Indian Institute of Technology Kanpur
National Programme on Technology Enhanced Learning (NPTEL)
Course Title
A Brief Introduction of Psychology

Lecture – 18
Memory

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Now that we are on the last topic, today our focus would be not in terms of how much we succeeded recollecting from our memory storage rather we would focus upon the failure in the attempt to retrieve information from the memory, that is our focus will primarily be today on forgetting. We will try to make out why people forget, how much they forget and issues like this.

But before we come to what and why, and how much let us understand one thing and except one thing that forgetting is one of the most useful attributes that you can visualize for human memory system. One way of looking at it could of course be that, basically the message that has been transferred to the long-term memory, for certain reason you have not been able to recollect it, which results into forgetting.

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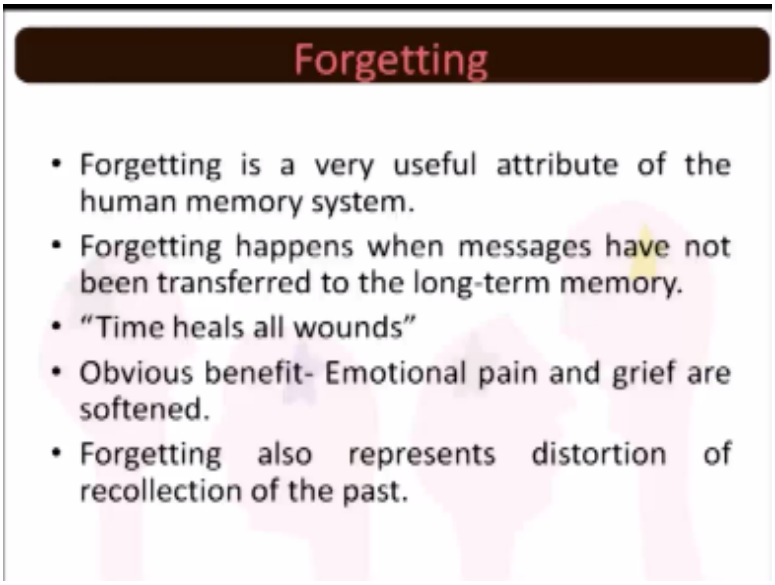

But there are obvious benefits attached to it, the most important thing that the emotional pain and grief, they get soften after a passage of time you must have heard the proverb that time heals all wounds. So what time does to the wounds, it basically helps you forget, what you call the emotional valency, the magnitude of the grief gradually gets soften enough okay.

Also forgetting might also represent the distortion of recollection of the past, so the truth was something else and you narrate something else okay, which is completely devoid of the reality. But accepting all these things we must understand the value of forgetting.

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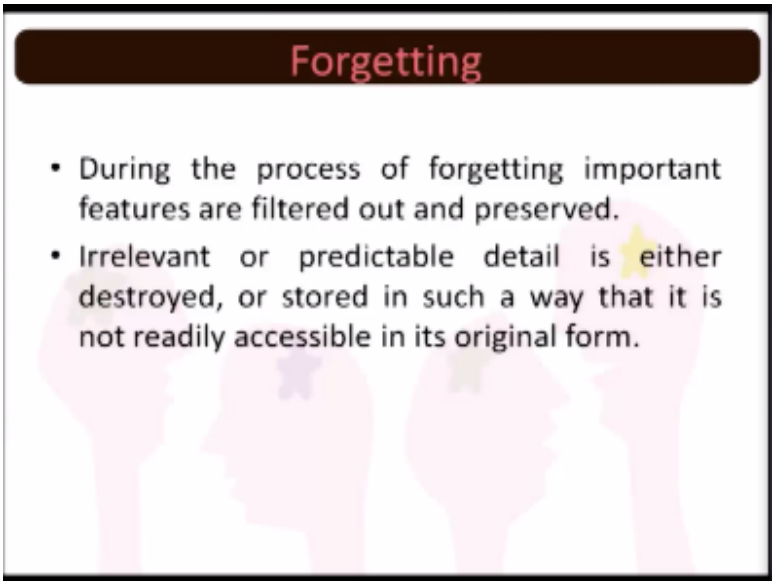

Now during the process of forgetting important features are either filtered out or if there could be a possibility that they are preserved. Right now we will also refer to one fact that many times you forget okay, involuntarily and many times you forget, because you want to forget that thing.

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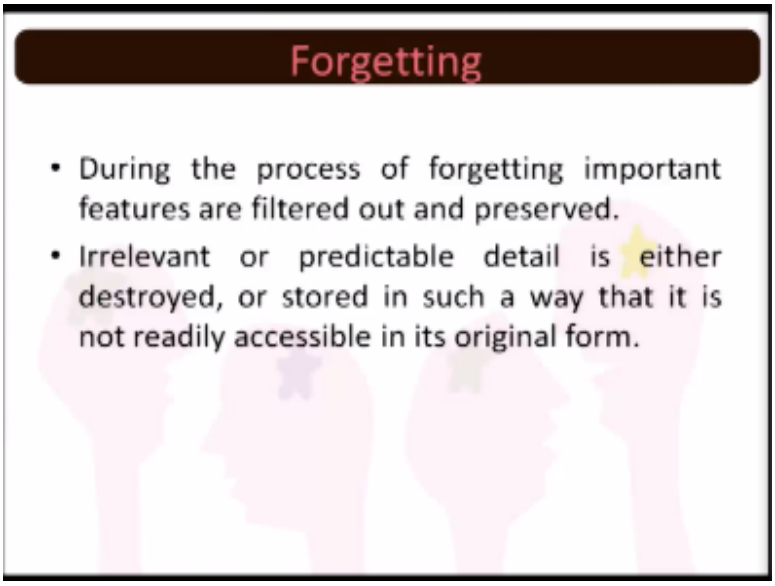

Now things which are irrelevant to us or details which are predictable they are either destroyed or they are stored in such a way that it is not readily accessible in its original form. And therefore when we try to retrieve the information we commit certain error. And this is what people consider that this is forgetting, you have not been successfully able to recall what you were supposed to at this point in time, therefore it is called forgetting.

There are series of theories which explains why people forget. So let us talk about the dominant theories which tries to explain the process of forgetting. First and the most important theory is the theory of decay.

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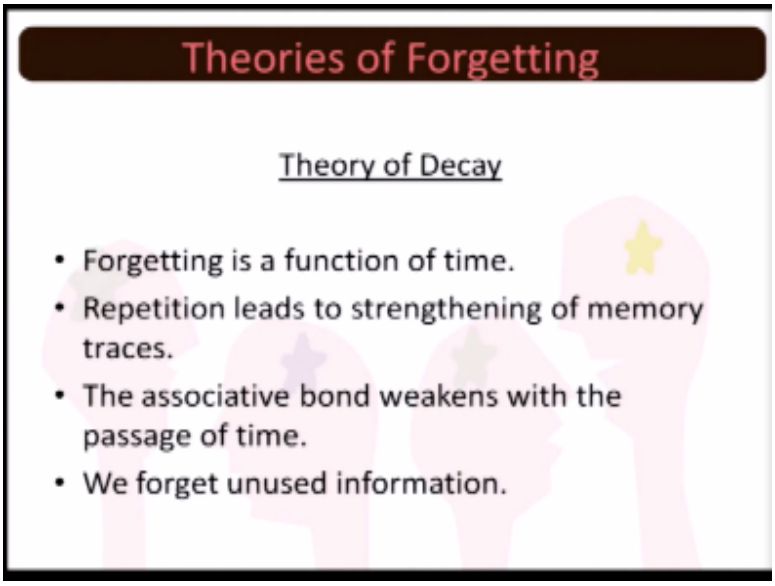

Now basically what theory of decay says, is that you remember we talked about a fact that there are concepts, concepts which are remembered as nodes of information, and then they are networks in these nodes okay. Now when similar type of events are repeated, similar information is given to you time and again okay, with repetition the memory traces they become very strong.

