

Memory
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Lecture - 23
Semantic and Lexical Memory- I

Hello, I welcome you all to the lecture series on memory. Today, we are going to extend our discussion on semantic and lexical memory. Previously, we discussed episodic and semantic memory in detail, and we learned about the role of autobiographical memory, the nature of autobiographical memory, the role of episodic and semantic memory, and the neural structures that assist in semantic and episodic memory. When we talk about semantic memory, it is very important for us to understand, as it involves the meaning of stimuli. The meaning comes from the perspective of language, and language has two aspects.

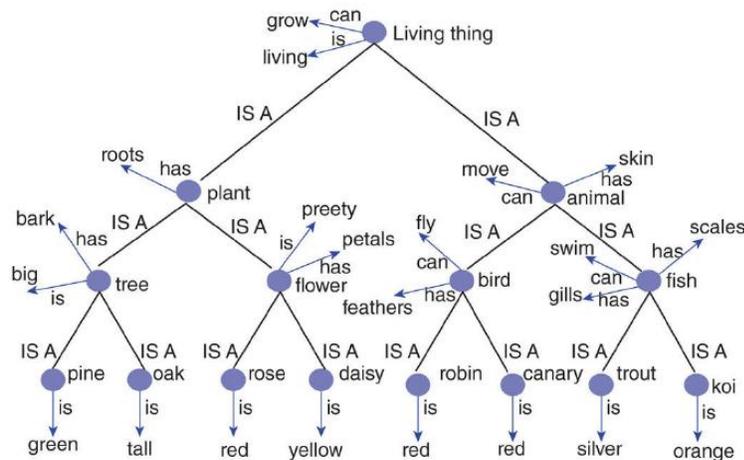
The grammar rules, which are the lexical root, and non-grammatical rules, which are also part of non-verbal communication. Now, when we talk about semantic memory, we have to understand the lexical roots or lexical processes that aid in the formation of semantic memory along with episodic memory. So, if you define semantic memory, it is broadly defined as general knowledge of the world. General knowledge of the world which we acquire, experience, and consolidate over a period of time.

When we move from the north of India to the south of India, or from the east of India to the west of India, we experience and consolidate a lot of experiences, cultural differences, cultural variations, and neurodiversity in our memory system. This semantic memory is supported by a separate neurocognitive system. When we refer to this as a separate neurocognitive system, we mean that it is different from the episodic memory system. Now, understanding this, one thing is very clear: the two types of memory may have distinct neural structures. There might be some similarities, no doubt, but at the neural level, they have very distinct and unique neurocognitive architectural frameworks.

This distinct neuroarchitectural framework depends upon the different types of other cognitive systems. So when we are talking about the other types of cognitive systems, then the attentional system and perceptual system play a major role in such tasks. And this is why decision-making, problem-solving, and reasoning skills all vary in an individual, even when two individuals are sharing a similar world, environment, scenario, or context together. This episodic memory has a temporal dynamic to it, which means

that it is dependent on the time framework. Time is an important attribute in the case of episodic memory, and the important feature related to retrieval from the past plays a crucial role.

So from the past, when we are retrieving information, then this is dependent on the temporal time frame. Some time frames make it easy for us to recall, while others make it very difficult for us to recall. In the previous lecture, we understood that some types of information, such as emotional information, assist in retrieval and also allow for robust processing over long periods of time. So if the nature of the information is emotional or if it is aversive in nature, these types of information get stored and consolidated in a system for long periods of time. See, the part of semantic memory we attribute, the attribute of retrieval, is the truth about the world, the facts, and the figures, which we have been discussing in the previous lecture as well. So when we are talking about such facts and figures or when we are talking about events, like when we used to play football in our school and we were awarded, the awarded event is personal to us and is very dynamic in nature. which we retrieve from time to time.



The blue circles represent concepts and the blue arrows represent "is a" relationships between concepts. The black lines represent feature relationships of the concepts.

