The Psychology of Language

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Lecture-10
Words II

Dear students, welcome back to this 10th lecture for the course on psychology of language. last lecture, we were focusing on words and as I described the last lecture we made a shift in learning lecture from the last lecture itself. So coming lectures are more into the complex dynamics of psychology of language, up till the 9th we are looking at the primary factors or primary dynamics of psychology of language.

So, we in detail dealt about some aspects of words in the last lecture. And what we will do today will continue those facts. Now words are important why because words are the subway station or the mid station between written and the subway station for rather the spoken and written language and below it you have those constrained parts which make up word and above it you have things like sentences and discourse.

So, this is kind of a midway station, where which can be exactly a set to be as stop or as more an important aspect of language because word symbolizes something called concepts. Now it is the level of the word itself whether language takes it true form, before that it if there are constant parts which make the language but word is the most important part of it. Now before we go into today's lecture.

Let us take a little trip to the first 9 lectures of what we did. So, that we have the context setting of how we have been moving along for the past 9 lectures and are where I did this lecture. So, the first lectures, the first couple of lectures were on looking at the need for language, what is language itself and the need for languages were we discussed, what different kinds of languages are there.

We looked at the primary language system, which is the animal communication system, we looked why animal communicate the reason for it and we looked at how what are the characteristics of a language like that. Now as I discuss there, there is a difference between communication language, because language has certain fact language is more developed it can express more number of ideas with limited number of symbols, but communications cannot do that, communication can only express or transfer exchange minimum number of ideas.

So, that is one of the things. So we looked at the primary characteristics of animal communication system and from there on we looked at the human language system. So, we looked into detail the human language system, we looked at how the structure of the human language system is right from the idea of phonemes, which is the basic speech sound to how they compose to get the morphemes and further on the word, the sentence, the discourse and so on and so forth.

So, we focused on to that, and towards the end of this lecture, we were looking at the evolution of language, how language evolved. So, where did it come from, and there we looked at how are great great great grandfathers the little men's and the homo sapiens how they develop the language system, how did they develop what language is all about and we looked at several evidences which provide us the fact of how language developer or how language came from the protolanguage, the initial language that great grandfathers had.

And one of the evidences that discusses something can begin, So, we looked at how the language evolved over the ears. So, that was the first section, then we were just dwelling around now, moving on what language is all about and then we moved on in the next 2 lectures into doing research in language. So, how do we do research in language. So, we took some model systems or model questions.

And based on those questions, we evaluated the research processing language, we looked at how research design is made, how our problem is formulated, what is a problem, what is a theory, how does the research cycle moving, how induction**,** deduction process in the research cycle lead

to the theory giving rise to the hypothesis, then the observations and how the observation confirms certain results and then go and falsifying certain results.

And then going back to the theory. So using both the inductive and deductive logic, how do we go about this such plan, We also looked at what are experimental designs, what our variables and how do they play a role in doing research into language. That is what we were doing and we took up some model systems and based on this model systems, we just follow of what the ears talking about. Toward the end of the lecture we looked at certain brain areas, particularly the broca area and wernicke area.

And we looked at how these 2 areas are important for language, and what role do they play language. Other than that we also looked at some neuroimaging techniques or details about neuroimaging techniques, and how neuroimaging techniques actually reflect or help us in study language. So that is what we did the first 2 lectures. So, the very primary lectures on the research language.

Now, for any language to proceed or for any language to evolve, we have to have the way of listening it. So, we have to have a receiver and we also have to have a producer. So, some mechanism of how language is process perceived and mechanics of how it is produced in the first place. So we looked at these 2 things. So, we started off 3 by looking at how language is perceived, how do we hear.

And so we discussed the idea of how our sound waves and what our fundamental frequencies, what our overtones and things like that, and other than that he went into details about the auditory system. So what is the auditory system light and how the cochlea and vascular membrane how they are arranged and how they are connected to the primary somatosensory, the primary auditory cortex and the secondary auditory cortex and how do they actually help us hearing.

For do that we also looked at the speech stream. So when we speak, what actually happens, and that we can understand with the help of something called a spectrograph. So we looked at what

the spectrograph depicts, were when it perceives speech. And so we looked at what are phonation and things like how consonants and what are consonants and vowels and how are they represented into the speech stream.

We also looked at what is prosody and how these variations in vowels and consonants and things like Foreman's, what are sovereigns, what thinkative, what applauses, how so these are variations of speech sounds, so certain variations in a when a vowel or consonant distribution, use and what are the till what we look in detail, we also looked at that so the question there was do we perceive because since he produce sound in more or less continuous way.

So, whether sound perception is continuous, so basically how is sound and so what we found out is that the production of sound is continuous in nature. So, if it is continuous in nature, how do we perceive it, how do we listen to it and so, we looked at the idea of categorical processing and how boundaries of words and phonemes are actually developing. So, there we discussed about the foreign restoration effect how the certain phonemes if they are missing in sentences, how they are restored by the brain.

He towards the end of it, we looked at the development of speech perception, how small children develop these ideas or developed this whole way of perceiving language or listening to language. So, in detail we those we looked at all those mechanicals because the child uses to mark word boundaries, to mark phonological boundaries, to speech is continuous, how does he know where to which word is and that kind of thing.

And towards the end of the section we are looking at theories of speech perception. So, we looked at 3 basic theories, we looked at the idea of Lieberman's theory, motor theory. So, that basically says that, speech perception is basically related to the motor movements of the area which is producing speech. We also looked at and what motor theory says is that by looking at the motor area or those motor movements, the gestures which is producing speech, we can actually generate the idea what is being said.

We also looked at the general auditory framework which says the speech is not special, as it is like any other perception of sound signal by the brain and then we looked at the idea of direct realism, he says that the sound the speech on which comes to us has all the information we need necessary and so we do not need to proceed speech as such. The lastly we took an overview of how speech is produced.

So, we focused on the vocal tract and how the vocal tract produces the various consonants and vowels in English language. So, our detail into that and then we looked at a little bit into what is the broca area and what is the wernicke one area and how they are connected and the vertical and the dorsal streams, which connect these areas and how they function in detail. We also looked at the models of speech perceptions of various models, that we discuss that.

And lastly there we looked at development of speech productions how the speech production is developing children. So, that is what we were doing up till now. And in the immediate lecture before this one, which is actually number 9 we were looking at words and as I said word is important because it is a subway station or it is a main connection between the sentence and the morphemes.

So from word from speech production to speech understanding the word is the critical point which is that, so we started looking at what are words in terms of like what does word symbolize, so, what is the meaning of what as such or what is symbolism or word and so, they we looked at as word is basically is a it is a meaningful speech, sound or meaningful unit of speech, which can stand alone.

So, we looked at how words represents a certain kind of concepts and how they are represented. So, what is represented, words not only represent a certain concepts or a mental representation of it words are saved in both phonological and semantic form. So words basically how words are.

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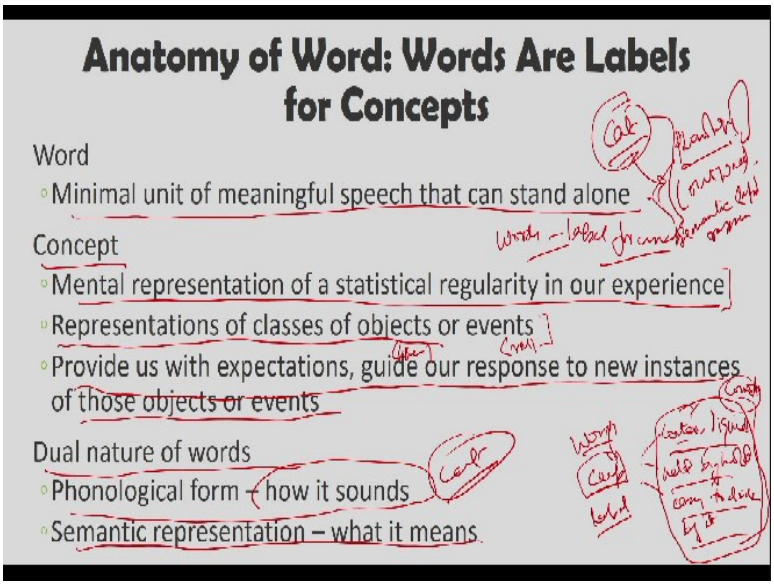

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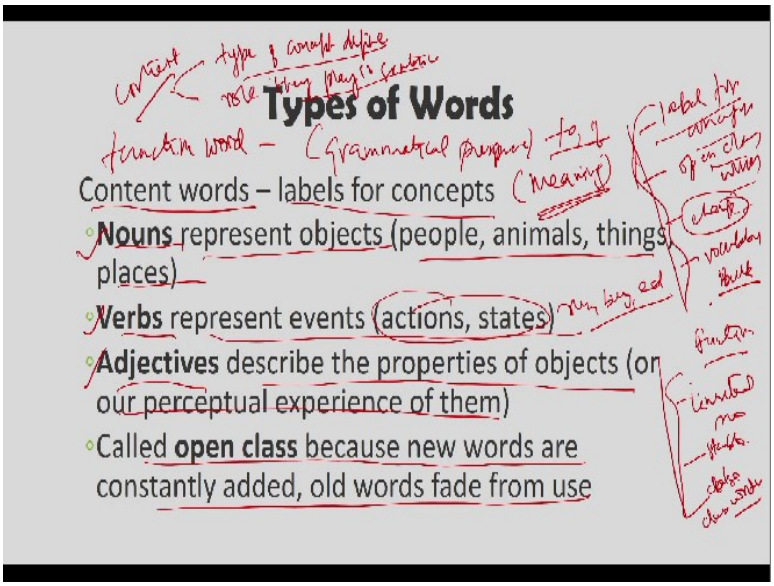

So that is another thing that we looked at. Then we looked at certain kinds of words which list in English language and we looked at the content word which is the noun verb and adjective and these are called open class work.