Now think of a situation when you learn something, you memorized it, but then you did not get a chance to repeat it okay. So what would happen then, the associative bond that is formed that becomes weaker enough, and the weaker the bond becomes higher or the chances that you will forget the information.

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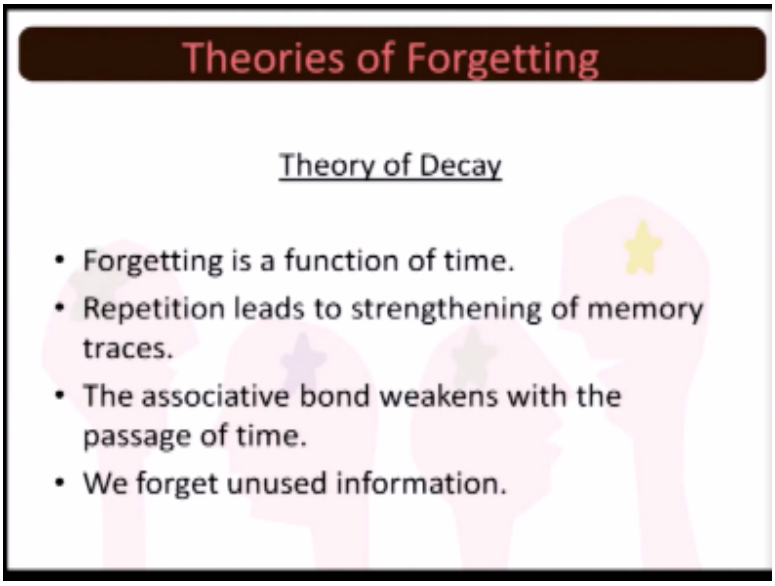

So in all cases where associative bonds are weekend with the passage of time and, because forgetting functions as one of the functions of time, therefore we will usually forget those information after lapse of certain period of time, this is what is called a theory of the decay. Time has passed you did not get a chance to repeat the information and therefore the bond that was formed the memory traced that was formed, that race becomes weak enough to be recollected, this is the theory of decay.

The other interesting theory which explains forgetting is the interference theory okay. Now interference you can be easily make out know, two things which interferes which overlaps okay, now interference could be of two types, you remember when we were talking about transfer of learning at that time also we said that there is possibility that things which are learned previously might interfere with learning of the new task, this was one possibility.

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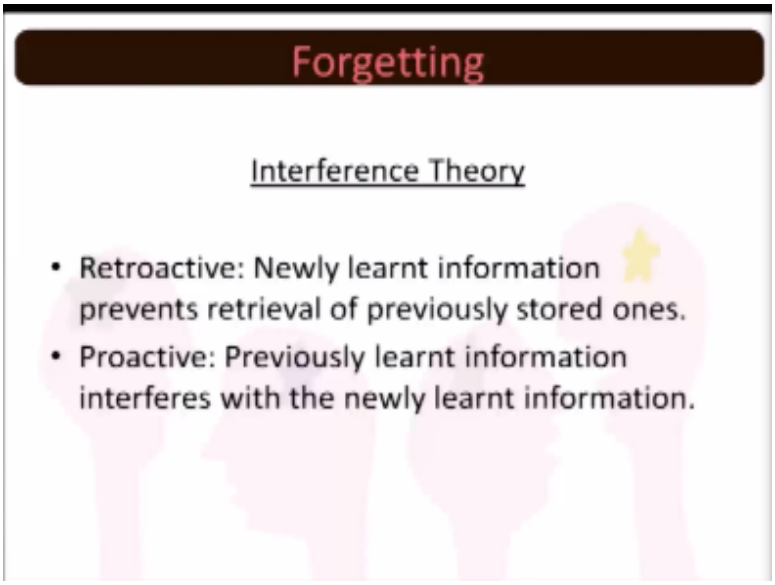

And other possibility where the newly learned thing it does not allow you know, to perform things appropriately. Similar type of situation comes up in case of interference theory also, there are two types of interferences it could be retroactive or it could be proactive.

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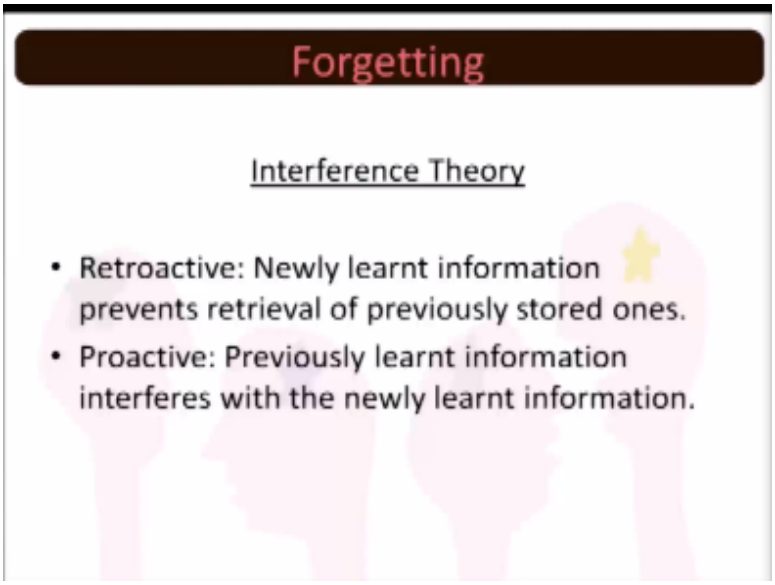

Now proactive interference would be a situation where newly learned information it prevents the retrieval of the previously stored information. So I have learned something in the past, I have learned something very recently okay. And the newly learned information does not allow me to recollect what I had already memorized in the past. So earlier the stack that is with me in my long-term storage that I am not able to know, extract out, because of the interference that is created by the newly learned information, this is called retroactive interference.

The reverse of it would be proactive interference, proactive interference would mean that the previously learned information that interferes with the newly learned information. So I already have something in my stack, I have already stored something in my long-term memory. Now I learn a new thing, I memorize it, when I try to recollect the newly learned information, I somehow know extract the old information.

So what is happening actually the previously memorized content that interferes with the process of recollection of the new information, this is called proactive interference. Now interference theory says, that either the interference is proactive or retroactive, but the fact remains that whatever is the desired information that you want to extract out, that information you are not

able to okay, because of this competition between the old and the new information and their fore you commit an error in terms of accuracy of recall of the content and therefore it is an episode of forgetting.

