Advanced Cognitive Processes
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Lecture - 12
Language: Historical Background

Hello and welcome to the course introduction to advanced cognitive processes. I am Doctor Ark Verma from IIT Kanpur and in this week we have talking about we have been talking about language. Now in the last lecture I was trying to explain what is language? And I was trying to talk about what is it so, unique about human languages that sets it apart from other species that sets the human language apart from the other communication systems that so, many other species seem to use.

In today's lecture, I will try and give you a brief historical background of where the study of language really comes from. Because that is important in a in a in a way because that will help you appreciate why is or the kind of thought, the kind of things you will read; you know in the in this current course is that how have we come till here from the past. What were people thinking about language when it began? When the studies or interest in language came up and what do people think now, and why do they think in that way?

Also one of my favourite topics under language is basically the evolution of language. Now it is something that is rather fascinating and it is something that you know it does not seem to be solved at any point in time. But there are some very interesting theories about how has language evolved ah; who was the first person that started to speak what was this language like for that matter? And how do how do languages change over time.

So, we will do two things in this lecture; we will talk about some historical background into psycho psychology of language or study of language. And we will trying talk about a little talk a little bit about the evolution of language. So, without wasting any time let us move to the historical background now.

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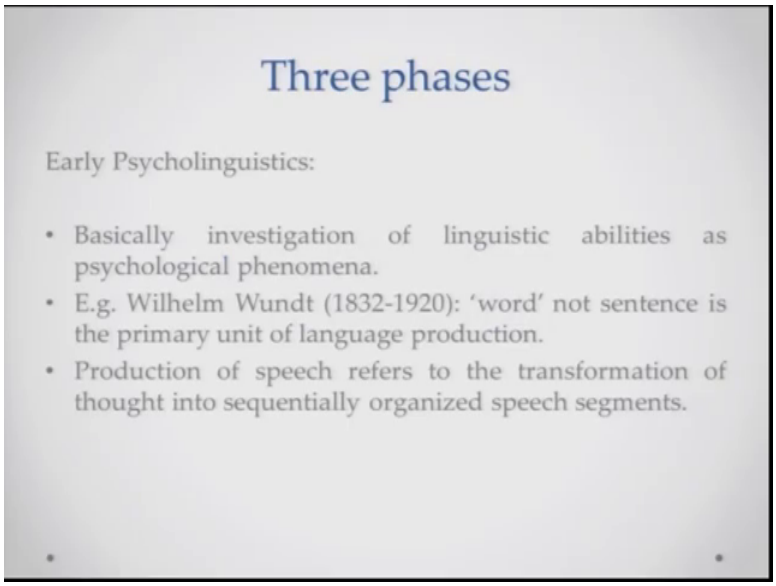

So, what is the historical background? So, one of the earliest you know studies in psycholinguistics one of the earliest work in psycholinguistics have been attributed to this person called Wilhelm Wundt. Now if you have taken my earlier lecture or if you have been students of psychology at any in time; you would know that Wilhelm Wundt is one of the fir is credited to be the person who is from the first laboratories in psychology in Leipzig in Germany.

Now, Wilhelm Wundt was interested not only in other mental processes, but also language and one of the things language one of the things Wilhelm Wundt says about language is that a word, but not a say not the sentence is supposed to be the primary unit of language production.

So, he says that a word is the primary unit of language or if people speak in words and not really in you know sentences that is something that Wilhelm Wundt said long back. Also he seems to opine that production of speech refers to the transformation of thought into sequentially organized speech segments.

So, the idea is speech is nothing switch is just a manifestation of your thought and the idea is it is just transforming the thought into sequentially organized speech segments. So, we will talk about this in a bit more detail in which we go ahead you will see.