Source: Adapted from Collins and Quillian (1969)

So, semantic information, when it is holding information about the world, we could understand the nature of the information, the complexity of the information, and the diversity of the information, which also decides the consolidation of the semantic information. So, when such aspects are there, we would like to address the issue of lexical memory, the memory associated with the lexical processes, which is the grammatical processes, the grammar rules that are being followed in the language. Now, in many cases, you know, people have been talking about how lexical roots or lexical

memory or lexical processes seem to be dominant. It should be noteworthy here that this is not the scenario. The lexical root is being studied heavily.

However, the non-lexical root is also being equally studied in the domain of memory processes. Now, when we are talking about the lexical and non-lexical, as a reader and as a student, you have to understand when the grammatical rules are being followed. When the grammar rules are being followed, then we address the problem of lexical processes. The lexical processes are talking about the grammar rules, the syntax, the nature, verb, object, subject, verb, object, positioning. Mostly, you may have seen this type of problem.

Abbreviation when people have been talking about subject, verb, object or subject, object, verb. The subject generally comes at the beginning. So, this type of nature we generally tend to follow in the lexical pathway. So, any form of literacy or literate And when these studies are being conducted in the area of memory, you know the information needs to be consolidated, the information needs to be experienced, recall is because recall is required, retrieval is required, and

In this case, the list of words, non-words, and pseudo-words is being given. In this case, when the words, pseudo-words, and non-words are given to the participants, it is very important. As a researcher, it is important to ensure that the participant is able to understand the meaning of the words and should be able to distinguish these words from the non-words or the pseudo-words. Now, when we are talking about such a rule, definitely literacy comes into play. Individuals who are registering, encoding, and storing these lists of words should have a clear understanding of the language and its processes, as well as grammar and its processes. Then, in those cases where the list of words or the distinction or discrimination between the words and the non-words is not required, we tend to do a study which does not involve literacy but a non-lexical pathway grammar without the grammar rule, which should be there. So, in that case, we generally do a matching task, and in this matching task, we use the visual matching task.

The visual matching task is there. A visual search is there where an individual has to search for an item among a list of many items. So, if I say here, so many cartoons are there, among these different cartoons, if I say a girl with a ponytail or a boy with an orange shirt. Such information is visual in nature and doesn't have to follow a lexical route or lexical pathway, as you can see here. However, if I give you information related to a grammar rule, or information related to some meaningful information such as a 3-

month-year-old child, a 5-year-old child, or a 3-year-old girl, then following such information, you try to do the task.

Now, when we are talking about this type of lexical memory or semantic memory, they have a direct route, or declarative memory is there. So, they tend to follow this consolidation, the type of long-term memory which is declarative memory. The other nature of memory, the other types of memory which we discussed previously, was the non-declarative memory. We didn't discuss non-declarative memory, but in some instances, we have been taking their examples. So, non-declarative memory is any memory that can be verbalized and includes both episodic and semantic memory because declarative memory is divided into two types of memory. We have discussed this thing earlier also.

When we talk about lexical memory, it is related to the concept of semantic memory because, as I said, it involves meaning, it involves concepts, ideas, schemas, meaningful information, and also the grammar rules that have to be followed. That is why lexical memory has to be part of it. So, lexical memory refers to the memory system where words and other linguistic entities are stored. When we talk about other linguistic entities, one has to understand that we are not only limited to grammar rules, but there might be many more things. So, one such example is meaningful sounds, meaningful objects, and meaningful words.

So, you know, phonemes, graphemes, and morphemes are extensively used in language, which can be part of it. Linguistic entities, if you talk about them, then the subject, verb, and object also become the elements of linguistic elements: subject, object, and verb. So, the meaningful items provide assistance to semantic memory. When they are meaningful in nature and when they follow grammar rules, it becomes easier for an individual to remember and keep information about their environment. We study these grammar rules from childhood, and as we progress, as we grow older, we tend to use these grammar rules.