The third theory which also has to do with no how we store information in long-term you remember we discuss that in long term one of the important strategies is to provide appropriate cue to the information of giving a good file name which will help you which will ease the process of search whenever you have to do so in the future now if there is a problem with giving appropriate cue and therefore it because of the inadequate cue you are not able.

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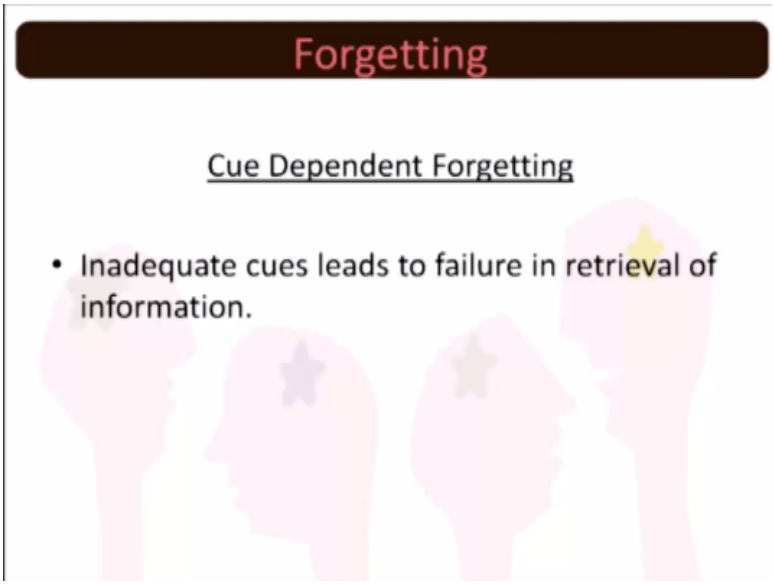

To retrieve the information then this is called cue dependent forgetting you basically did not provide sufficient cue the adequate cue and because of this inadequacy okay you are not able to recollect the information this is cue dependent forgetting so this is the third theory which tries to explain why we forget and forth theory is basically talking about the overall failure of the storage system. Now this theory basically no looks at the information processing approach this is the view point it says.

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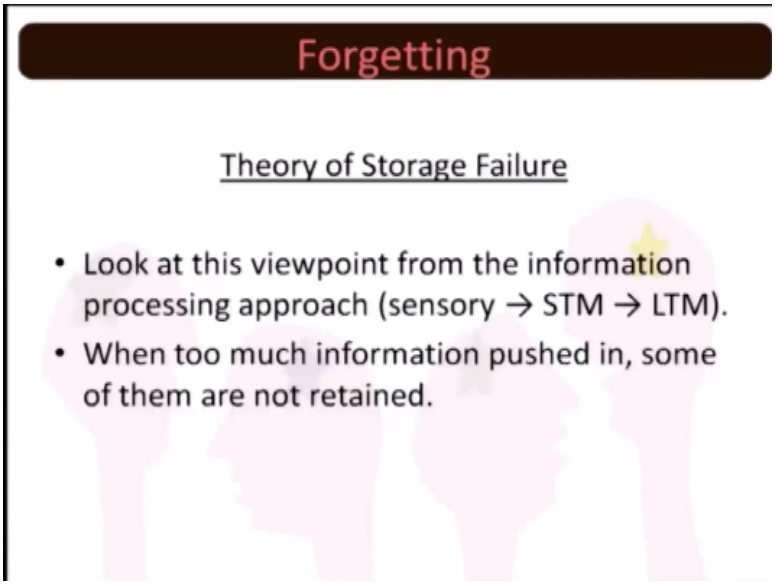

That from sensory to short-term to long-term this is how the memory moves and it is long-term where the information is stored now how much of information is now pushed in and how much of it can actually be retained that is a matter so somewhere you can visualize this theory in little symbolic order say for instance you have attached a pen drive or an external derive okay or a sd card okay in the system and then you realize that it says that your external device your pen drive or your sd drive has this capacity say for instance it has one TV that is the size okay.

Now that the external drive can store information only up to one TV the moment no you are above to reach that level okay it starts giving you a signal that fine only this these many bytes of information can be stored more okay because you have gone for an optimal usage of external storage device okay so theory of a storage failure actually bangs on this very hepatices okay that the information that is supposed to be retained okay is dependent somehow on the overall capacity.

Now remember one thing we discussed in long-term storage that the ultimate capacity of long-term memory system is not known all we know is that based on personal significance and based on other relevant information most of the things are retained with us okay so certain things that

we know that it is extremely useful to us we will always be recollect it we will always just store it okay and we never commit error in terms of recollecting it back whereas certain types of information might not be significant after passage of certain period of time say for instance you memorized a poem because it was about one of the expected questions in your examination you know this was just a poem which was basically memorized only to serve you the purpose of successfully scoring in your examination.

And therefore the chances of further forgetting it is very high if you recollection no when you memories questions from your notebook you even remember know where the teacher at put a red mark where did you turn the page the comment the full stope most of these features to remember and within certain period of time just within few days you start forgetting these dresses and little later you do not even remember any of those things okay.

Now all these theories can be used to explain it decay explains this the process from one point of view cue dependent forgetting explains it from a different point of view storage system now explains it from a different point of view and the interference theory explains it from a different point of view okay but all these four theories basically explains why people forget let us now come across one of the examples let us first understand that Hermann Ebbinghaus was the first psychologist.

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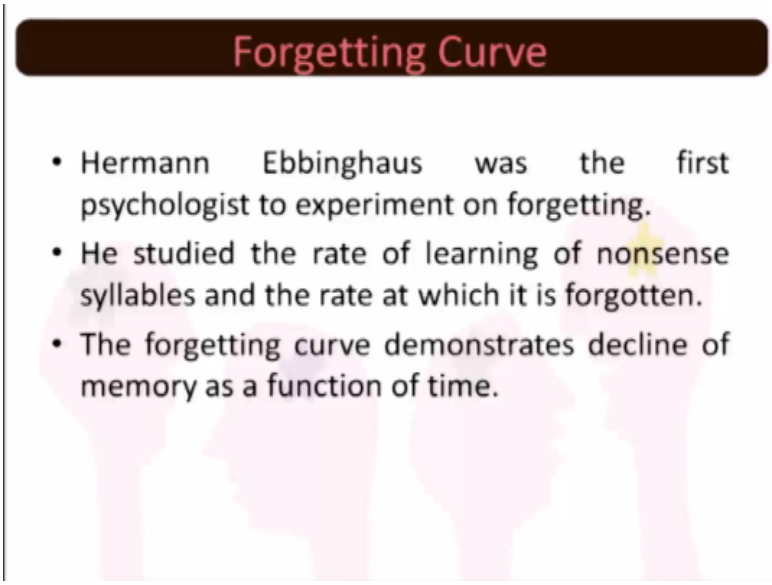

Who conducted experiments on forgetting and he basically what he did was he again use the nonsense syllables okay tried to see how much people forget okay over a period of time so forgetting was actually experimentally verified in terms of decline of memory as a function of time.

