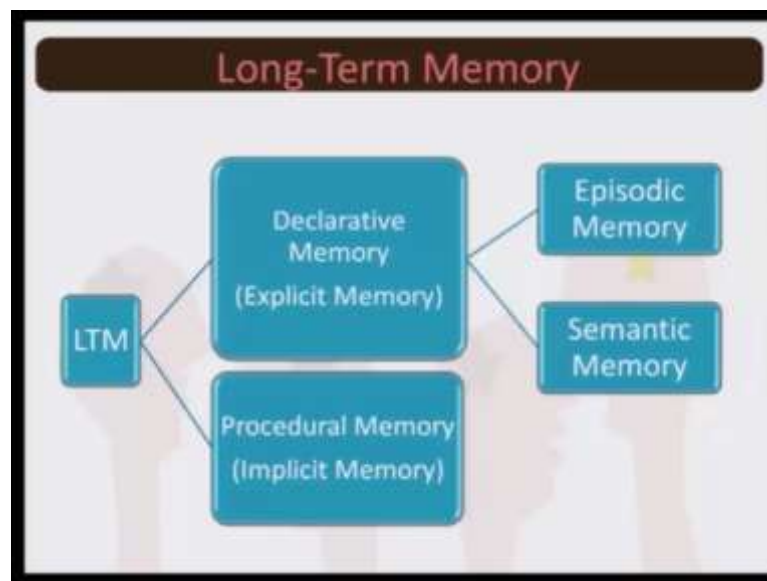


Lecture - 21
Memory Long Term memory-Procedural Memory

Till now, we have talked about episodic and semantic memory which are basically part of the declarative memory it is also called as explicit memory.

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Let us now, come to the implicit sight of memory what is called as procedural memory procedural memory basically constitutes the knowledge of the procedure and the skilled behavior.

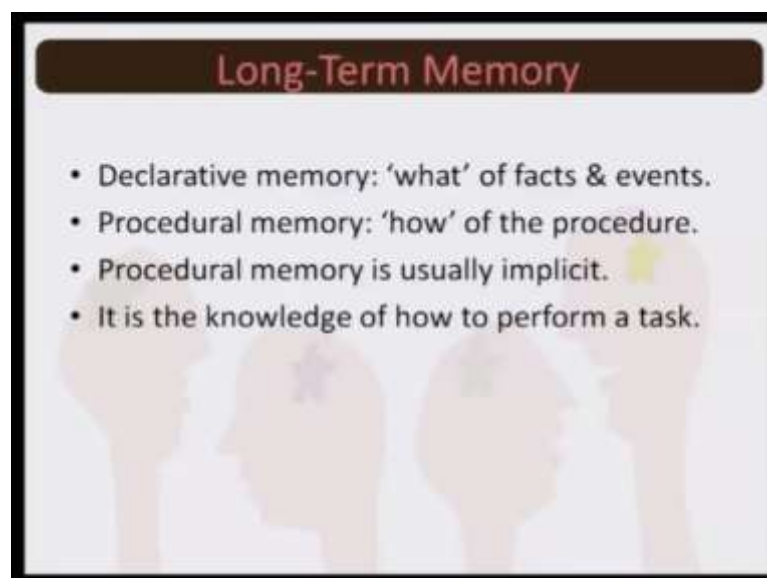
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So, when we acquire a skill and gradually we realize that the whole process that we have learnt for a particular type of an operation becomes too automated and we have developed the control we have developed mastery the over the process that is called procedural memory.

Now, declarative memory from that point of view, if you see they are basically what of the facts.

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And The events where as procedural memory basically denotes how of the procedure and therefore, procedural memory is usually implicit in nature you must have seen many, many events in our life. Where you perform that task and you remember the full mechanism how as to how to operate it say for example, cycling riding a bike running a computer whole of this mechanism you would realize that there are steps series of steps you know and all this steps have has to be religiously followed in sequence. If you want the mechanism to work appropriately, but then it is now, so nicely know acquired by you that this intermediate this steps transition between the steps none of this things you remember you realize as if things are getting done automatically this is called procedural memory.

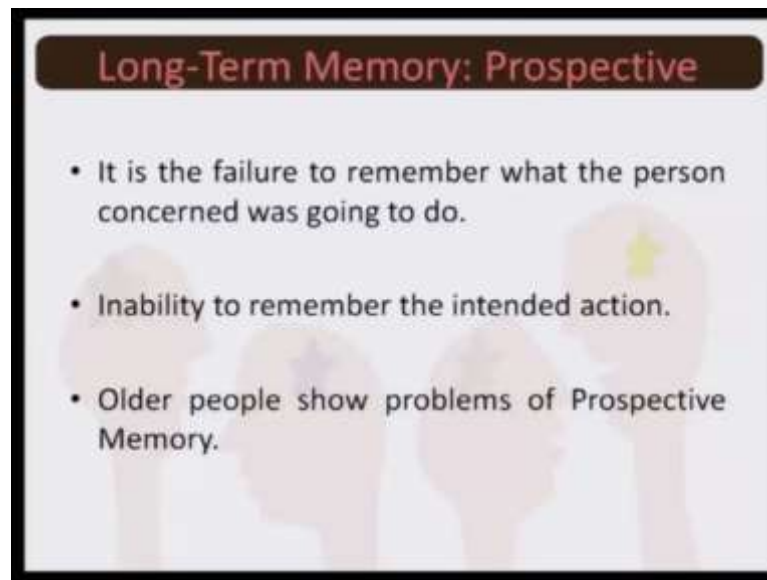
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Let us look at this very video to see how a medical technician actually performs a task meticulously although he knows what the apparatus is he knows what the concerned doctor has asked this technician to perform rest all involves whole degree of moment of knobs fixing the machine taking the output of the machine have a look at this [FL].

