Lecture 7:
The step on Language Acquisition

Hello and welcome with the course introduction of the psychology of language. I am Dr. Ark Verma from IIT, Kanpur and we are in the second week of the course. This week we are talking about development of language in infants and young children. We are actually talking about how is the child acquiring language? How does the child acquire language? What are the basic tasks that the child needs to do in order to pickup language from hearing you know to the fact of producing flawless speech. So, these are these are some of the things that we are going to talk about in the last lecture. You saw me, discussing some of the driving forces which could drive language development, say for example; how this happening? Is, is it true imitation or learning or is it happening? Through you know child addicted speech. We also talked a little bit about some of the early basic tasks, that a child needs to do. Okay? In today's lecture, we talked about some of the first steps in acquisition of language. Okay?

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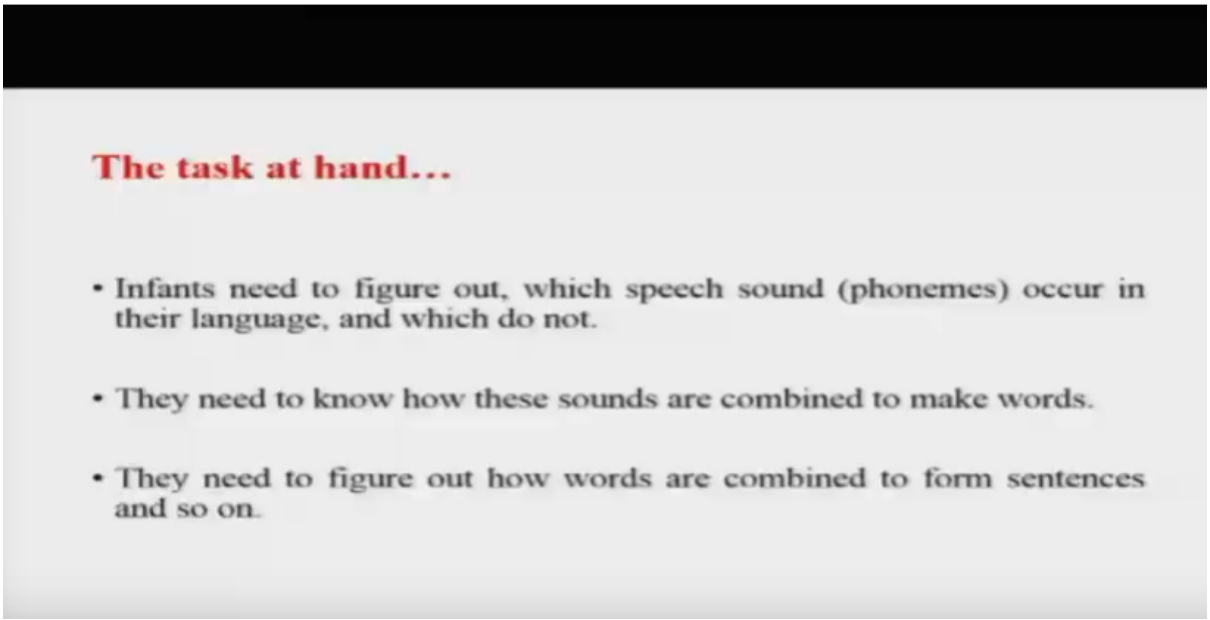

What are the first building blocks that kind of establish a foundation for a child's learning language? What are the first things that the child needs to do? Let us look at that. Now the task at hand is fairly complex. Okay? The task at hand for a child to figure out, what language is? How language functions to the point of? Not only mastering the rules of the language, but also being able to produce them effectively is something very difficult one of the first things that inference. Would need to do is to figure out, which speech sounds you know their language comprises of they listened to a lot of things. You know children are exposed to lots of noises, lots of sounds, even as you saw starting from the third trimester of the of their mother's pregnancy, while they are born you know, why even before they are born, they are the auditory system has started functioning they are exposed to all kinds of sounds from you know animal sounds, to you know human sounds, to motor sounds, through sounds of traffic and the sounds of machine. It may be depending on where all say. For example, the mother has been and you know whatever has been the input the child here everything one of the first tasks, so to speak then for the child will be able to distinguish from non speech sounds also in the speech sound. If you see for the most part when people are talking amongst them, they're talking in a manner which is hardly intelligible with the child. The child does not know what are the basic sounds? We do not really speak in bad a and ER. So as to help the child figure out. Okay? These are the sounds of my language and this is very easy and then we do not also talk about like you know enter. So that, we

the child can easily combine / enter to form pad to form, say for example you know one of the first words of the language or we do not really talk about my and mine pie in a sense that the child can combine these phonemes to create the first words, that the child eventually speaks in that sense, the child also has to kind of you know from this continuous stream of speech be able to distinguish isolate particular phonemes recognize that okay , this are meaningful sounds in my language. These are the phonemes and the other sounds like the troll or the girl of the motor is not this is a fairly difficult task. So one of the first things that the child has to do is to kind of really, get to a point that the child has an inventory of the basic sounds of their language. Once the child will have the inventory of this the child, we need to move to the second step the second step is to be able to combine, these phonemes to be able to combine, these sounds into words. Okay? So whatever's the child first has to figure out sounds and then the child also has to figure out words. Okay? If I combine current in and I have care here then this form scat cat is a meaningful word in my language, mama is a meaningful word in my language, Papa is a meaningful word in my language the child also has to figure out the rules. That is used to combine these things and the fact once, the child kind of does. Okay? This is Papa this is mama this is cat this is Dada this is whatever the child will eventually then need to understand the meaning of each of these constructions. So you see to a child they seem to be very difficult tasks. If you really want to get a taste of how this probably happens you could, then I always say this in class try listening to a movie, which is not in dubbed in your own language. You could go and listen to Chinese or Dutch or polish or German and you try and just if you've not been you know if you're not taking the aid of subtitles just try and see how does that really sound, just try and let us say isolate words from the speech let's try and say for example; you know make out what this particular utterance mean. Then how does this particular utterance map to something happening in the world. If you try and do it yourself we'll figure out that this is fairly difficult task and we are talking about children, who are just born on the face of this earth and a Bailey you know about themselves .so the child needs to figure out the sounds of Chinese we're not, how the sounds are going to be combined to form words? And then you know, what the are the meanings of these words? And once the child has kind of got all three of them together the hardest task of all comes the hardest task of all is for the child to start forming sentences. So the child needs to even though. He now, knows let us say meanings of each of these words and the child needs to put together. These words in a perfect order using a perfect syntactically grammatical rule of their native language to form a grammatically acceptable sentence because that is one of their measures, whether the child has acquired the language completely or not, so children by the way they do this as early they start doing this very well by the age of two point five three, three point five years of age this is fairly quick. If you remember you know if you really think of it and if you really think of the difficulty that each of these tasks has in the coming lectures of this week. We will talk about each of these challenges and we will talk about also what the two basic theories the behaviour stands and the native stand have to say about? How children are picking up aspects of this knowledge. Okay? In today's week we'll probably mostly concern,