So, if there is any anomaly in If there is any discrepancy in the grammar rules, then the sentence, the information becomes ambiguous in nature, and in that case, once the lexical root is failing, once the lexical axis is becoming interfered or disrupted, then the lexical memory is getting compromised. When we talk about these lexical root words, non-words, such distinctions require a repository, a mental repository that contains the words where recall, retrieval, and recognition can all happen. And that is why this mental

repository, after encoding and after storage, we tend to put all this information into this repository. This repository is a mental repository called a lexicon, which is a mental dictionary.

So we actually have a form of mental dictionary within us. So if you talk about the mental dictionary in different age groups, you could see that a 3-month-old cannot have a developed mental dictionary. Only the behavioral pattern can be seen. Language is not present at all. People start, the kids, the infants start to babble, and after the babbling, the production of speech begins after 1.5 years.

So you can see that in 18 months, 5 to 40 words are present. Though in some instances, kids after 1 year can come up with a few words like mama, papa, but as they grow older, they come up with more basic words like food, water, poo, bath, etc. Then, at 2 years, 150 to 300 words; at 3 years, 900 to 1000 words; at 4 years, 20,000 words; at 5 years, they identify letters and create sentences, and as we grow older, it is noted That a fully grown person has a mental lexicon of one lakh words.

Now, this one lakh words, more or less, depends on the association, networking, modeling, the weightage, the familiarity, frequency, and dominance. Many other parameters are there, and also, as we said, much information does not require the lexical route but may also require a non-lexical route in that scenario. So, this number may vary from subject to subject. What is the capacity of the mental dictionary? It could be roughly around one lakh words that one can keep information in.

Colin and Quillen in 1969 were more curious to understand how this mental repository actually works and what the need is, what the attribute this mental dictionary should be looking for so that it can expand itself and remember when the mental dictionary is having. When you are having lots and lots of experiences, when you are having more information about the world, your mental dictionary starts to expand and expand and expand. The more you use your, you know, the more you experience, the larger your mental dictionary becomes. If you are multilingual, then your mental dictionary will definitely be bigger than that of monolingual individuals who are speaking one language compared to multilinguals who are speaking more than two languages. When we talk about the hierarchy, Colin proposed this interesting hierarchical network model, and he said that

Our mental dictionary or mental repository depends upon the hierarchical network. And how deep this network is, how far this network goes, and how connected this network is

depend on many other parameters. This type of networking model, which Colin proposed, if you remember in the long-term memory, we were just talking about the non-declarative memory. This non-declarative memory, we were having the associative memory. Now, associative learning and memory is a very established concept and idea.

We discussed this with respect to Pavlovian's dog conditioning experiment where the dog started to associate the food with the bell, with the researcher, with the context, with the bowl, with the smell, and all these associations; any one of these associations or activation of one of these networks can trigger the other network as well. So if we talk about this associative model, as you can see, information is represented in semantic memory terms in terms of connections among the units of information. So there is a network which you are seeing on your screen. So if we are talking about a living thing, then when we talk about the living thing, we say what the living things are.

So, a living thing could be an animal or could be a plant. So, a plant is a living thing, and an animal is a living thing. Then we talk in detail about plants. A plant is a tree or a plant is also a flower. In animals, we talk about how animals are of different types.

So, a bird also belongs to the category of animals. A fish also belongs to the category of animals. Now, some of you may say that this animal category could have been further divided into mammalian and non-mammalian animals. And then further down the mammalian and non-mammalian categories, Then we would have been given this classification.

So, understand one thing: this networking, which you are seeing here, the hierarchical networking model, is different for different individuals. It depends upon our understanding, it depends upon our categorization and discrimination. So, my perception of the world will be very different from your perception of the world. Perception is just, you know, getting the meaning attached to the incoming sensory information in an orderly fashion. So, when we are doing the ordering, then the ordering can be based on subjective experiences and subjective understanding and knowledge.