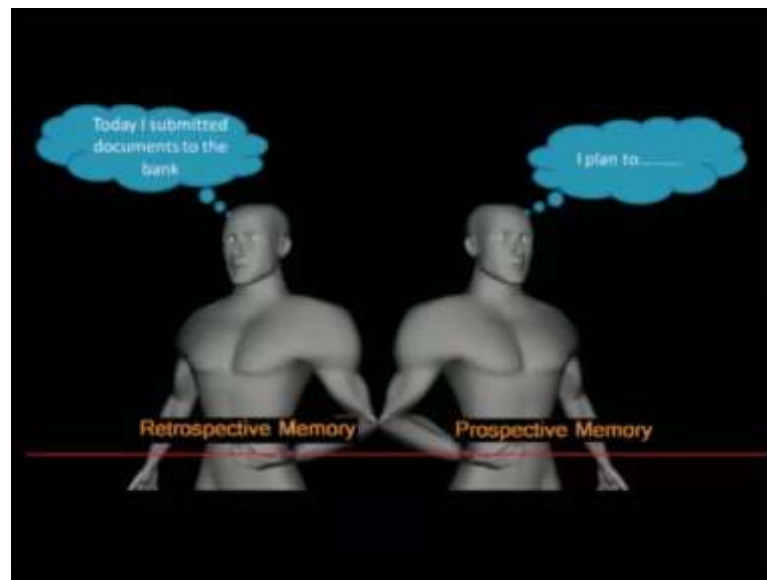
Now, let we have understood explicit and the implicit side of the memory, let us look at another aspect of long term memory what is called as prospective memory prospective something which is about to come. So, if a person fails to remember what he or she was going to do.

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So, say for instance I intend to go and switch on the light, leave my table go towards the switch board and half way if I forget what thought that is loss of prospective memory. So, the inability to remember the intended action is what is called as prospective memory older people usually they show this problem of prospective memory in our young days adulthood. Usually we do not have this type of problem unless we are too busy and we are into multi tasking then, it might happen because of competition between two thoughts which are going parallelly else even in the case of at least older people even if they have one single thought one single prospective is steeped at the head plan to execute there might be a problem in terms of inability to recollect what he or she was intending to go and do.

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So, this very image represents what actually retrospective and prospective side of memory would be now retrospective memory. If you think today I submitted documents to the bank you have already performed that task and you remember prospective memory would be I plan to and you have planned something what exactly you have planned half way while trying to execute it, you forget that is loss of prospective memory it is mostly seen in elderly people having. Now understood sensory short term and long term memory let us once try to compare between this three systems of memory we will try to you know compare this three structures of memory on certain criteria's.

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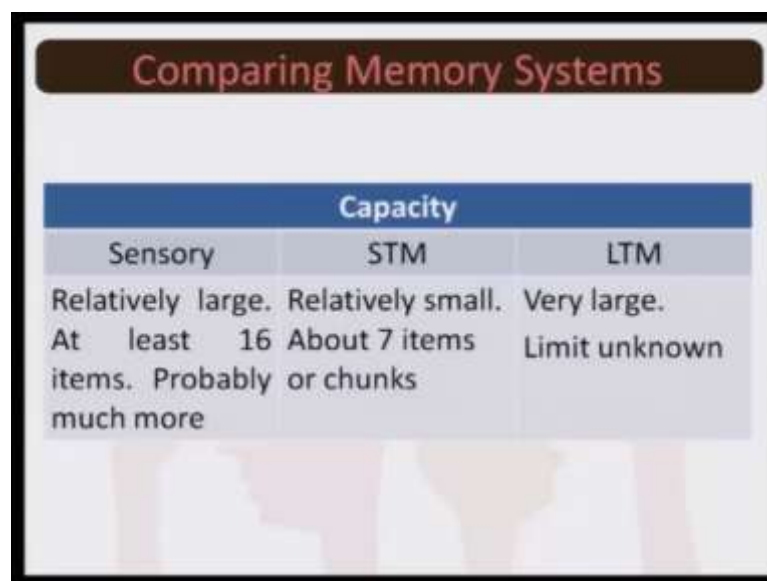
Comparing Memory Systems		
Approximate duration		
Sensory	STM	LTM
Iconic: 1-2 sec. Echoic: 4-5 sec.	20-30 seconds	Days, months, years or life time

So, on this screen when you see on the white font the word written there is the criteria on which to three memory systems are being compared.

So, first let us compare the memory system in terms of their approximate duration sensory memory. We discussed the duration for 1 to 2 seconds for iconic memory and 4 to 5 seconds for echoic memory this expands substantially. It goes from 20 to 30 seconds in the case of short term memory and in terms of long term memory it could be days months it could be even life time something starts from 1 second upto life time this is the whole expansion up to the first 5 seconds part of sensory memory upto 30 seconds that is short term and thereafter it is long term.

In terms of capacity we realize that sensory memory also has a relatively large capacity in terms of storing information and at least 16 items can be stored at the level of sensory memory.

