Lecture 10:
Acquiring Morphological and Syntactic Knowledge

Hello and welcome to the course on introduction to the psychology of language. I am Dr. Ark Verma were from IIT, Kanpur and this is the final lecture of the second week. This week, as I've been saying we have been talking about language development in infants and young children. We have been looking at various challenges that the children needs to overcome or undertake in order to acquire language and speak as the adults do. There are, as we've seen quite a few challenges, segmenting the speech stream into chunks making sense of each of these chunks understanding, what each of these words mean in the last lecture we

talked about that. Today we are going to talk about, slightly more complicated things. Okay? So, today's lecture is basically going to focus around acquiring morphological knowledge and acquiring syntactic knowledge now. Before I go into the chapter, let us try and talk about, what is morphology mean? or what is syntax me morphology is more concerned with the make up of words? How are the words made? we know that words fulfill different grammatical functions in the language and in order to fulfill those different grammatical functions. The words are kind of changed using particular techniques, some words can be add. If you have to go from a present tense to a past tense version of a particular verb, I would like to sleep, today all versus I slept yesterday, in order to convey that you know slept is about yesterday. I changed the word sleep into slept, you know there's some morphological variation that is happening. Also, we kind of add in terms of add things to the word say when ever, we add play and played. So, we added ie to convey past tense. We are suffer to suffering to ing to suffer to make it suffering, in order to kind of convey the continuous nature or we say for example, say you know apple and apples and mango and mangoes, we add the "s" to add the pureness. So, we kind of changed the words that are known in a variety of different ways. So as to kind of get the grammatical function fulfilled of that word in particular scenarios, so that is typically, what morphology is about? broadly and I'm kind of giving you a very watered-down version of morphology precisely. Also, because I'm not describing it from the you know accurate linguistics first factory but just to try and understand what morphology basically means. I think this bit of an introduction should be enough the other part is saying tactical knowledge. What is syntactic knowledge? Syntactic knowledge basically is about the rules that govern the words. Okay? So, we know that, if you remember in one other in the last week in one of the beginning lectures, I talked about what the definition of language? I said, the language is simply a system of symbols and rules. We talked about symbols, which are the words and we now have to talk about rules which are, how are those words combined to create meaning? Or to convey fertile kinds of message, Say for example, cat eat rat or say for example, cat is eating the rat or the cat ate the rat or the cat could not eat. Any of these things, how do you combine the three words? Cat rat in each to convey different kinds of messages, what do you add? What do you subtract? What kind of variations you bring in? What are the rules that are used here? That is precisely, what syntax is. Okay?

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Observations

- Children from about 2 years onwards begin crafting short sentences, those that they have never heard before.

- Gradually, these approximations get closer and closer to adult language performance.

Again as lightly watered down in a version of, what syntax could be? We will talk about some some of, there are those things in the later versions, as well now, let's share some observations, such it's known the

children from about 2 year on wards begin crafting short sentences, those that they have never heard before. So, they start creating spontaneous speech. Okay? Remember, we had this discussion about animal communication and children's communication and we said that, for the most part animals are notable to create spontaneous speech or ask questions or basically to create space, which is not made to get a specific end. So, you start creating lots of speech thoughts of spontaneous speech from the time they are around two years of age gradually, what happens is that these approximations get better and better and they better and better and they get to a point, where it is almost similar to adults language now. What we are going to talk about today is from, this point eighteen months to two years to a point, where the children's output or production or speech is equivalent to data Feeders. What are the challenges here that they need to surmount, what are the challenges here that they need to overcome and reach to a point, where they can create speech of that kind an important question,

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An Important Question

- How do children acquire the skills to form grammatical phrases & sentences?

that we can ask here is how do children acquire the scales – from grammatical phrases and sentences? How is this that the grammar kind of starts setting in, let us, say there are three kinds of knowledge, that a child would need, in order to kind of be able to create perfectly grammatically acceptable sentences. Okay?

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Three types of knowledge

- Knowledge of word categories:
  - Children must learn the categories of words that exist in their language.

