

SHORT-TERM MEMORY.

- STATEMENT OF THE PROBLEM :-

To study retention as a function of length of retention interval in short term memory.

- INTRODUCTION :-

1) Definition of Memory :-

"Memory is the process of maintaining information over time" (Matlin).

"Memory is the means by which we draw on our past experiences in order to use this information in present" (Sternburg).

"Memory is an active system that receives information from the senses, organizes and alters it as it stores it away, and then retrieves the information from storage." (Baddeley).

2) Types of Memory :-

A) Sensory Memory :-

Sensory memory is the first stage of memory, the point at which information enters the nervous system through the sensory systems, eyes, ears and so on. Information is encoded into sensory memory as neural messages in the nervous system. As long as those neural messages are travelling through the system, it can be said that people have a "memory" for that information that can be accessed if needed.

There are two kinds of sensory memory that have been studied extensively. There are the iconic and echoic sensory memory. Iconic memory is visual sensory memory; lasting only

a fraction of a second. Echoic sensory memory is the brief memory of something a person has just heard.

B) Short-Term Memory (STM) :-

Information moves from sensory memory to the next stage of memory, called short-term memory (STM), through the process of selective attention or the ability to focus on only one stimulus from among all sensory input. When a person is thinking actively about some information that information is said to be in short term memory, the memory system in which information is held for brief periods of time while being used.

Another way to think about short term memory is as a working memory. This term emphasizes the fact that short-term memory is not merely a box into which information is placed but is a working, active system that processes the information it contains at any given moment. Short-term memory lasts from about 12 to 30 seconds without rehearsal.

C) Long-Term Memory (LTM) :-

The third stage of memory is long-term memory (LTM), the system into which all the information is placed to be kept more or less permanently. There is physical change in the brain itself when a long-term memory is formed. This physical change is relatively permanent.

Although many long term memories are encoded

as images, sounds, smells and tastes, in general LTM is encoded in meaningful form, a kind of mental store house of the meanings of words, concepts and all the events that people want to keep in mind.

• Long-term memories include general facts and knowledge, personal facts and even skills that can be performed.

Long - Term Memory

Procedural
Memory

Declarative
Memory

Episodic
Memory

Semantic
Memory.

i) Procedural Memory :-

Type of long-term memory including memory for skills, procedures, habits and conditioned responses. These memories are not conscious but are implied to exist because they affect conscious behaviour.

ii) Declarative Memory :-

Type of long-term memory containing personal information that is conscious and known.

• Episodic Memory :-

Type of declarative memory containing personal

information not readily available to others, such as daily activities and events.

● Semantic Memory :-

Type of declarative memory containing general knowledge, such as knowledge of language and information learned in formal education.

* Difference Between short-term Memory And Long-Term Memory.

i) Short-term memory has a fairly limited capacity and can hold items for only short periods of time while long term memory can store unlimited amounts of information indefinitely. The more that short term memory information is used or repeated, the more likely it is to become part of the long term memory.

ii) People must relearn item constantly to keep them in the short-term memory but the long term memory is rather passive in nature and is not easily disturbed by interruption.

iii) Short-term memory and long term memory are handled by different parts of the brain. Short term memory is primarily a function of the frontal lobe of the cerebral cortex. In contrast, information stored in long term memory is first held in the hippocampus and then transferred to the areas of the cerebral cortex involved in language and perception for permanent storage.

iv) Information is usually stored in short term memory in terms of the physical qualities of the experience, such as what we see, do, touch or hear.

In long term memory, information is primarily stored in terms of its meaning or semantic codes.

3) Process of memorizing :-

In this process of retrieving information from storage there are three forms they are as followed.

A) Encoding :-

Specificity is the tendency for memory of any kind of information to be improved if the physical surroundings available when the memory is first formed are also available when the memory is being retrieved (Tulving 1978).

In other words, it allows the perceived item of interest to be converted into a construct that can be stored within the brain and then recalled later from STM or LTM.

B) Recall :-

Is a type of memory retrieval in which the information to be retrieved must be pulled from memory, with very few external cues. During recall the brain replays a pattern of neural activity that was originally generated in response to a particular event. The other feature of recall is, the Serial position effect, the tendency of information at the beginning and of a body of information to be remembered more accurately than information in the middle of the body of information [Murdoch 1962].

• The Primary Effect :- Is a tendency to remember

information at the beginning of a body of information better than the information that follows; it is due to the fact that the first few words, when the listener has nothing already in the STM to interfere with their rehearsal; which receives more time for rehearsal than the words, in the middle, that are constantly being replaced by the next words on the list.

