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7

REMEMBERING AND FORGETTING

Do you remember your first day in the school?

On what day did you go to the market last week?

Can you name your friends?

In our everyday life almost all activities in one or the other way deal with memory. Loss of memory means loss of one's self. Learning will make no sense if it is not retained by the person. It is only through the capacity of memory that we are able to relate to different events, experiences, conditions, people and objects. Also, we use the understanding thus developed in different contexts and on different occasions. Thus, memory makes it possible to operate beyond the constraints of time and place. A child learns something in class and uses it in the market or at home or some other place. Memory establishes links across diverse experiences. It's a great mental capacity — almost magical. It is needed in developing social relationships, mastering cognitive competencies (mental capacities) and solving various problems. There are also occasions when our memory fails and we forget a name, a formula or fail to recognize a person. The study of memory is one of the oldest fields of research in psychology. Psychologists have been studying various aspects of memory. In this lesson we will study how our memory works, the factors which increase or decrease our memory capacity, and what can be done to improve memory.

OBJECTIVES

After studying this lesson, you will be able to :

- describe the nature of human memory system;
- differentiate between short-term memory, long-term memory and the various ways retention is measured;
- explain the causes of forgetting;
- describe important aspects of everyday memory;
- explain the constructive nature of memory; and
- describe the ways of enhancing memory.

7.1 SIGNIFICANCE OF MEMORY

Memory is a remarkable mental process and a mental system which receives information from (external or internal) stimuli, retains it and makes it available on a future occasion. It provides continuity to our experiences across different time points. A moment's reflection will tell you how difficult it will be if you do not have intact memory function. You would perhaps loose your identity or the sense of what you are and will always remain a new learner because the past learning experience will have no value or significance to you.

Memory appears like a tape recorder which records a song or music and plays whenever we demand. Our memory system does perform this but it is more dynamic and versatile than a tape recorder. When some one asks us to sing a particular song and we sing, then we are working like tape recorders. But human memory differs from a tape recorder in many important ways. For instance, we remember not only verbal material but visual experiences, tactile impressions, feelings of pain and joy, motor skills, events, activities and so on. Second, retrieval of information can be exactly in the same way or in a different form. Third, the reception of new information depends a lot on what information we already have. Fourth, we neither receive nor retain all the information presented to us because there is great deal of selectivity in receiving the information. Fifth, all tape recorders have some limitation on recording but human memory can retain extremely large amounts of information. Finally, our memory system is an active system. It works on the information received. It may integrate, add, modify, omit or reorganize the information. It is not passive like a tape recorder which reproduces the information in its original form.

7.2 KEY ASPECTS OF MEMORY

Based on the features of the human memory system just described, we may say that memory is a perceptually active mental system. It receives, encodes, modifies, retains and retrieves information. Let us understand these terms more clearly.

Encoding refers to the translation of incoming stimulus into a unique neural code that a person's brain can process.

Storage is the retention of the material encoded over a period of time.

Retrievel is the recovery of the stored or retained information at a later occasion.

These components of memory can be seen in Figure 7.1.

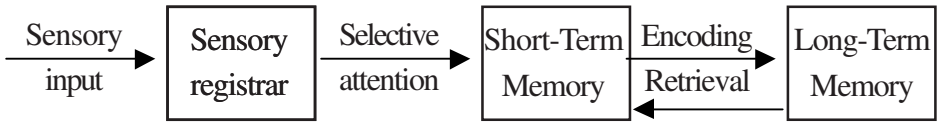

Fig. 7. 1 : *A General Model of Human Memory System*

We gather information through our senses. Each sensory modality has its own sensory registor (or sensory memory). It holds information for a very short duration, then it passes the information for further processing to long term memory. Let us try to understand the three major systems of memory.

Sensory Memory: Hold a picture in front of you and look at it steadily for a while. Now close your eyes and notice for how long does a clear image of that picture last. A clear visual image of any object will last in our sensory memory for about ½ a second. Sensory memory occurs within the sensory system while it is being transmitted to the brain.