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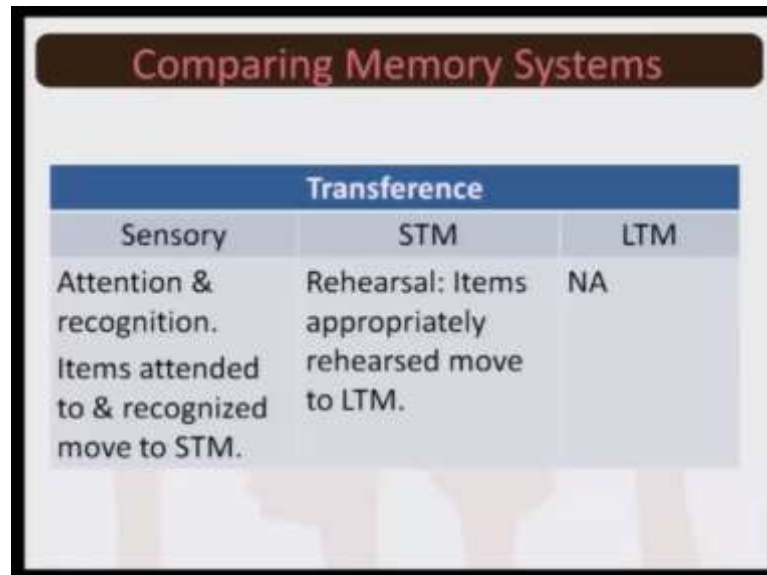


Comparing Memory Systems		
Capacity		
Sensory	STM	LTM
Relatively large. At least 16 items. Probably much more	Relatively small. About 7 items or chunks	Very large. Limit unknown

And probably little more can also be done short term memory from that point of view given the time it has we realized that the capacity is relatively small, but this capacity increases many fold, if the items are divided into chunks depending on whether you form a chunk of three or chunk form of chunk of four items approximately up to 40 items can be stored in the short term memory.

Long term memory it is very large and the limit is just not known any and every thing can be stored then we come to transferring memory.

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Transference		
Sensory	STM	LTM
Attention & recognition. Items attended to & recognized move to STM.	Rehearsal: Items appropriately rehearsed move to LTM.	NA

In terms of transfer we have the long term memory where transfer is not at all needed because information is already stored there it has nothing to do beyond that, but in case of sensory memory attention and recognition. They play an important role items that are attended to and items that are recognized they have the likelihood of moving towards the short term storage items that we do not pay attention to items that you fail to recognize they will not be forwarded to short term storage.

In case of short term we did discuss this factor also that there are two types of rehearsal the maintenance rehearsal and elaborative rehearsal now depending on the rehearsal the items are appropriately forwarded to long term memory.

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Comparing Memory Systems		
Type of information stored		
Sensory	STM	LTM
Copy of input.	Sounds, visual images, words & sentences.	Primarily meaningful sentences, life events & concepts, some images, semantic & episodic memory.

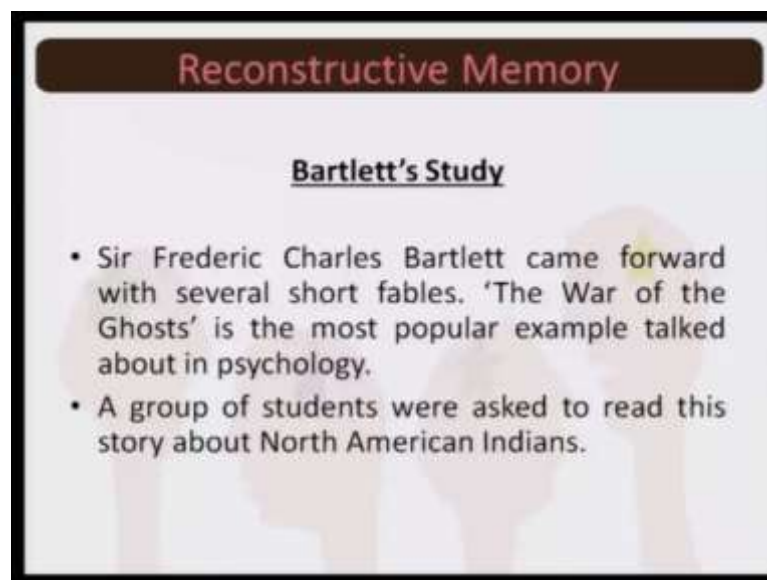
Now, we come to the type of information that is stored in case of sensory memory, it is exact copy of input that we stored in the case of short term it can have sounds visual images words and sentences long term memory has the fantastic thing, long term memory primarily has the meaningful sentences life events concepts images .right Now we discussed semantic and episodic memory. So, whole of this becomes the part of long term memory in terms of inability to recall information from long term if you consider reason for information loss in sensory memory decay of trace as considered as the important reason why information is lost.

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Comparing Memory Systems		
Reason for information loss		
Sensory	STM	LTM
Decay of trace.	Displacement of old information by incoming information.	Faulty organization, inappropriate retrieval strategy, interference.

In short term memory, it is the displacement of the old information by the incoming information, but in the case of long term memory it could be faulty organization it could be inappropriate retrieval strategy or it could be interference. So, two information, if they compete against each other to be recollected, this could lead to interference you have given the file name memory and you search by file name emotion you will not get the information. So, inappropriate retrieval strategy is used or if because you know that the information is stored in an organized order you go for a random search, you are not able to retrieve the information this would be the possible reasons of loss of information from long term storage.

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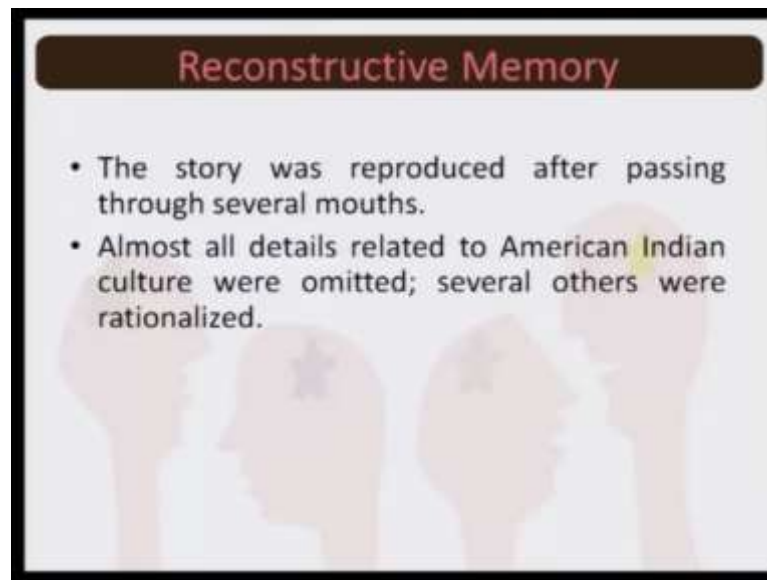
Reconstructive Memory

Bartlett's Study

- Sir Frederic Charles Bartlett came forward with several short fables. 'The War of the Ghosts' is the most popular example talked about in psychology.
- A group of students were asked to read this story about North American Indians.