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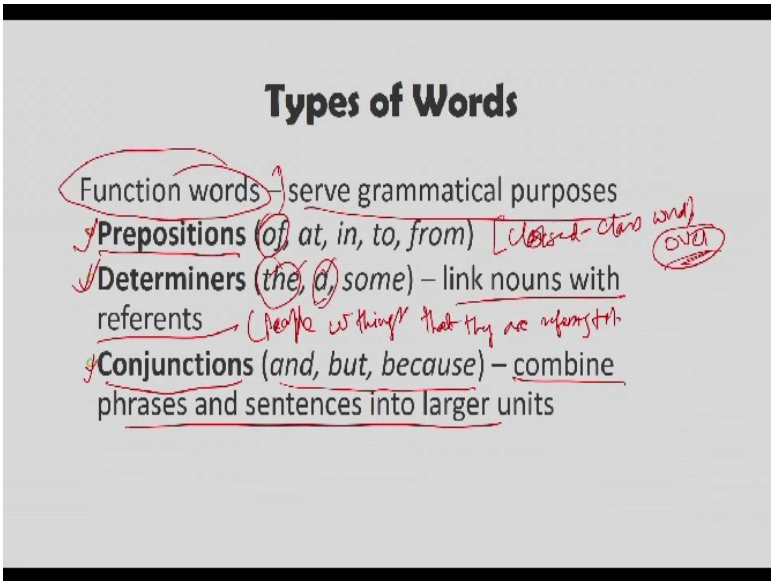

And we also looked at the function words. So, content words are the basic word forms which are there and the function words are additional word forms, which help us in connecting certain group of words together and so function words are prepositions, determiners and conjunction, that is what we looked at.

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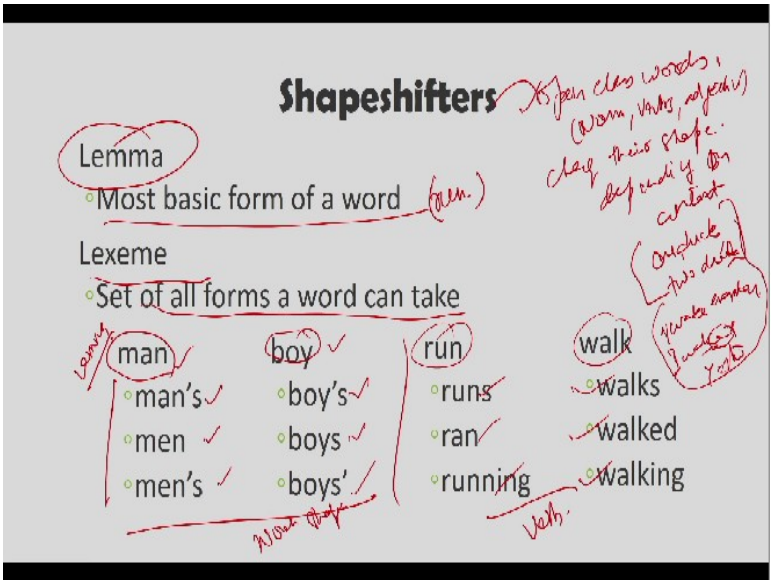

We also looked at that words has something called the basic form, and something called the extended form. And so basic forms of word call the lemma and the lexeme all other form of the word. So these are called shape shifters.

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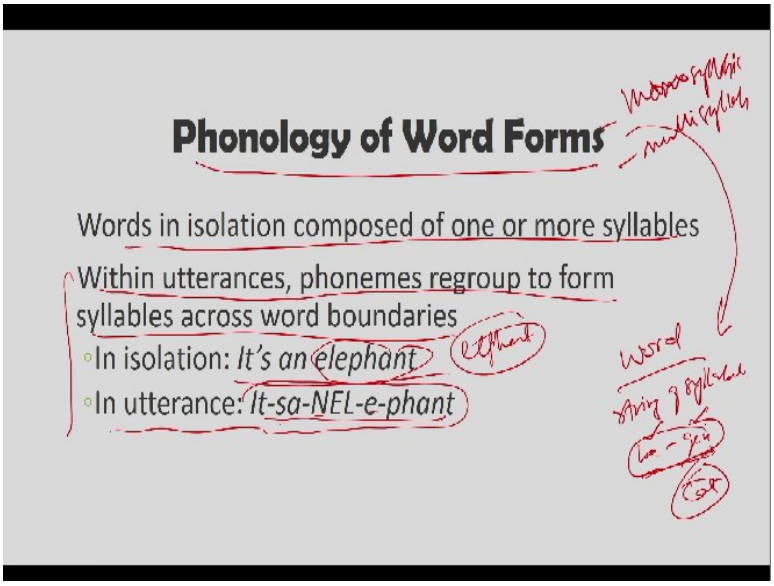

We also looked at the phonology of word form. So basically how word is composed in terms of its syllables.

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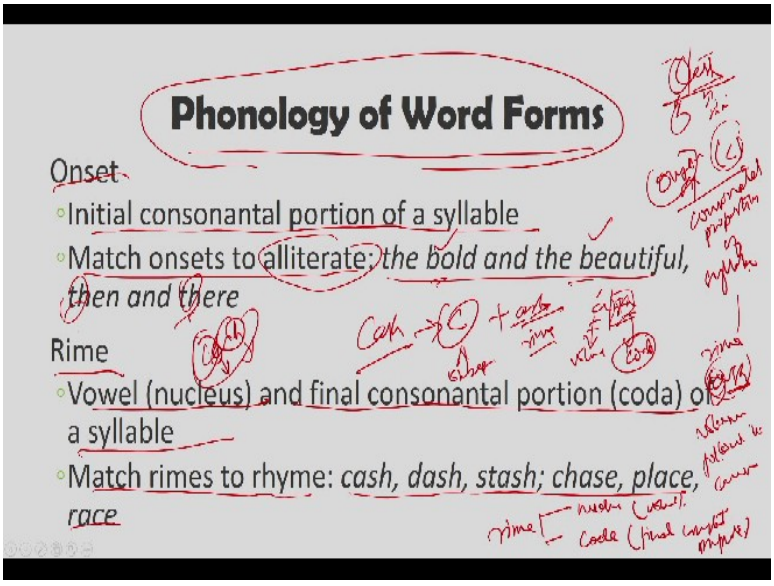

And we looked at how each word has something called onset and a rime, and so onset is the initial consonant proportional of any word. And then the rime is the vowel.

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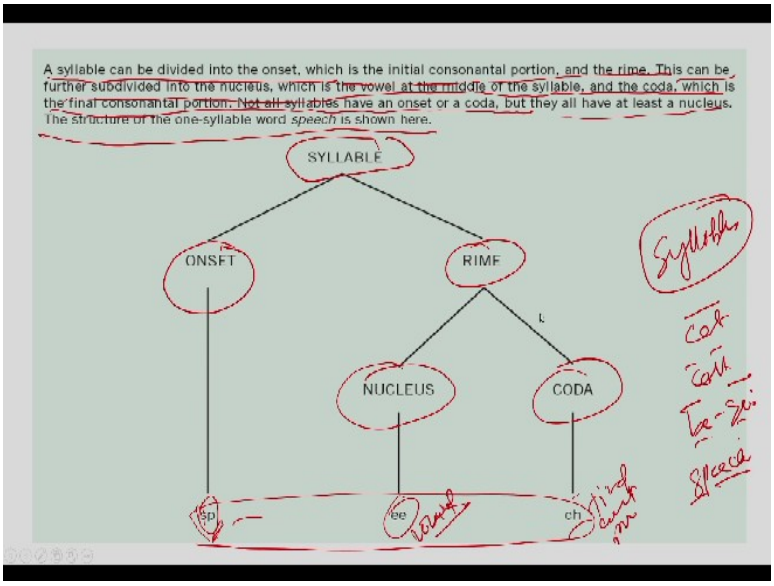

The rima basically consists of the nucleus and the coda, and the onset is the continent, the rima is the nucleus which starts with a vowel and followed by a consonant proportion.

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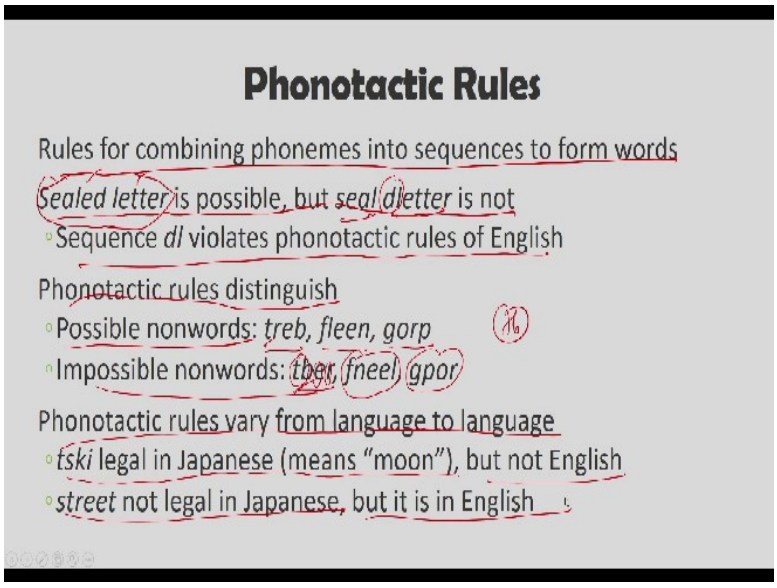

So, that is how we looked at how syllables are defined. We looked at phonotactic rules which are rules for combining phonemes together. And lastly, that we did in last class, we were looking at symbol grounding problem of how words expressed symbols or how do words get the symbols or how they are related to the symbols as we looked at 3 theories. The cognitive theory says that by just being together, certain words bringing together or certain words are walking together, they get this symbolism, which was not right.

Because we challenge this because several challenges to the Chinese room problem where he found out that just by number of alphabets mean to a number of words being together they do not generate meaning.