So here the classification may be at the beginning. I am not adding the mammalian and non-mammalian categories, but after a few years, I may even bring more categories to this, including the mammalian and non-mammalian categories. If we talk about the plant, then we have said that it could be a tree, or it could be a flower. Now, when we talk about the tree, then we know it could be a pine tree, or it could be an oak tree, or it could be a

mango tree. It's as simple as that. So when we talk about the mango tree, the mango tree is also green, the pine tree is also green, and the oak tree is tall.

Then we can also think about where these mango trees, oak trees, and pine trees are growing. If we talk about this, then we could say mango in Uttar Pradesh, pine in Uttarakhand, oak in a different place. So this distinction which we are making, we are associating. You will see that each of these ideas and concepts is actually branching out.

Branching out in different directions. So one branch is saying that living things grow. So generally, anything which is growing is a living thing. In that case, there are living things and non-living things also. So here what we are saying is only about the living things.

Non-living things also grow. The question is no. So that is how the association and networking are built up. Then we talk about living things. Then we come to plants.

So, plants have roots. Animals don't have roots. Animals have legs. Animals have skin. Animals have eyes.

Plants do not have eyes. So, such extension, such elaboration seems to happen, and the association is happening in several directions. As you can see here, the birds have feathers, and fish have gills and scales which help in swimming. So, when we talk about fish, we talk about trout fish or koi fish. Trout fish are silver in color, and koi are orange.

This you can also extend it and then you can say rohu fish or many other types of fish, which are, you know, based on the context. When we talk about the context, then you add another concept here, which is the nation, the country where it is available or not. So this is how, you know, these things are there. So when we see the blue circle represents the concept, the blue arrow represents the 'is a' relationship between the concepts. This arrow, which is being connected, or this is, we are calling it a connection.

And if this connection is active, or this connection is active, we tend to give it a weight. Now the weight could be 1, or the weight could be 0. Now, if I am saying, 'Please tell me a living thing which has a gill and can be found in water.' So, then a living thing which has a gill. So, this is, this has to be a fish.

In the animal category, birds do not have gills. Birds have wings. So, this selection, when we are talking about, so from living thing to animal, you have a weight of one. And when we are talking about the gill, so animal to bird, because it is not, birds do not have gills, so we weigh them 0. This node becomes inhibitory.

And then from animals we move to fish, because fish have gills, so we weigh them as 1. So the circuit which is excitatory, from here to here it is excitatory, we give it 1. But the circuit which is not excitatory, which is not required, that circuit becomes inhibitory. And this inhibitory circuit, we give it 0.

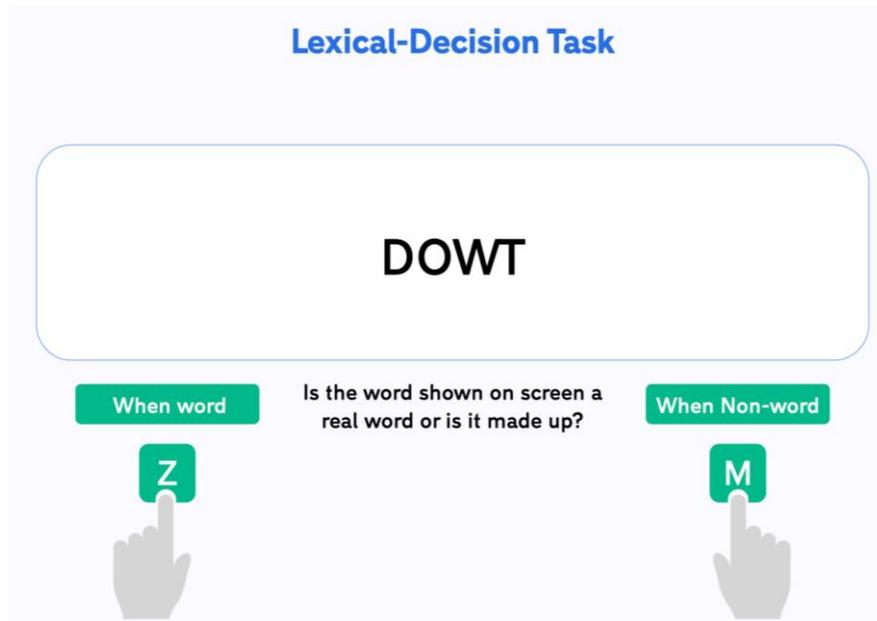
So this is how the weighing is done, and then the nodes, the meaningful nodes, the bifurcation keeps going on and on, and then we, this is how we do the excitatory and inhibitory coding in the hierarchical network model. It is splitting activation when we talk about this activation from one node to the associated node. So from this node, this point to another point, this point or this point. So, if this A is being bifurcated, then A1 and A2 is how the activation is spreading again and again, and that is why earlier also we have been talking about this concept and idea that if we try to inhibit the information here.