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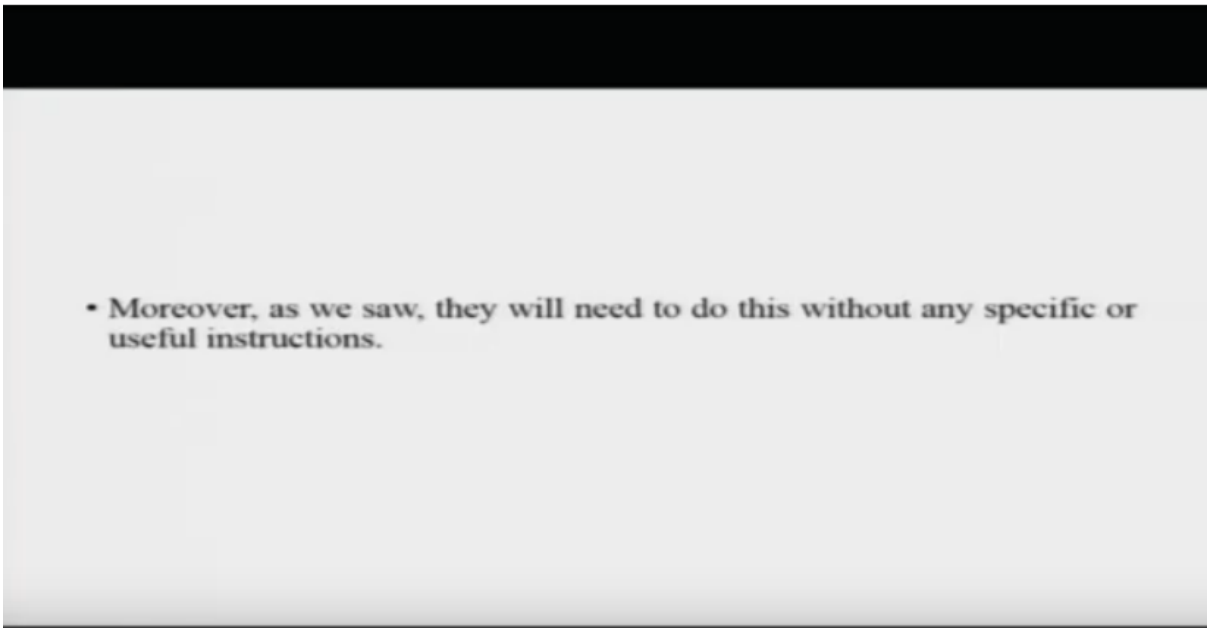

ourselves with understanding or figuring out the phonemes of a language. Before that and just point that out to Alice remind you that all of these tasks the children have to do without any specific or explicit instructions for the most part children are doing this with very little environmental feedback, with very little instruction by the way of actually telling them how to do this okay? So children are kind of doing this by themselves gradually as their brains are developing gradually as they are getting more and more experience of the word of the language. That they are being exposed to

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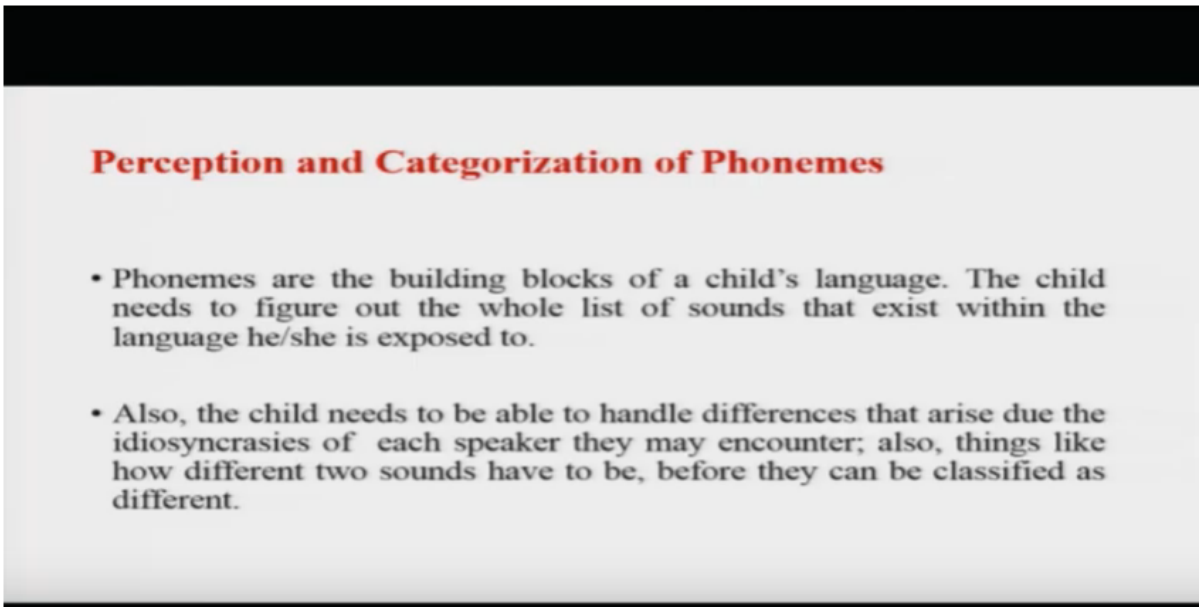

So, coming back what we are going to talk about in today's lecture, we're going to talk mostly about how the child reaches or kind of reaches a place. Where he knows or she knows the number of

phonemes, the number of basic sounds that exist in the language. Okay? Let's talk about perception and categorization of phonemes, now phonemes I have been saying this word a few times phonemes are the building blocks child's language. They are the basic sounds that comprise any of the languages that a child might be exposed to you know this is basically all the sounds that are there in Hindi. If you kind of put together that Hindi has all of these sounds they might be 2030 ,40, 48, 45 whatever the child has to know and the child has to be able to in some sense isolate all these 40, 60sounds from the continuous speech input that a child is getting exposed to okay. So the child has to do this also the child has to do this in a scenario which makes this very difficult because different speakers speak differently. Okay? Suppose I were to say pink and you were to say pink and somebody else were to say pink and if you take our attainders and you analyze it physically you will see that each of our entrenches are physically very different .Okay? In terms of a frequency plot all of them will sound really very different amount of energy and etcetera, in there will make the signals look very different still the child has to figure out that each of these things are very different signals. You know the power here in the power there in the power here are very different , so the child has to kind of you know really do this also the child has to in some sense be able to not distinguish instances of phonemes . That are not very different okay, so this is basically basic tasks to things that the child needs to do.

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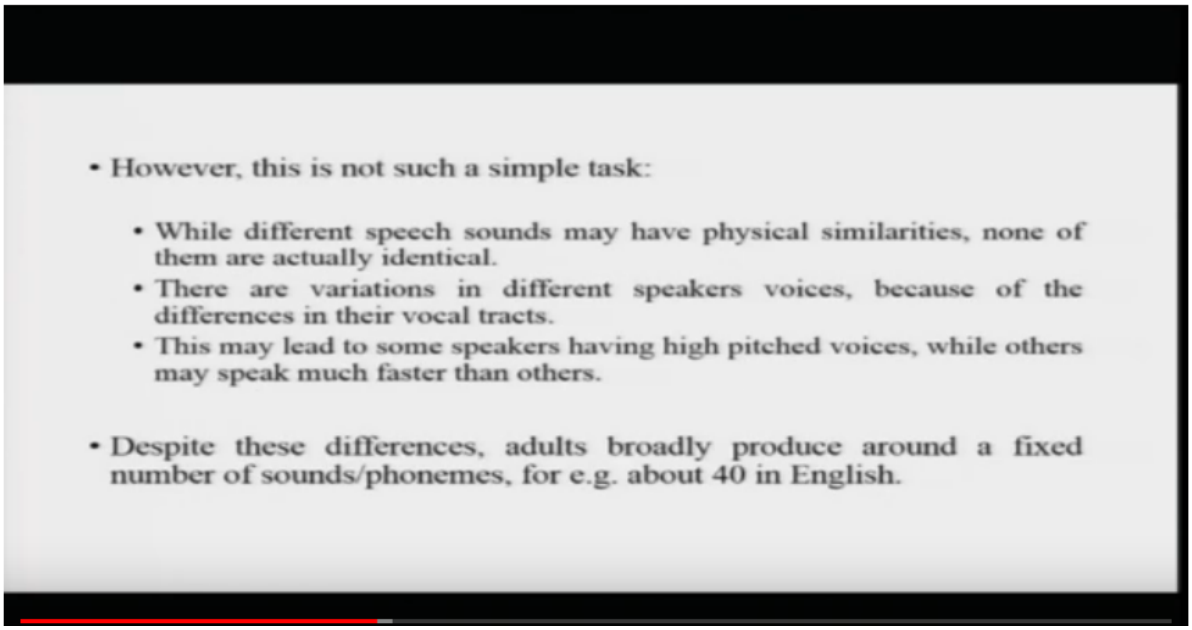