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Now this is the cover what is called forgetting curve and Ebbinghaus came forward with this very curve now basically what he did was that on y axis he had retention and on x axis was the number of days how much of information is stored or how much of information is lost remember he was using nonsense syllables for in studies okay so meaningfulness was already taken care of all the items that was supposed to be memorized did not carry any meaning now of all these now meaning devoid information.

How much of loss takes place actually and this is what you Ebbinghaus was trying to study what he found was.

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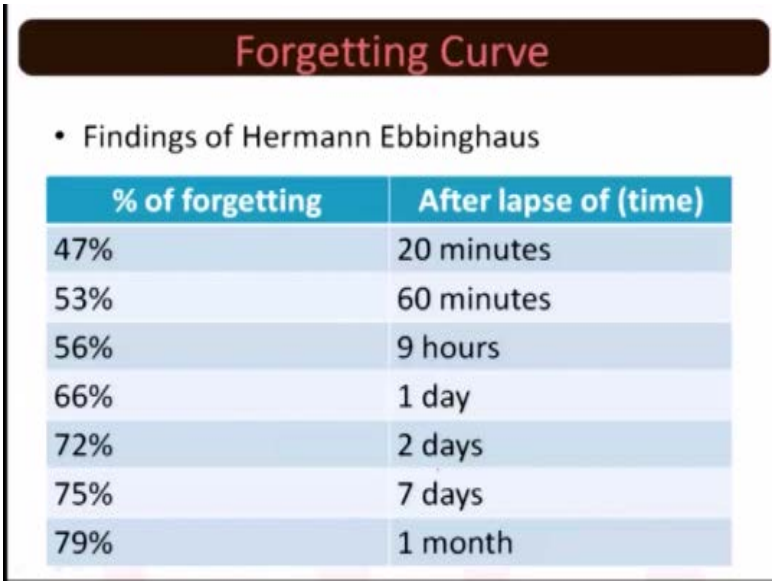

That after lapse of around 20 minutes human beings they have loss of 47% information after 1 hour 53 % loss of information after nine hours we have 56% of loss after one day we have 66 %, two day 72% seven days 75% and after one month we have loss of 79% of information. Now if you look at this curve now you will realize a very interesting phenomenon the loss in the first few minutes is very high and gradually it starts stabilizing okay.

So from one hour that is a 60 minutes to 9 hours you just have an addition of 3% of loss okay were as in the first 20 minutes you have a massive downfall no 47% of information is lost 20 to 60 minutes you have a 40 minutes gap but then the information lost is very little just 6% more okay 3% in 9 hours okay and 10% when you cover one full day 24 hours so that way you realize that there is not much of a loss and again the loss of information at the end of the second day is 72% whereas loss of information on the 7^{th} days 75% only okay so in 5 days you lose only 3% of information.

So this basically gives us a feel, okay. That actually what happens in the case of human beings is that in the initial phase we have a drastic loss of information.

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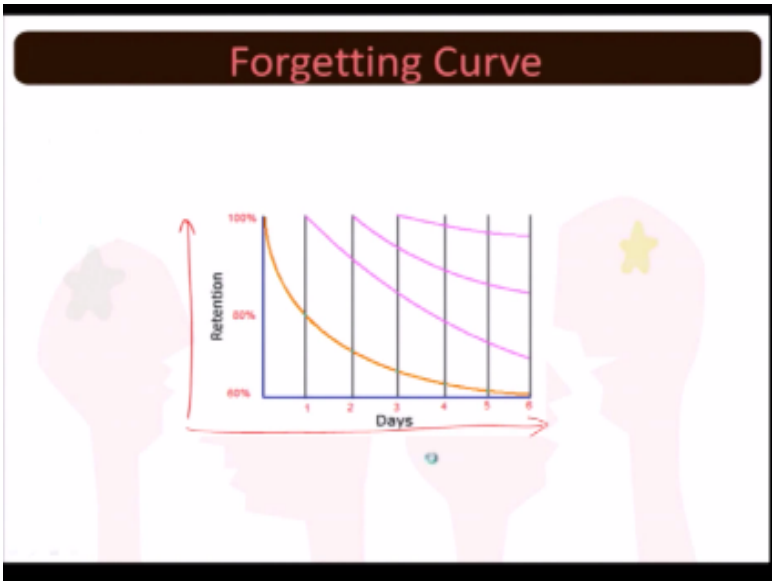

And this loss gradually start sitting stabilized, okay.

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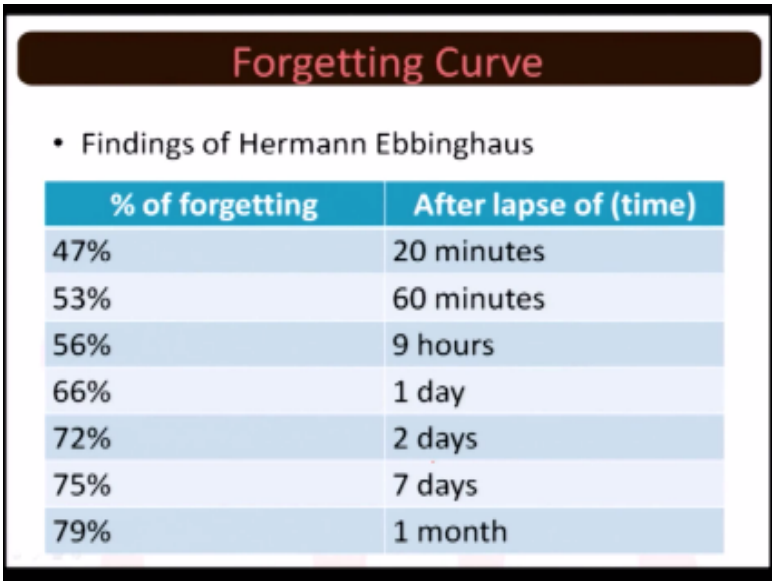

And by the time we complete seven days one week period, okay. We realize that the information is by enlarge stable now, okay. Little bit of loss is there but it is still stable English here, okay. So with this we come to an end to whatever we had to talk with respect to forgetting but because we are talking about Ebbinghaus. So let us understand one thing, Ebbinghaus also gave a formula to understand how much we save in the process of retention, okay. Therefore it is called the method of relearning or saving method.