We try to completely, because this network is inhibited. If we try to completely inhibit this network, then the information related to the birds, see, the network, these networks, these networks will also be inhibited. And further down the line, if these networks are again projected further down the line, so this inhibition, this root inhibition is one thing, but the node inhibition is another thing. The root inhibition when the root is inhibited does not mean that the information is going to be blocked or interfered; there is always an access to it that is not activated, but in a while it will get activated. But when the node gets blocked or interfered, damaged, impaired, or dysfunctional, then the information from these two will not reach this place to move further down the line.

So the idea of inhibition and excitation in neural networks plays a major role and gives us an understanding of how the projection, how the networking is formed. If we talk about a lexical decision task, the lexical decision task, as the word itself suggests, is a decision made based on grammatical rules or principles. If grammatical rules and principles are not followed, then the lexical decision-making task is incorrect. So, here when we are talking about the lexical decision task, semantic priming is present. This means something you are already familiar with, the meaning of the information or the information you hold onto, is used to prime you.

And if that situation exists, then your response will be better and faster. If you remember when we discussed earlier, we were talking about the cues, the visual cues, auditory cues, tactile cues, and so for a blind person, visual cues cannot be relevant. So visual priming of these cues may not be relevant because these blind individuals cannot see. However,

when these individuals are primed with tactile cues, their performance has been observed to be better.



Source: <https://www.testable.org/experiment-guides/language/visual-lexical-decision-task>

Similarly, we know that if the processing of a related word or idea is present, then we tend to perform better. So the similarity between the two meanings, you know, many times when we say, like yesterday, earlier we were discussing categories. Different categories were present. There is a fruit category. There is a vegetable category.

And then there is a profession category. So, if we are talking about semantic priming, if the list of fruits is being shown to you and then you are asked if you have seen, recognized, or recalled any of those fruits, then before any of the target fruit categories are presented to you, you are being primed with some other fruits which are not present in the list. In that case, your retrieval becomes better and better. So when the list of fruits includes mango, orange, apple, and grapes, just before these fruits are presented to you, you are being primed with a fruit like papaya. So the moment papaya is shown to you briefly before the presentation of the target words or that target stimuli,

you tend to respond quicker. So, a related word will activate a target item and allow it to be processed quickly. Then, the lexical decision task is a cognitive task in which

participants judge whether a string of letters is a word as quickly as they can. How they can, you know, judge it. Is it a word or is it a non-word?

So, here you can see. The person has to press a key. When it is a non-word, they will press a key. Instead of D-O-W-2, if it would have been down and down, these are words. The moment they see such words, they have to press a Z button.

Now, you know the positioning of the Z and M. It is quite far. So, the chances of confusion in pressing the buttons, word for the non-word and non-word for the word, should be avoided. Young adults can make these decisions in under half a second, which means that 500 milliseconds is enough for young adults to answer, but for the elderly and young kids, it may be a little bit more. Another aspect is the nonsense string, the string which doesn't have any meaning to it. So, you can see on your screen XFF and XER. So, this does not have any meaning.