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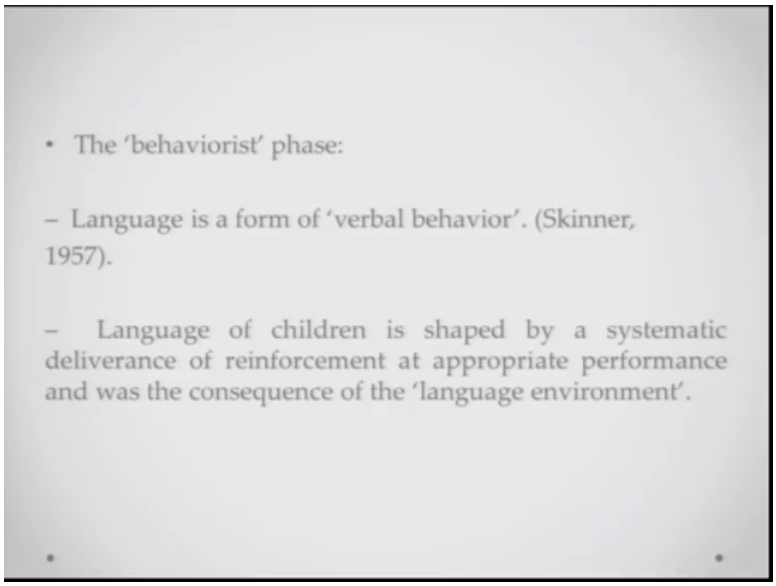

After this the early phase of language and stuff one of the more interesting phases about language was the behaviourist phase in psychology. So, because we are talking about psychology of language primarily, the interest in what language is as a mental function of what does language mean for human behaviour came under you know interest; from what I call the behavioural psychologists. And behavioural psychologists basically opine that language is a form of verbal behaviour.

Now, what do we mean by verbal behaviour? When I am saying verbal behaviour from the behaviourist stance; it means that it is something that is learned through systematic deliverance of reinforcements or punishments at an appropriate time. And basically is learned through what is called a language environment. So, the idea is that any language that you speak or I speak is basically learned by us over time and it is basically learned as the function of whatever reinforcements we have got, whatever rewards we have got or whatever punishments we have got.

So, whatever we have learned it is probably somebody it is probable that somebody reinforces to learn that and whatever we have not really learned in the language it is probable that somebody has managed us for not learning that. So, that is again the behaviour stance of psychology I have talked a lot about this in one of the in the earlier course.

But just to give you a brief behaviourist used to think that all behaviour is an aspect of learning. I will talk about behaviourism and nativism in some of the next lectures of this course as well, but the idea is that they believe that any behaviour that human beings are born as blank slates and any behaviour is learned through reinforcements and punishments things that we are rewarded for, we picked them up things that were punished for we kind of throw them away

So, that is again one of the things that you know that is the view of language that was taken by behaviourists.

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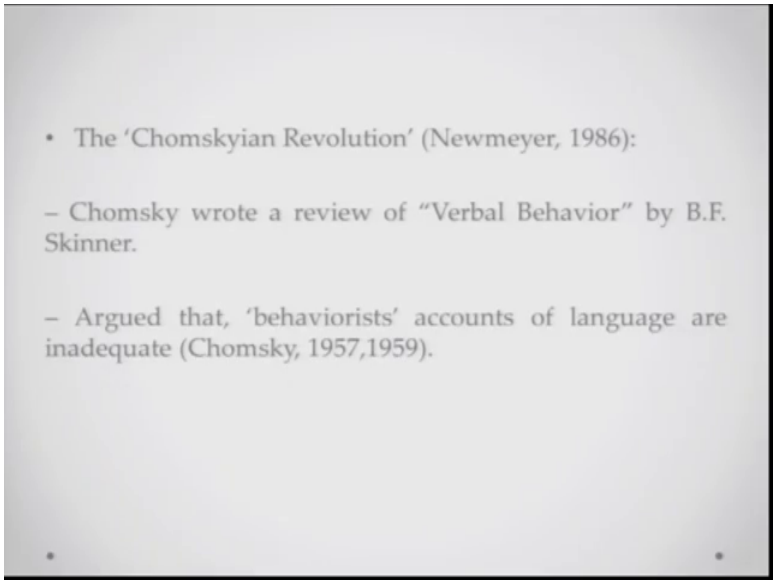

Then comes the Chomsky in revolution why do I call it a revolution with a Chomsky kind of triggered this you know long back in the 1950's, when he wrote a review of you know B.F Skinners, but B.F Skinner was one of the foremost behaviourists and he wrote a book titled verbal behaviour. And in this book B.F Skinner kind of there you know describes how language is learned through various you know regimes reinforcement procedures other kind of processes, how is language picked up from the verbal behaviour by children.