Is that the child needs to distinguish between phonemes that are adequately different and not distinguish phonemes which have minor variations, we'll come to that in this and also some of every discuss this in the coming lectures. Now this is not really a simple task as I was saying because different speech sounds may have physical similarities while , they may have physical similarities when I say by a newspaper but they are not physically actually identical . So that is one there are variations in different speakers because different speakers have you know these different vocal tracts and the signature of speech might be very different something to be heard by a person they probably sound very different in, in their since. This also sometimes lead to speakers having very high pitched

voices somebody speaks very loudly and somebody speaks very fast you know, so there are these variations as well and the child has to kind of grapple through all of these variety of auditory input .That a child is getting exposed to and from that very, very confused jigsaw really figure out all the 3040 sounds. That the language will have however it is been documented that despite all of these differences adults broadly, you know kind of produce around a fixed number of sounds in the given language. So English has around 40 phonemes okay, all the English input all the English speakers included the sum total of that can be categorised into basically just 40 basic sounds. Okay? Obviously variations of them are also there with respect to speaker to speaker in condition and different conditions. But broadly this is all to be you know condensed into 40 sounds and this is the40 sounds and a child has to figure out by the time the child. You know starts picking up first aspects of language.

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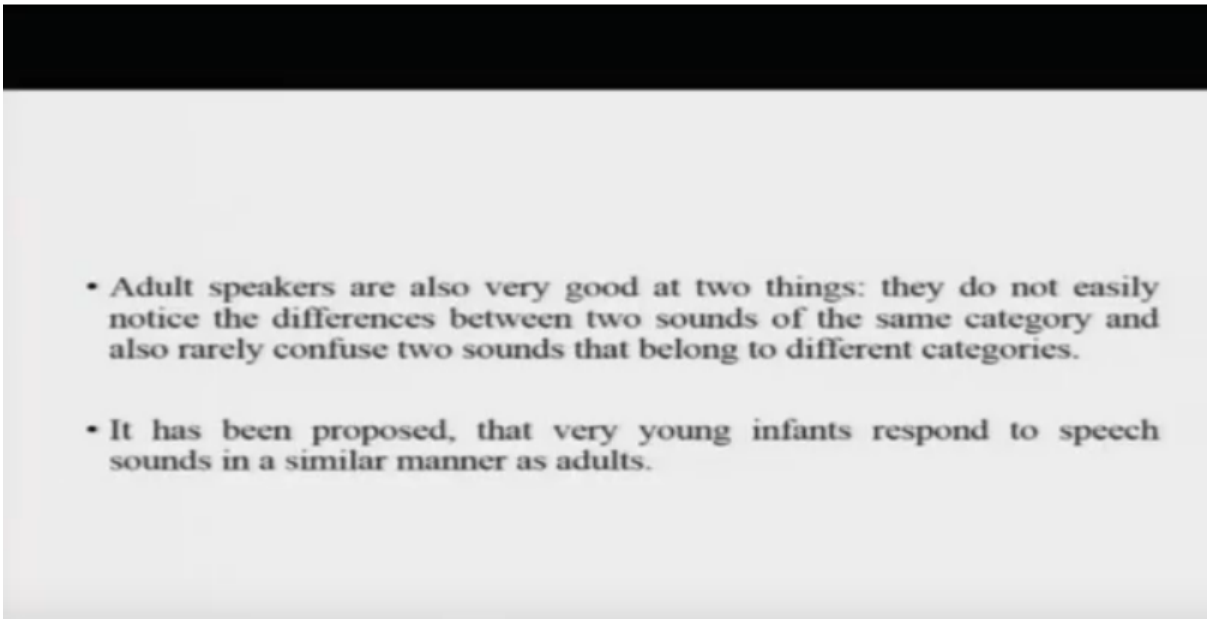

Adult speakers are also very good at two things as I was saying they do not easily notice the differences between two sounds of the same category, so different versions of / as I say it or you say it or somebody else said all of our powers even though physically. Will be different signatures will still sound the same sort of okay? We appear to us as only okay? Also they rarely confuse two sounds that belong to different categories. So if I say pas and BA and the other person say Spa and buy new say / and children should also be able to distinguish / and separately in all the three speakers. Okay and this is because I mean this is what adults are very good at doing? So these are the two skills as I was saying children need to really figure out now it. Has been proposed that very young infants respond to speech sounds in a very similar manner as adults, they are very good at doing this as soon as, they are born they are not really, they don't really take a lot of time in picking. This up I see some examples.

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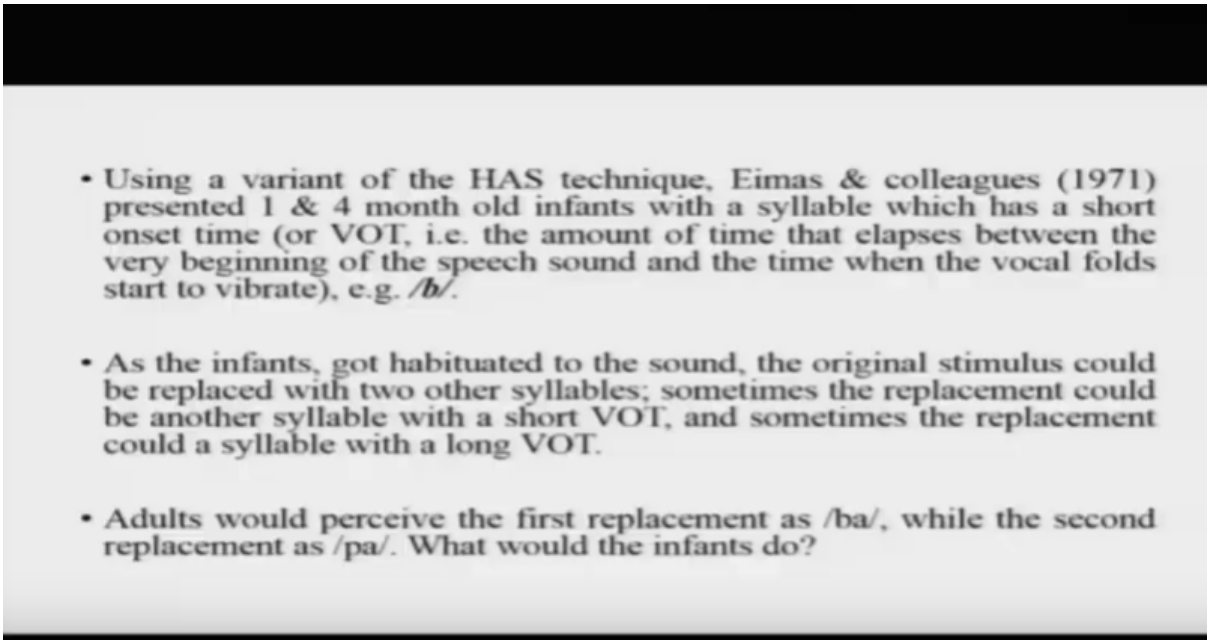

You know using a variant of the HS procedure; we talked about the CHS procedure in the last lecture as well I'm us in colleagues 1971 presented one in four month old infants with a syllable. That had a short on say time like BER and basically what is a short onset time basically is effort to as voice onset time and this is typically the time gap between when you start speaking the sound and by the time your vocal cords start vibrating .Okay? So there sounds like that have short on to time like bar and there are sounds that have a slightly longer on to time like PAH okay. So the gap is kind of a little bit more but the bottom line is that the child was presented with a syllable with a short answer time mainly bar and once. They were habituated to this they we represented with two kinds of test symbols one test symbol has similarly a short voice on say time like BER and the other test syllable . Has a slightly long answer time like / now, how would adults do this? Adults would perceive the test syllable and shorten say time example as the same category and they would basically perceive the test syllable and the long one said time probe as different category. This is what adults would do ,how infants perform on this let us check.