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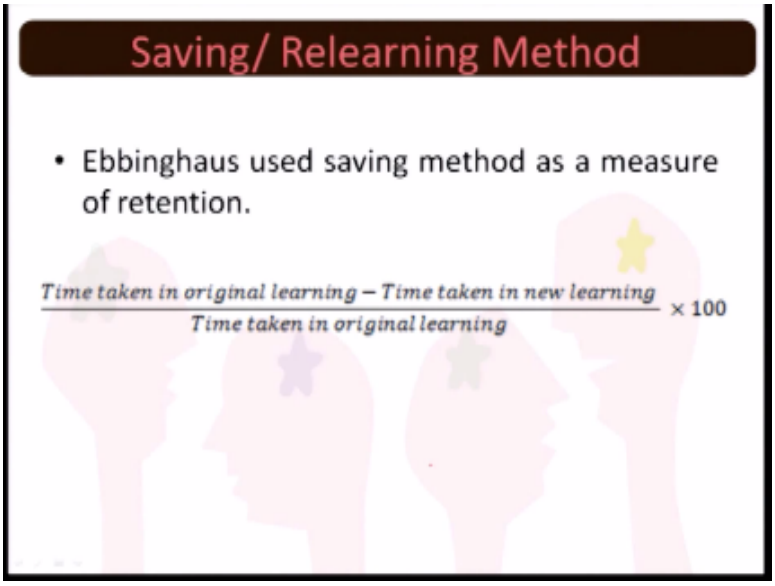

So what he said was, that the time that you take in the original learning, okay. Minus the time taken in the new learning. So you have learnt the information, memorized it. Now it is lost you are again trying to memories it. So time taken originally and time taken in the next attempt divided by the time taken in the original learning and you multiplied by hundreds and he said this is what is called as Ebbinghaus saving method.

Because it is realized that you save lot of time, you remember even in learning when we were talking about the extension and when we refer to spontaneous recovery there also we had discussed that once the extension takes place the process of spontaneous recovery is very fast, even if the animal took say series of trials to learn the information originally, okay. Subsequent learning takes very few attempts.

So is the case with memory and therefore the time taken no in the next phase is no different from the time taken originally to memorize the information, okay.

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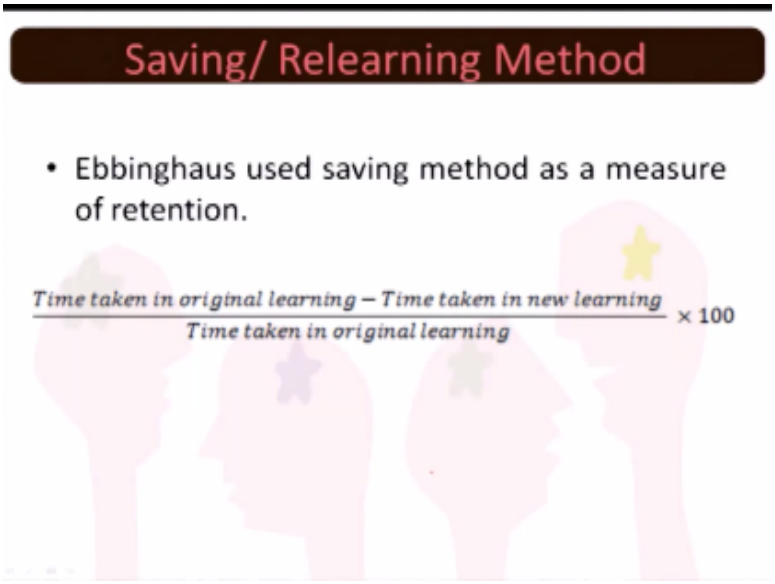

And this is what is Ebbinghauses contribution to the process of forgetting. So what have we discussed till now, we have tried to understand the process of memory we have tried to succinctly no understand the process of forgetting. Now realizing the importance of memory and also of course accepting the beauty of forgetting all of us would always visualize of situation where the overall capacity of the individual to memorize things should multiply should increase.

So what are the tips for better memory? Let us discuss it very succinctly, four options can be thought of.

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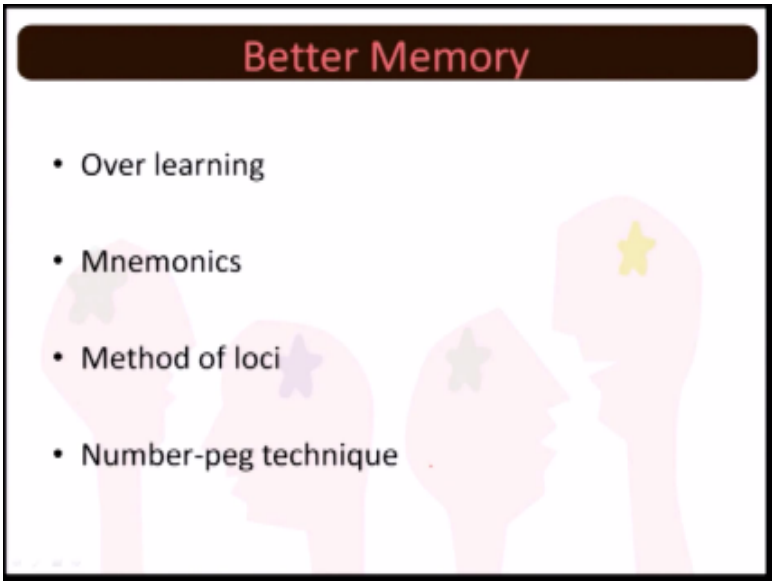

Either you over learn, or you use three other techniques, the method of Mnemonics, the method of locus and the number-peg techniques. So very succinctly next couple of minutes we will discuss our methods which can enhance your memory and you can try it out. Now the process of over learning basically means that you keep on keep on keep on repeating it to an extent that the whole process becomes automated, okay.

So it is nothing but doing it several times, several times, okay. So you over learn the thing, okay. And because you repeat it several times therefore automatically the information becomes much more automated, the whole process of recollection is automated, this is the middle of over learning. But remember over learning is too tedious an approach, okay. Let us think of the other intelligent options. Mnemonics is another interesting method.

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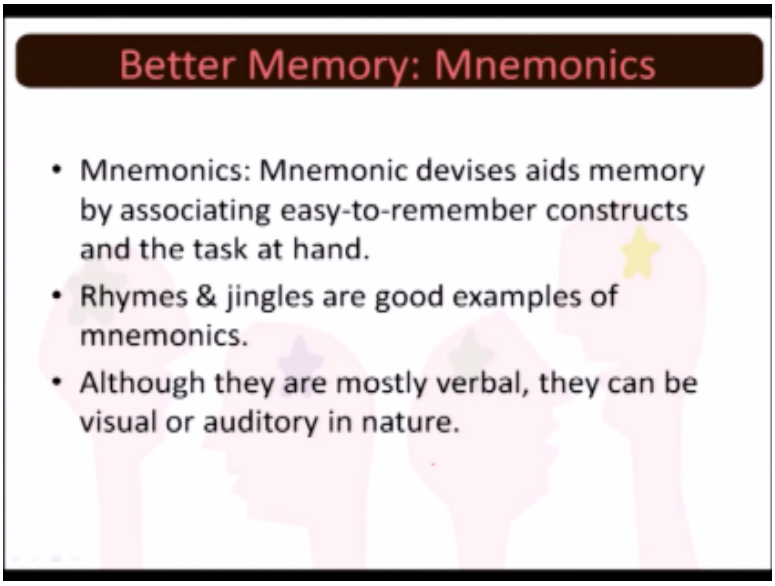

Mnemonics devices they basically aide our memory by associating easy-to-remember constructs, okay. And the task at hand, the best examples of Mnemonics is, rhymes and jingles. I cannot give you a very good example other than no repetition of a rhyme but I can share one interesting experience with you, during my student days I had a friend in philosophy and he would memories the entire book just by no attaching it.

