if that information is rehearsed (i.e. repeated). If maintenance rehearsal (repition) does not occur, then information is forgotten, and lost from short term memory through the processes of displacement or decay.

The Memory Stores

Each store is a unitary structure and has its own characteristics in terms of encoding, capacity and duration.

Encoding is the way information is changed so that it can be stored in the memory. There are three main ways in which information can be encoded (changed):

1. visual (picture),
2. acoustic (sound),
3. semantic (meaning).

Capacity concerns how much information can be stored.

Duration refers to the period of time information can last in the memory stores.

Sensory Memory

- Duration: ¼ to ½ second
- Capacity: all sensory experience (v. larger capacity)
- Encoding: sense specific (e.g. different stores for each sense)

Short Term Memory

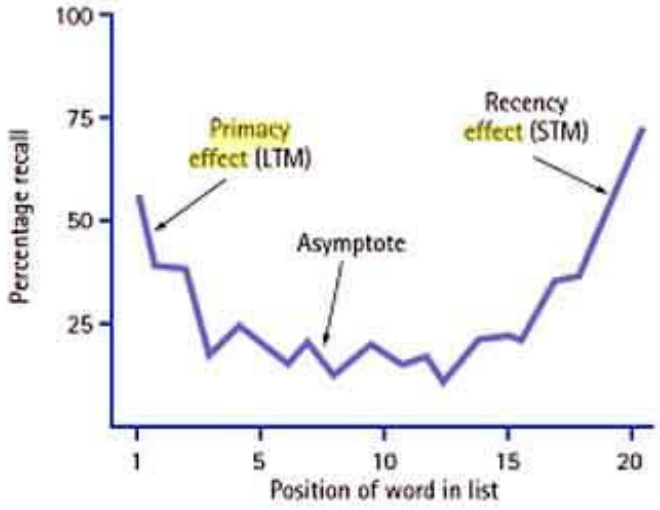
- Duration: 0-18 seconds
- Capacity: 7 +/- 2 items
- Encoding: mainly auditory

Long Term Memory

- Duration: Unlimited
- Capacity: Unlimited
- Encoding: Mainly Semantic (but can be visual and auditory)

Key Studies

Glanzer and Cunitz showed that when participants are presented with a list of words, they tend to remember the first few and last few words and are more likely to forget those in the middle of the list, i.e. the serial position effect.



This supports the existence of separate LTM and STM stores because they observed a primacy and recency effect.

Words early on in the list were put into long term memory (primacy effect) because the person has time to rehearse the word, and words from the end went into short term memory (recency effect).

Other compelling evidence to support this distinction between STM and LTM is the case of KF (Shallice & Warrington, 197) who had been in a motorcycle crash where he had sustained brain damage. His LTM seemed to be unaffected but he was only able to recall the last bit of information he had heard in his STM.

Critical Evaluation

Strengths

One strength of the multistore model is that is gives us a good understanding of the structure and process of the STM. This is good because this allows researchers to expand on this model. This means researchers can do experiments to improve on this model and make it more valid and they can prove what the stores actually do. Therefore, the model is influential as it has generated a lot of research into memory.

Many memory studies provide evidence to support the distinction between STM and LTM (in terms of encoding, duration and capacity). The model can account for primacy & recency effects.

The model is supported by studies of amnesiacs: For example the HM case study. HM is still alive but has marked problems in long-term memory after brain surgery. He has remembered little of personal (death of mother and father) or public events (Watergate, Vietnam War) that have occurred over the last 45 years. However his short-term memory remains intact.

Weaknesses

The model is oversimplified, in particular when it suggests that both short-term and long-term memory each operate in a single, uniform fashion. We now know is this not the case.

It has now become apparent that both short-term and long-term memory are more complicated that previously thought. For example, the Working Model of Memory proposed by Baddeley and Hitch (1974) showed that short term memory is more than just one simple unitary store and comprises different components (e.g. central executive, Visuospatial etc.).

In the case of long-term memory, it is unlikely that different kinds of knowledge, such as remembering how to play a computer game, the rules of subtraction and remembering what we did yesterday are all stored within a single, long-term memory store. Indeed different types of long-term memory have been identified, namely episodic (memories of events), procedural (knowledge of how to do things) and semantic (general knowledge).

Rehearsal is considered a too simple explanation to account for the transfer of information from STM to LTM. For instance, the model ignores factors such as motivation, effect and strategy (e.g. mnemonics) which underpin learning.

Also, rehearsal is not essential to transfer information into LTM. For example, why are we able to recall information which we did not rehearse (e.g. swimming) yet unable to recall information which we have rehearsed (e.g. reading your notes while revising). Therefore, the role of rehearsal as a means of transferring from STM to LTM is much less important than Atkinson and Shiffrin (1968) claimed in their model.

The models main emphasis was on structure and tends to neglect the process elements of memory (e.g. it only focuses on attention and maintenance rehearsal). For example, elaboration rehearsal leads to recall of information than just maintenance rehearsal. Elaboration rehearsal involves a more meaningful analysis (e.g. images, thinking, associations etc.) of information and leads to better recall. For example, giving words a meaning or linking them with previous knowledge. These limitations are dealt with by the levels of processing model (Craik, & Lockhart, 1972).

Note: although rehearsal was initially described by Atkinson and Shiffrin as maintenance rehearsal (repition of information), Shiffrin later suggested that rehearsal could be elaborative (Raaijmakers, & Shiffrin, 2003).

The multi store model has been criticized for being a passive/one way/linear model.

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How to reference this article:

McLeod, S. A. (2007). Multi store model of memory. Retrieved from https://www.simplypsychology.org/multi-store.html