- Morphology:
  - Children must learn different forms the words can take, and their relations.

- Phrase structure knowledge:
  - Correct ways of combining words into phrases.

So, first is the knowledge of word category. So, the child needs to know that a particular word is a noun, it's a verb, it's an adjective, is an adverb and a child we need to kind of have some knowledge of these word categories and by virtue of these word categories. What are the function of each of these words a noun, as a useful represent an object, a verb is useful a person in action and adjectives represent a property of that object and adverb is used to obtain the property of that action things. Like this, the other knowledge is morphology, as I was saying Trillion must learn different forms. The words can take and their relationships. So sleep, sleeping, slept or a drink and drank think and thought or say for example, play and played. So, what are these different forms that the words can take and what is the relationship between these forms? So played is the past tense version of play, sleeping is the continuous tense version of sleep. Things like that and then come the phrase structure knowledge. Phrase structural knowledge is basically knowledge about the correct ways of combining words into phrases and later into larger sentences. So, all these three kinds of knowledge together we enable to the child to produce language in a similar manner, as the adults would okay? So, this is what you have to remember.

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Two approaches

- Nativist approach:
  - an innate universal grammar plays a central role in informing the child about the three types of knowledge.

- Probabilistic learning:
  - children acquire linguistic knowledge gradually discerning patterns from systematic input.

Now, as always or as this chapter was concerned, there are two possible approaches to look at, how these knowledge might come? There is the nativist approach, which says that there is an innate universal grammar, that plays a central role in informing the child about these three types of knowledge. So, people like Chomsky and Steven Pinker, they've talked about aspects that they say, that there are all of these basic knowledge --is that the child needs to perform perfect language is already in Italy. Available to the child and what the child needs to do is just to activate or reactivate. So, to speak that innate knowledge by coming up through certain lines of experiences, doing a little bit of a Hilton trial but precisely everything is already there. The other approach the learning theorists approach or the probabilistic approach says that what children do is that, they acquire linguistic knowledge by gradually discerning patterns from the systemic input. So, they get a lot of input, the analyze that input they analyze these particular patterns and they use their patterns in an incremental way in their own. Speech while, they are using those patterns, or the knowledge of those patterns in you know incrementally in their daily speech. What they're doing is they're gradually approaching a point, where their speech also starts to be error free and much like, that of their adults. So, these are the two contradictory approaches and we will see with respect to each of the kinds of the knowledge that we talked about. Now, how are these two theories spitted against each other, So let's see, Let's talk about word category knowledge,

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Word category knowledge

- The nativist view:

  - Knowledge of word category is innate (Chomsky, 1965; Pinker, 1996).

  - Categories are populated using *semantic bootstrapping*.
    - learning is based on the child's ability to distinguish between objects, actors (agents), and actions, independent of any linguistic labels.

first now the nativist to you about word category knowledge is that, the knowledge of word categories is innately present and what the child needs to basically do is, use something called semantic bootstrapping, which basically inverse the child to populate each of these categories, nouns, verbs, adverbs with specific instances from its own language. Okay? So, learning is basically based, so so any bootstrapping says that learning is basically based on the child's ability to distinguish between objects actors and actions independent of any linguistic label. So, the first that, the thing is that soil kind of figures out. Ok? this is the event that happened. This is the actor, this is the patient, this is the object and gradually the child starts kind of when they have enough examples of this kind they put all actors together, they put all objects together and they put all actions together. This is how they would populate the categories. That are already known to them in innate sense. So to speak, so basically what the child is doing is the child is mapping concepts

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- So, the child has to learn to map concepts (objects vs. actions) to linguistic tokens (nouns vs. verbs).