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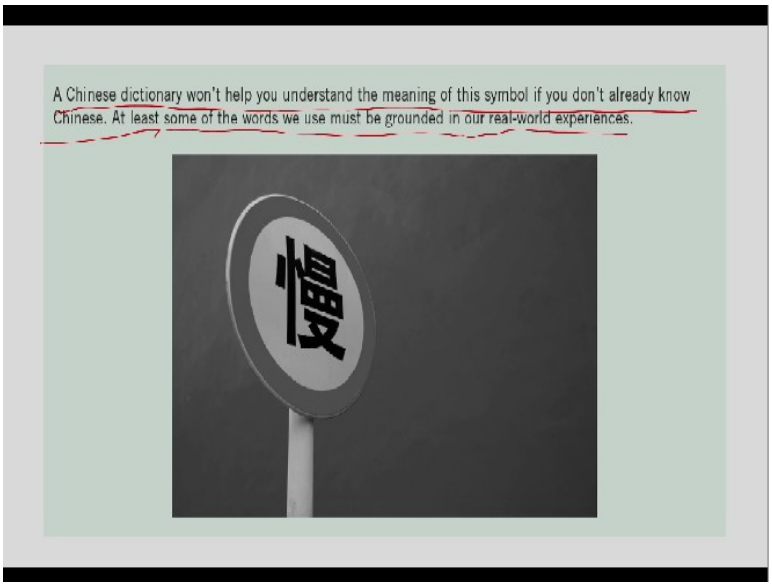

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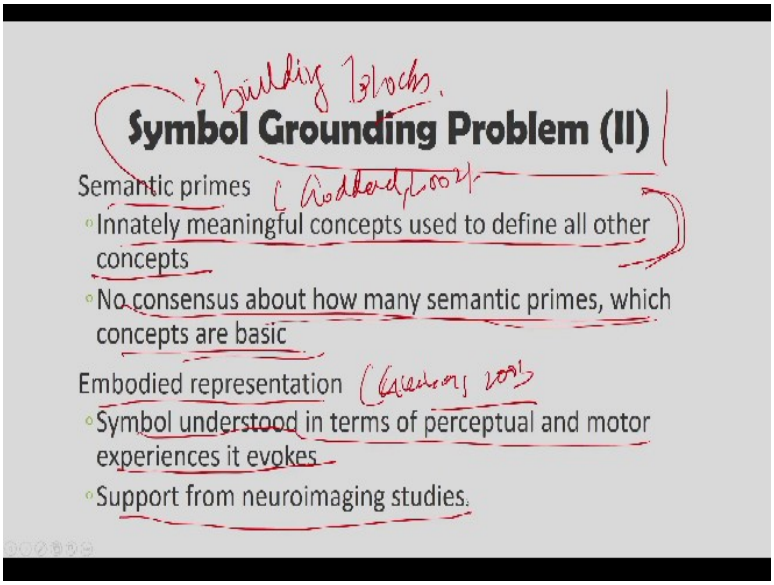

The second answer that was given to the symbol grounding problem is how do words get the symbol or it gets related to the symbols that it is expressing on the semantic meaning that the words are how do they get linked to it. The idea was that it happens in terms of semantic price, it basically proposes that there are certain basic price or there certain basic concepts which are

already available, and based on these concepts are the concepts are developed and the word gets linked to the symbols.

Also there is something called embodied representation which explains that symbols are understood in terms of perceptual and motor experiences of basically it is not the perceptual experience, the motor experiences also that in understanding symbol.

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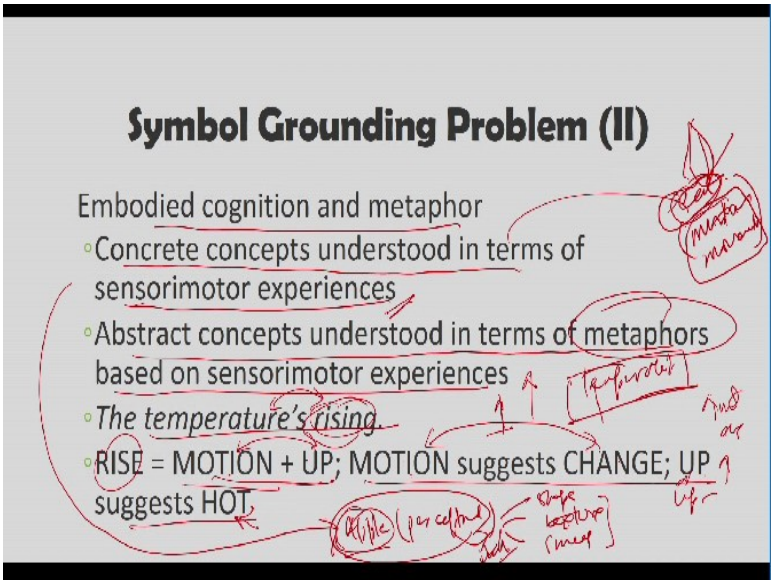

And that is where we left off.

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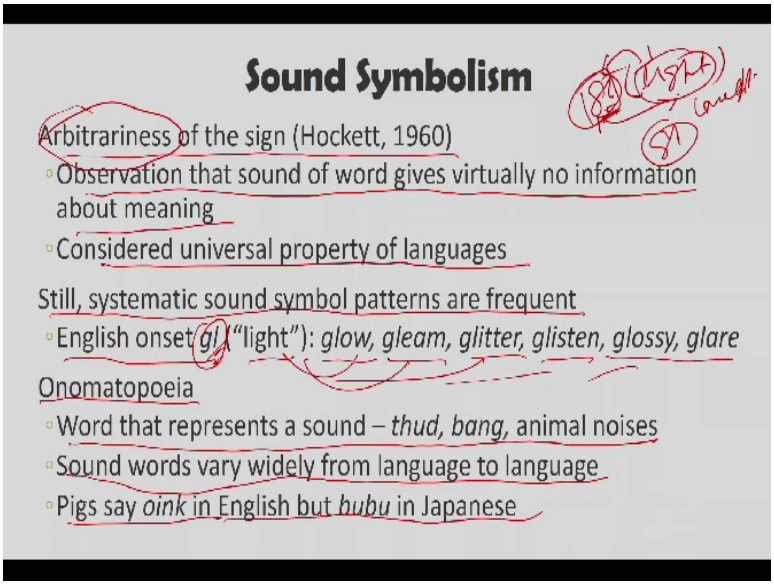

Now today what we are going to do is we are going to start off where we left, we are discussing the symbol grounding problem. And so another interesting thing with word is something called sound symbolism. Now, as you look at the word, any word which is there, the what the word says, and what the word means are 2 different things. So, basically there is something called arbitrariness of the word sound and the meaning that it is relating to.

So sound of a word, the way it is spoken, actually gives no information whatsoever about the meaning that is there and that is what is called arbitrariness of the sign, which is given by Hockett in 1960. And what he says is that observation the sounds of words give virtually no information about what it is meaning considering universal properties of language what would happen is that has to be if language are universal then it should the word sound should relate to some of its meaning.

Now nevertheless, word forms in languages are more systematic, then would be expected if they were truly arbitrary. So even if it is believed that way the words are, the way the words are pronounced it gives more no relation to what it is meaning still, it is believed by looking at languages around the world it is believed that they are some form of systematically arranged, words are systematically arranged or there is some systematic arrangement of words.

Some systematic arrangement of word and symbol relation is that across languages, so it is believed that systematic sound symbols patterns are frequently used. For example, if you look at the English onset gl, generally it relates to most words with light and that is why you have words like glow, gleam, glitter, glisten and glossy, glare ok. So basically what it says is that the way of work spoken it although it has no relation, it is totally arbitrary, it is no relation to the meaning.

Still looking at languages around the world, we do see some kind of systematic arrangement in relation to how a word is spoken and what is the meaning of it and the example that we have given here is if we from what starts with gl there are very high chances that the number of words which is formed with gl, there are chances that they will mean something greater to light and as you see the word which are formed with gl, it does not mean that all words, it start with gl will mean light.

But it says that a number of words will start with gl will actually mean light, now the arrangement gl and the relation that it has to light that is what we are talking about right. So how it is spoken and how it is related to the concept of life is that we are looking at, so our technically speaking the gl is arbitrary symbol and it has nothing to do with light, as it go around different languages in the world, most words which represent light will not start with gl.

If you look at how light is expressed in German or how it is expressed in Hindi or any other language, it might be possible that gl will not be the starting word which expresses light. But then even if you look at words all around the world, and even in the English language, what it says is that if gl expresses light, then most words are some words at least with gl will tend to be light as you see glow, gleam, glitter, glisten, glossy, glare all are lead to light.

Now so basically, then there is some kind of systematic arrangement of how the words are pronounced in what it should mean. And then we have the case of onomatopoeia which is basically these are words which expresses certain sounds. So for example, bang, now this is a word which expresses a sound. So, word that represents a sound for example, thud, bang, animal noises oih, ping.

These are or cat cat says meou, all these words are basically the onomatopoeia. So, what are these now, sound words they vary widely from languages to language. For example, the pig says oink in English but bubu in Japanese and so this is another interesting thing to be looked at.

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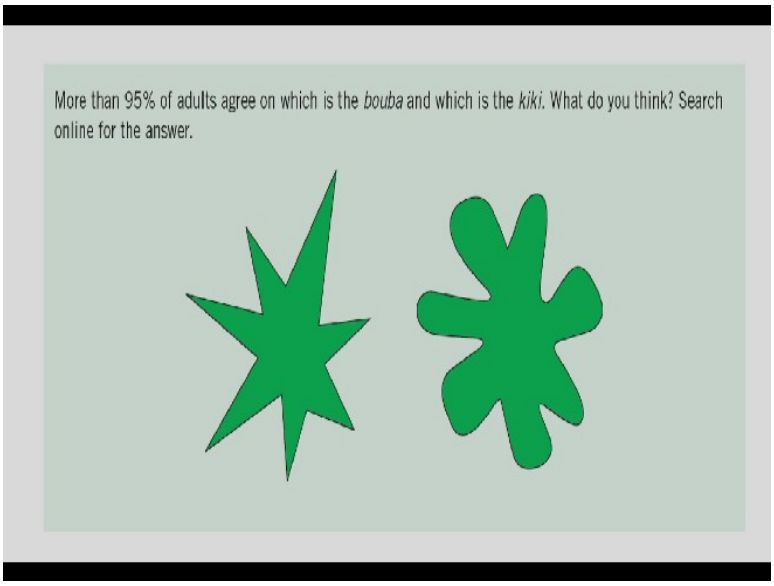

More than 90**%** 95% of adults agree which is bouba and which is kiki. If you do a search you will come to know, so basically bouba the way it is spoken the kiki the way it is spoken. And the way these are demonstrated people 95% of adults will agree which of these is bouba and which of these is kiki and these are sounds for the pig, what the pig speaks in Japanese.