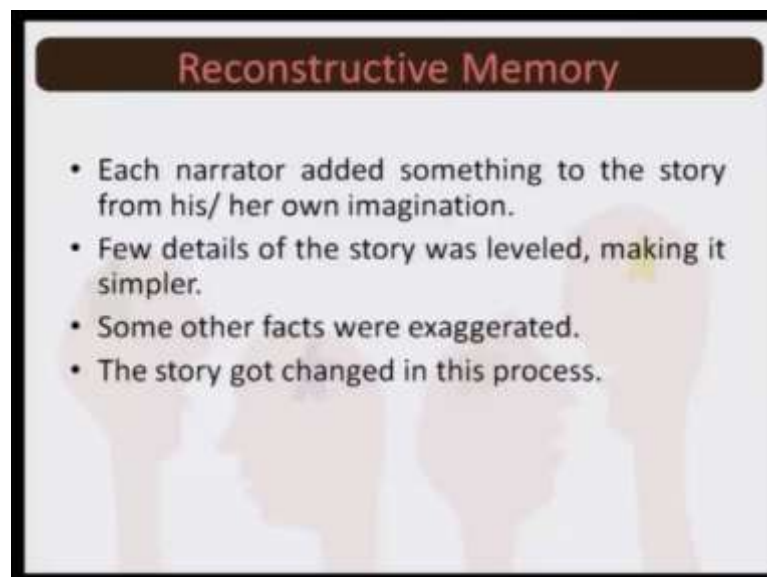
There are two more interesting things about memory we will talk about one right now the reconstructive aspect of the memory, Sir Frederic Charles Bartlett performed a very interesting experiment. What he did was that story was narrated to a group of students titled the war of ghosts and then the story was supposed to be reproduced by these students who had actually heard it what Bartlett was able to prove was that the story. When it was reproduced to passing through several mouths underwent series of reconstruction.

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Almost all details related to the American Indian culture were omitted; and several others were rationalized. When students try to recollect the story reconstruct the story, what was very also interesting was that each narrator added something to the story based on his or her own imagination.

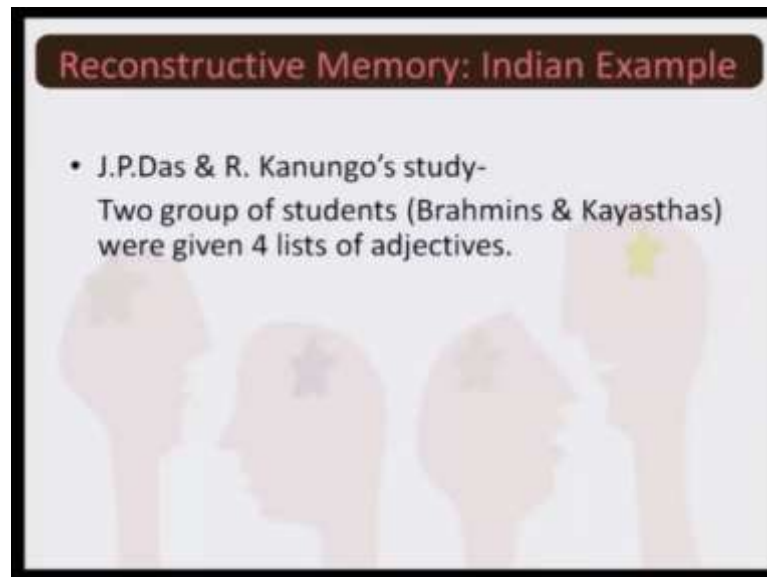
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Few details of the story was leveled making it very, very simpler some other facts were exaggerated and therefore, what happen finally, the story got changed in the entire process Bartlett said that this is reconstructive memory. Why because something you

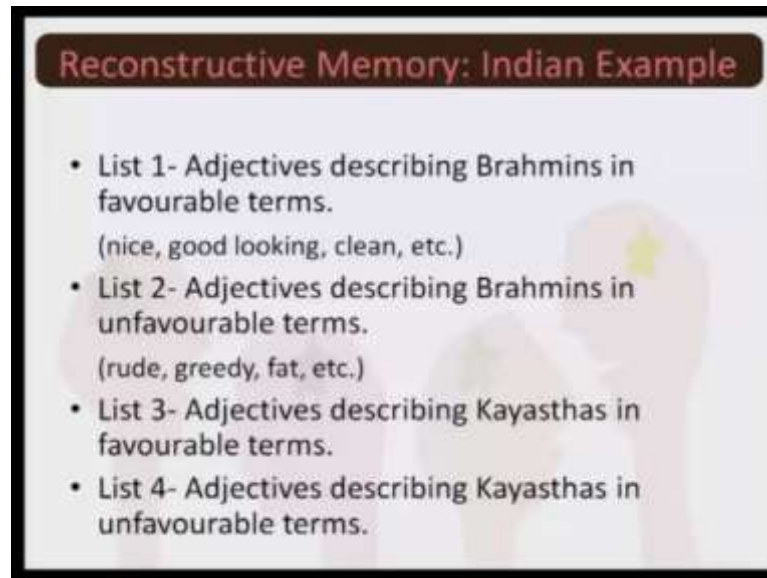
have heard of when it is transmitted from mouth to mouth the whole episode gets reconstructed several things are leveled several things are exaggerated several things are downplayed and therefore, the original content and the later content undergoes a big difference.