- Pinker(1996):

  - Children must be using sematic notions as evidence for the presence of grammatical entities in the input.
  - The baby (subject) ate (predicate: verb) the oatmeal (object) with the spoon (prepositional phrases).

 objects versus actions to linguist tokens, that is nouns, versus, verbs. Pinker says that in 1986 says that children must be using "semantic notions" as evidence for the presence of these categories. So, as they start understanding the world. That is how they are kind of picking these things up. Okay? So, the baby ate the oatmeal with the spoon. What happens is? that the child is having this sense of the sentence and the child is looking at the world and the child is seeing. Okay? What is happening here? There is a baby and the baby does something. What does the baby do? The baby eats. So, what does the baby eat? The

baby eats the oatmeal. How does the baby eat the oatmeal? The way we eats the oatmeal with the spoon and gradually when the child completely is to the point of understanding, this sentence what the child is doing is, if you remember you're talking about syntactic bootstrapping earlier. It's very similar, what the child is doing is the child is picking up the understanding of the world and mapping it to the words that are presented. So, the baby is an object. Okay? This could be a noun. Ate something is being done, that is an action. What is being eaten the oatmeal? So, that's also a noun. What is being, what is this being eaten with spoon? that's also an object. That's also a noun. So, this is how gradually I think Pinker would believe that children are acquiring knowledge about these specific word categories. Now this is one proposal, there's another proposal as well obviously and this other proposal is from the probabilistic perspective or the learning theorists perspective. What do the learning theorists say, they say that it can't be that the child's innate knowledge of word categories will be the same as that of adults. It you can it probably could be a far stretch to say that shouldn't know the world of words as much as the adults know it. So, it's kind of a little bit too much to expect the children also appreciate the world in terms of nouns and verbs and adjectives and adverbs. So, there should be something else that is happening here and what is it that something and what is the proof for that. It's been shown that children don't replace and noun switch genetic substitutes freely, so they not say for example ,

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- **The probabilistic view:**

  - It can't be that the child's innate knowledge of word categories be the same as that of adults.

  - Children don't just replace nouns with generic substitutes freely. (dog vs. person)

  - Children's word categories are based on concrete semantic properties (e.g. person vs. animal; activity vs. state) than on abstract grammatical properties (noun vs noun).

they don't start replacing nouns like dog and cat and other kind of nouns with other nouns. They are not really looking at them as in the same class as proposed by the pen native school. what is happening on the contrary is that children's word categories are probably based on the concrete semantic properties of those particular objects. So, now this is something that I'm doing. So, I'm waving my hand, well says this is something, this is a pen, so the concrete semantic properties of this object will tell the child that this is an object and this is a different class of word versus. The semantic property of waving my hand or moving my hand is something different on the basis of these properties is that the child will arrive at these different kinds of words, that exist and it is kind of a difficult thing to assume that the children already know some of this. Okay? So, that is, that is something that this particular school is trying to say,

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 Further, they say that the category is structured that children develop it reflects. The kinds of language that the child is exposed to and because there is variation with respect to the kind of language that the child is exposed to you, can say that this could not be then innate, okay? because they for example, if a child is exposed to a language that have more works than nouns and the child is picking up more works and the basis of that language. Just giving an example or say for example you know that understanding of the world depends on the understanding of their language and there are so many different languages and cultures in the world. Then we are basically saying that, okay? This cannot be in name because anybody born in any culture can be raised up by people who speak a very different language and then that will create a little bit of a problem. You remember this problem probably or this problem also came up. When we're discussing this aspect of forgetting the non-native contrast versus remembering the non-native contrast. Okay? So, this is something, so the children the category structure children develop reflects the kinds of language that the child is exposed to and the likelihood of different words appearing in different contexts rather than predetermined categories. So, it is also often the case that some word might appear as a noun in some cases versus the same word can appear as a verb in indifferent cases. I clap you know, I was clapping verses I heard a clap the same word is being used as different categories here, Okay? and that is also something that the child really needs to acquire and figure out. Okay?

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Observation

- Acquiring *morphological knowledge* (e.g. tense & aspect information) is important to learning a language. E.g.: kick, kicks, kicked, kicking.

So, this is about word category knowledge. Let us move to the second category of knowledge. The second category of knowledge is morphological knowledge. What is morphological knowledge? As I said a word can exist in many versions kick, kicks, kick kicking. Okay? You have to know the relationship between each of these words. How does kick move, two kicks, versus kicked, versus kicking, the child needs to

know the relationship between these versions. Also in order to be able to produce them at appropriate points and in appropriate places. So that is something which basically will happen, if the child has acquired morphological knowledge correctly. Okay?
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Question

- How do the children learn about morphology?
  - E.g. tenses.