Now, Chomsky writes a very scathing review of this book and kind of in some sense almost tears the arguments apart thread by thread. So, Chomsky kind of presents contrary views with very a really very forceful argument. And says that the arguments for learning of language or the behaviourists account of language is inadequate. And he gives out

various reasons we will talk about those reasons in a bit, but this is what is referred to as the Chomsky in revolution when Newmeyer in 1986 and it says that you know this is what asurs in a new era of understanding language.

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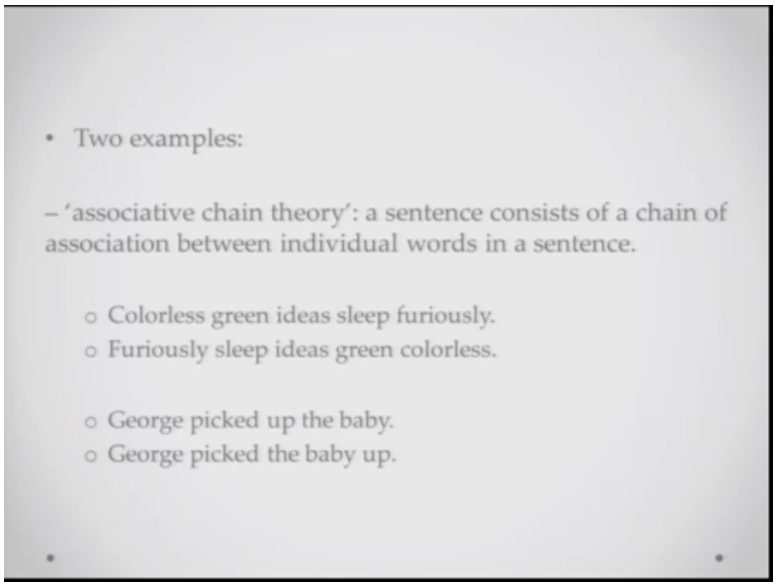

Let us talk about some of these examples. So, one of the accounts of behaviourists accounts of languages something called associative chain theory. Associative chain theory scheme says a sentence consists of an association between individual words in a sentence say for example, you know; if you have a sentence like colourless green ideas sleep furiously now; all of these words are basically written in a particular way.

If I write it differently furious sleep ideas green colourless, it kind of means completely opposite thing. We are not really changing the association between the words the words are just coming there they in just a different order, but the idea is you know even though these two sentences are found by these words which seem to be associated with each other; they do not really make any sense, it is something different.

Suppose for example let us take a different example George picked the baby up or George picked the picked up the baby. Again this the you know the just the form of the versus or the way these words are exchanged, but the meaning is exactly similar. In the other one even if you change the form of the word the form of the words the meaning was not chain; I mean there is no meaning at all in that in the first set of sentences.

This is again one of the examples that says that no words cannot be just an associative chain of you know associative chain of words as sentences can all just be associative chain of words because that does not really completely capture what sentences are; we will talk about that in much more detail ahead.

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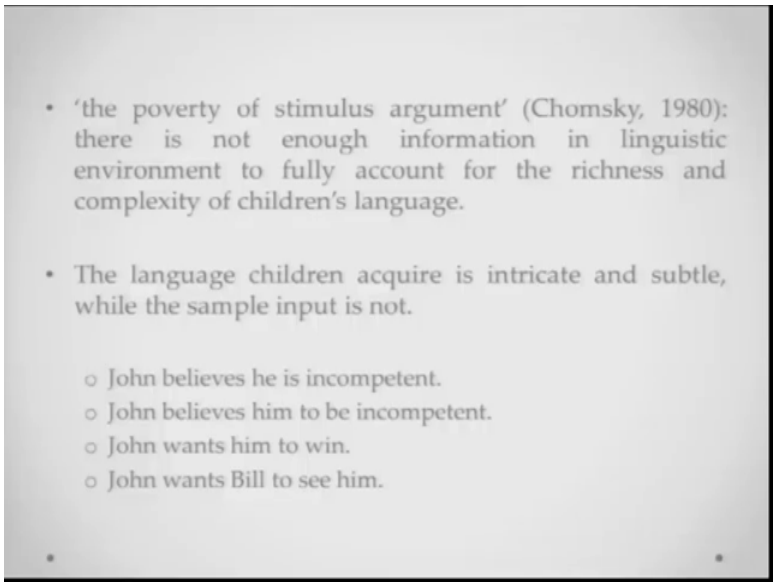

One of the other arguments that Chomsky makes is referred to as the poverty of stimulus argument. And this argument was basically the fact that Chomsky was trying to say that there is simply not enough information in the linguistic environment to fully account for the richness and the complexity of the children's language.