So, the idea is that nonsense strings are easier and quicker to reject than possible but not employed in the non-words. The nonsense string is easy to detect, but we still have a preference over the nonsense. Sensible words, meaningful words, and the words which are easy, which have high frequency, dominance, and familiarity. More common words such as 'doctor' are easier and quicker to verify than the obscure word, in what scenario, in what context. So, such as if the word 'doctor' is being presented to you, hospital, medicine,

All these are related words. But these words are being primed with 'nurse.' The moment the word 'nurse' comes to your mind, then you start anticipating the associated words. The anticipation of associated words with 'nurse' goes with 'doctor,' 'hospital,' and 'medicine.' Unlike the word like 'jeuni' or anything else.

Let's say if the priming word is not 'nurse,' but the priming word is 'ball.' Then we will see doctors do not play with a ball. In a hospital, you cannot play with a ball. Playing with a ball is not going to provide us with medicines. Okay, so this semantic priming seems to

you know, give you help, provide you with an aid in the anticipation of the target words. As you can see on your screen, the target word is 'doctor,' and the related priming word is 'nurse.' So, when 'nurse' is presented before 'doctor,' 'nurse' provides a context, 'nurse' sets a scenario in which the participant understands the following word has to be associated

with 'nurse.' However, when a word like 'gumball' is presented before 'doctor,' then this is an unrelated priming. There is no relationship between 'gumball' and 'doctor.'

If we say 'gambling,' then 'gambling' is also an unrelated word to 'doctor.' 'Sketching' is an unrelated word. 'Cooking' is an unrelated word. So, when these words are used as a prime, the target word will not be 'doctor.' For 'cooking,' the word would be 'chef.'

Gambling, gambler. Sketching, artist. So, the participant judges if a string of letters in a word is preceded by a prime or not. A related prime produces faster and easier processing of the target word.

So the moment the target word is given to you, the moment the priming is, the prime words are given to you, you start anticipating. And because of your anticipation, the process becomes faster and easier. Priming can cross languages. So what has been seen, priming does not depend on the language itself. But it can trigger.

What does this mean? So we call water. We call paani. We call panni, we call agua, we call vasar. So what does all this mean?

All of these words mean water. So priming can cross languages. If I say vasar, it will activate all these words. If I say pony, it will activate these words. Then the priming is subliminal priming, where the participant is not consciously aware of the priming.

How does this work? All of you may have seen a Formula One racing car. In the Formula One racing car, Ferrari, you may have seen at the backside of the Ferrari, at the tail, there is a barcode. This barcode, what does it indicate?

This barcode is actually a subliminal message about the Marlboro cigarette. So the smokers, the moment they see such a symbol, which is subliminal in nature, not everybody knows Marlboro. Only for those individuals who are familiar with this sign and symbol, their sensory system will detect, and their perceptual system will assign the meaning to this subliminal message, which is hidden, which is present there in the environment. But those individuals who are not familiar with this sign and symbol may not get triggered by the presence of these stimuli. But the smokers get triggered, and then they go to the smoking lounge, smoke 2-3 cigarettes, and then they come back.

Because sports do not promote substance abuse, alcohol, drugs, smoking, etc. So Marlboro cannot directly advertise it. So Marlboro uses subliminal messaging techniques to encourage their customers to use their products. Now, this is a subliminal message

where the participants are not consciously aware of the prime, but the individual who is familiar may take action. Okay, semantic priming can also serve as a marker of certain neurological impairments.

What does this mean? That it can be an indicator that there is a certain impairment. When we discussed the case of Henry Molaison, when we discussed the case of SM, when we discussed the case of KC, we discussed these neurological impairments. And in these neurological impairments, we were talking about the markers that these people were giving. Like in the case of HM, we understood that he was not able to form new memories.

