Human Memory

NCERT TEXTBOOK QUESTIONS SOLVED

Question 1. What is the meaning of the terms 'encoding', 'storage' and 'retrieval'?
Answer: Memory is conceptualized as a process consisting of three independent, though interrelated stages. These are:

1. **Encoding:**
   - It is the first stage which refers to a process by which information is recorded and registered for the first time so that it becomes usable by our memory system.
   - In encoding, incoming information is received and some meaning is derived.

2. **Storage:** It is the second stage of memory:
   - Information which was encoded must also be stored so that it can be put to use later.
   - Storage refers to the process through which information is retained and held over a period of time.

3. **Retrieval:** It is the third stage of memory.
   - Information can be used only when one is able to recover it from his/her memory.
   - Retrieval refers to bringing the stored information to his/her awareness so that it can be used for performing various cognitive tasks.

Question 2. How is information processed through sensory, short-term and long-term memory systems?
Answer: Atkinson and Shiffrin model of memory also known as stage model of memory.

- This proposes the existence of three separate but sequentially linked memory systems, the sensory memory, the short-term memory and the long-term memory.
- The **sensory memory**—contains a fleeting impression of a sensory stimulus (a sight or a sound). It is initial process that preserve brief impression of stimuli. It has a large capacity. It is of very short duration that is less than a second.

- The **short-term memory**—a limited recollection of recently perceived stimuli (a telephone number or an order of drinks). It holds small amount of information for a brief periocfof time i.e. less than 30 seconds. It is primarily encoded acoustically.
- The **long-term memory**—a more or less permanent store of memories for later retrieval (e.g. our telephone numbers). In this stage informations are encoded semantically and storage capacity is unlimited.
- Each of these memory system is seen as differing in the way they process information, how much information they can hold and for how long they can hold that information. The model can be expressed in the following diagram:
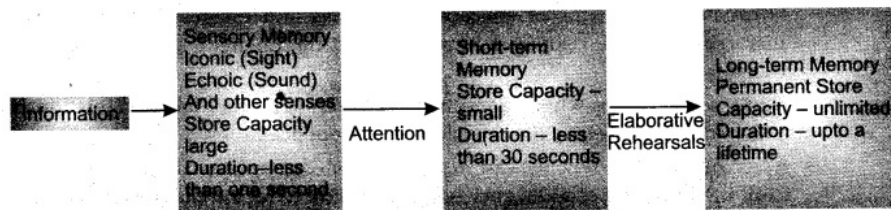
Question 3. How are maintenance rehearsals different from elaborative rehearsals?
Answer: Maintenance rehearsals:

- It is an important control process of STM.
- It is used to retain the information for as much time as required.
- As the name suggests these kinds of rehearsals simply maintain information through repetition and when such repetitions discontinue the information is lost.
- It is carried through silent or vocal repetition.

Elaborative rehearsals:

- From the STM information enters the long term memory through elaborative rehearsals.
- This rehearsal attempts to connect the "to be retained information" to the already existing information in long term memory.
  e.g. the task of remembering the meaning of the work "humanity" will be easier if the meaning of concepts such as "compassion", "truth" and "benevolence" are already in place.
- In elaborate rehearsals, one attempts to analyse the information in terms of various information it arouses.
- Assignment of meaning and associations are formed. −
- It involves organization of the incoming information in as many ways as possible e.g. we can expand the information in some kind of logical framework, link it to similar memories or else create a mental image.

Question 4. Differentiate between declarative and procedural memories.
Answer: Difference between declarative and procedural memories are following:
Declarative Memory

- All information pertaining to facts, names, date, such as rikshaw has three wheels or that India became independent on August 15,1947 or a frog is an amphibian or you and your friend share the same name are part of this.
- Facts retained in this memory are related to amenable to verbal descriptions.

Procedural Memory

- It refers to memories relating to procedures of accomplishing various tasks, i.e. skill

learning e.g. how to make tea, play basketball or drive a car. .

- Contents of this memory can not be described easily.