So, the idea is that you know the kind of language that children are capable of spontaneously producing by 3, 4 or 5 years of age, they are producing a lot of language that they have not even heard of they are producing a lot of spontaneous language that they are creating themselves and they have not really been you know encouraged to do that or discourage true that do that in any which way.

So, the idea is if you look at the kind of language that the children are producing. And if you look at the linguistic environment that the children have had there is no one to one correspondence between these two things; obviously, children do pick up some of the things from the environment, but the entire language output cannot really be explained by just by the language environment that the child is living in.

So, that is one of the things and an example of the fact is say for example, the language the children speak is intricate and it is subtle; while the sample input might not be. So, subtle sample input might be a very complicated sample input might be in some sense sometimes inconsistent results the first for example, if I am having these sentences John believes he is incompetent or John believes him to be incompetent.

The idea is how is the child to make meaning out of this; it is just the same set of words almost the same set of words, but the kind of you know mean very different things this is just you know variation there or let us say John wants him to win. Now there is no way the child can figure out what him means here what John wants bill to see you know and this is more specified in some sense.

So, one of the arguments that Chomsky was making is that if you try and explain whatever the source of child's language; is it is not certainly completely explained by the environment that the child is living. So, that is the poverty of stimulus there is less stimulus in the environment to explain the output of the child's language. So, that is the second argument

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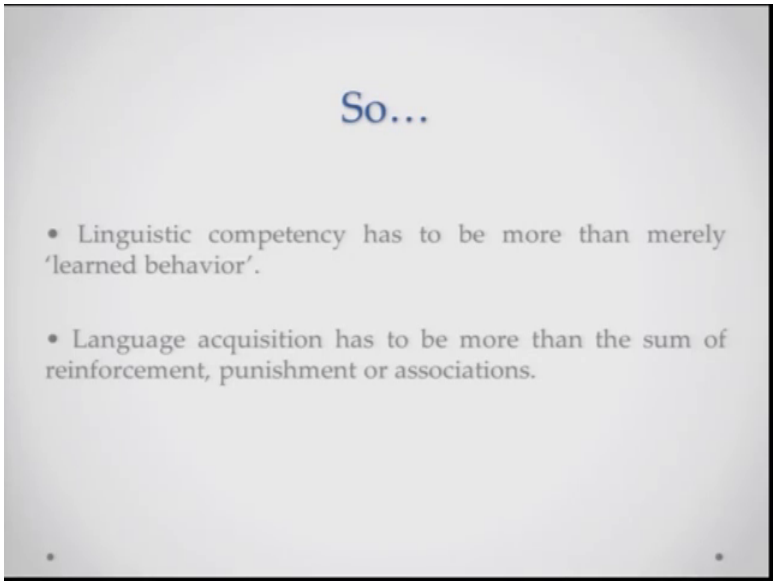

Now, in this sense if you try and compare the behaviourists account and you try and look at what do you know Chomsky was trying to say you will basically come to a you know reason or you basically came to appreciate the fact that linguistic competency or the you

know the entire knowledge of language that somebody has, it has to be much more than just learn behaviour you know.

Children do not really speak just what they have heard or did you do not really need to teach children word by word sentence by sentence; they create a lot of language and that competency is; obviously, certainly not just amounting to whatever the language in had not had it is much more than it. It is spontaneous, it is generative, it is creative as all of those three things.

So, another aspect that I would like to say about is the language acquisition has to be more than the sum of reinforcements punishments or just associations. If you are just associating towards and they are coming together again and again now it does not really mean that they can be combined to create a lot of sense you will you know create a lot of meaning as we saw in the word that colourless green ideas if furiously.