What we are able to memorize depends to a large extent on what happens to the information once it reaches the sensory memory. We are continually bombarded by sensory stimulations of various kinds. As we cannot respond to all of them, it is important that we must selectively focus on those things which are significant. This kind of selectivity is possible on the basis of attention. The process of attention limits the input of information which we receive from the environemnt. Thus through selective attention information enters short-term memory (STM). STM holds information for a few seconds and transmits it to the long-term memory (LTM) which has a very large capacity to retain information.

INTEXT QUESTIONS 7.1

Choose the correct alternative:

1. Memory is thought to be made up of _____ stages.

   a. One

b. Two

c. Three

d. Four

2. Approximately how long does it usually take for visual information in the sensory register to fade?

a. about a second

b. from several seconds to a minute

c. several minutes

d. generally an hour or more

3. In the memory model, in order for information that has just been sensed to enter short-term memory, it must first be

a. attended to

b. stored

c. extensively processed

d. retrieved

7.3 SHORT-TERM MEMORY AND LONG-TERM MEMORY

We have read that human memory comprises of three interrelated subsystems, namely - sensory register, short- term memory (STM) and long-term memory (LTM). The sensory register as the name implies makes the environmental input or information available for a very short period consisting of milliseconds. The retention which forms the basis for the use of information in future is largely related to the systems of STM and LTM. Now let's find out what is STM and LTM?

The nature and functioning of STM and LTM are different. The distinction may be made in terms of capacity, duration, type of information retained, and the causes of forgetting. These differences are give in Table-1.

Short-term Memory

While you are studying, look up for a moment and see around you?

What are the thoughts that are occuring to you at this moment?

Do you know what you have just done? You have identified the contents of your Short-term Memory (STM). STM can also be called "working memory". For example, you look for a telephone number from the diary and after your finish talking, keep the diary back in your pocket. Looking for and using the telephone number is an example of short-term memory. You forget it again after dialling.

Long-Term Memory (LTM)

Can you remember the name of your childhood friend?

Have your ever thought about how you can remember things/events that happened to you a long time ago. It is possible because of LTM. The sensory memory and STM are not limited in terms of duration. Information in LTM can last as long as we live. It is a relatively enduring memory in which information is stored for use at a later time.

Table –1: *Comparison of Short-term Memory (STM) and Long-Term Memory (LTM)*

Features	Short-term Memory	Long-term Memory
Capacity	Limited up to 7 items or chunks	Unlimited
Duration	Usually up to 30 seconds but varies under different situations	May range from days to a life time
Type of information	Visual images, sounds, words, sentences	Meaningful verbal material, life events.
Causes of forgetting	Displacement of old information by new one, inadequate	Interference, organization of material

It is clear from Table –1 that while STM has limited capacity and exists for short durations, LTM has no known limits. People show large scale variation in memorizing stories and poems. The Vedas have been passed on from one generation to the other in an oral tradition. There are scholars who still retain and recite Vedas, Ramayan and Mahabharat.

We also find that STM has pieces of information which are simple and relatively less organized. In contrast, LTM consists of a broad range of information and experiences. They are often meaningfully organized and refer to a wide spectrum of information ranging from personal life events to abstract theoretical knowledge.

Finally, the causes of forgetting in these two memory systems are also different. In STM forgetting takes place because of the entry of new information in the system which displaces the old information. This leads to forgetting of the old information.

In LTM various kinds of events, experiences and stimuli are retained. Forgetting is caused by numerous factors including interference from one information to the other, lack of organization in the material retained and/or unavailability of appropriate cues at the time of retrieval.

Eyewitness Memory

Human memory as an active process creates a major challenge when we collect eye witness accounts of accidents or other events. People often interpret what they see in terms of what they expect and their memories reflect that. It has been found that we always actively process our memories and try to fit them in the schemata and beliefs that we hold about the situation. It is only when we look at the overall meaning and context of a memory that we can really judge about the accuracy of accounts. The details do not constitute the most significant aspect of memory in most of the cases of that kind.

Autobiographical Memory

This kind of memory refers to people's memory for their own personal experiences. The studies indicate that autobiographical memory is organized at three different levels. The highest level consists of **lifetime period**. These are the periods of time in which some aspect of personal life remained reasonably consistent (e.g. living with someone, working for a particular organization). The second level is of **general events**. These are major occurrences covering several days or months (e.g. conference, visit or trip). The third level is that of **event–specific knowledge**. It involves details about a particular event or happening in one's life. We organize our personal memories across various phases and periods as we go through our lives.