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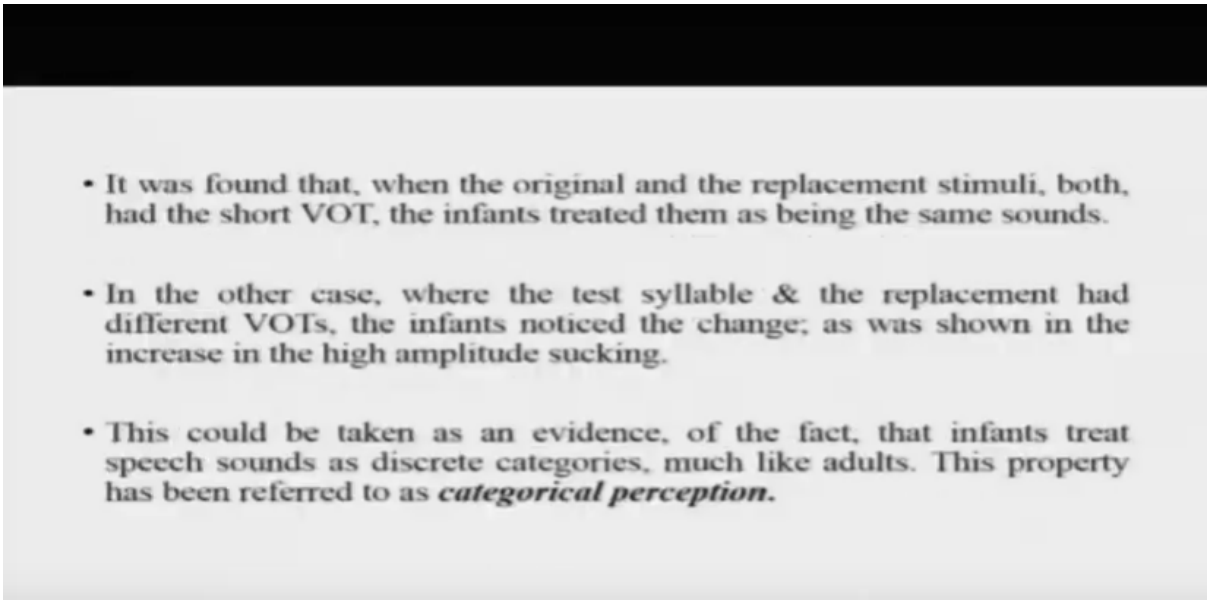

It was found that when the original and the replacement stimuli both had short voice onset times the infants treated them as the same category much as the adults do in the other case. Where the test syllable and replacement had different voice onset times the infants were able to correctly classify them as being different, so you see infants are also a perceiving sound or perceiving phonemes in much. The same manner that the adults are doing now this ability a very basic and very fundamental ability of learning language the ability of being able to regard sounds as discrete categories. Is referred to as categorical perception and categorical perception is one of the most fundamental basic properties of children and we see that this is therewith children as young as one month old and four months old. Okay?

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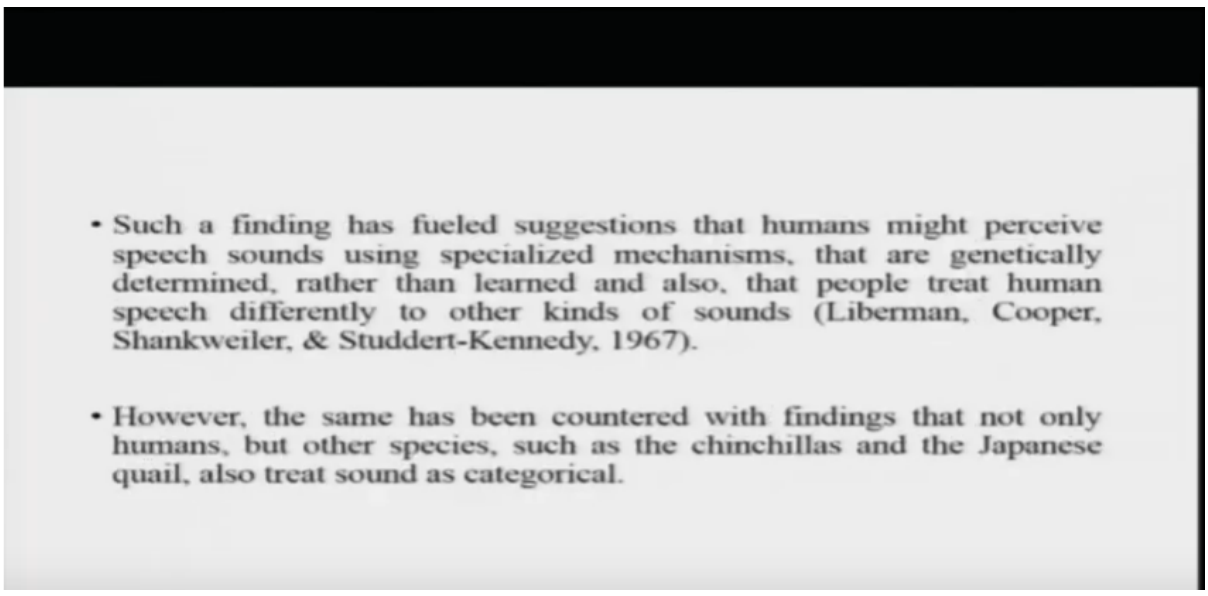

So it's something that is children already have mastered by a very, very young age. Now such a finding when you kind of come up with this kind of receptions that humans might ,you know perceive speech sounds using specialized mechanisms because say for example people weren't able to explain, how quickly children are learning this? So they said that maybe what is happening is that children perceive speech sounds .Using very specialized mechanisms that are genetically determined. We are born with these mechanisms which obviously are genetically endowed to us and these are the mechanisms that are helping us perceive speech in so many discrete categories. So that is what basically was proposed now wall good but now there are also counted evidences to proposals. So similarly this evidence was also countered with the fact that other species as well nonhumans. She's like the chinchillas and the Japanese quail are also capable of doing categorical perception, that is regarding speech sounds into discrete categories categorizing speech sound into discrete no categories. So this, this was kind of very quickly countered,

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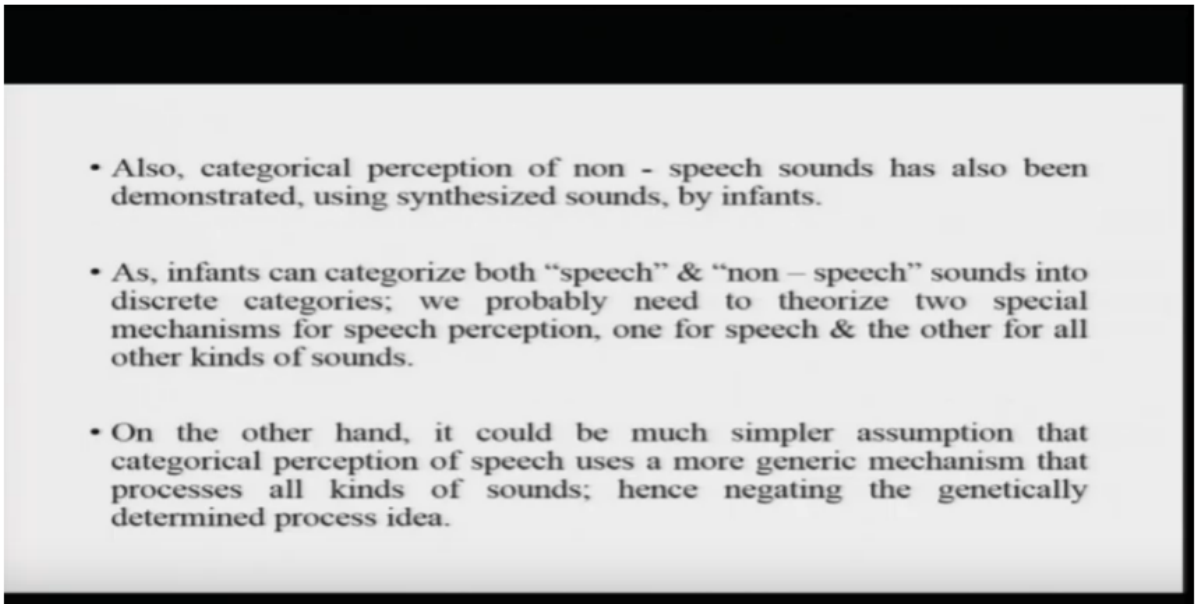

also it, it has been shown in a range of studies that children also very good at categorical perception of non speech sounds. So they can also do this say for example with artificially generated speech sounds you know sounds, that are generated by a computer and if they are sufficiently different from each other. The child will be able to notice and respond to the difference, now if the child is able to do this for speech sounds. As well as no speech sounds and remember there is no evolutionary advantage to categorically perceiving non speech sounds then where are we okay , how do we explain that.So one of the ways could be to say that children have two basic speech mechanisms one for speech sounds one for non speech sounds . But that is a slightly more complicated way of doing this however a much simpler assumption. Could be that the categorical perception of speech probably is using a very generic auditory perception mechanism, that is kind of processing all kinds of sounds and hence it kind of negates the use or possibility of having a genetically determined or processing mechanism. Okay?