Now, all of this is perfectly legitimate and you know these words are linked and associated in a particular way, but does not really have any meaning. So, greatest meaning come from how do children start making meaning and why do they only talk in meaningful ways; those are the things which one needs to talk about. This is a little bit about the history or the historical arguments in psychology in psychology of language.

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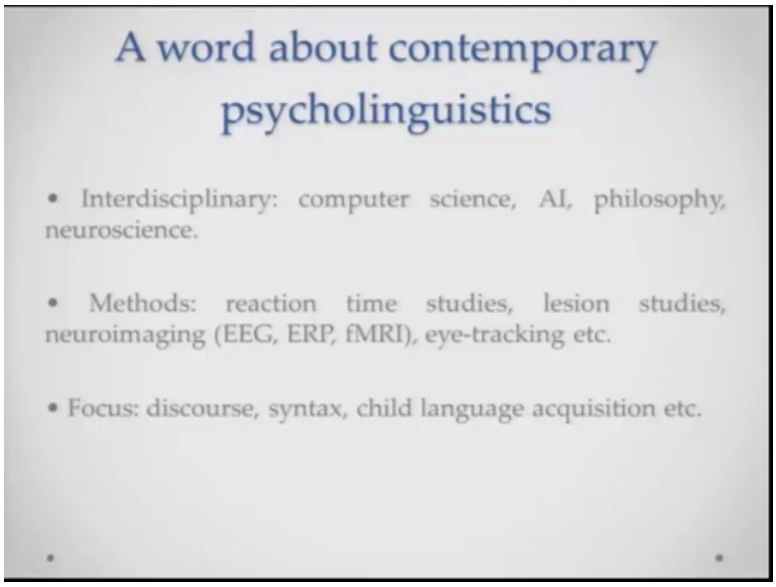

Now just a little bit of a word about what contemporary psycholinguistics looks like. Contemporary psycholinguistics other than you know having input from psychology and linguistics is also interdisciplinary in the sense that it derives from computer science it derives from artificial intelligence, it derives from philosophy and also you know there are also a lot of neuroscientists who are working in you know they labs to understand how language is produced or comprehended.

The kind of methods that these people are using are also varied say for example, they are using reaction time studies, they are using lesion studies when somebody's brain is damaged and what kind of language input language input he can comprehend or what kind of language output they can produce; those kind of things and they have also things like neuroimaging studies you know; EEG, ERP, fMRI and things like eye-tracking new studies you know a lot of research in language or psychology of language is involved using eye tracking; how are people where are people looking when they are hearing something or where are people looking when they are saying something.

The focus is; however, on things like you know child language acquisition, syntax you know how do people realize that this is a syntactically correct order, how do people realize that this is interactively in correct word, discourse level analysis you know when do people; when are people able to read the largest and larger takes how are they making sense of it and so, on and so, forth. So, these are again some of the concerns of the things that contemporary psycholinguistics is looking for.

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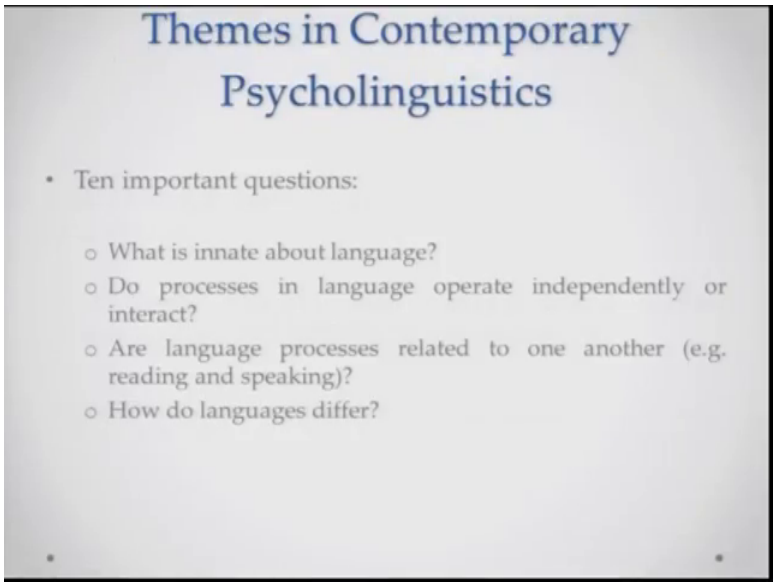

Now, also let me try and underline for you some of the interesting questions that are asked in contemporary psycholinguistics. There are about ten important questions that contemporary psycholinguistics likes to talk about or seems to be working in and I am just quickly just running over this to give you a slight preview of what kind of things we might be talking about later.