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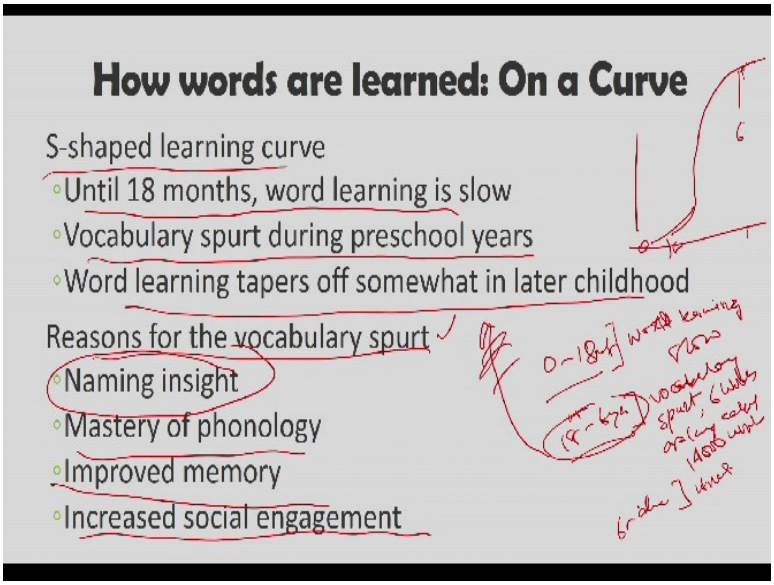

Now how words are learned, what we have done till now as we looked at what are words and how they attain the concept which is there and how do they solve the symbol, how words are team not only the concepts how they are grounded into this concept, so, we looked at how to attain this concept. So and what are different kinds of words in English language, that is what we have been focusing on.

Now, let us look at how words learn. Now, generally speaking, it is believed that the learning of vocabulary or words they start with s shaped curve. Now, it is believed that vocabulary or condition follows a s shaped curve. Now, from 0 to 18 months, when a child is born, the word learning is very slow. But from 18 to 6 years, there is a vocabulary. So, there is an increase, there is a dramatic increase in vocabulary.

And during this day, or during this period, 6 words are generally learned by the child each day with almost 14,000 words at the end of 6 years. So from a 0 to 18 year old children learn various words very slowly, but from**,** 0 to 18 months, and from 18 months onward to 6 years there is a vocabulary spurt, and from 6 years ahead, this is a fall. So we are learning drops. And as you see, this is how the curve will look like that a shaped curve.

So initially there is if this is how the child is born, this is 18 months and from 18 months to 6 years. So this is 6 years and from there on, there is a until 18 months the word learning is slow, vocabulary spurt during the preschool year, so this is what it is and word learning tapers off somewhere in the later childhood. So why does this happened. First of all reason for this vocabulary spurt. One thing is that naming insight.

The children acquire a naming insight. So, they start naming things and they get this insight that this has a anything that they see as a particular name and that is the reason why that particular spurt is there, so why this spurt is there or why they simply certain increase is that because at this age children start naming things first of all, then they attain the mastery of phonology from 0 to 18 months children are still learning or still understanding what are the word boundaries are.

Some something is spoken to them where should they break the words and where they should they break the speech stream into its constraint words. So they are still learning the syntax and still learning how to understand the speech stream. But after within 18 months to 6 years of age, the children has mastery phonology they have understood the idea of what boundaries and phase boundaries.

And they start learning with this increase phonology and master phonology, they start understanding or different words, they start understand the pronunciation of different words. Also they are memory increases at this period of time. So, the child becomes or the memory power of the child increases the brain develops and utilizes development the child can now store more number of words and can process more number of words.

And then increase social engagement, also there is this time the child becomes engaged socially, starts meeting new people, he starts meeting friends and family and they come up with new words and the child like a form, he starts talking of new words or understanding new words.

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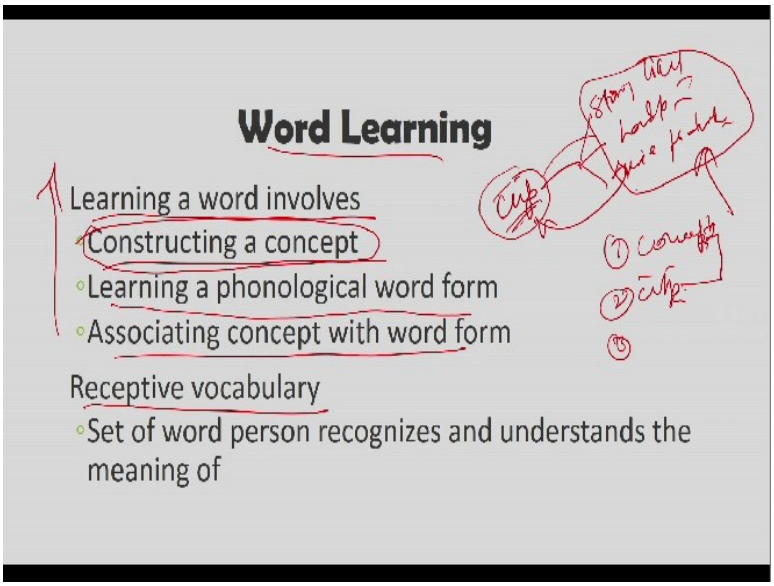

So basically then, how this learning of word is basically tested. So before that, learning of a word involves constructing a concept, however basically what are the steps of learning a word, a word learning or learning about a word starts by first constructing a concept, the child has to first create a concept of a word. For example if the word is cup, the child has to create the concept of this word and the concept creation requires us to understand these characteristics.

So what is word, it is something for copies something for storing a liquid, it has a handle, it is used for drinking and so on and so forth. So, these are the characteristics of this cup and the child then has to make this idea or this kind of a concept that cup is this if, if an object has these properties than it is a cup. So, first thing is learning this construct or this concept of what a cop is and then they learn to us learning the phonological word form.

And then they learn the phonological word form, for example, how the cup is pronounced, that is another thing and then there is something called associating concept with word form. So, this is a 3 step process. In the first step, the child creates a concept these and this concept has these characteristics, then it learns how cup is pronounced the phonology of it and then the third is they associate this phonology with this concept.

So, this cup associated, this is the steps in which the learning of a word takes place. So, basically word learning starts with constructing a concept, then a phonological word form and then link between concept meaning and phonological form. So how do we test this, how do we test that of what words are learned. There are 2 ways to doing it. One is called the receptive vocabulary and the other is color productive vocabulary

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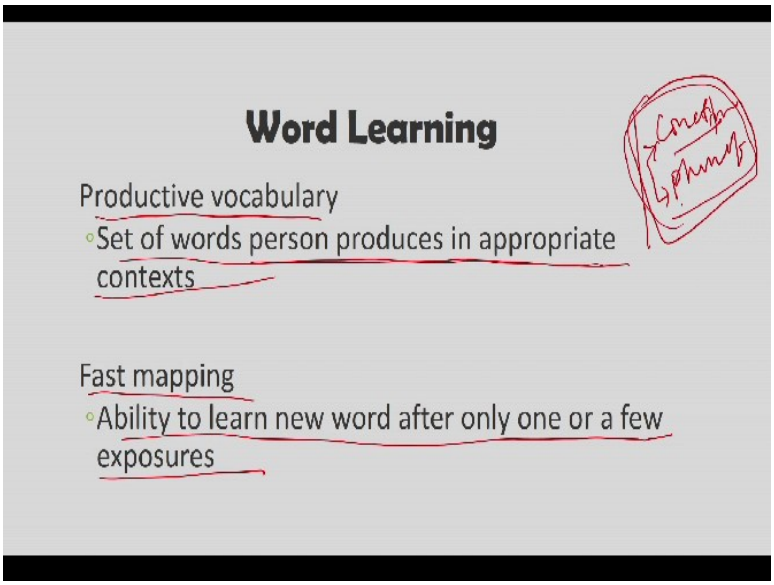

So what is deceptive vocabulary, so looking at children, who are learning words, and as I said, word learning starts with first forming a concept the child has to know that whatever name has been given to it, or whatever name he is repeating, whatever what he is repeating that has certain properties. And this is a concept for example, copies a concept and so he has to learn that and this concept will have certain properties.

And so this is how they does, not only that he also has to learn the phonological properties of how cup is pronounced and then later relate to that, but how do I test that this word is learned

and how much word is done by a child that is done by something called receptive vocabulary when the receptive vocabulary of children and what is deceptive vocabulary, it is a set of words person recognize and understand the meaning of.

So the receptive vocabulary is the number of words it is a set of words or number of words person recognizes and understands the meaning of and it is also word learning is also tested in terms of productive vocabulary which a set of words person produces in appropriate context. So receptive vocabulary is how many words can you understand, the meaning of right so and you can recognize that and productive like vocabulary so it made its ways will happen, that you may not understand the meaning of a word.

But you can actually use a word in a particular sentence or a particular context and that is called productive vocabulary. So set of words person producing appropriate context. And that is that. So you may know a word, but you may not be able to use it or it may be possible that you would put in a particular context, but you may not be able to the understand the meaning of that could also happen. This happens with us in reading also.