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One very interesting example, I would like to quote from one of the Indian studies by J.P. Das and Rabindra Kanungo they conducted a very interesting study where two groups of students who belongs to two dominant casts in the country. Brahmins and Kayasthas they were given 4 lists of adjectives the first list had adjectives describing Brahmins in favorable terms like nice good looking clean and so on.

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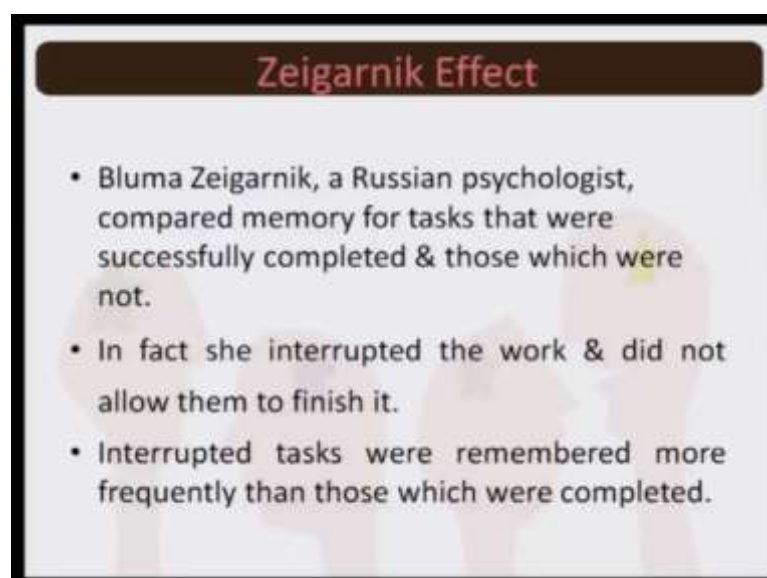


Reconstructive Memory: Indian Example

- List 1- Adjectives describing Brahmins in favourable terms.
(nice, good looking, clean, etc.)
- List 2- Adjectives describing Brahmins in unfavourable terms.
(rude, greedy, fat, etc.)
- List 3- Adjectives describing Kayasthas in favourable terms.
- List 4- Adjectives describing Kayasthas in unfavourable terms.

The second list had adjectives describing Brahmins in unfavorable terms. Like rude greedy fat and so on. And the same thing was done for Kayasthas list three had adjectives describing Kayasthas in the favorable terms list four describing in unfavorable terms. Now when this Brahmins and Kayasthas students are supposed to recollect the content every one remember more unfavorable adjectives than, the favorable ones and based on this J.P. Das and Rabindra Kanungo they inferred that people preferred to remember the bad attributes rather than, good ones one interesting thing which is also talked about in introductory psychology is an effect called Zeigarnik effect.

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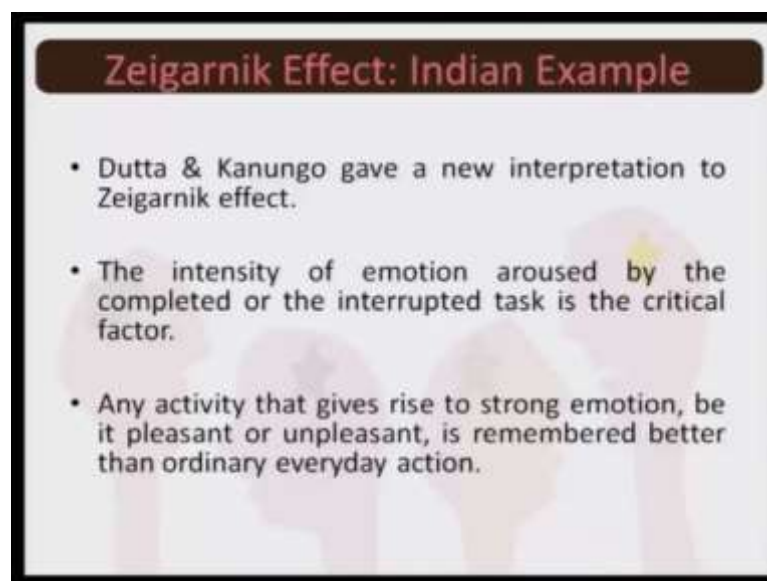
Zeigarnik Effect

- Bluma Zeigarnik, a Russian psychologist, compared memory for tasks that were successfully completed & those which were not.
- In fact she interrupted the work & did not allow them to finish it.
- Interrupted tasks were remembered more frequently than those which were completed.

Bluma Zeigarnik, was a Russian psychologist, who actually compared memory of tasks which you are able to complete and compared it with the task which you are not able to what she did was she basically interrupted the work and did not allow the participants to finish the task.

What she finally, found out and what is now called Zeigarnik effect is that interrupted task where remembered more frequently than, those which you are able to complete things that you are not able to complete, you would remember it more.