Question 5. Discuss the hierarchical organisation in long-term memory?
Answer:

- Allan Collins and Ross Quillian suggested that knowledge in long-term memory is organized in terms of concepts, categories and images and are organised hierarchically and assumes a network structure. Elements of this structure are called nodes.
- Nodes are concepts While connections between nodes are labelled relationships, which indicate category membership or concept attributes.
- According to this view, we can store all knowledge at a certain level that 'applies to all the members of a category without having to repeat that information at the lower levels in the hierarchy'.
- This ensures a high degree of **cognitive economy**, which means maximum and efficient use of the capacity of long-term memory with minimum effort.
- Images: An image is a concrete form of representation which directly conveys the perceptual attributes of an object.
- All concrete objects generate images and the knowledge related to them is encoded both **verbally** as well as **visually**. This is known as **dual coding hypothesis**, originally proposed by Paivio. Such information can be recalled with greater ease.
- According to this hypothesis, concrete nouns and information related to concrete objects are images.
- Information related to abstract concepts assume a verbal and a descriptive code. For example, if you are asked to describe a bird, the first thing that happens is that an image of a bird is generated and based on this image, you describe a bird. But, on the other hand, the meanings of concepts like 'truth' or 'honesty' will not have such accompanying images.

Question 6. Why does forgetting take place?
Answer: Each one of us has experienced forgetting and its consequences almost routinely. There | . are some reasons because of which we forget:

1. It is because the information we commit to our long term memory is somehow lost.
2. It is because we did not memorise it well enough.
3. It is because we did not encode the information correctly or it is because during storage, it got distorted or misplaced.

There are theories which have been developed to explain forgetting:

1. **Theory of forgetting developed by Hermann Ebbinghaus:**
   According to him the rate of forgetting is maximum in the first nine hours,particularly during the first hour. After that, the rate slows down and not much is forgotten even after many days.
2. **Forgetting due to Trace decay:**
   (a)Trace theory (also called disuse theory) is the earliest theory of forgetting.
   (b)The assumption here is that memory leads to modification in the central nervous system, which is akin to physical changes in the brain called "memory traces". When these memory traces are not used for a long time, they simply fade away and become unavailable.
   Drawbacks:

- If forgetting takes place because memory traces decay due to disuse, then people who go to sleep after memorizing should forget more compared to those who remain awake.
- Those who remain awake after memorizing show greater forgetting than those , who sleep.

3. **Forgetting due to interference:**
   - The interference theory suggests that forgetting is due to interferences between various informations that the memory store contains.
   - Interference comes about at a time of retrieval when these various sets of associations compete with each other for retrieval.
     There are two kinds of interferences that may result in forgetting.
     (a) Proactive (forward moving): Proactive means what you have learnt earlier interferes with the recall of your subsequent learning. In other words, in proactive interference past learning interferes with the recall of later learning, e.g. If you know English and you find it difficult to learn French it is because of proactive interference.
     (b) Retroactive (backward moving): Retroactive refers to difficulty in recalling what you have learnt earlier because of learning a new material. In retroactive interference the later learning interferes with the recall of past learning.e.g. If you cannot recall English equivalents of French words that you are currently memorizing then it is because of retroactive interference.

Experimental Designs for Retroactive and Proactive Interference

	Phase 1	Phase 2	Testing Phase
Retroactive Interference			
Experimental participant/group	Learns A	Learns B	Recalls A
Control participant/group	Learns A	Rests	Recalls A
Proactive Interference			
Experimental participant/group	Learns A	Learns B	Recalls B
Control participant/group	Rests	Learns B	Recalls B

4. **Forgetting due to retrieval failure:**
   - Forgetting can also occur because at the time of recall, either the retrieval cues are absent or they are inappropriate.
   - Retrieval cues are aids which help us in recovering information stored in the memory.
   - This view was advanced by "Tulving and his associates" who carried out several experiments to show that recall of content become poor either due to absence or inappropriateness of retrieval cues that are available /employed at the time of recall.
   - Without getting any cues one may recall a couple of them only but if the learner get cues like category names then the recall improves significantly.
     Category names may act as retrieval cues.

Question 7. How is retrieval related forgetting different from forgetting due to interference?
Answer: According to Tulving retrieval cues are adds which help us in recovering information stored in the memory.

- Tulving said that contents of memory may become inaccessible either due to absence or inappropriatance of retrieval cues that are available at the time of recall.
- According to interference theory of forgetting we forget due to interference between various informations the memory store contains.
- According to this theory learning and memorizing involve forming of associations

between items and these associations remain in the memory.

Question 8. What evidence do we have to say that 'memory is a constructive process'?
Answer: "Bartlett" saw memory as a constructive and not a reproductive process.