Sometimes we read and based on the context we develop the meaning of or we extract the meaning of certain words. So, this is basically the receptive and productive vocabulary. So, then how does this process of learning the word actually takes place, the concept formation that we will talk about. So this concept formation, the understanding the phonological form and relating the concept formation with the phonological form.

How does this take place or what is the process. So, there are 2 ways to look at the one is called the fast mapping and the other is called slow mapping. So, in fast track mapping, what happens it is the ability to learn new words only after a few exposures. So, children learned words basically links the concept and phonology together by using either the fast mapping or the slow mapping system. In the fast mapping what happens it is the ability to learn new words only after a few exposures, which are there.

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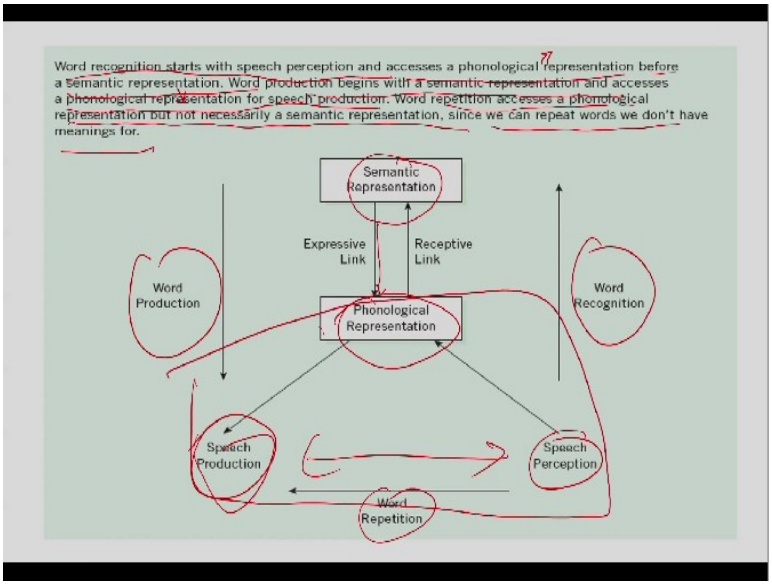

So, what recognition as I said, what recognition starts with speech perception and assessing of the phonological representation before the semantic representation. So, first understanding the phonological representation and then understanding the semantic representations, how is word recognize. Now word production begins with a semantic representation and accessing a phonological representation for the speech production.

Word reputation access is a phonological representation, but not necessarily the semantic representation. Since we can repeat words we do not have meaningful and so, that is how it is this is what reputation, this is what production and this is word recognition, if you look at word recognition it starts with something called speech perception. Then speech perception leads to phonological representation and the receptive link is established between semantic representation.

If you look at word production how word is produced, it starts with semantic representation, first you have to think about the concept. So, if you want to produce a word you have to think about that word or what it represents and then to an expressive link generate the possible phones, which should express this word and from there you will produce peach, but in word representation or speech perception and speech production is the only reasons which are then it happens only at the level of the phonological representation.

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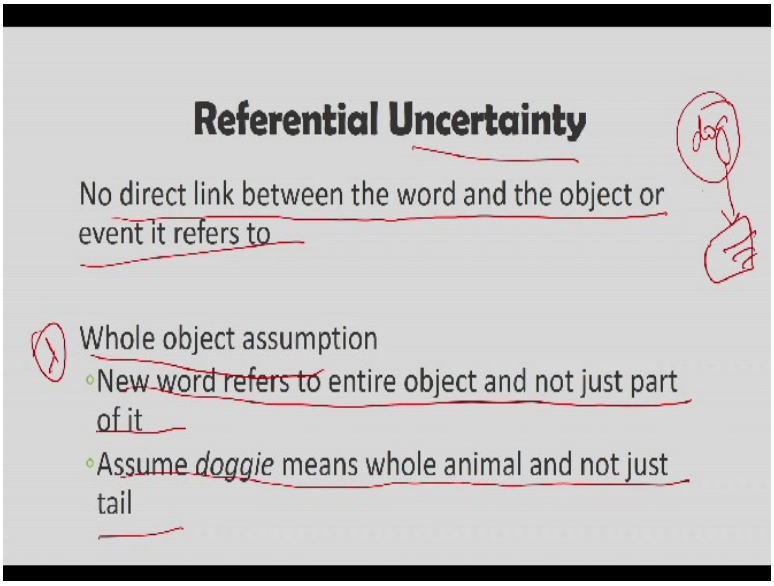

It does not go to the level of semantic representations. Now, in learning word and another major problem that happens in learning word is something called referential uncertainty. And so what is referential uncertainty, the referential uncertainty problems is that there is no direct link between the word and the object that it refers to. So basically referential uncertainty is an observation that there is no direct link between the word and the object event it is refers to.

Now how to solve this referential uncertainty, see it was referred to certain concepts and what happens is we look at the word in different languages it means what happened that it may not represent the same concept. For example, look at dog. Now the concept is it is a pet animal, it barks, 4 legs, has a tail, but you inu is also representing the same concept and gou is also representing the same concept and hun is the word is represent the same concept.

Now, this is called referential uncertainty, there is no direct link between the word and the object it is representing to all these words are represented the same thing. So there is no direct link between them. So how do I multiple words repeating the same function. So how do I solve this referential uncertainty in word perception or word recognition. The first idea is something using call whole object representations.

So what is the whole object representation. So basically solving referential uncertainty is through providing certain kind of cognitive constraints to children. So cognitive constraints that guide children in narrowing down the possible range of reference for a new word. Now, let us look at this. Let us assume that a child learns a new word. For example, he will learn the word dog. Now, there is no link because the parents says dog dog and he the parent shows the child, a dog and he says dog.

But it may be possible that there are certain other things maybe a cat is sitting right next to the dog. So how does the child know what is the dog and even if he looks at the dog, maybe he sees the dog has a head and he has a tail which is whirling around it has 4 legs. So whether this tail is the dog, or whether this body is the dog or the whole object is the dog or what is the dog, how does it know that dog means everything.

So, how do you solve this kind of referential uncertainty and that happens by providing certain kinds of cognitive constraints. So that and why does cognitive constraints are provided or how these cognitive constraints actually help the child in solving the referential uncertainty, what the parent is referring to, that is done by using quality constraints, which narrow down the possible range of reference for a new word.

So, the child is learning a new word, these cognitive constraints help him in understanding that okay this is the idea or this is the object that the parent is referring to or anybody is referring to. So, certain kind of cognitive constraints are used, one is called of the whole object assumption. Now, the new word refers to entire object and not just part of it. One assumption that small children use while learning a new word is that whenever a parent is showing a particular or telling him or making him learn a new word, he's actually referring to the whole thing, the whole object that the parent is pointing at.

For example, is a parent is making the child learn dog, he assumed that the whole dog is what is being referred to, dog does not refer to just the tail or the legs and so on and so forth. And so, the child follows this whole object assumption. So I assume doggy means the whole animal and not just the tail of it. So this is one way of solving the differential uncertainty problem.

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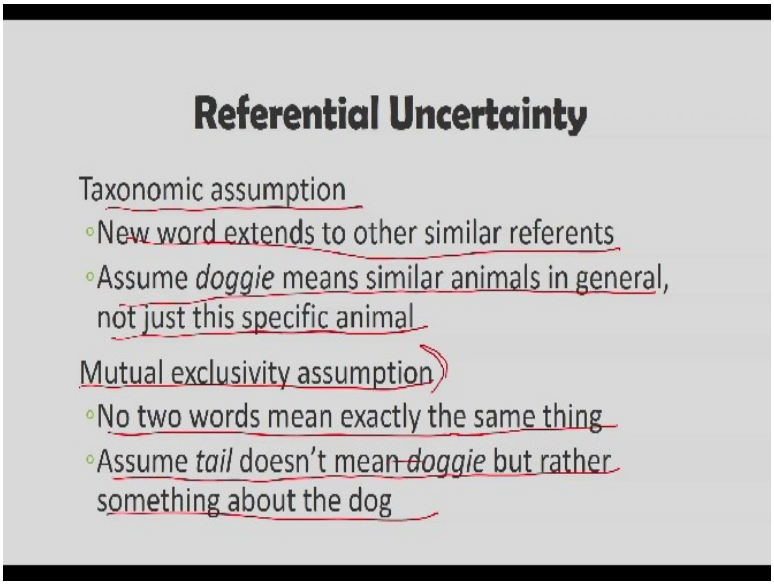

What are the other ways of solving this referential uncertainty problem. The other way is using taxonomic assumptions. So what is taxonomic assumptions, a new word extends to other similar reference. So basically, what it means that assuming doggy means similar animals in general, not just this specific animal, which basically means that child now understand that doggie or dog, what the parent is referring to, is for first of all, it is the object, the whole object, the whole 4 legged animal, which is there.

And also other animals, which are similar to this particular dog will also be called doggy. So that is called taxonomic assumption, he extend this idea to other members of the group, and then something called mutual exclusivity assumption is also used by the child. And so it means that no 2 words mean exactly the same thing. It would mean that 2 words do not act exactly mean the same thing.

So if the parent says dog, and he is says tail it does not mean that it should not mean that or he believes that dog and tail are 2 different things. It is not the same thing. If he does not use these assumptions, he will never learn the idea of how words are related or how words are related to certain concepts. And so know 2 words, so mutual exclusivity assumption says that no 2 words mean exactly the same thing.

Assuming that tail does not mean doggy, but rather something about the dog. So, this is another thing that child uses in solving the referential uncertainty problem. So this is about fast mapping as I said if word learning is fast or word learning can be done in a fast way by learning words in 1 or 2 demonstration only, there is another way to learning word and that is called slow mapping.