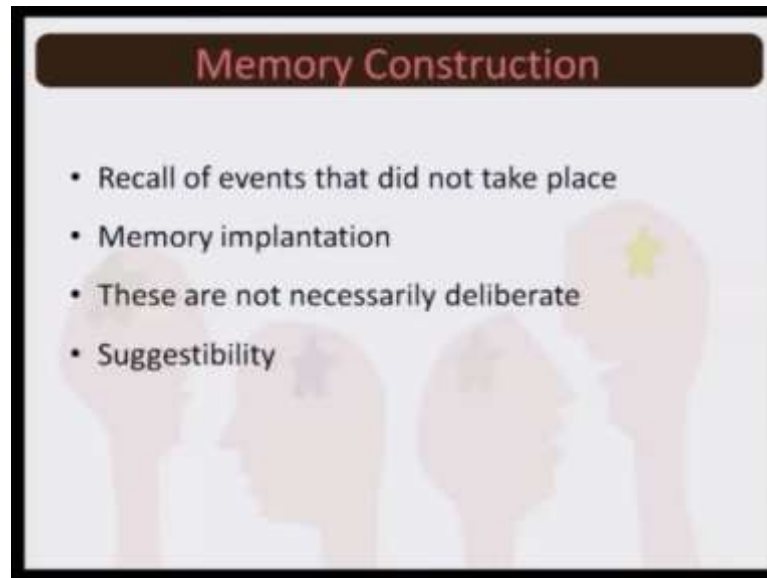
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Now, this might mismatch with her daily life experiences another interesting study again by Rabindra Kanungo along with Dutta they give a interpretation to the Zeigarnic effect they said that the intensity of the emotion that is induced by the complete or the interrupted task that becomes a critical factor. So, it is not the task per say, but the emotion that it leads to. So, any activity that gives rise to a strong emotion whether it is pleasant or unpleasant that does not matter the fact that the activity gives raise to strong emotion such events will have better memory.

you remember right now we said in are previous lecture the things which as an element of surprise things which as personal significance and things which induces great degree of emotional arousal in you, those things have better chances of getting recollected. So, this was the explanation given by Dutta and Kanungo. Why Zeigarnic effect works another interesting thing that is also talked about in memory is memory construction.

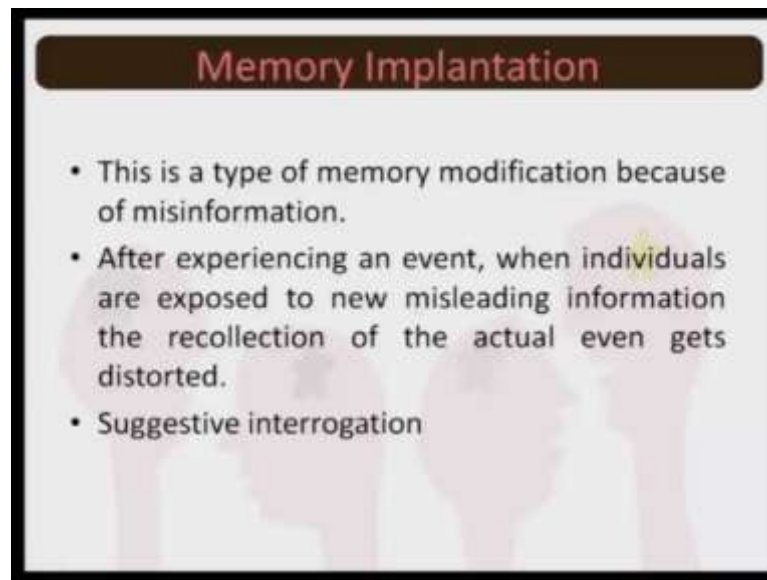
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Bartlett he proved that there is a reconstruction in memory construction of a memory has basically to do with the experiences that was gathered in the clinical set up where memory is implanted and therefore, the participants recall events of their life which had actually not happened.

Now, this depends on the suggestibility of the participant certain type of content is implanted into your memory and you are supposed to recollect it. So, when you recollect know your life experiences you try to recollect when those events which are actually you did not experienced, but you are told that this is how things are happened with you this is called memory construction this type of memory modification.

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Basically takes place because of the misinformation and after experiencing an event when individuals are exposed to new misleading information the recollection of the actual event it gets distorted and this is something that sometimes is also witnessed in interrogation what is called suggestive interrogation. So, if an officer interrogates the suspect and you deliberately you know ask questions which have lead answers.

For example if I ask you were you present there in that very building at that time that is a question which asks you to declare whether you were present or not and you have a option of saying that was not present in that building think of the other situation when I say. So, you are in building what actually happened at that time you are not given the opportunity to declare I was not available in the building the question is based on the premise that you are actually present in the building and then, it goes beyond asking you what actually did you see inside the building this an example of suggestive interrogation therefore, this is a misinformation the fact that you are not present in the building is not taken to account, but then a misrepresentation allows the whole construction of new sequence of events therefore, it is called as constructive memory.

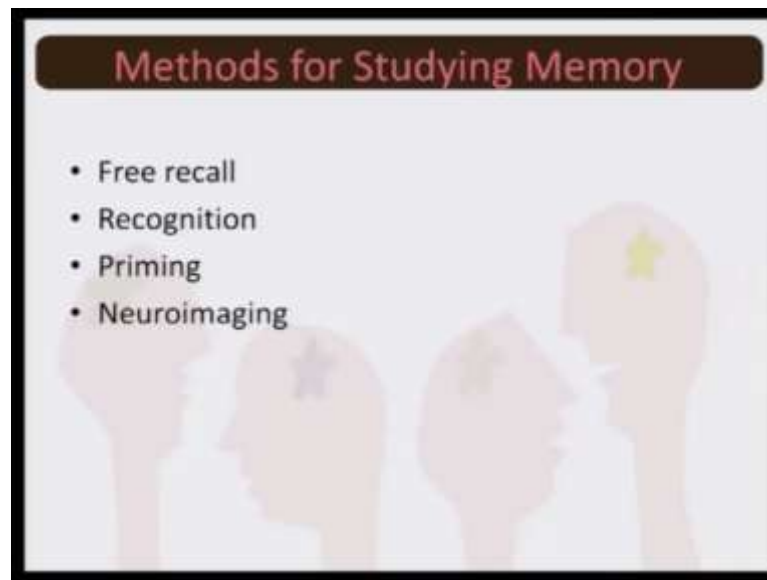
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Now, we come to what is called as memory distortion remember we are still not talking about forget forgetting will be our last lecture with respect to this very topic on memory now memory distortion basically in a change in content of the recall as a result of internal or external factors. So, there could be cognitive bias you have bias which does not allow you to remember good things about somebody about whom you have negative feeling. So, for example, if you do not appreciate someone all good things told about that very individual because of your bias you are not able to remember.