But his old memories were intact. Similarly, in some cases, we observed that she lost the ability to feel fear entirely because of a rare genetic disorder, hypercalcification happened, and both her amygdalae were removed, permanently gone at a very young age. As a result, she does not have a fear response. However, She has the sense of fear, the self, with self-understanding.

And we have been talking about this self-referential semantic memory, which is a part of autobiographical memory also. So, these types of neurological damages, these types of behavior patterns indicate that there is some sort of neurological impairment present. So, if someone is not able to process semantic priming, then there might be some sort of neurological impairment, and this particular form of neurological impairment we call anomia. This anomia is a condition in which persons find it difficult to choose the correct word in a given context.

So, such things people have seen. So, if the association, as we were telling you about, when the priming is being given, the prime word is given to them, then it becomes a little challenging for them to anticipate what could be the target word. Okay. So, when we have talked about this aspect of priming, semantic priming, let us spend some time on this sentence verification task.

What do we mean by this sentence verification task? We, as individuals, try to encounter thousands of stimuli every moment. When we are encountering these thousands of stimuli, we ensure that the incoming sensory information is correct or incorrect. So, here participants are being asked to decide as quickly as possible whether the sentence is true or false. Sentences reflecting the close link between the nodes will be verified faster.

So, earlier we were talking about the living, which we divided into plants, animals, and then further down the line, we divided fish. And the birds, and in the plant, we said trees, flowers, and so on and on. So, reflecting closely linked to the nodes will be verified faster. The nodes, this node is closer to the plant rather than when we talk about the branch. Teak, timber, potato, bacteria, potato can be divided into two: sweet, tasteless, tasteless is divided into two parts, rural, urban, sweet can be divided into two.

So, if I have to connect the living thing, this node is near. While if I connect, look at this node, sorry, if I look at this node, urban, tasteless, and urban with the living thing, this node is very far. So, the node which is near will be retrieved quickly, quicker, fast, but as the information is down, it will take some time to be verified, it will take some time to come back. Now, reflecting the distantly linked nodes, activation can be spread from one node to

to a nearby node faster, then it can spread to a more distant node. What does this mean? When the living thing is sending a node from the living thing to the plant, to the animal, birds, fishes, this networking is faster, way faster than the more distant one, this one. These networkings will take some more time. What does this mean?

Let us take an example. Tigers have stripes and tigers have lungs. So, tigers have lungs, kidneys, stomachs, and also tigers have the black stripes. How do we see the tiger? We do not.

We know that animals have lungs. All animals have lungs. But we also know the attributes which these animals, the birds, the fish, the flowers, the trees, there is a unique attribute attached to each and every species and to each and every plant. So the unique characteristic of a tiger is its strength. The unique characteristic of a zebra is its white stripes rather than black stripes, you could say.

Tigers and zebras have black stripes. So, when we talk about these stripes, this is verified quicker because these are the unique characteristics. In order to process that tigers have lungs, It seems to be a little far down the line. So, here also when we see a living thing like a fish or living things like animals and plants.

That is nearer. That is quicker. Then the living things are fish, birds, and even in fish, if we talk about tuna, then tuna has gills and further down the line. Okay? So, the gills are very far from the living. But the animal is close to the living. So there is an advantage over the distance. Something which is close, people can recall better, retrieve better,

recognition becomes better. But when they are very distant, then it becomes a little challenging.

So closer association leads to further verification, faster verification time versus the nodes or the items which are way far away from the central point. Areas of the left frontal lobe and the left medial temporal lobe were particularly active during the sentence verification. If the sentence is correct or not. So, such verification requires the left prefrontal side and the left medial temporal side.

The left side of the brain is the logical brain. For such verification tasks, logic is required. As a result, these brain regions seem to have priority or preference over other brain regions. When we talk about the world, when we talk about lexical memory, The memory can be stored following grammatical rules.