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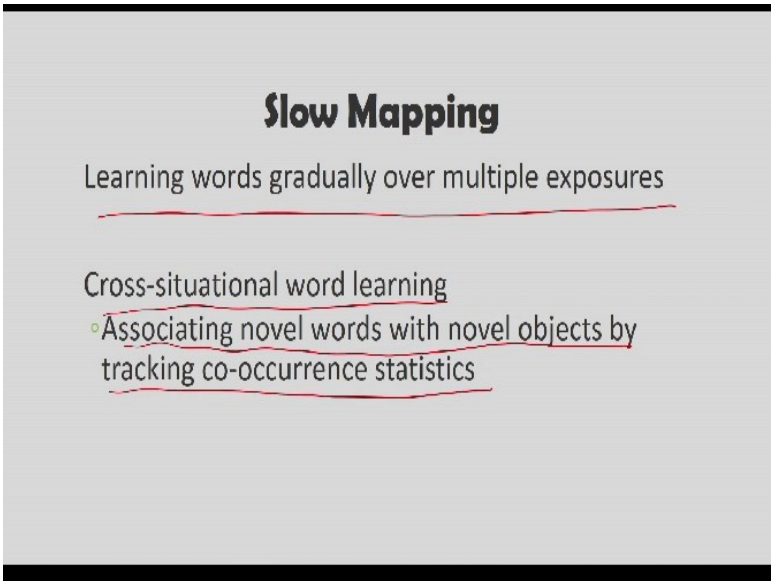

In this what happens is learning words gradually over multiple exposures. So basically then dissolving this referential ambiguity that we are talking about or this referential uncertainty is basically same as it is to the same as establishing a permanent link in memory between word format concept, basically, if what learning produces word in appropriate context, this is fast learning.

And it leads to something called associative learning. Now, there is another way of learning word and that is called slow mapping of words and so learning words over mutual exposures and for that we have something called a cross situational word learning, in this way also children learn word and how do they learn word through the slow mapping by using something called cross situational word learning.

What happens here is associated novel words with novel objects by tracking co-occurrence statistics. So, what happens here is that cost situational word learning is the ability to learn associative novel words with novel objects, even in case of referential ambiguity by tracking co-

occurring statistics. Now, it so may happen that the child developed this referential uncertainty but what he does is he the same dog appears in many number of context.

So, it appears with a cat and then in some other instance or some other time the dog appears with a table and in third instant the dog appears with food and so on and so forth. So, the child develops this referential statistics or this referential develop this co-occurrence statistics and based on that he developed this idea that ok says this object is coming every time and the second object that it is coming with is varying.

So this is particularly what the parent is referring to or this is particularly what the concept is, and this is what a dog is all about.

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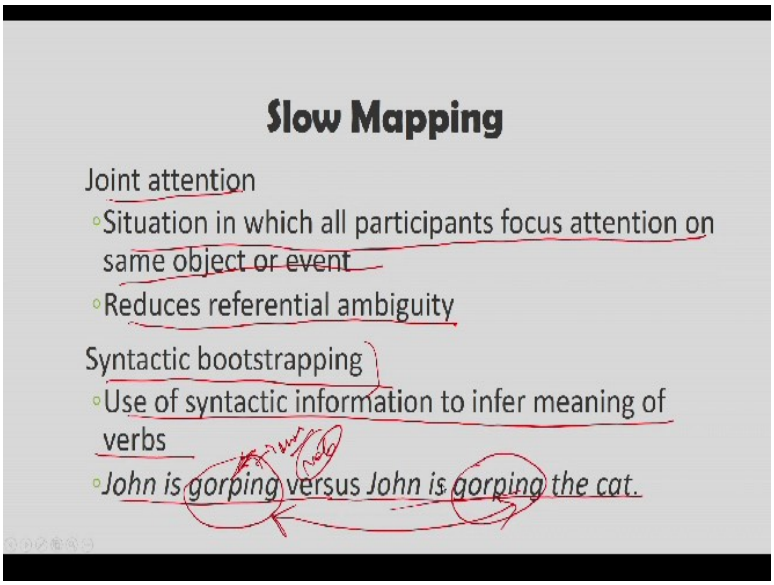

So, basically how he does that he does that using something called propose but verify strategy, when encountering a new word in an ambiguous context, both child and nettles they make a guess about what the word actually refers to the repeated co-occurrence of a word and reference in different contexts solidifies the connection between the word form and concept long term memory.

So, as I explained multiple occurrences, if he sees the same word co-occurring with other words which are there, he is slowly developed this idea that this is what probably the concept is referring to, or this word is referring to this particular concept, what is the meaning of this word.

So this is what a dog is all about. There is also something called joint attention that also leads to a process of slow learning.

So what is joined attention, situations in which all participants focus attention on the same object or even it reduces referential ambiguity. So situation in which all participants in interaction have focused their attention on the same object or even in those cases so everybody was talking about that or that conversation has focus their attention on that particular word, and that leads to a situation of joint attention.

And this leads to referential ambiguity. So everybody wants of the same thing in his dog or referring to the same thing and it is his dog it is basically the idea of joint attention. And then there is something called syntactic bootstrapping is also use, it is the use of syntactic information to infer meaning of words. For example, John is gorping verses John is gorping the cat. And so this basically, in this case, the verb is used through or verb is identified through something called syntactic bootstrapping.

So using this interesting information, the idea of what a verb really means. So, basically, the idea or the meaning of this gorping is understood through this. So basically, if somebody is groping one picture and the other picture John is gorping the cat, so gorping what does it really mean, that is expressed or that is understood by the child by using this syntactic bootstrapping, which basically means that gorping is a verb and so this is the act of gorping. So he looks at multiple sentences with gorping and based on that he develops the meaning of gorping from those sentences.

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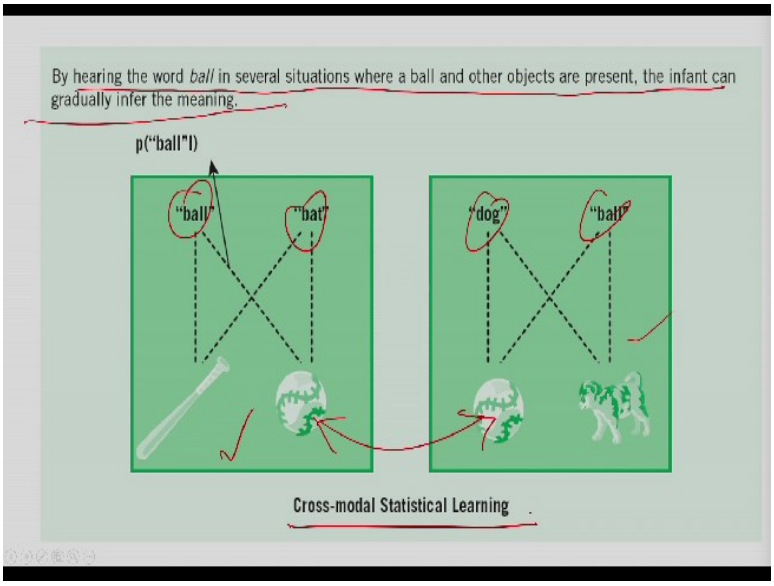

For example, by hearing the word ball in several situations where a ball and other objects are present, the infant can gradually infer the meaning of ball. So this is ball, this is bat, in one situation this is dog, this is one another situation, infant knows that this is what the ball is. And this is called a cross modal statistics.

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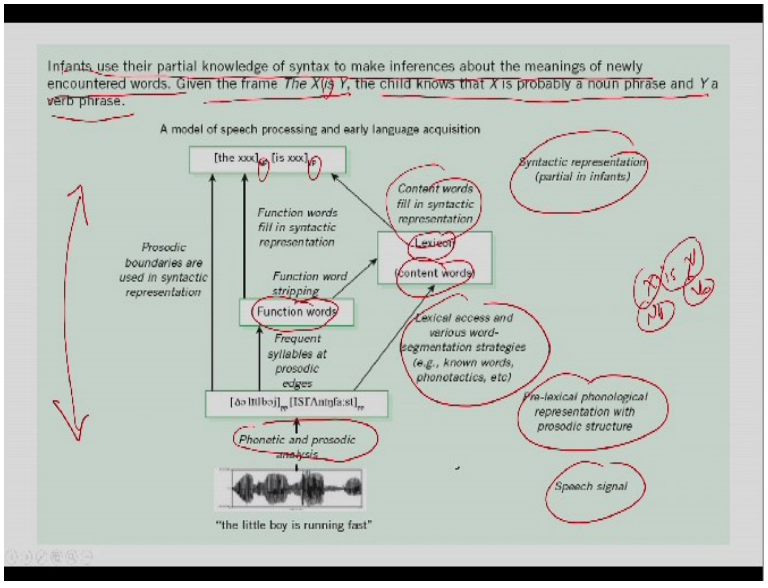

So then again nouns are more easier to learn the verb because they reference are concrete objects, and the child can look at the and interact with them. So learning was difficult the nouns is because nouns actually have concrete differentials in comparison to verb, Lakman 1990 found that young children make use of syntactic information to infer the meaning of verb. And that is how what we showed to you.

So basically they use something called syntactic bootstrapping, for understanding the meaning of what and how does this happen. They look at the different contextual cues in different ways in different pictures. So john is gorping, John is gorping the cat. Something is John is gorping the table or John is gorping something else. And so that is how he understands what gorping the act of gorping actually means.

Because in several pictures if the same person does the same act with different objects, we understand that okay what is happening is this or different people also do that act he understand that this is the meaning of act, so that is called syntactic bootstrapping. Not infants use the partial knowledge of syntax to make inferences about the meaning of newly encountered words, given the frame the X is Y the child knows X is probably a noun phrase, and Y is a verb phrase.

Now if you look at this, this is a verb is being me is a verb. And so the child understands that X is Y is basically X is the noun phrase, and is Y is the verb phrase and based on that he understands the meaning. So a model of speech perception is that he uses phonetic and pathologic analysis. And based on that prophetic bond is he understands that this is the noun phrase and this is the verb phrase.

And so then extracts the functional word, when the use the mental lexicon to look at the content towards lexical access is that semantic representations we lexical information and speech signal. So basically uses this kind of a model to extract the meaning of the partial knowledge of syntax help them in understanding the meaning of newly encountered words.