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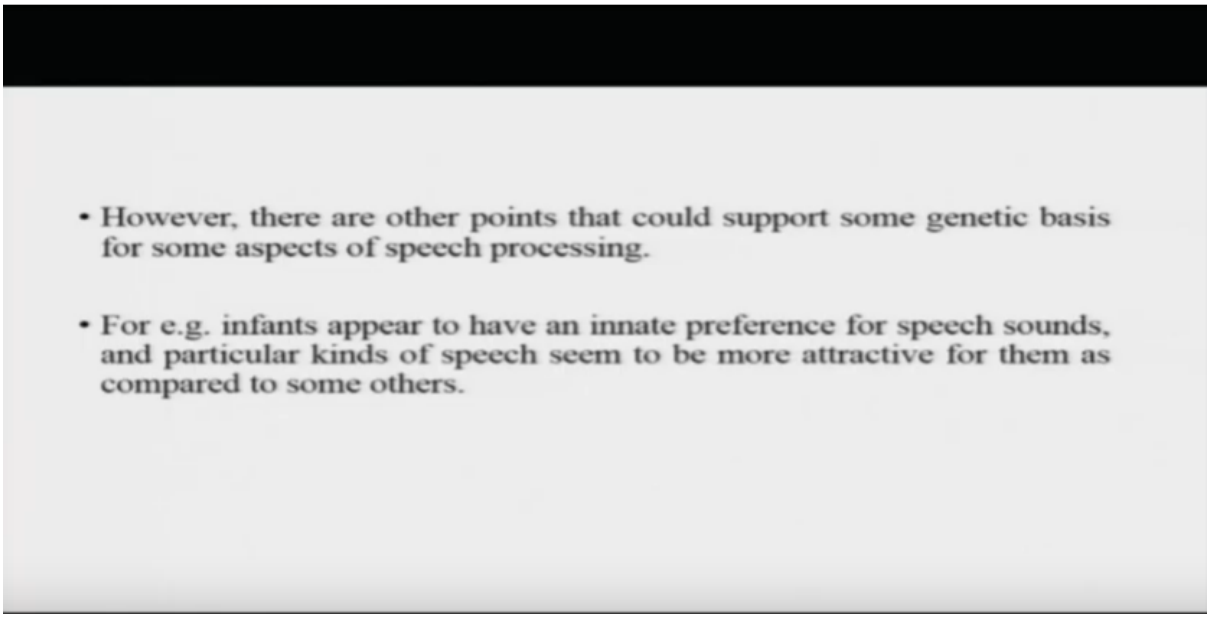

So this is something but again remember that categorical speech perception is some of their very is one of the most important and foundational skills. There the child needs in order to pick up phonemes and categorize them into discrete categories, because this is building on which the child will later be able to combine these phonemes and form words and so on now also there are other points. That kind of support the genetic basis of some aspects of speech processing even though this did not really work but there is probably some weight in the idea of children being able to or children possessing. Some genetically determined innate skills for perceiving speech. Let us look at that infants appear to have innate preference for speech sounds they prefer listening to human speech as opposed, to listening to prey in sound so motor sounds or you know sounds of bells or something like that okay, so they have this preference and this seems to be evolutionarily endowed. So this means something about speech is special and children obviously have an innate of affinity towards listening to speech

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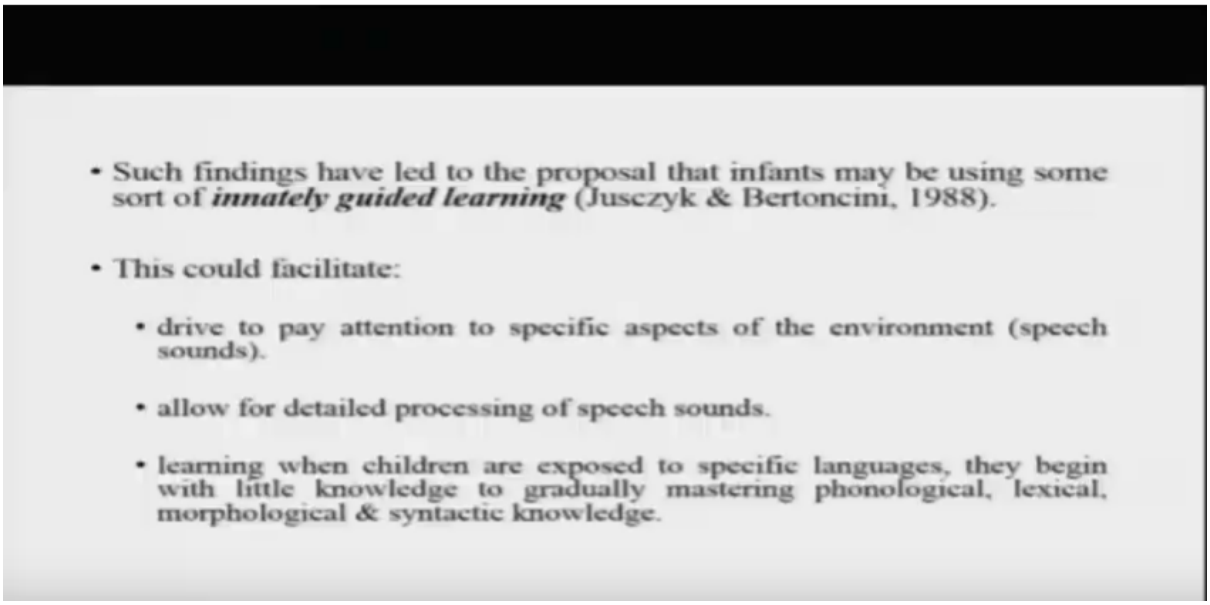

So, such findings have kind of led people to propose that infants may be using you know something similar to what is referred to as the innately guided learning. You know, what is something that they innately possess? And what is this innately guided learning doing this innately? I were to say pink and you were to say pink and somebody else were to say pink and if you take our attainders I were to say pink and you were to say pink and somebody else were to say pink and if you take our learning drives the child to pay attention to specific aspects of the environment. You know speech sounds and to notice the tempo and the speech and so many other things on the basis of which the child will be able to pick up some of these things. Okay? The child will be able to pick up the basic nature of how human language is this also in that sense , will allow for detailed processing of space on you remember that infants already in the third trimester of pregnancy could distinguish between a familiar versus an unfamiliar nursery rhyme . They preferred listening to French over Russian, where is all this coming from probably from this innately guided learning mechanism also this innately guided learning mechanism kind of leads to learning. When children are exposed to specific languages they begin with little knowledge to gradually mastering the phonological lexical morphological and syntactic knowledge of their native. You know knowledge of the native language this seems to be a very generic mechanism which probably starts with the basic idea of you know, whatever language is exposed to I'll pick up and then depending on the statistically a large amount of input of whatever language they listen to the kind of gradually use this to pick up both the phonology. The words and morphology and the syntax of that knowledge. So, this is something which is there in the proposal.