And what you called putting and fitting the theories hardcore philosophical viewpoints and theories into nursery rhymes, okay. So if you remember jingle bells jingle bells jingle all the bell all he would do is, that big, big theories would be no put into such rhymes and you just recollect the rhyme because you already had memorized it and now big theories can be retrieved using those cues, okay.

Although no Rhymes and Jingles are mostly verbal you can think of a visual and auditory formats of rhymes and jingles.

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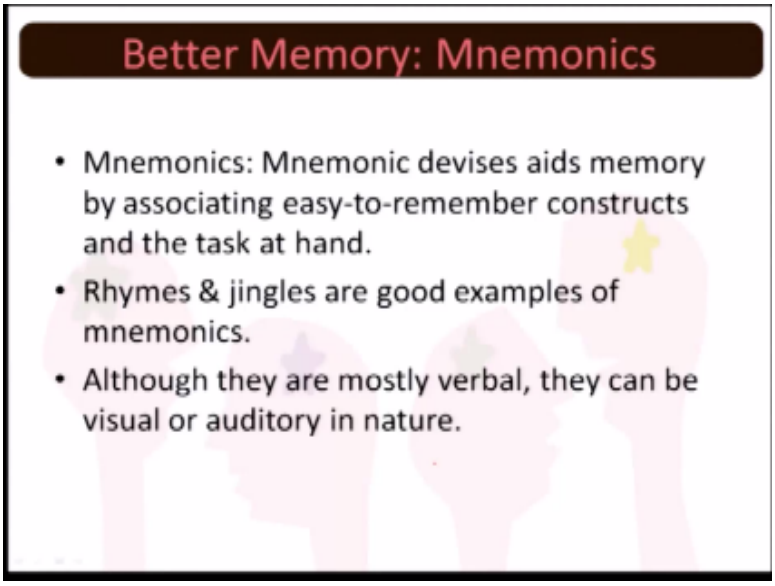

We saw this very example. Now at that time we were no looking at this very example with respect to how the mother recollects the episode of how her child used to sing this very song. But now let us replay the same video and see how the child learns the rhymes. Look at the clip to see an actual attempt by a child to memorize a poem.

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Now two methods we have discussed no? Either you over learn, or you have already memorized no some rhymes and Jingles. So you convert the new information into rhymes and jingles you embedded over the existing rhymes and jingles and you will have a better memory. The third format that can again you know enhance your capacity to store information is, the method of locus. Now what happens here is, that you have already a memorized space, okay.

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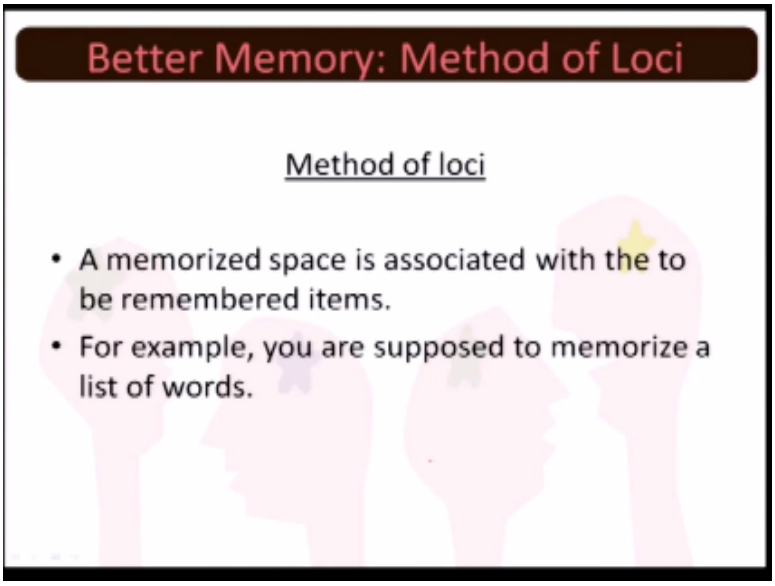

Say for instance no your college building your school building your office, okay. So you have a walk through you know how no, where to enter how to move, how does the corridor move ahead, what leads to where and so forth. And now once you have the memory of the space all you have to do is, that you associate it to the new information that you are supposed to memories, okay.

So say for example if you have a list of words with you that you have to memorize, all you have to do is, that you associate it with the space that you have already memorized. Now the prominent places in the building the gate, the corridor okay, the first door, the brown door, the green down likewise, so all you do is that you now undertake a mental walk through and when you, now take the mental walk through.

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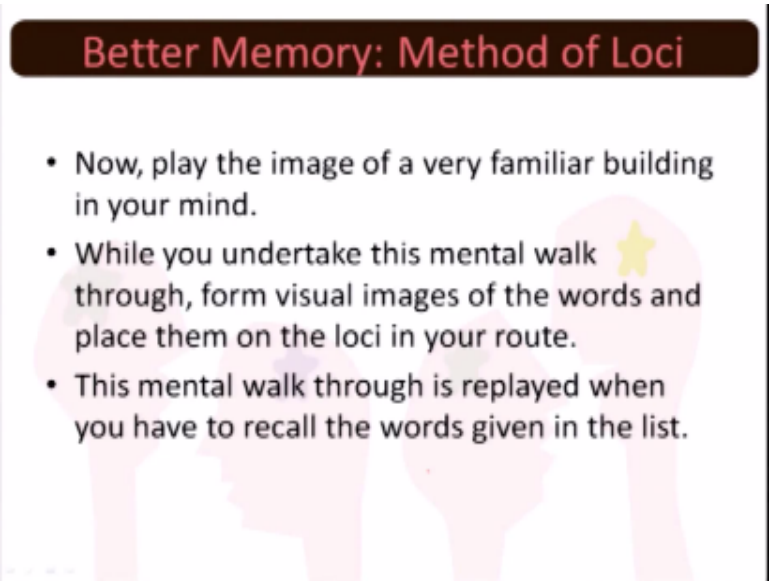

You from the visual image of the word okay, and all you have to do is, that in that very mental walk through you keep on locating these words okay, the their visual images, so that next time when you have to reconnect all you have to do is, that you have just walk through that very space okay, and in this process of mental walk through the second time okay, the moment you see the main gate you remember what was the word.

Green Gate, brown gate the left turn, the right turn whatever significant land marks that you have know identified okay, all those significant land marks on the mental walk through is now associated with the visual image of the wall, and that would help you a lot. In fact the person who holds the Guinness book of records for the best memory ability okay. If you see him performing in the experiment all he does is, that he uses this very technique. And the last method, that can be used to increase memory is, what is called as number peg technique.