Measurement of Retention

The measurement of memory is undertaken with the help of two types of measures i.e. **explicit** and **implicit**. The explicit measures require that a person must remember some given information that is stored in memory. The person makes deliberate efforts to recall the details of the previously experienced events or material. Thus

a direct measure of memory is used. The implicit measure of memory is one in which a person has to perform some task in which no deliberate or intentional effort is made to retrieve from memory. Let us learn about some of these measures in some detail.

Explicit Measures

Recall: In recall a person first learns a list of words. Then he or she is required to recollect the material learned. The number of items correctly recalled becomes the measure of explicit memory. The accuracy of reproduction of the story may provide a measure of explicit memory.

Recognition: In recognition the learner is presented with the previously learnt items or words mixed with new items and his or her job is to identify the previously learned items. Usually recognition is found to be a more sensitive measure than recall.

Implicit Measures

Word Completion: In this task the learner is presented with fragments of words. The learner is then required to complete the fragmented word. Thus f – sh is a fragmented word.

Priming Task: In this task earlier background activities (e.g., reading a story) may help to complete fragments of word in a particular manner. The background task does priming.

In both of the above mentioned tasks the learner is not explictly asked to remember.

7.4 CAUSES OF FORGETTING

Memory is a very complex psychological process and any kind of mechanical analogy in terms of storage, processing and retrieval (e.g., tape recorder, computer) falls short. In this process information is retained not only as it is but it may be subjected to change and modification. We often fail to remember due to brain damage, resulting in loss of memory functions, called amnesia. But people do forget in the normal course of life. In fact remembering and forgetting are both natural processes subject to a number of factors that operate in everybody's life.

Understanding the factors of foregetting is helpful to clarify the nature of memory and making it more effective. Let us examine some of the important factors which have been found critical to retention.

(i) **Decay of Memory Traces:** It is a common experience that memories of many events and experiences become "dim" over time, like the colours of a

photograph bleached by the sun. This notion was proposed by many early psychologists as a general cause of forgetting. However, people remember many events of early childhood during old age without any kind of distortion. Therefore, decay cannot be considered as a general cause of forgetting. However, it has been found that decay is an important factor in sensory memory and in STM when there is lack of rehearsal.

(ii) **Interference:** Whatever we learn, we learn in some context. Thus every experience of learning is preceded and followed by some other experiences. These experiences are often interrelated and influence each other. When such influences are adverse we call them interference. When earlier learning negatively influences present learning, it is called proactive interference and when present experience influences previous learning then it is termed as retroactive interference. It has been noted that more the similarity between two sets of materials to be learned, the greater will be the degree of interference between them.

(iii) **Motivation:** According to Freud, forgetting takes place because the event is unpleasant. We forget because we do not want to remember something. We may exclude memories or push them out of consciousness if we do not like them. Freud called this process repression. It's a common experience that we usually remember pleasant events more often than unpleasant ones. Also, we find a strong tendency to remember incomplete tasks more than completed tasks. This has been termed as Zeigarnik effect. The role of mood in human memory suggests that affective aspects of our lives do shape our memory in significant ways.

(iv) **Retrieval Failure:** It has been found that a lot of forgetting, particularly in long-term memory, is due to absence or non-availability of retrieval cues at the time of recall. The changes in context associated with physical and mental states from the occasion of learning (encoding) to recall (retrieval) often result in poor retention scores. We often "blank out" during examinations.

Memory as a Constructive Process

The meaning of forgetting in terms of failure to retrieve gives the idea that memory storage is static. This, however, is not the case. Memory and remembering in particular has been shown to be a constructive process. In summary the reproduction are found to be constructive in nature. The constructive nature of memory is evident when we recall some event. If you compare recollections of the story of a movie which you and your friends have seen, you will notice how differently people have constructed the same story. In fact rumours often show our tendency to highlight certain details and assimilating some. It seems that recall is always a combination of retrieval and reconstruction. The three main tendencies are sharpening, leveling and assimilation.