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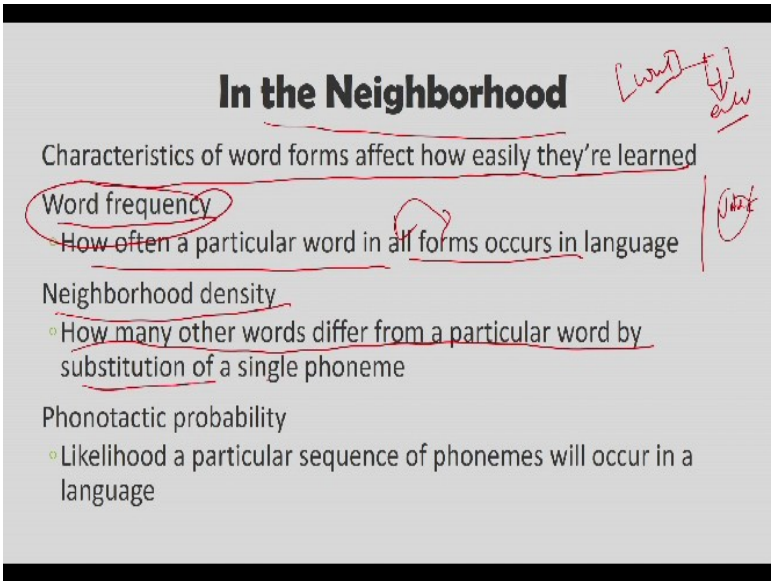

So, basically then another interesting thing in learning words in children is in terms of what neighborhood words are there and how neighborhood words actually influenced word learning. Now characteristics of what form effect how easily they are learned. For example, one interesting thing is word frequency. So the word form that you are using, they can influence or they can this word from will tell, or they can basically predict how easily words are learned.

Now one interesting fact is something called word frequency, how often a particular word occurs in all forms of the language. So word frequency is how often a word in all forms occurs in a language if you see more now more of the same word in more number of forms it is after it is appearing in language it is more easily learn, also function words for example, the and of are remembered more frequently than context word, which are content word which are learning less common.

Now children learn, rare words more often than they learn and also children learn the nouns first followed by the verbs, so most children learn the noun first, then they learn the verb, then they learn the adjective and do not use function words regularly. So basically, if you look at children, what they use is this function words. And verbs are something that they learned late, they use they learn the noun.

because nouns can be used in all different forms any language look at any known for example, dog, so dogs, the doggy and so on and so forth. So basically in different forms in a singular in a plural first person second person and so in different ways and nouns can be used and so they are learned faster than verbs and adjectives and function words are the connecting words are learn the least or the last by children.

So, another interesting thing you think is neighborhood density, what is neighborhood density, how many other words differ from a particular word by substituting a single phoneme, that is called neighborhood density a particular word.

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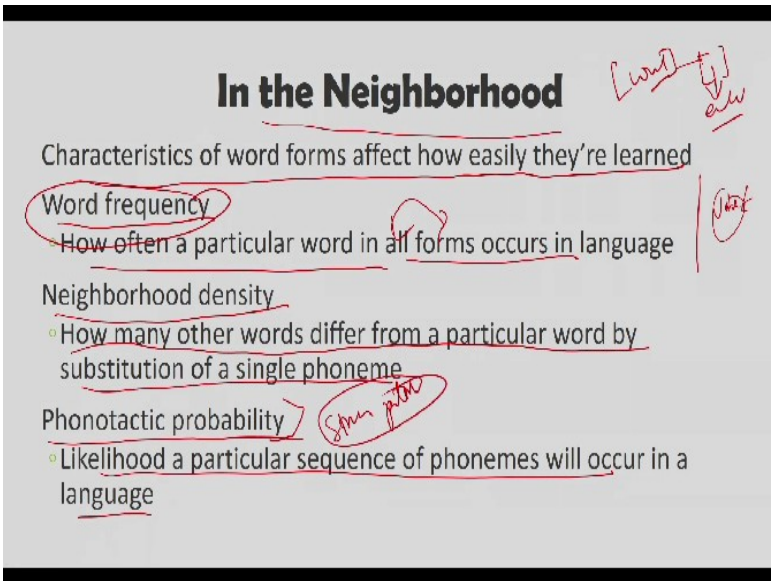

For example, look at this if we have hat, now the neighborhood density of this is if we replace the H phoneme and keep the at phoneme, these number of words can actually be formed we can have pat, chat, cat, bat, fat, sat, vat, and if he replace the a phoneme and keep the h and t we can have heat, hit, hate, hot, hoot, height, and if you remove the t phoneme and lead the actually phoneme here.

We can have words like hatch, hack, had, hag, hath. So, it has high number of or high density there. But if you look at words like juice, it is very difficult to find a thing like that for example, remove the J phoneme we have goose, loose, use, moose, noose, but if we replacing the UI phoneme and JCE will have no word at all, and in fact, if we replace the CE phoneme we can have jewel and June.

So, it has a very narrow neighborhood density and this has a high neighborhood density. So neighborhood density is another interesting thing, which is helping the child learn words. Also, we use something called the phonotactic probability, which is the likelihood that a particular sequence of phonemes will occur in a particular language, that is also used by children in learning word.

For example, stress patterns can also influence word learning in youngsters, if we have a 2 syllable noun, a tri kick form which is a strong weak form, the stress pattern will be it will be easier to be learned by the children, for example words like basket and pillow, but if you have amebic syllable form of 2 nouns, so example, we have weak and strong pattern. For example, guitar and among this will take more time for the child to learn.

Now influence then use something called a metrical segment that we have discussed before, strategy to infer what boundaries before stress syllable, and it says in 2013, they found that infants need support both from the stress patterns and the phonotactic regularity to learn words, so basically it is the phonotactic regularity phonotactic probability, the stress patterns they also influence how our word is learn or how a word learning will actually happen.

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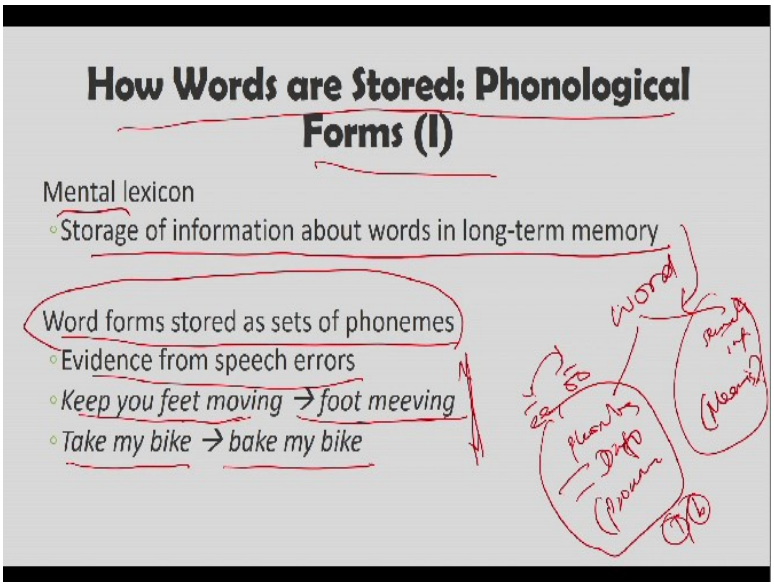

So, word learning so, how are words toward the way words are stored into the memory they asked us in phonological form. So, how are words actually learn, the mental lexicon is the

storage of information about a word in long term memory. Now, any word is stored in 2 forms, it is store in a phonological information, which is the pronunciation of the word and then it has a semantic information, which is the meaning of the word.

So, mental lexicon storage of information about what in long term memory and it is done in these 2 words. So, word has stored as a set of phonemes, we are only looking at the phonological form we are not looking at the semantic form now. So words are stored set of phonemes, evidences and so this idea that words are stored in the mental lexicon in the long term memory in terms of a set of phonemes is evident from speech errors.

For example, if we say we say keep your feet moving and we can have error like foot moving and this kind of error from feet moving to foot moving actually expresses the re turns into oo, this basically says that the words are actually stored in terms of pronunciation also in the mental lexicon. Also problems like speech errors like this take my bike becomes bake my bike is because the T is replaced by a b sound and that is the reason why the take becomes bake.

And this basically these speech errors give us an idea that words are not only stored as meaning in the mental lexicon, in the long term memory words are also stored in terms of the phonological form or in terms of the pronunciation, now very common words are actually stored as syllables, only basic form of a word is stored in memory, other forms are generated to the rule. For example we have this.

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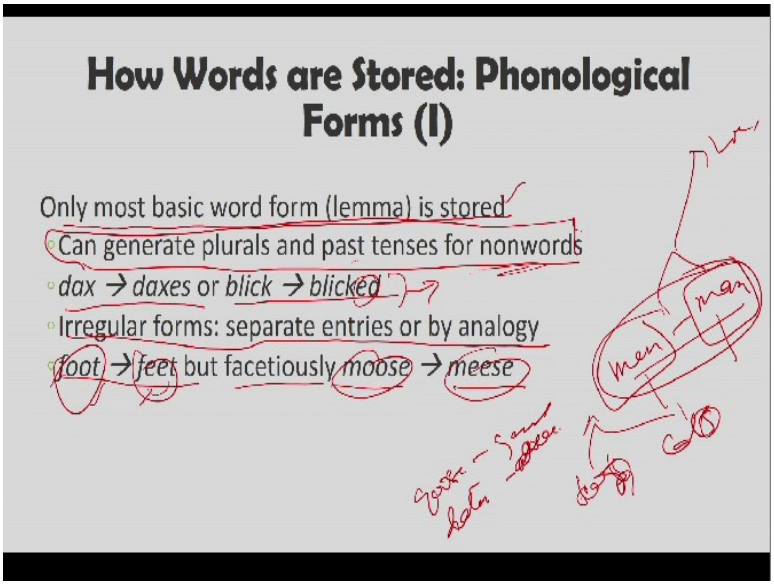

So, basically what happens is that in the long term memory, you only have the basic word form, which is stored which is the lemma and this lemma, then people use this lemma to produce to reproduce or to generate more forms for the word, can generate plurals and past tenses from nonwords and the reason are the clue that basic forms of the word are stored into a mental lexicon is that people can generate pleural and past tenses for non words also.