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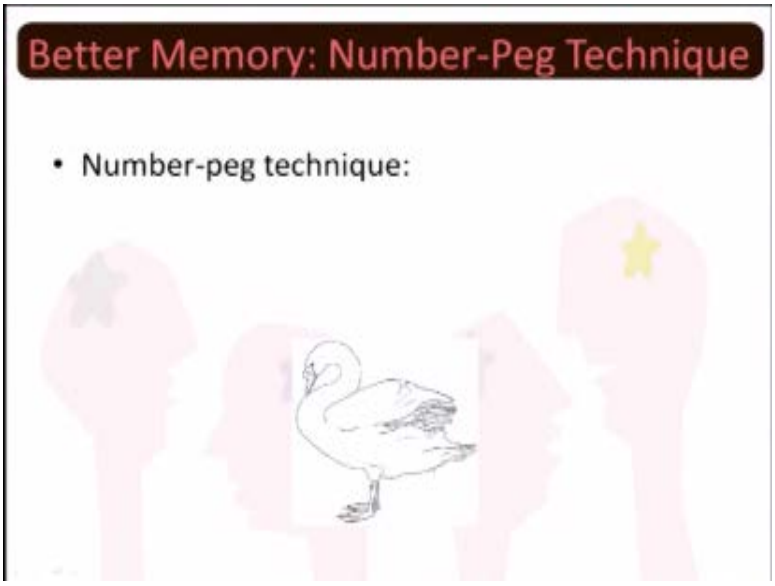

Now number peg technique is a very interesting technique, you have information given to you and this whole piece of information all you have to do is, that you have to convert it into number okay, those numbers are and then further linked in the form of a story and then you memorize the story you remember the whole information okay. Look at your screen.

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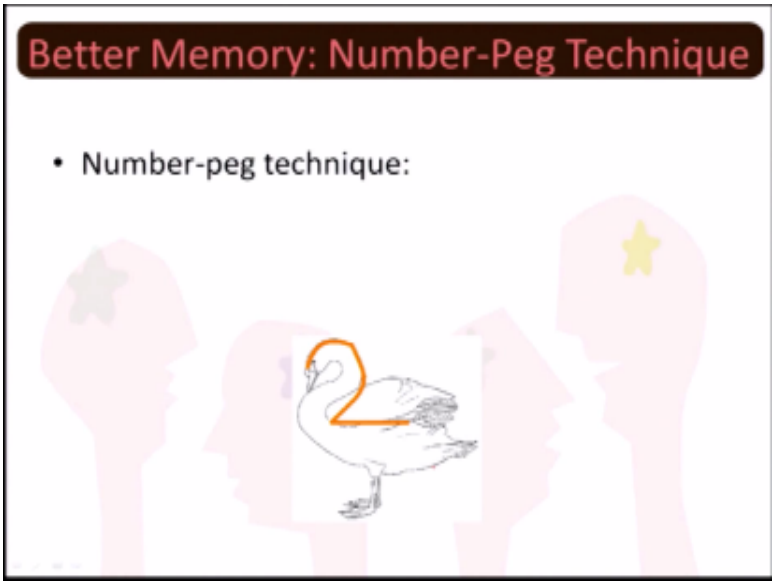

You see a swan okay, and then you can now made out know that there is an actual mental image that you already carry, and that mental image now you have converted into two, so likewise all forms that you have already with you, in your memory system, you can convert them into numbers okay. And more know rhyming you make it the better you would succeed. Now let us take an example, I ask you to memorize a number okay, and the number is 359924.

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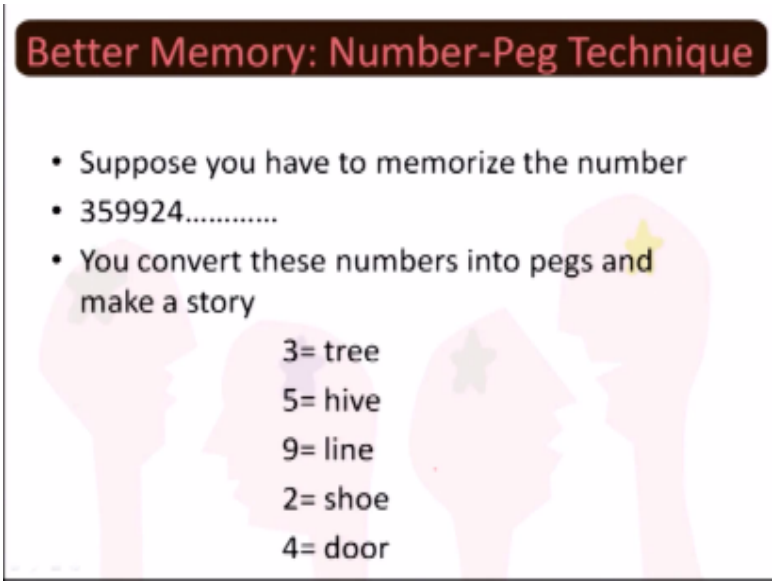

This is the number that you have to memorize and this might know, continue, you remember we have done this exercise when we were going to chunking okay, where we said, that you break the information if the chunks of three or in the chunks of four, and this is how you enhance the capability of your short term storage. Right now, we are talking about number peg technique and imagine that this is the number that is given to you and you are told it, you have to memorize it.

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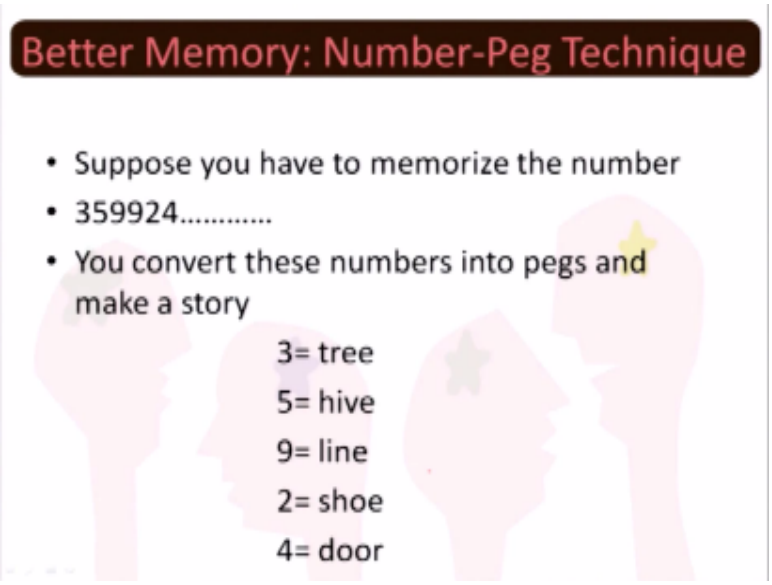

359924, and this might continue, now convert these numbers into pegs and then construct a story, so 3 the rhyming word would be tree, 5 the rhyming word would be hive, 9 line, 2 shoe, 4 door okay, so these are basically know the rhyming words and what you do now, is that you simply now convert this numbers into pegs and then you make a story.