1. He used the method of "serial reproduction" in which the participants of his experiments recalled the memory materials reportedly at varying time intervals.
   - While engaging in this method of learning material, his participants committed a wide variety of errors which Bartlett considered useful in understanding the process of memory construction.

2. Using meaningful materials such as texts, folk tales, fables etc.
   - He attempted to understand the manner in which content of any specific memory gets affects by a person's knowledge, goals, motivation, preferences and various other psychological process.

3. Schemas play an important role in the process of memorization. Schemas refer to an organization of past experiences and knowledge which influence the way in which incoming information is interpreted, stored and later retrieved.
   - Memory, therefore becomes encoded and is stored in terms of a person's understanding and within his/her previous knowledge and expectations.

Question 9. Define Mnemonics? Suggest a plan to improve your own memory.
Answer: All of us desire to possess an excellent dependable memory system. There are a number of strategies for improving memory called "mnemonics" (pronounced ni – mo-nicks) to help you improve your memory.
Some of these mnemonics involve use of images whereas others emphasise self- induced organization of learned information.

Mnemonics using Images: Mnemonics using images require that you create vivid and interacting images of and around the material you wish to remember. The two prominent mnemonic devices, which make use of images are following:

1. **The Keyword Method:** In this method, an English word that sounds similar to the word of a foreign language is identified. This English word will function as a keyword, e.g. If you want to remember the Spanish word for duck which is "pato" you may choose "pot" as the keyword and then evoke images of keyword and the target word (Spanish word) and imagine them as interacting. You might imagine a duck in a pot full of water.
   This method of learning words of a foreign language is much superior compared to any kind of rote memorization.

2. **The Method of Loci:**
   - This method is particularly helpful in remembering items in serial order.
   - It requires that you first visualize objects/places that you know well in a specific sequence, imagine the objects you want to remember and associate them one by one to the physical locations.
   - Suppose you want to remember bread, eggs, tomatoes and soap on your way to the market, you may visualize a loaf of bread and eggs placed in your kitchen, tomatoes kept on a table and soap in the bathroom. When you enter the market all you need to do is to take a mental walk along the route from your kitchen to the bathroom recalling all the items of your shopping list in a sequence.

3. **Mnemonics using organization:** Organization refers to imposing certain order on the material you want to remember. Mnemonics of this kind are helpful because the

framework you create while organization makes the retrieval task fairly easy.

(a)Chunking: In chunking, several smaller units are combined to form large chunks. For creating chunks, it is important to discover some organization principles, which can link smaller units. This method is very much used to improve short term memory.

(b)First letter technique: For this method you need to pick up the first letter of each word you want to remember and arrange them to form another word or a sentence, e.g. colours of a rainbow are remembered in this way (VIBGYOR— that stands for Violet, Indigo, Blue, Green, Yellow, Orange and Red).

Drawbacks of mnemonics:

(a)Mnemonics strategies for memory enhancement are too simplistic.

(b)It underestimates complexities of memory tasks and difficulties people experience while memorizing.

More comprehensive approaches to memory improvement:
(a)Engage in Deep Level processing:

- "CRAIK and LOCKHART" have demonstrated that processing information in terms of meaning that they convey leads to better memory as compared to attending to their surface features.
- Deep processing would involve asking as many questions, related to the information as possible, considering its meaning and examining its relationships to the facts you already know.
- In this way, the information will become a part of your existing knowledge framework and the chances that it will be remembered are increased.

(b)Minimise interference: Maximum interference is caused when vary similar materials are learned in a sequence.

- To avoid this, Arrange your study in such a way that you do not learn similar subjects one after the other.
- Instead pick, up some other subject unrelated to the previous one. Give yourself rest periods while studying to minimize interference.

(c)Give yourself enough Retrieval cues: Cues will be easier to remember compared to the entire content and make link to the parts of the study material to these cues. Then this content will facilitate the retrieval process.

"THOMAS and ROBINSON" have developed another strategy to help students in remembering, more which they called the method of "PQRST". It stands for Preview, Question, Read, Self-recitation and the test.

- "Preview" refers to giving a cursory look at the chapter and familiarizing oneself with its contents.
- "Question" means raising questions and seeking answers from the lesion.
- "Read"—Now start Reading and look for answers of questions you have raised.
- "Self-recitation"—After reading try to rewrite what you have read.
- Test-At the end test how much you have been able to understand.