7.5 WAYS OF ENHANCING MEMORY

It is a common experience that forgetting is usually a source of trouble for people. Everyday conversation, class room participation, performance in examination, interview, presentation and communication in meetings often put demands on us to remember information. Failure in doing so has negative consequences which all of us experience to different degrees in our lives. As a result most of us are interested in improving our **memory**. The study of memory aids and related techniques is called **mnemonics**. Some of the techniques used in improving memory are listed below:

1. **Organization:** While preparing for learning a learner needs to organize the material in some form. Such an organization may help by creating a natural context and provide relevant cues while retrieving the learned material. If the material lacks natural organization, an artifical organization may be created by the learner.
2. **Concentration:** One of the main reasons of forgetting is inadequate allocation of attentional resources to the material while processing the same. As a result the material is not stored and we fail to recall when we need it. Thus by focusing attention on the material while processing we can increase the probability of storage and recall.
3. **Method of loci:** As the name implies, this technique uses associations with place or task. The visualization of the same provides cues for recalling the task. By choosing any action properly one can use memory at any point in the day. Use of such mnemonic codes allows one to have vivid and distinctive associations between new information and prior knowledge. Being related to context the cues become very effective. For instance one may have a clear visual image of a building, its rooms, furniture and other details. These may be linked to different ideas and using these linkages, memory of those ideas can be enhanced.
4. **Recoding:** While dealing with non-meaningful material one may recode the items to be remembered in a more meaningful manner. Recoding may take many forms. For example people may use the first letter of all the items and make a sentence. This kind of narrative structure works as a cue. Acronyms (e.g., U.N.O., TV, CBI, WHO) are also used for the purpose in which all the first letters are used. Using elaboration one may add more information which makes the material distinctive. Chunking is a good example of recoding. If a large serial of numbers is presented it becomes difficult to remember. The same, however, may be divided in two or three chunks in some meaningful way using ingenuity. Using elaborative coding one may put many items in a story form and recall the same easily.

INTEXT QUESTIONS 7.2

Choose the correct alternative:

1. Under ordinary conditions, short-term memory seems to be able to hold _____items at a time.

   a. about 2

   b. about 7

   c. about 17

   d. about 100

2. Which of the following items is most likely to act as a single "chunk" of information in STM?

   a. 843348

   b. CKNUH

   c. I like you

   d. Mohan, river, bag

3. Radha and Nishi are studying together for a test. Radha's strategy is to read her book over and over. Nishi tries to link what she reads to other concepts she knows. What will be the likely result?

   a. Radha will remember more

   b. What Radha learns will stay with her for a longer period of time.

   c. Nishi will become confused

   d. Nishi will remember better

4. When you are reading a textbook, which technique will facilitate recall of contents of a lesson.

   a. asking yourself questions about the materials you read

   b. having other people ask you questions

   c. using your powers of concentration to focus on each word individually before moving on to the next.

d. Remaining relaxed and trying not to get too involved with the material.

WHAT YOU HAVE LEARNT

- Human memory is a dynamic system. It helps us to retain information and make the same available for future use.
- We receive information through various sense modalities. The information is registered in the sensory memory and through selective attention it goes to short-term memory (STM). Then it is encoded and enters long-term memory (LTM). Sensory memory lasts for one second.
- The STM has limited capacity and lasts only for a few seconds or minutes.
- LTM has unlimited capacity and persists for hours and months or even the entire life time. Forgetting is caused by a number of factors such as interference, motivation, retrieval failure and reconstruction.
- Capacity for retention can be enhanced through organization of material, concentration, using method of loci and recoding.

TERMINAL EXERCISE

1. Describe the main types of human memory system.
2. What are the main properties of short-term memory?
3. Enumerate the factors which cause forgetting.
4. Try some nmemonic devices and write your experience.

ANSWER TO INTEXT QUESTIONS

7.1

1. c
2. b
3. a
4. a

7.2

1. b
2. c
3. d
4. a

HINTS TO TERMINAL EXERCISE

1. Consult section 7.3
2. Consult section 7.4
3. Consult section 7.5
4. Consult section 7.6