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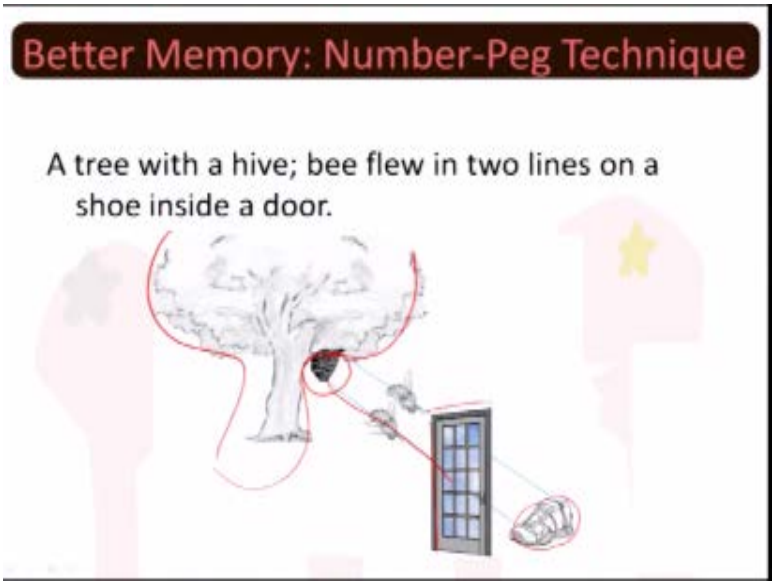

Now you look at this image, 3 tree okay, so all you do is that you have now made a tree here okay, so this is 3. 5 is hive okay, 9 is line, 2 is shoe and then 4 is door okay. So let us again now look at this story, the number that was given to us was this.

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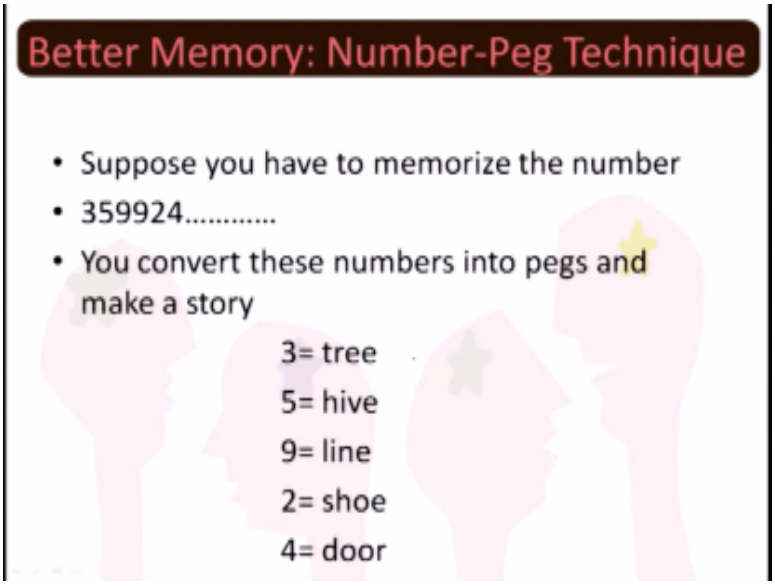

359924 okay.

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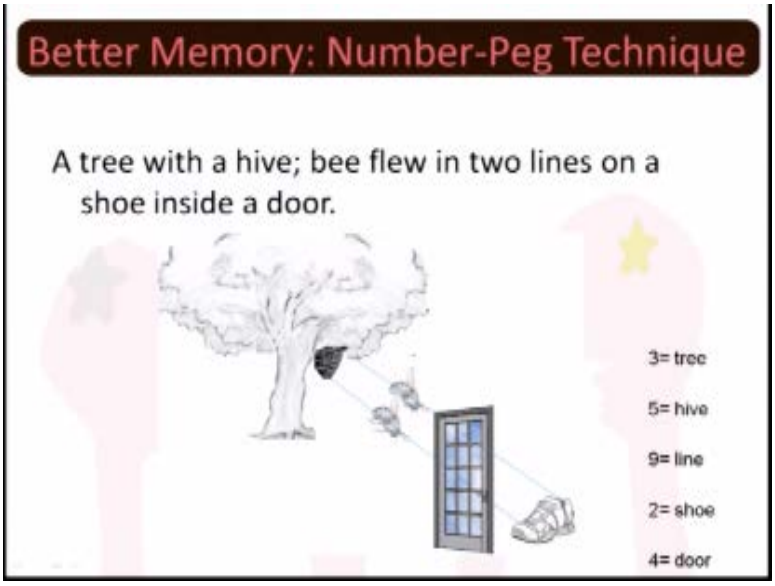

So 3 was tree, so you have made a tree, 5 was hive you have added a hive to the tree okay, because there was double 9 therefore, you have drawn two lines and all you are now visualizing it that from a tree, 2 bees from the hives they are entering to the door and then going to shoe. So a tree with the hive bee flew in two lines.

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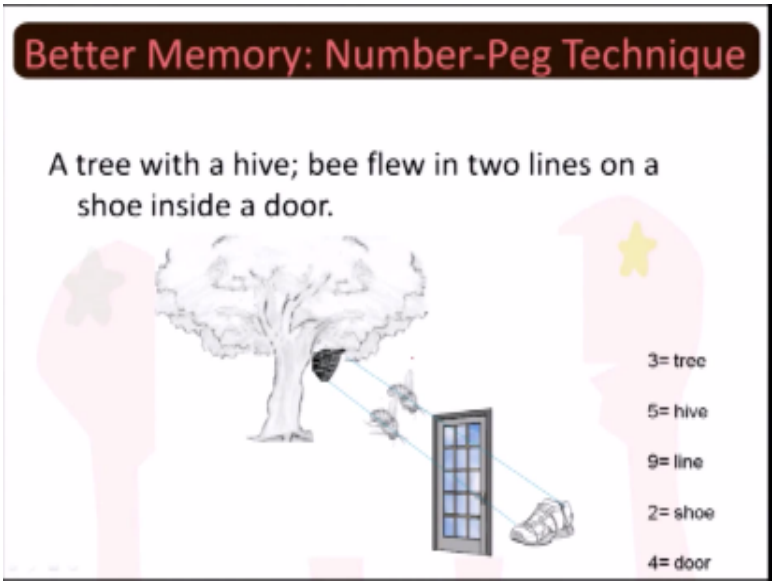

On a shoe inside a door okay, so all you have to memorize know it is very easy to visualize a tree with a hive two bees know following a straight line entering through a door and then entering into a shoe, this is called number peg technique know. A bigger chunk of information okay, what you do is these numbers are converted into pegs and these pegs are further attached together to convert it into a story.

This creates a mental image which in turn will help you recollect the number very fast okay, so this is called number peg technique and with this we have come to an end to our discussion on the topic memory, just to summarize we talked about the three structures of memory, the sensory, short term and long term memory okay, and in long term of course we devoted to much of time to understand different, different formats of a long term storage okay, semantic memory, we talked about episodic memory okay.

There also we classified know that eye witness and flash bulb could be two such important different distinct type of memories okay, and then we came to the procedural aspect of the life that we memorize know, you saying that memory can be divided into procedural and declarative

memory, what is also called as explicit and implicit aspects of memory, and the we talked about forgetting and now we are finally concluding our discussion on memory trying to understand that there are possible techniques of enhancing the overall ability of an individual to store more and more information using intelligent techniques such as method of locus or number peg technique.

When we meet next we will talking about a new concept and that new concept would be emotion, so we started with sensation, perception, learning memory, and we would be coming to the, one of the most significant attributes of human beings, that is human emotion that would be our next series of lectures.

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