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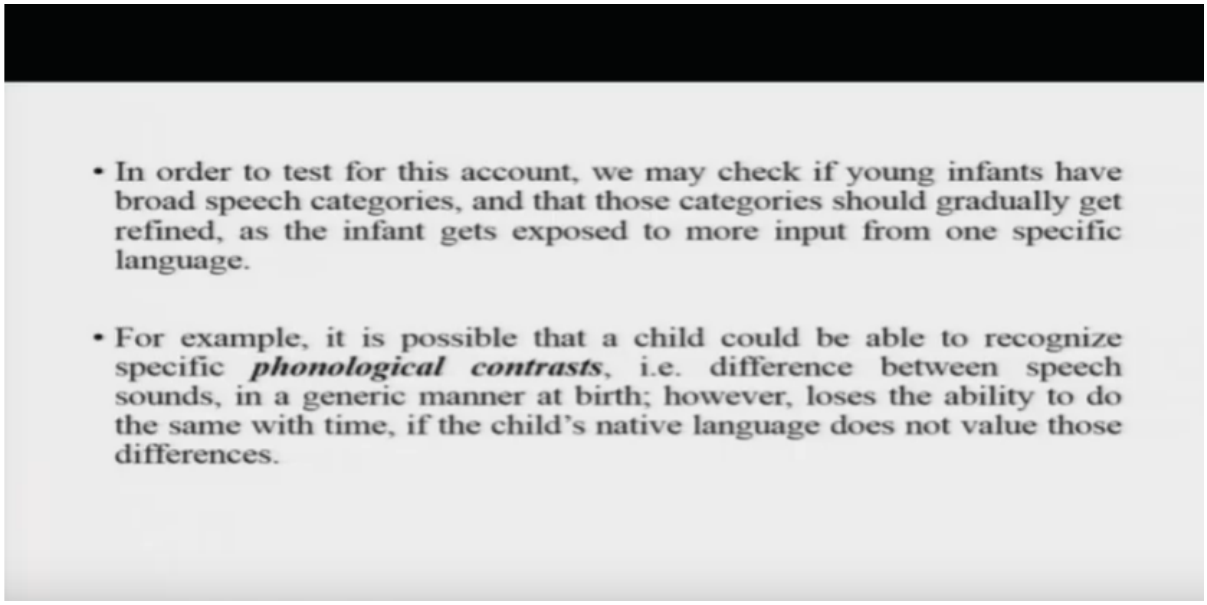

Now in order to test for this account what can we do. We can probably check if young infants do have broad speech categories and that those broad speech categories. Should gradually get refined as the infants get exposed to more and more input in their specific language in the in the native language that they have to learn, so putting this differently it is possible that the child could be able to recognize specific phonological contrasts what are the phonological contrast the phonological contrasts are differences between phonemes of particular language. Okay? Japanese some children are not being able to distinguish meander and LA because their liquid phoneme and Japanese language does not distinguish between them. So much let us take another example.

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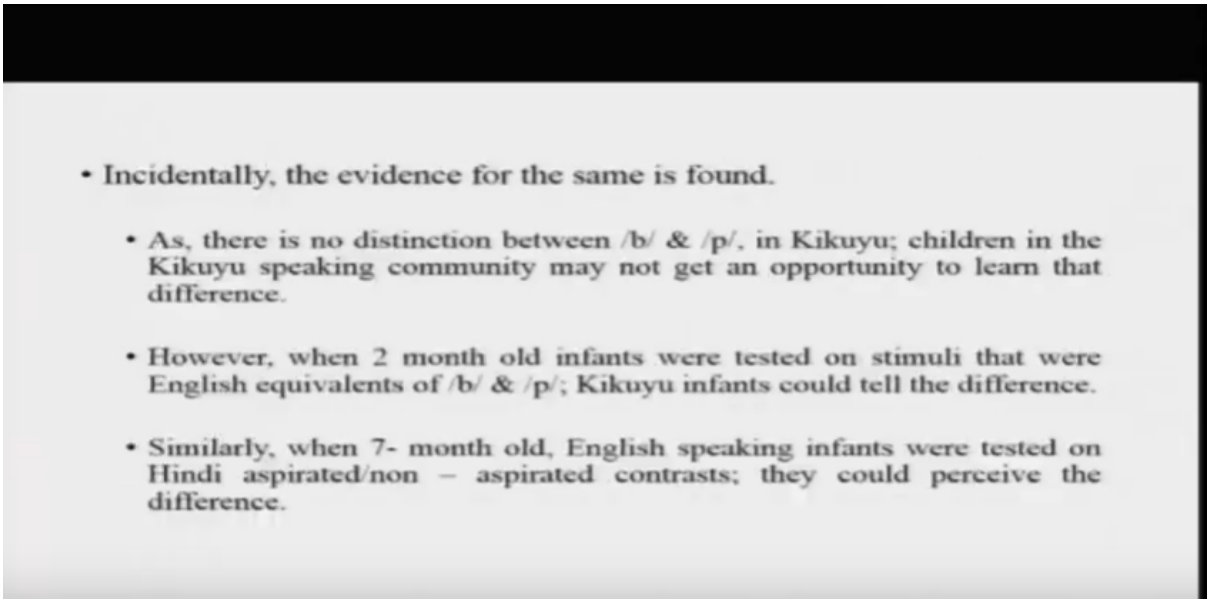

So, Kikuyu in Kikuyu language there is no distinguishing between bah and bah whereas in English burn power to discrete sounds and everybody. Who speaks or learns to speak English can and should be able to distinguish between burn / ok but if you test Kikuyu children you would probably believe, that they shouldn't even be able to distinguish because this is not in their language and in any environment. That are being raised they are not being exposed to the distinction between by and so typically, they should not be able to do it however when two-month-old Kikuyu infants, were tested on stimuli that were English equivalents of BER and / they could tell the difference. Okay? Similarly when seven-month-old English speaking infants. Were tested on hind aspirated and non aspirated contrast like pi and purr for example they could also perceive the difference now, why this happening why is, is this useful if you really wonder. This could be possible because the mechanism when the child R is born or the children are born is a very generic mechanism okay, and the mechanism has to be ready to encounter and learn any language that comes the child's way so the mechanism at birth is very, very generic you exposes too quickly you English Hindi Chinese Japanese German the mechanism. Should be able to pick up the phonological contrast or phonological differences from any of these languages okay, in order to be prepared for learning any of the language that there is however with time when the child latches on to one of these languages as the native language suppose the child is more in a kick you tribe or English speaking family or a Hindi speaking family the child will start mastering the phonological contrast of their specific language and start gradually start losing out on the phonological contrast of the non-native language .Let us see if that really happens.

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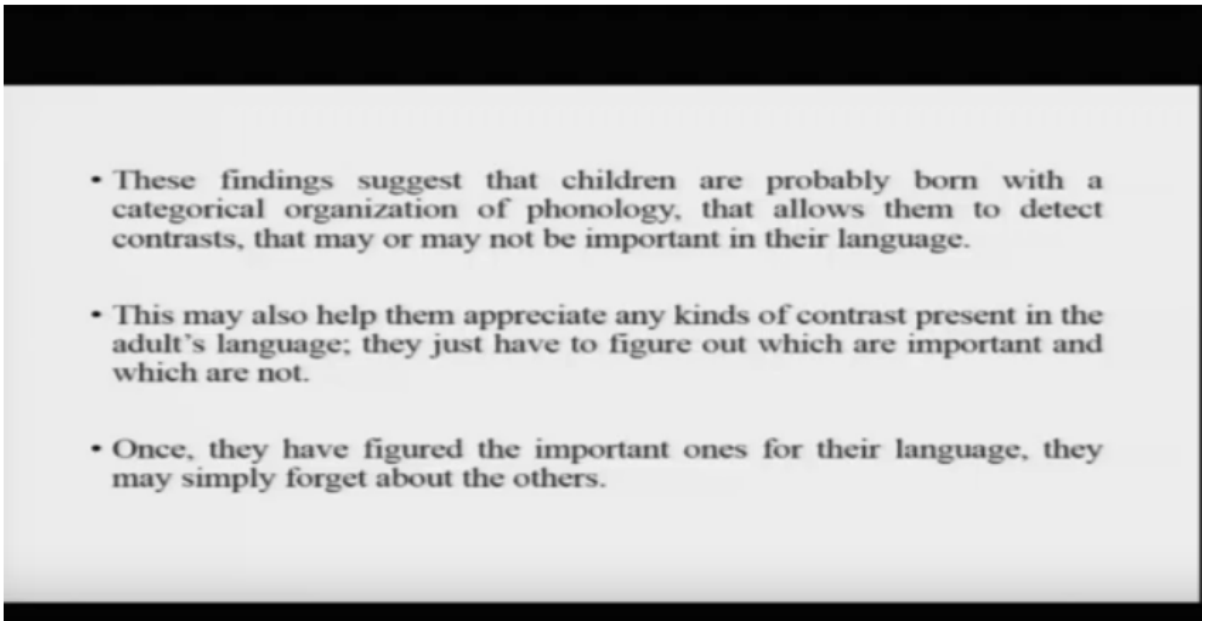