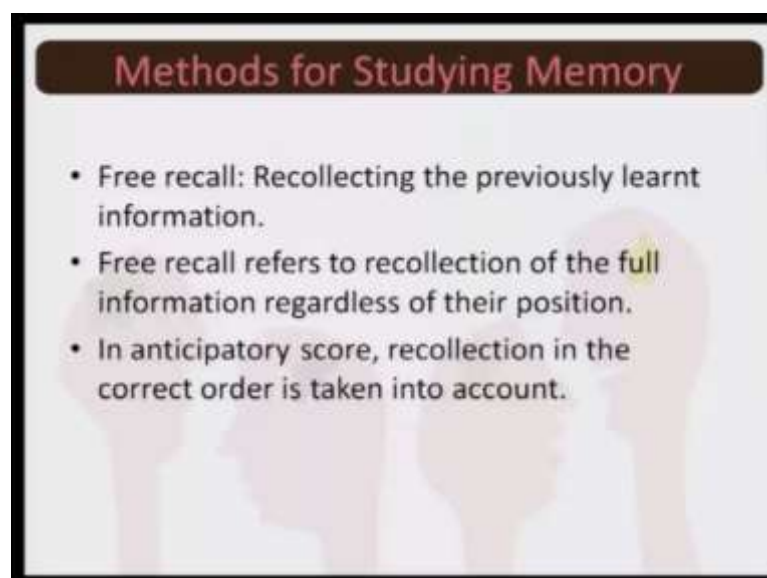
Say for example, right now we took the example of suggestive interrogation if you go for suggestive questioning the question that I ask suggests gives a cue to you as if what is expected out of you, what type of response should you give this is suggestive questioning this is bound to distort the memory plus this schema, you know how the representation of the world it you have made in your mind the mental representation that might be important in terms of better recollection accurate recollection or distortion and how motivated you are to recollect information that would also play an important role.

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So, let us now talk about the methods that are predominately used for studying the process of memory four important methods. We talk about today free recall recognition Priming and Neuro imaging the recent phenomenon you find is the dominant uses of Neuro imaging technique, wherein the brain scans are used to identify which regions of the brains are involved in the memory of what kind of information.

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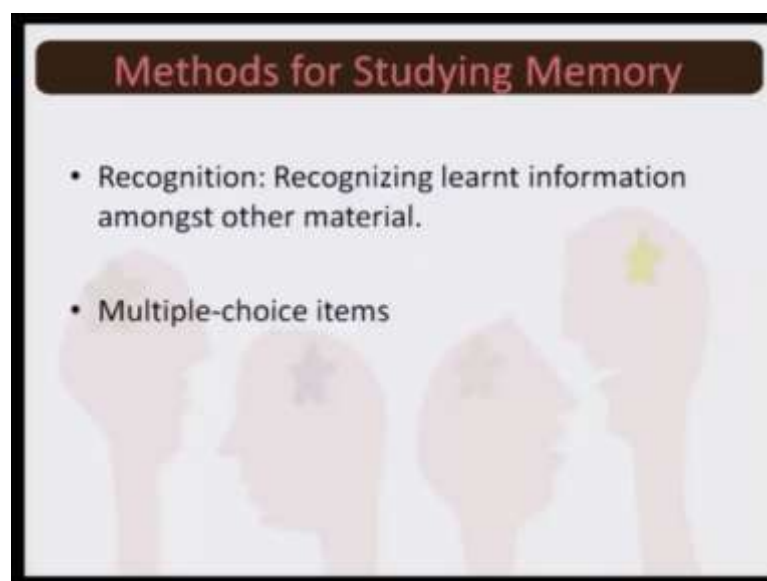
Let us first begin with free recall free recall as you can make out from the word itself, it is recall that is recollection of the learnt information in a free order this means that you

are free to recall the information regardless of the position of the event .you remember We talked about serial position effect you know primacy in the effect. So, free recall basically means that you are supposed to recall the information regardless of it is position we have talked about know serial position effect the primacy and recency effect.

Now if I give you a list of items and then tell you that you have to recollect information in the order in which it was presented to you. So, say for example, if I give you a list of items that you have to procure from the market and said this 15 items have to be recollected in it's serial order. So, first item should be recalled first second item for at the second order third at the third-order you would realize that usually people commit much of an error in terms of recollection and that is what is called as you know recall where we have serial position effect where we have the primacy and the recency effect.