- Answer: they probably memorize the past tense forms of each verb.

- Problems:
  - Coming up with new verb forms.
  - Making errors.

So, there's a question here, how do children learn about morphology things like tenses? So to speak answer, simple answer would be they just pick it up, they just mug it, they just learn it completely, Okay? but then we see that children make a lot of errors with verbs. They come up with new verb forms you know, you you can you might have heard of a child thing. I think that today, there is a holiday. He'll probably initially is the child will make an errors as to this day Lord say, I thought that and there is a holiday today or something like that you can make some of these over regularization errors Okay? Because think the child has heard never because nobody speaks things around the child but then where is the child coming up with this kind of thing? it's probably that the child is making an effort to create this thing. Okay? They are making a spontaneous speech and in that sense they are coming with their own ideas. So, Yes there are again two views the nativist and the probabilistic. You let us first look at the nativist view. The nativist preview says that the words and the rules basically are innately known,
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- The nativist solution:

  - Words and rules (pinker, 2000): Infants begin by categorizing words; each verb as a separate category. Later they link them (e.g. kick & kicked) and develop an insight rule, i.e. past tense can be generated by adding 'ed' to present tense.

  - Leads to over-regularization. E.g. think -> thinked.

  - Following this, a list of exception verbs is compiled & used to re-check tense usage.

so infants begin by categorizing words each verb as a separate category and later what they do is they link them up. So, if there are three versions of the verb kick, so kick, kick and kicking. Initially they learn them up as separate verbs, so kick is a separate verb, kick is a separate verb, kicking is a separate verb, eventually what they will do is they'll realize that the all three of these verbs represent the same action, so they might be a related thing. So, they'll link them up and once they've linked them up what will happen is they will delineate a sort of a rule they will come up with a rule which says that if you add Edie to kick it already becomes the past tense. So, this is somehow they will kind of come up with this kind of relationship and this as I said earlier leads to a lot of errors errors like over regularization they will start adding Edie to every known verb in order to make it into past tense. They will also come up with things like I drank, I drink, I think and so on and so forth. Okay? So following this then how does a child learn the other kind of verbs, other kind of past tense forms of the verbs. So it is said that once the child has come up with this rule the child will learn all the other forms as exceptions. Okay? so following this a list of exception verbs will be combined and the child will basically be able to pick that up and learn that and in a case, where Edie does not work that I will use those exception verbs and that is sort of how the child is kind of getting to the point at how verbs are learnt, Okay?

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This is one way of doing it. The probabilistic intention is slightly different. The probabilistic intention is that it cannot be the children. Suddenly from a Eureka moment start applying the rules it probably happens in in a way that chi'lan only gradually learn to mark out words using the regular past tense and then later increase the use of the regular tense. So, what they do is, they start they begin with the regular forms kik- kik play, played sort of they begin with this and then gradually they start using it more often, okay? and the regularization of past in verb has actually been found to occur across some context more than the other context. So, they kind of in some context, they know that this will fit in right away and they use it more generally in some other context. They probably are more hesitant in using. These kind of loaves, now one of the problems in really resolving this problem as to how children are really making this is that the studies of child language and studies of child language development are still relatively fewer at least fewer than the amount they should be and they're also linked with sparse data problems. Then the data is not there so much and you would appreciate say for example, if you really want to document shy language you probably should document in a longitudinal sense, how a particular child acquires language over time in the in days life span and you have to have lot of this kind of data because that will probably be a good solution obviously. There are ways to circumvent this and there are plenty of cross-sectional studies which attempts to provide information and data. So as to how each of these things are concerned Refer Slide time: (18: 55)

Preparing for longer utterances…

now. Coming to the final part coming to the part where the child now has a word some degree of word category knowledge. The child also has some idea of how these particular words can change? So, the child has some degree of morphological knowledge as well. Now, what is left? The only thing that is left is start using those words and the variation of the words that the child has learned in longer utterances in larger strands of speech. So, let us see how that happens now there's a quote that Trachsel uses.