So, what is innate about language you know what are the aspects of language that children come with you know children are born with say for example, is it really as we will say that children are born tabula rasa as a blank slate and they do not know any language at all at they were at they were and they pick up all the language from the environment; it says like that.

Also the one of the questions that people are asking is you know due process of language operate independently or the interact. Suppose I am saying something and at the same time I am understanding something that another speaker might be saying to me.

Now, are these two processes exactly you know same are they operating using the same mechanisms or they are different.

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Suppose I am what I am trying to say here is suppose language production and language comprehension are different processes or you can say that language production and comprehension; obviously, forms of the same process. So, this is also one of the questions that people are asking also people are asking about what are the language processes that are related to each other are reading and speaking related to each other?

Are you know speaking and comprehending related to each other? Things like that; also one of the things that people are interested in from the linguistics perspective also is that how do different languages differ amongst themselves. If you are a linguist basically you will be asking this question in terms of the form of languages that what kind of grammar is there, what kind of words are used, what are the arrangements a for example, subject work object or object work subject those kind of things.

Or from a psychology psychologists perspective you might be interested in asking that how are these languages understood differently? This is the brain you know need a different kind of an apparatus to understand English or a different kind of an apparatus to understand Hindi and so, on and so, forth.

So, again these are these are some of the questions that people are asking.

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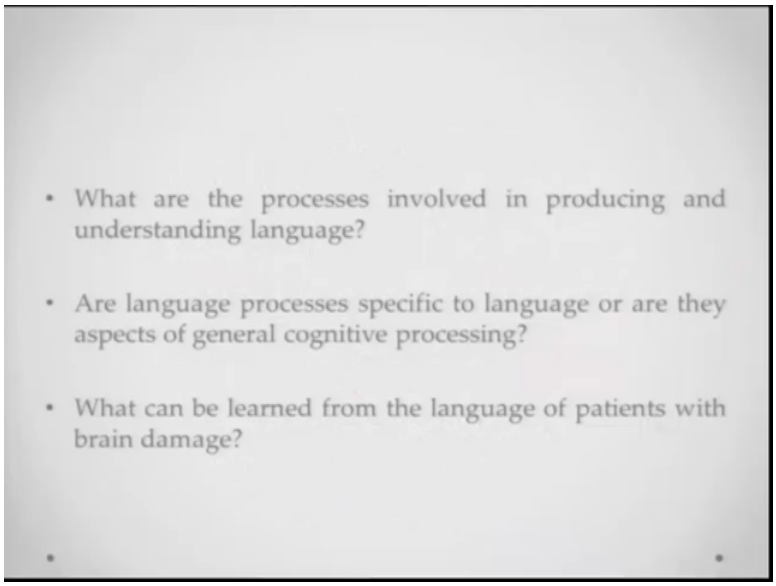

Also things like what are the processes involved in producing and understanding language; how do we speak? How do we comprehend? What are the areas of the brain? What are the de component processes will talk about all of this in the coming lectures also are the language processes specific to language or they are related to general aspects of cognitive processing.

If you remember we when we are talking about visual imagery; we were talking about you know this argument between xenon machine and we are asked and Steve Gosselin and the idea was you know that whether imagery is language based or it is pure image based or it is you know it is more like the world that it tries to depict.

So, one of the things that you can derive out of it and also is relevant to a psycho linguist or a psychology of language person is the fact that does language actually you know part take in visual imagery. Or for that matter if you go to the first chapter that we have done does language part take in the conceptual semantics processes?

Does language play a part in you know things like categorization in terms of concepts or does language part take in you know building of scripts say for example, for going to a restaurant or going to a bar or going to a you know court hearing or so, on and so, forth. So, these are also very important questions that people are talking about. Another question that people are asking is what can we learn from the language of patients? You

know patients with brain damage, suppose somebody suffered from a stroke you know and the lesion or the damage in the brain is at a particular area in the brain.