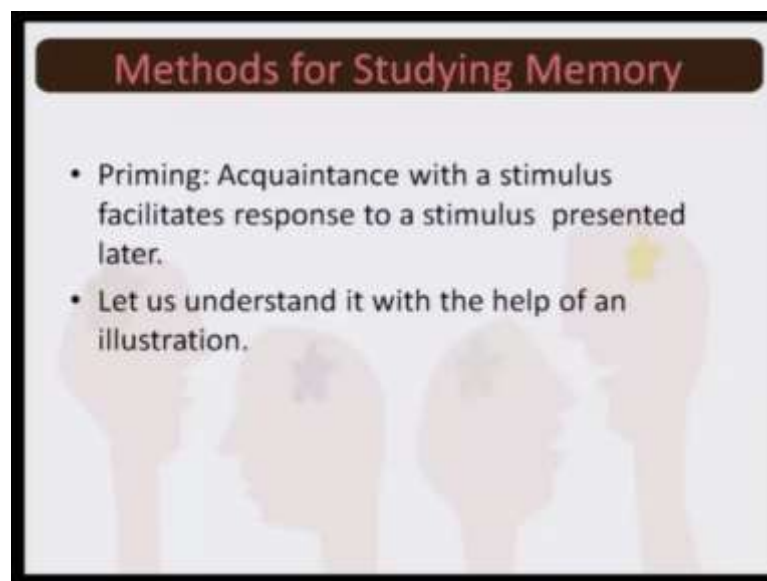
But free recall usually is considered as one of the good methods because you do not want to worry of about the relative positioning of the information rather you have to simply recollect the information. Now in anticipatory score recollection in the correct order is taken to account, but free recall would basically mean that you regardless of the position you just recollect the information and accordingly you know you get a score for that. So, that is one of the dominant methods in studying memory the second important method for studying memory is recognition and that is one of the most generously used techniques.

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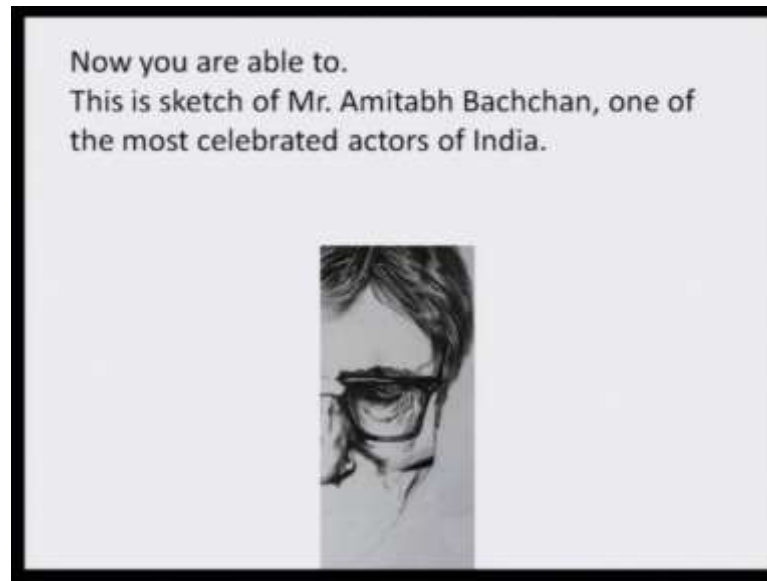
Now a day, even for this course we will come to evaluation we will come across multiple choice items. So, when you are supposed to recognize the learnt information which is hidden among other items. So, you have the question written in the top and you have four options only one answer is correct and the rest of the three are false information. So, when the actual information is hidden amongst the other information and you have to recognize this is the correct answer this is what had learnt this is called as the method of recognition multiple choice items is a best example of it.

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The third and interesting method of studying memory is priming. Now in case of Priming how acquaint you are with stimulus that is important. So, what happens? Acquaintance with a stimulus basically facilitates your response to this stimulus which is presented later now let us understand with the help this illustration.

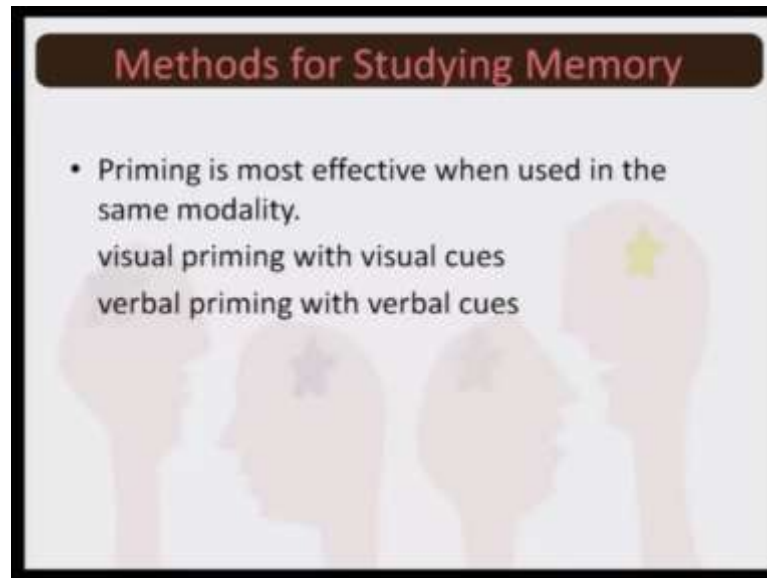
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Now, I ask you that look at your screen and the based on the sketch you see at the bottom of the screen identify the person and am sure none of you would able to identify the person. add a little bit to it and say can you now identify the person given that you have little more clues perhaps some of you might make a guess,I add little more and, say now that very recently you saw one of his recent movies in which he had this very character con you know identify who you are looking at now when you see half of the face. So, you know him, he is most celebrated actors of Indian cinema Amitabh Bachchan this is Priming technique.

So, what actually happens here you are acquainted with the character you were presented with part of the information and depending on how well acquainted you are with facial features you would have identified first case you certainly not succeeded many of would succeeded just after the second slide. When this know little more clues were given some of you would by this time many of you would probably identified and after this much approximately all of you identified who is person is this is called the Priming technique.

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Now, Priming is considered to be most effective when it is used in the same modality. So, if you are using visual Priming then, it is good to visual cues and when you are using verbal Priming then it is good to use verbal cues in that case Priming will be very, very effective because you are using same modality.

Key words - procedural memory, memory systems, reconstructive, zeigarnik effect, construction, distortion, priming