● The Recency Effect :-

It is a tendency to remember information at the end of a body of information better than the information ahead of it. Here the last word or just heard is in the short term memory for easy retrieval, with no words entering to push the most recent word or words out of memory.

c) Recognition :-

Is the ability to match a piece of information or a stimulus to a stored image or fact (Shiffrin 1984):

Recognition is usually much easier than recall because the user is the actual object, word, sound, etc. that one is simply trying to detect as familiar and known. The error of recognition occurs when a person thinks that he or she has recognized something or someone but in fact does not have that something or someone in memory, it is called as false positive.

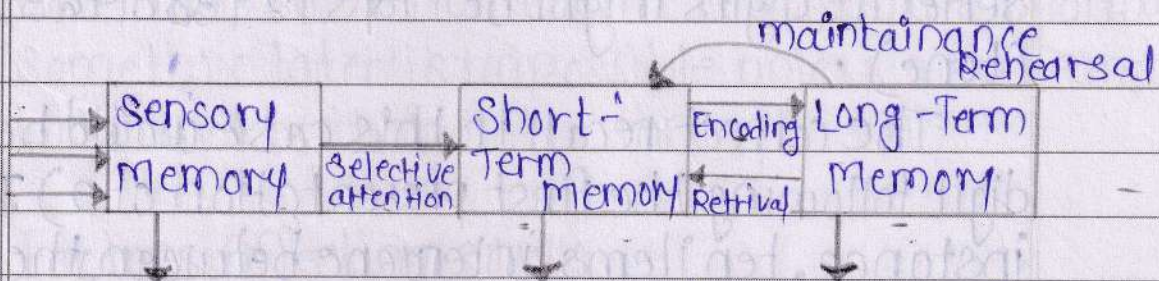
4) Theories of Memory :-

A) The Atkinson - Shiffrin Model :-

This model is based on the information

processing approach. It is also known as the "model-model" because it is the model that is most often referred to. It was proposed by Richard Atkinson and Richard Shiffrin (1969). According to this model the memory consists of three stores - the sensory memory, short-term memory and long-term memory and focuses on the length of the time the information is stored.

Stimuli from the environment first enter sensory memory. Sensory memory is a large storage system for a very brief period of time (less than a second) that records information from each of the senses with reasonable accuracy. The material from the sensory memory then passes on to the STM. The storage capacity of STM is small, memories are fragile and encoding is acoustic. The information lasts for 20 seconds and the capacity is for 7 ± 2 items. Material from the STM passes to LTM. It has a very large capacity and contains memories that are decades old. Information in LTM is encoded semantically and the memories are relatively permanent.



All information last within a second or so	Unrehearsed information is lost in about 15 to 30 seconds	Some information is retained indefinitely; some is lost with the passage of time.
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B) Waugh And Norman Dualistic Memory :-

The theory is dualistic primary memory (PM), a short-term storage system is conceptualized as being independent of secondary memory (SM), a long term storage. Waugh and Norman borrowed freely from William James and attempted to do that James never did; to quantify properties of primary memory. The short term storage was taken to have limited capacity; so that loss of information from it was postulated to occur not as a simple function of time but once the storage capacity was exhausted by displacement of old item by new ones.

Waugh and Norman traced the fate of items in PM by using lists of sixteen digits that were read to subjects at the rate of one digit per second or four digit per seconds. The sixteenth (or probe) digit was repeated digit one that had appeared in either 3rd, 5th, 7th, 9th, 10th, 11th, 12th, 13th or 14th position. The probe digit accompanied by a tone, was the cue for the subject to recall the item that followed the probe digit the first-time it occurred. A typical series of digits might be 78512938046370602 (tone).

The correct recall in this case would be 9 (the digit following the first presentation of 2) In this instance, ten items intervene between the initial presentation and the probe. Since subject did not know which digit would be cued, they could not focus their attention on any one digit and rehearse it. The purpose of presenting digits every second was to determine whether forgetting was a function of

DECAY (presumed to be due to time) or interference in PM. If forgetting was a function of decay, then less recall could be expected with the slower rate (1 digit per sec.) if forgetting was a function of interference in PM, then no difference in recall could be expected according to the presentation rate. The same amount of information is presented at the both presentation rate, by which, Waugh and Norman's logic, allows the same time for decay to occur. It might be argued that even at one item per second, subject would allow extra experimental information to enter their PM, but later experimenter (Norman 1996) in which presentation rate varied from one to ten digit (for given period) yielded data consistent with the rate of forgetting expected from the original model.