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"Children…have to work out… how to talk about agent versus patient, location versus instrument, or beneficiary versus recipient. They must find out how to mark grammatical relations such as subject and object…" - Eve Clark (2009, p. 158)

It's also very interesting. So, I've also used it here which says children have to work out how to talk about agent versus patient location versus instrument or beneficiary versus. Recipient they must find out how to mark grammatical relations such as subject and object and so on and so forth. This is my Eve Clark and she points out this very neatly that to start creating longer sentences to start creating larger strands of speech is not something that is very easy it requires figuring out. So many of these rules you know, I was talking to you about these things. When I was talking about verb learning and this is what you know, this is how complicated it is. So you know whether you know I I went to have my lunch by the park is Park and instrument which somebody has lunch or it is the location where I've gone to have lunch. Things like this you know, he did this to whom and he didn't he did this to him something like. Who's the actor? Who is the patient? all of those kind of things that children have to figure out and we see that they do it and do it fairly well without a lot of explicit instruction as we've seen in the earlier lectures and they do it already by the age of two, two and a half, three years of age. So, let us see, how is that happening again two views the nativist view versus, the probabilistic learning view. Let us look at the nativist view first.

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Phrase Structure Knowledge

- The nativist view:

  - The basic knowledge children need to combine words into phrases is present in latent form at birth in the form of parameters.
    - E.g. "subjects either come before verbs or after".

  - Infants need to figure out the settings of the parameters for their native language.

The natives for you says that the basic knowledge that children need to combine words into phrases is already present in latent form at the birth in form of parameters. Chilean are born with these parameters. What are the parameters? Parameters are things are small rules like subjects would either come after verbs or before verbs. So the cat hit the rat. Okay? So the subject will basically come before hit or after hit, so the cat was hit by the rat or the cat hit the rat in one case, the, the object and the subject is coming earlier and in another case subject is coming later than the verb and this is one of the rules that a child needs to figure out in order to understand the sentence and later produce a sentence of similar complexity. Okay? So, infants need to figure out the settings of these parameters for their native language and as soon as they figure out the settings of these parameters with respect to getting, so much experience getting and analyzing so much of standard input that they will basically be able to start speaking equally complicated language.

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There is also an hypothesis in this sense which is referred to as the continuity hypothesis. The continuity hypothesis basically says the phrase structure knowledge that children possess is just early form but almost equivalent to the phrase structure knowledge that adults have. Okay? So the idea is the phrase structure analysis by children is very early on, is almost equivalent to the phrase structure knowledge that adults possess. So, they are saying that those two are pretty much the same thing. Here just the parameters their experience is not so much, here the experience is so much. So that parameter I said much in a much better meeting and they supported by citing things like even in children's utterances. Sentences have subjects, noun, phrases and verbs and work phrases also consider of a verb and a subject and so on. So, pretty much the way children speak is just a microcosm or more simpler way of how it'll speak. The structural integrity is exactly the same that is why people think that these two might be the same thing. Okay? However, this continuity hypothesis fails to explain how do children come up with ungrammatical sentences because adults fairly usually do not use a lot of ungrammatical sentences. So, how is it that the children come up with ungrammatical sentences? Okay? So, this is something, say for example an example of trenches. I want hold Postman impact a child is saying to his mother that I won't hold, so it's not using. I want to hold postman pack. Okay? So, how are these errors coming up, if the level of knowledge of the child is equal into the level of the knowledge of the adult? So this is some of the

problems with this idea and because there is a problem with that idea, they have alternate idea. The alternate idea is the probabilistic view.
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- **The probabilistic view:**

  - Learning phrase structure rules results from analysis of the input they are exposed to.

  - Children's phrase structure knowledge mirrors the frequency with which sequences of words occur in the language addressed to children.

  - E.g. children exposed to verbs like want without the preposition to make more errors of the kind, "want dance" in place of "want to dance".