Basically if non words are if we can generate plural for non words it basically means that the generation of plural is a process oriented thing it is not a storage oriented thing had plural been stored in the long term memory then non words plural would not have been stored because people do not learn non words. But, the moment you understand this that people are able to generate plurals for non word, it basically means that people are only storing the lemma the basic form of a word.

For example, dax means daxes and blick means blicked, and if you are able to generate this kind of plural, this is a process generating plural is a process oriented thing and this is not a storage oriented thing and this basically says that words are stored into the basic lemma form only So, blick is there and that is why you can generate the plural. So, we can generate plural for these kind of thing. Also irregular words are stored separately.

So, irregular what forms are separate entries or by analog for example, foot, feet, but facetiously moose is meese. So, that is what it is and so, it beats let irregular forms, irregular word forms are actually stored into the memory. So, in its entire form, but in not as lemma but it is in entire form. So for example moose meese will be stored and for foot feet will be stored and as the irregular forms of word stored separately.

For example, men and men, both will be stored. So because the plural of man is men, and so do not both have to be stored into the, in these cases both have to be stored into the long term memory but for words like let us say dog or cat only the dogs we can make plural with dogs and cats which basically means that only the word dog or cat is stored into the long term memory which is the lemma form, but this kind of men men or goose gees data, datum. For these both forms have to be stored in long term memory.

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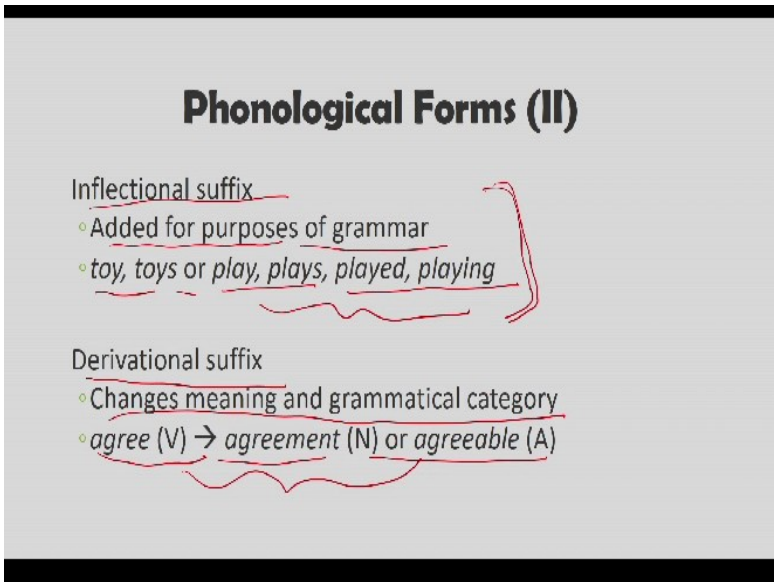

Now the experimental evidence is that the experimental evidence is that the basic form is there in the mental lexicon and suffix says, if you put suffixes what recognition or word production is there, so inflection suffixes add for purpose of drama, for example, toy, toys, play plays, played playing. So this kind of a inflection suffix, which is suffix plus word for grammar in the inflection form.

For example, toy leads to toys and play leads to both play plays played, that gives us some idea that word is stored in the these kind of basic words is stored in terms of the lemma form, and

there is something called derivational suffix, which changes meaning and grammatical category. For example, look at agree in a verb it means agreement and a noun it means agreeable and so, this is the derivational suffix.

So, using the inflection suffix you can produce various forms of the word and derivational suffix say is that word can also change its grammatical category and more frequent words are recall, more quick, quickly.

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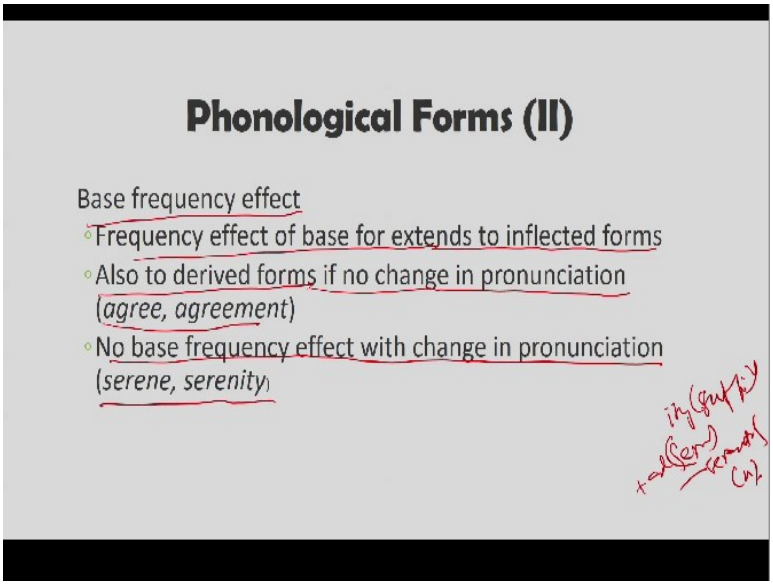

That happens because of something called the base frequency effect, the frequency effect of base of for extends to inflected forms, the frequency effect of the base forms extends to its inflected forms not all derived words form exhibit the base frequency word. For example, look at the tt suffix ity, if you add it to the objective serene, it becomes serenity which is a noun.

So, also to derive forms if no change your pronunciation is therefore, agree with agreement and no base frequency fact we change in pronunciation for example, serene becomes serenity. So, basically the effect is that.

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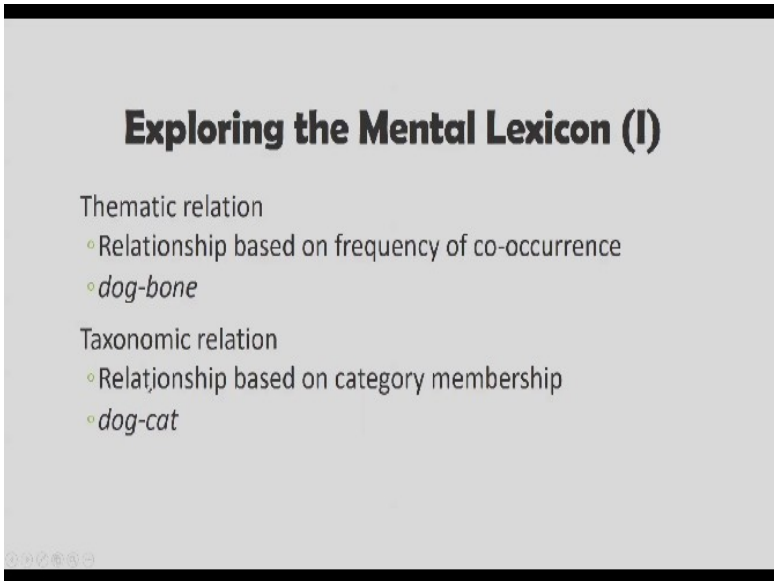

Now, so that is how the phonological representations of words are stored or how words are stored into the phonological representation. So we will take a break today.

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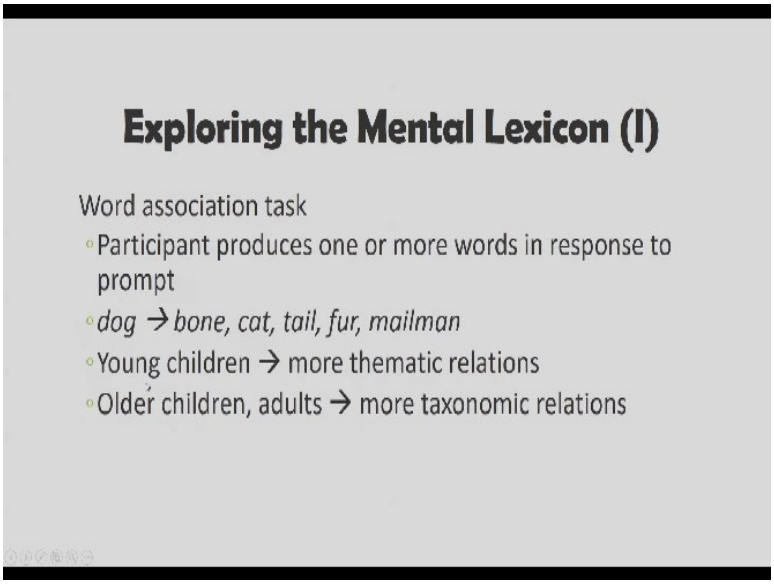

And we will look at the mental lexicon or exploring the mental lexicon in terms of the semantic forms of word in the next class. So before we do that, let us look at what we did today. So what we did in today's lecture is we looked at the idea of how sound symbolism, or the arbitrariness of any word, how that that our witnesses solve, and how the differential ambiguity is solving, in terms of words understanding or understanding words.

We also looked at how words are learned, what is the process of learning words, and what is receptive and productive vocabulary. We looked at 2 methods of word learning, which is the fast learning and how fast learning takes care of this team and differential ambiguity. And we also looked at the slow learning of words which are there. So, we looked at several in fast learning, we looked at the idea of the whole assumption, that taxonomy, consumption and mutual exclusivity with the assumption of solving the referential ambiguity.

We also looked at how neighboring words are the density of neighboring words actually help us in learning words, we also looked at the various phonological forms of how words are stored. So, basically those evidences that words are stored in terms of its phonology, or in terms of how they pronounce. Now when we meet next we look at the semantic forms of the how words are stored, and we will deal in detail of how the semantic forms are related to the phonological form.

And how actually words are stored. We also will look at how words are retrieved from long term memory what is the process of retrieving the word from long term memory when we meet in the next lecture. So, up till that time that you meet in the next lecture, it is goodbye and thank you.