Waugh and Norman's system makes good sense. PM holds verbal information and is available for verbatim recall; this is true in our ordinary conversation. We can recall that last part of a sentence we have just heard with complete accuracy, even if we were barely paying attention to what was said. However to recall some information some time later is impossible unless we rehearse it, which makes it available through STM.

5) Factors Affecting STM :-

A) Decay :-

Forgetting due to memories fading over time does not apply in LTM. This often occurs in sensory storage and STM. since we do not need to process and store all the information that we

encounter. As a result, there is a lot of information we don't attend to recognize or rehearse and so it simply fades away.

B) Interference :-

Hindrance of learning new information because of the other information learned before or after the new information. There are two types :-

(i) Proactive Interference :-

Information learned previously causes problems with new information.

(ii) Retroactive Interference :-

New information causes problem with previously learned information.

C) Capacity :-

STM has relatively small capacity up to about 7 items or chunks. Under most conditions

D) The Approximate Duration :-

The approximate duration in STM is upto 30 seconds, but it varies, depending on the number of factors.

e) Brown (1958) and Peterson (1959) experiment :-

The control idea in the Brown and the Peterson work was that forgetting might be caused simply by the passage of time before testing. In other words, forgetting caused by decay. In their experiment, a simple three letter trigram (eg. MHA) was presented to the people followed by three digit (eg. 728). People were told to attend to the letters, then to being counting backward by three from the number they had been given. The counting was done aloud, in ryth with a metronome

clicking twice per second. The essential ingredient here is the distractor task of backward counting. At the end of available period of time, the people were asked to report the three-letter item. The results were so unexpected, and the number of researcher eager to replicated, them so large, that the task required a name it is still known by the Brown-Peterson task.

- HYPOTHESIS:-

As the length of retention interval increases the number of correct responses decreases.

- VARIABLES:-

Independent Variable:- Retention Interval.

Dependent Variable:- Retention of Trigram.

- MATERIAL:-

Stopwatch.

Prearranged Record sheet.

Stationary.

Wooden screen.

Trigrams.

- PLAN OF THE EXPERIMENT:-

1) Block randomization is used to present the subject with nonsense syllables.

2) The subject is presented, the retention interval of 3, 6, 9, 12, 15, 18 secs in random order.

3) Presentation in 8 blocks with 6 trigrams and 5, 3 digit no's in each block is indicated on the data sheet.

4) Use of distraction technique is followed to prevent rehearsal.

- PRECAUTION :-

- 1) The record sheet and the trigrams should be kept concealed from the subject at all times.
- 2) The experimenter should present the retention interval randomly.
- 3) The experimenter should start the stopwatch immediately after uttering the digit.
- 4) The experimenter should go to the next block only after finishing the previous one.
- 5) The subject should be asked to repeat the digit and then start counting backwards from there.

- PROCEDURE :-

The experimenter checked all the material required and while cubical was arranged, subject was called inside the cubical and seated comfortably. Rapport was established and instructions were given :-

“I am going to tell you some three letter meaningless word. I will read the word aloud. Immediately after which I will utter a three digit number. As soon as you heard the no. you have to repeat it and start counting backwards in step of 3, continue the count till I ask you to stop. When I say stop you have to tell me the meaningless word.”

- Result Table :-

Sr. No.	Retention Interval	Total correct Response	Percentage of Correct Response.
1	3	6	75%
2	6	3	37.5%
3	9	4	50%
4	12	5	62.5%
5	15	2	25%
6	18	3	37.5%

- Treatment of the result. [calculations].

- Percentage of correct Response $\left[\frac{CR}{\text{Total no of concept}} \times 100 \right]$

1) 3 sec 5) 15 sec
 $\rightarrow \frac{6}{8} \times 100 \rightarrow 75\%$ $\rightarrow \frac{2}{8} \times 100 = 25\%$

2) 6 sec 6) 18 sec
 $\rightarrow \frac{3}{8} \times 100 \rightarrow 37.5\%$ $\rightarrow \frac{3}{8} \times 100 = 37.5\%$

3) 9 sec
 $\frac{4}{8} \times 100 \rightarrow 50\%$

4) 12 sec
 $\frac{5}{8} \times 100 \rightarrow 62.5\%$

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Title of the Graph: Graph showing % of CR for each R.I

Origin = ()

Slope = _____

Scale
on x - axis, 1 cm = 1 R.I
on y - axis, 1 cm = 10%

Intercept
on x - axis =
on y - axis =