However, it can also be formed based on generalized knowledge about an event, a person, or a situation, which we call a schema. So, there are schemas, which are generalized knowledge about an event, a person, or a situation, and this is in addition to the script, which is a learned sequence. They provide assistance in the form of semanticity to the memory information, and both of these concepts aid the semantic memory, which ensures the robustness of the information in the semantic memory for a long period of time. So, when individuals are forming a memory, they generally make a general layout of the information. So here, schemas and scripts are well-learned patterns that organize information in memory.

We discussed this in perception earlier on several occasions, that perception is categorizing the information. So, based on schemas and scripts, the information is being categorized, formed, and stored. A schema is a pattern of collected information about a particular topic. So, we have seen this earlier about living entities. So, we have a schema about living entities.

Living entities could be animals or plants. Animals can have a schema and several categories, such as two-legged animals and four-legged animals. What is the distinction between two-legged and four-legged animals? Scripts are well-learned sequences of events that are associated with common activities. If you go to a restaurant, you sit and call for a waiter.

There is a script. When going to a restaurant, there is a required script. You sit at a table or look for a table. Once you find a table, you order food. Once you have ordered food, you eat, pay the bill, leave a tip, and then move to the next script.

What is the next script? After having a nice meal, I will head to work, and after finishing my work, I will head home. After reaching home, I will play with my kids. After playing with my kids, I will go to bed. The next morning, my similar tasks will begin again.

All these actions and tasks which one is executing are a well-written script and a well-learned sequence by an individual. In this script, from time to time, from context to context, we make some modifications. Once a schema is formed, it is useful in encoding new information. Schema about a living thing, schema about fruit, schema about vegetables, schema about profession. So this schema is a backbone upon which new information can be associated.

So Brewer and Trezn in 1981 did a very simple experiment to understand in what scenario schema helps and in what scenario schema doesn't help. And is schema really helping an individual in the encoding process, in the storage process, and in retrieval? So they did a very simple study where an office setting is used and in this office setting, some items which you can anticipate should be present in the office were placed. In addition to those office items placed in the area, some violating items and irrelevant items were also placed. So in an office,

What do we expect in an office, in our office? We expect files, we expect computers, we expect a wardrobe with books, we expect a table, a chair, and this is exactly what you see here: a chair, a table, a rack, and books. This is what you expect. However, what is violating this schema? The skull, the bottle of alcohol, the section, the coffee machine.

And these violating items seem to be remembered better. Why do they seem to be remembered better? Because of their unique characteristics. These items are not supposed to be in the workplace setting. And because of their unique nature and characteristics, they are also going to be remembered as equally as the schema-consistent items.

Schema-irrelevant items were less remembered. Some items you will not pay attention to at all because they are not related to it. So, some people have falsely remembered schema-consistent items not present in the room. How are these people falsely remembering the items? They are falsely remembering the items because of the schema

they have in their internal mind or mental framework, and they know that these schemas should be present or consistent with the targeted stimuli.

So if the target assembly lacks those items, then the participant tries to bring those elements because of his or her consolidated experience. And as a result, there is a mismatch. As a result, they falsely remember the items because they assume these things are expected in the office setting. But what we do not expect in an office are irrelevant items. So let me summarize here quickly what we have studied.

We studied semantic memory. We studied semantic memory and lexical memory. Memory that requires a grammar rule. Memory that requires a grammar principle. Hierarchy network model.

We discussed how the hierarchy is built. And not only the hierarchy, but the projection, networking, how dense projection and networking are. Lexical decision task, how people make decisions, the factors, parameters responsible for such lexical decision task. If any meaningful item Q is presented related to the target item, then people remember better. If any semantic priming Q is not associated with the target letter, then remembrance is compromised.

We even discussed it. There is a sentence verification task. We have to verify if the sentences are correct or not. And if there is a mismatch, then processing will be delayed. We also discussed the knowledge of the world, that is, a schema and a script, required for an individual to store information easily in their semantic memory system.

Let me stop here, and in the next lecture, we will continue our understanding of episodic and semantic memory. Thank you.