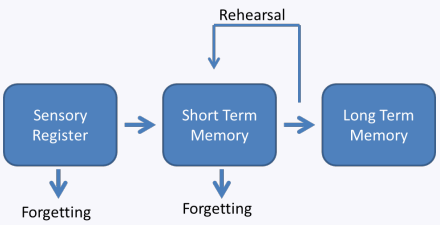
Multi-Store Model



Developed by Atkinson & Shiffrin as a cognitive explanation of memory.The model explains memory through biological means; explaining how information flows through a series of storage systems with three permanent structures in memory. Each stage differs in terms of coding, capacity and duration.

Sensory Register (SR)

The SR is not under cognitive control, but is an automatic response to the reception of sensory information by the sense organs and is the first storage system within the multi-store model. All information contained within LTM will have originally passed through the SR, though in an unprocessed form.

Echoic Store - Auditory Information
Iconic Store - Visual Information
Haptic Store -Tactile Information
Gustatory Store - Taste Information
Olfactory Store - Smell Information

The Sensory Register

Coding	Capacity	Duration
Information is stored in a raw, unprocessed form, with separate sensory stores for different sensory input.	Capacity of each store is very large, with the information cotained being in an unprocessed, highly detailed and ever changing format.	All sensory memory stores have limited duration, though the actual duration of each store is not constant, with different types of information within each store decaying at different rates. Different sensory stores have different capacities and there is some evidence that duration decreases with age.
Research by Crowder (1993)	Research by Sperling(1960)	Research by Treisman (1964)

The Sensory Register (cont)

Found SR only retains information in the iconic store for a few milliseconds, but for two to three seconds within the echoic store which supports the idea of sensory information being coded into different sensory stores.	Flashed a 3 x 4 grid of letters onto a screen for 1/20th of a second, and asked participants to recall one row. He sounded different sounds to indicate which row must be recalled. Recall of letter in th indicated row was high, which suggests all the information was originally there, indicating large capacity of the SR.	Presented identical auditory messages to both ears of participants, with a slight delay between presentations. Participants noticed the messages were identical if the delay was 2 seconds or less, suggeting the echoic store has a limited duration of 2 seconds.

Short Term Memory

STM temporarily stores information received from the SR. It is an active (changing) memory system, as it contains information currently being thought about. STM differs from LTM especially in terms of coding, capacity and duration and how information is forgotten.

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Short Term Memory

Coding	Capacity	Duration
Information arrives from the SR in its original raw form, such as in sound or vision, and it is then encoded in a form the STM can more easily deal with. For example one word can be coded in three ways: Semantically (by meaning), Visually and Acoustically	STM has limited capacity, as only a small amount of information is held in the store. Research indicates an average of 7 +/- 2, though it can be increased by chunking - where the size of the units of information in storage is increased by giving them a collective meaning i.e BBC/SOS/ABC/FBI into 4 chunks will increase capacity	The amount of time information remains within the STM without being lost is limited to a maximum of about 30 seconds. This can be extended by rehearsal of the information, which if done for long enough with result in the information being transferred to the LTM.
Research by Baddeley (1966)	Research by Jacobs (1887)	Research by Peterson & Peterson

Short Term Memory (cont)

Participants were presented with 1 of 4 lists repeated 4 times. The lists were either acoustically similar words, acoustically dissimilar words, semantically similar or semantically dissimilar. They were the asked to arrange the words in the correct order. Acoustically similar words were recalled the worst at 10%. Recall of other lists was between 60 to 80%. This suggests there can be acoustic confusion which suggests STM is coded on an acoustic basis.	Participants were presented with increasingly long lists of numbers or letter followed by recall. When participants fail on 50% of the tasks, they were judged to have reached capacity. Jacobs found capacity for numbers was 9 items and letters was 7. This shows that capacity is limited, and that numbers are easier to recall perhaps because there are only 9.	Read nonsense triagrams to participants, then got them to count backwards in 3's for varying periods of time to prevent rehearsal. They found 90% correct recall after 3 seconds, but only 5% after 18 seconds which suggests STM duration is around 20 to 30 seconds.

Long Term Memory

LTM involves storing information over lengthy periods of time, indeed for a whole lifetime, with information to be stored for longer than 30 seconds counting as LTM. All information in the LTM will have originally passed through the SR and STM, though may have undergone different forms of processing during the process. Research indicates that there are several different types of LTM, and the LTMs are not of equal strength. Strong LTMs can be retrieved easily, but weaker LTMs may require more prompting. LTMs are not passive (unchanging) - over time they may change or merge with other LTMs. This is why memories aren't necessarily constant or accurate. There are several explanations for forgetting from the LTM. The process of shaping and storing LTMs is spread through multiple brain areas..

Long Term Memory

Coding	Capacity	Duration

Long Term Memory (cont)

Coding of information will be stronger (and thus the memory more retrievable) the deeper the level of processing of a stimulus that occurs while it is being experienced. With Verbal Material, coding in LTM is mainly semantic though coding occurs in other forms too including visual and acoustic	The Potential Capacity of the LTM is unlimited. Information may be lost due to decay and interference, but such losses don't occur due to limitation of capacity.	Depends on an individuals lifespan, as memories can last for a lifetime. Items in LTM have a longer duration if originally well coded and certain LTMs have a longer duration, like those based on skills rather than facts. Materials in STM that isn't rehearsed is quickly forgotten, but information in the LTM does not have to be continually rehearsed to be retained.
Research by Frost (1972)	Research by Anokhin (1973)	Research by Bahrick et al (1975)

Long Term Memory (cont)

Gave participants 16 drawings in 4 categories,i.e. animals, differing in visual orientation, like angle of viewing perspective. The order of recall suggested participants used visual and semantic coding, giving supporting evidence for both forms of coding.	Estimated the number of possible neuronal connections in the human brain is 1 followed by 10.5 million kilometres of zeros. He concluded 'no human yet exists who can use all the potential of their brain', suggesting the capacity of LTM is limitless	Showed 400 participants aged between 17 and 74 a set of photos and a list of names, some of which were ex-school friends and asked them to identify which ones were ex-school friends. Those who'd left high school in the last 15 years identified 90% of the faces and names, while those who'd left 48 years previously identified 80% of names and 70% of pictures, suggesting memory for faces is long lasting