So, these findings suggest that children are probably born with a categorical organization of phonology that allows them to detect contrast that may or may not be important in their language. This may also help them appreciate any kinds of contrast present in adult language because they have to figure out and they have to basically figure out which are the important and meaningful contrasts and which are not as. I said this will keep them prepared to learn any of the languages that are there okay now once they have figured out the important phonological contrast. So this burn pie is important for my language but if I'm a Kikuyu speaker by npi it's not important for my language so after I am six or eight months a fool or one year old I should probably forget it I shouldn't probably be remembering this, so does not really happen let's test. Okay?

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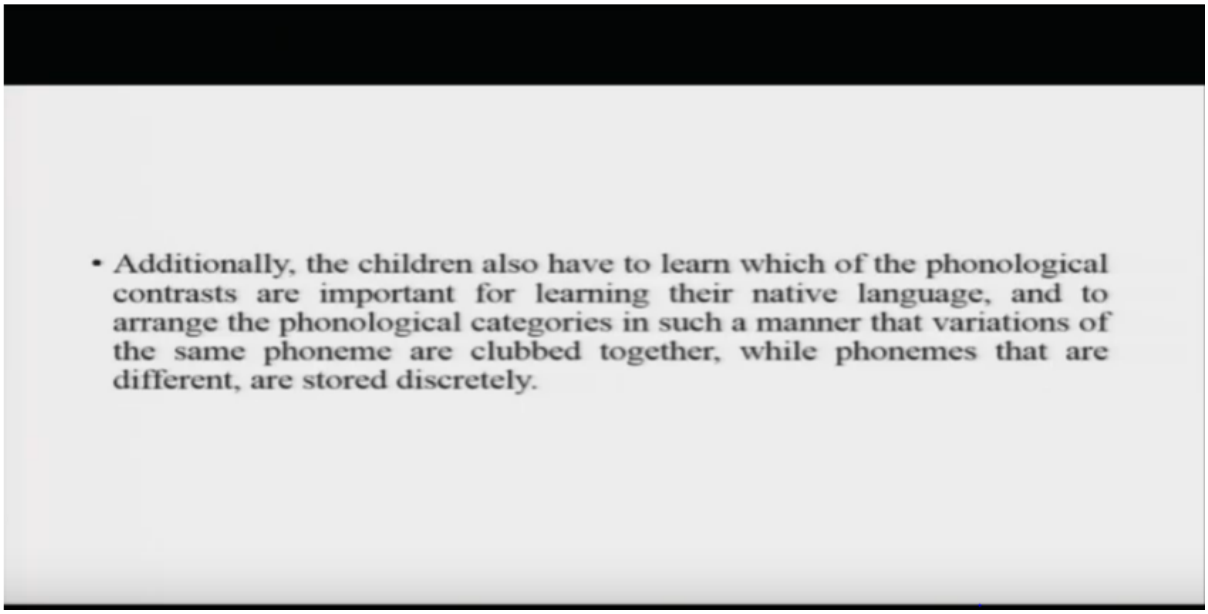

Before moving on additionally also what the children have to do is they have to learn. Which of the phonological contrasts are important for learning their native language and to arrange the phonological categories in such a manner that the variations of the same phoneme are clubbed together by phonemes? That are sufficiently different are stored discretely building on this they have to also acquire this scale now what are we talking about,

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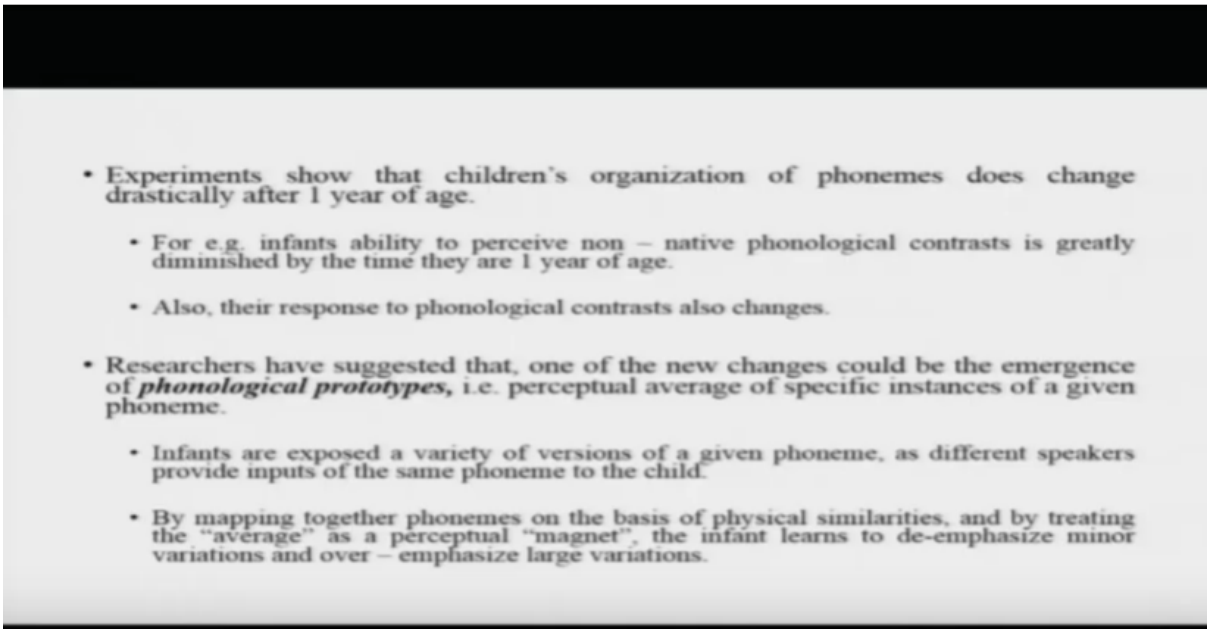