 The probabilistic view says that learning phase structure rules results from an analysis of the input that the children are exposed to. We have been seeing again starting from the last trimester of pregnancy till you know 18 months, 24 months of age that children are very good at processing the input that they are being exposed to they are very good at analyzing patterns that are embedded in that input and so. Why is it not possible that the child might be able to figure out the rules of grammar? Just on the basis of analyzing, the input analyzing the kind of knowledge that the child is exposed to. So this is the probabilistic contention as to how phrase structure rules are gained by the children. So children sprays a phrase structure knowledge, they say basically mirrors the frequency with which the sequence of words occur in the language address to children. So they say, the way children learn language very faithfully. Represents the kind of language they were spoken with. Okay? So the kind of input they got, kind of will reflect in the kind of output. They cave and this correspondence is the proof of the fact that the children are analyzing this input and by analyzing this input learning, how language operates? So this is the probabilistic convention an example could be that children exposed to verbs like want, without the preposition to basically will create more utterances with the want, without the prepositions, to say for example if children are exposed to words like I want dance, I want eight, I want play, then they will also create utterances like I want dance, I want it and I want play and they will not be able to know that technically the correct way to say, this I want to dance, I want to play, I want to eat. Okay?
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- **Usage based grammars:**

  - Phrase structure acquisition is closely tied to the acquisition of individual verbs.

  - Young children first learn about how individual verbs behave, and only gradually form larger abstract classes of verbs by noticing their behavior in different instances.

  - E.g. Children are reluctant to move from Mommy drank. to Mommy drank the milk.

So, this close correspondence is something that kind of makes this case now we have both of these views and one of the things. That kind of supports this whole concept of the nativist view is this existence of what is referred to as the usage based grammars. You just made grammars basically say that phrase structure, acquisition is closely linked with the acquisition of individual verbs. So they say is that what children are doing is they're not really acquiring the phrase structure rules in a broad sense not like reading a grammar book overnight and knowing all the rules together. What they're actually doing is, they are learning simply to use each and every individual verb. So they learn to use how this word is used? what are the different forms of using this word? And how this verb is used? What are the different forms of using this work? And how another verb might be used? And what are the different forms of using another world? And in doing mastering all the rules of these three verbs, they master a lot about how language works and because they eventually master. So many number of these verbs and they use it in so many different circumstances. This is probably how they are mastering phrase structure rules and they're kind of perfecting their phrase structure knowledge, Okay? And some of the evidence is a kind of point towards this idea and they say for example, young children they first learn about how individual verbs behave and only gradually they start learning to form larger abstract classes of verbs, by noticing their behavior in different instances. So initially children use the same verb and they use the same verb in some situations and in some other situations and after a point when they have learned to use so many different first and after time they have kind of learned to master. So many different verbs is that, they kind of start speaking language in a sense that they have idea of the larger rule set of the language. Say for example children in this is an example retraction it puts in, the children are reluctant to move from mommy drank, to mommy drank the milk. It only happens after adequate experience with language. Okay? So this is pretty much what I wanted to say about language development in infants and you know early young children and yeah, so the take-home message is yet we just, want to appreciate the this journey it has been from the third trimester of pregnancy, even the child starts getting the first sound input and from distinguishing the speech input to all other kinds of sound inputs to the point of coming and appreciating single phonemes, to the point of forgetting non-native phonemic contrast and learning on native phoneme in contrast to the point of using those knowledge. The prosthetic features and the other things you know statistical bootstrapping etc, to figure out how to segment the speech in two words to the point of learning? How words are you know? How word meanings are deciphered? And to the point of gaining the

word category knowledge, the morphological knowledge and the phrase structure knowledge that we talked about today. It is indeed, quite a journey. Thank you! I think it, yeah in case, you see it. I am touching 25 tell me take I think this should. Hello and welcome to the course on introduction to the psychology of language. I am our karma from IIT, Kanpur and this is the final lecture of the second week. This week as I've been saying we have been talking about language development in infants and young children. We have been looking at various challenges that the children need to overcome or under in order to acquire language.