Whether children forget the non-native contrast of different language. Let us see experiments have shown that children's organization of phonemes does actually change drastically. After one year of age for example infant's ability to perceive non-native phonological contrasts is greatly diminished by the time. They are one year of age, we saw that by the age of two months and six to seven months .They were being able to perceive non-native contrast fairly nicely, however by the time? They are one year of age and above they are not able to perceive the non-native phonemic phonological contrast. Okay? Also their response to phonological contrasts also changes the way, they respond to phone contrast there are also kind of changes in measurable ways now researchers have suggested. That one of the new changes there that happens with the child that is growing up from six seven-month years aged six seven months of age to one, one and a half years of age is the emergence of what is referred to as phonological proto types. What are phonological prototypes? Now a phonological prototype is typically its perceptual average of specific instances of a given phoneme it's not as complicated as it sounds is simply. When I say per and the other speaker says PI and the other speaker says par, so if ten of the speakers are saying purr and we are all probably saying this in a in our own indeed synergetic manner you know you can look at this very nicely ,when you're talking when you're listening to different people speaking their non-native language say for example; if a French guy is speaking English versus I you know you Pig I speak English ,what is a Punjabi guy speak English or a Tamil guy I speak English or, or this you know Mexicans . In Italian speak English all of them if they're speaking their non-native line you can distinguish very well. You know that their own that they're all of their utterances of pie and by some of the basic sounds will probably be slightly different. Now how does the child really figure that out, so the child what the child does is it stores a perceptual average of all of the pearls that are entered creates a sort of a perceptual magnet and then stores minor variations from this magnet as in the same category .If the variations are more than a particular threshold then they categorize then the child would categorize, this as a separate sound altogether. So, all of that will probably be in the same but as soon as power goes to bar the there is a new category. That is born so it kind of you know distinguishes between these two categories very well. Okay? So, infants are exposed to a variety of versions of a given phoneme as I was saying and

as different speakers try different inputs of the same phoneme and by mapping together. These different in senses or the phonemes based on the physical similarities and by treating the average is a perceptual magnet this is very interesting the way attracts reports it the infant learns to Ed-emphasize minor variations and super emphasize major differences. Okay? So a smaller variations are kind of clubbed together this is all per and larger variations are kind of discredited in in a sense that per this is PI and this is PI and they are not the same thing because see why I say this is a meaningful contrast and no meaningful contrast. If you see a pad versus if you say bat there are two different things all together and even though physically the two sounds are very very similar. So this is something that the child has to pickup this is something that the child has to master.

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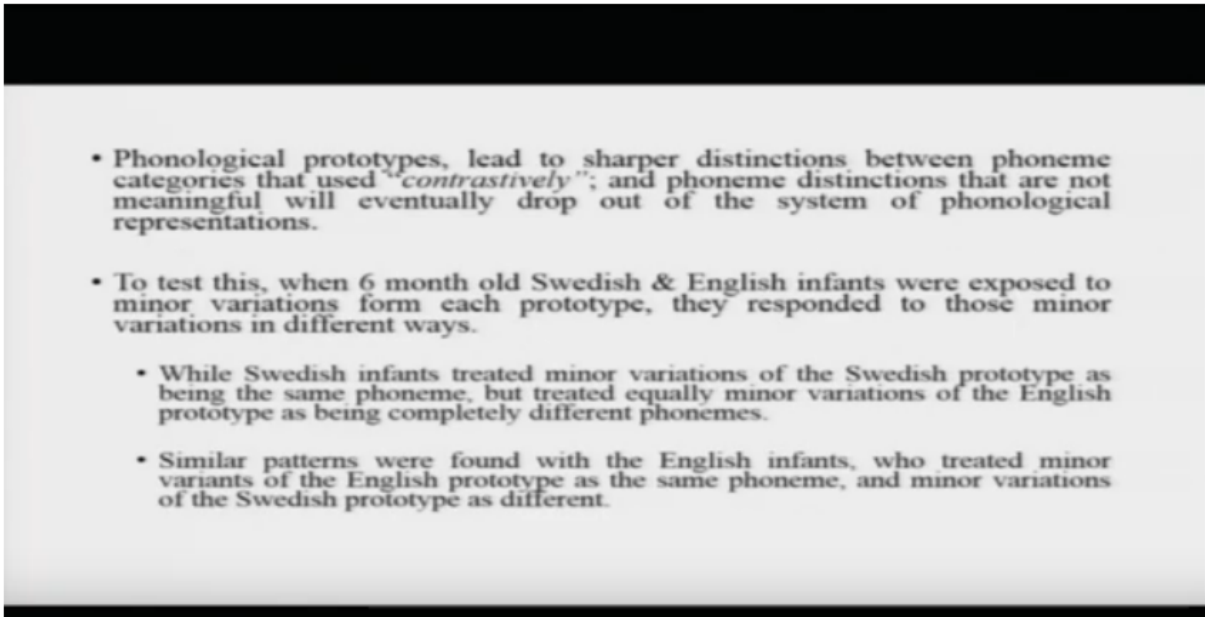

So phonological prototypes you know yeah because they exist in this way they lead to the child having sharper distinctions between phoneme categories that as use contrastive Lee and phoneme distinctions that are not meaningful. Then eventually drop out of the system of the phonological representations, so as in when you're learning in your native language say for example Hindi increases your learning of some of the other languages kind of temporarily probably needs to fade out. Okay? Because you are latching on to the phonological representations of this language relined of you know, internalizing them in, in abroad sense so to speak this is probably also one of the reasons. As we

might talk later is that whenever you are learning a second or a third language the phonological manifestation of the first language kind of still sticks around Tamil die or if a Malayalam guy speaks English. You can still detect overtones of Malayalam phonology or Tamil phonology or Hindi phonology in these speakers .So to speak to be very clearly there you knows this is something which we kind of call accent or something like that. But this these things are there okay and so how can we test this so to test this what they did was they kind of tested six-month-old English and Swedish infants and these English and Swedish in infants. Were exposed to minor variations from each of the English and Swedish prototypes and they were asked to respond to these prototypes and it was found. That they responded to these prototypes in different ways , how is that so when Swedish infants while Swedish infants treated variations of the Swedish prototype as being the same phoneme but treated equally minor variations of the English prototype as being completely different phonemes similarly . The English speaking infants treated minor variations of the English prototype as the same category but minor variations of Swedish prototype as very different categories. so this is where we see that child and are kind of using knowledge of prototypes which by the way started from them being able to you know do the categorical perception in a very incremental manner and learning the sounds are learning the phonological representations of the language. Okay?

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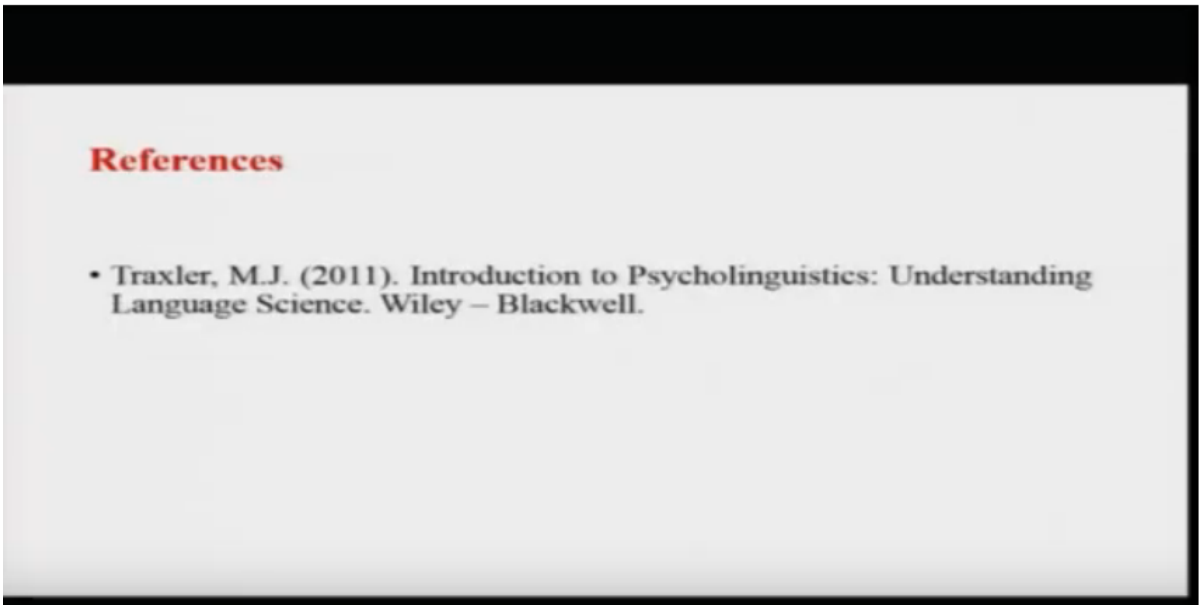

So, this was probably the first challenge that the children need to do in order to learn language that is mastering the phonemes of the language okay? we've had two lectures in the series coming lectures,

we'll move further with you know talking about how does the child move further in acquiring language. Thank you.