Let us say brocas area, let us say wernickes area and will talk about those areas when we do a bit of cognitive neuroscience here as well. The idea is that the language output of these people also changes; you know the language output of these people also become slightly atypical. Can you looking at from this on this atypical aspect of language commend something about their behaviour; commend something about the processes they are really using in making language.

And how are these processes different from the language process of normal individuals; this is again a very important question. Also how sensitive are the results of the experiments to the techniques employed; suppose I am you doing a single experiment word comprehension experiment. And suppose I am using eye tracking to look at this experiment or you know reaction time studies to look at this experiment or fMRI to look at this experiment; will the results be consistent across all three techniques? What kind of techniques I should use to ask what kind of questions related to language?

So, if you have or if you just want to you know pause and go back to the earlier course where I have talked about these different methodologies, you will understand that the kind of measures in these different methodologies are slightly different. But if you are talking about the same phenomena should not the results correlate with each other that is; that is one of the very interesting questions people are asking.

Also do we really need very specific rules for language processing; do we really process language by you know strictly by grammar rules or there are other things that help us process language. Also what from all of this study of language that we have been you know talking about or that we will talk about in the near future; how much of this can really be applied to everyday life, how much of this thing that you can apply you know to think like you know I have to go and talk to experts and communicate this message I should use a structure like this. So, these are the things that we are interested in and people have been talking.

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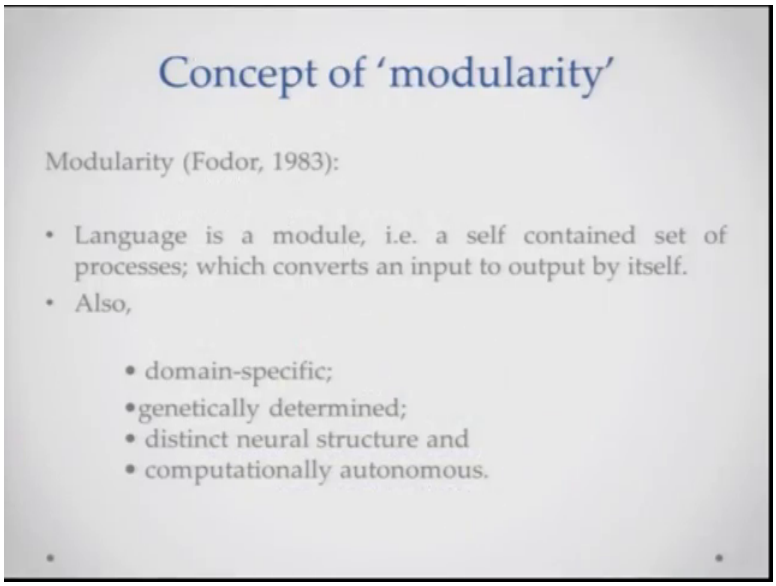

Now, let me also talk about before we move on to other more pointed aspects of language. The one of the things I could talk about is the fact is this concept of modularity. Now if you remember again something I have talked about in the past; is this concept of modularity given by Jerry Fodor.

Now, Jerry Fodor was talking about modularity in the sense that each cognitive function is a unit of itself which does not really interact to other units. So, if I am talking about languages or cognitive function, knowledge as cognitive function, decision making as a cognitive function, attention and perception as cognitive functions; then probably I will be talking about things like.

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I might be talking about these four different things; one of them could be language, the attention, perception, knowledge, decision making. So, we might be talking about the fact there is these two things these four or five different cognitive functions are very different from each other. And they are not really interacting there are no connections between them; this is the concept of modularity.

So, Jerry Fodor beliefs or proposes that language is a module that is a self contained set of processes, here in you can have you know language comprehension, language production you know language acquisition and you know semantics of language those kind of things, but all of these processes may or may not be connected to each other; when the fact is none of this kind of interacts to the other process that are in question. So, this is very interesting; this is one of the use that have put and that have been put forward and have been also contested vehemently the contemporary you know psycholinguistics or psychology does not really buy this.

So, much, but I am just kind of try and elaborate what their argument is they would want that language be domain specific all the processes just have to do with language. So, will be together with language and will not interact with other things; also that language is genetically determined something you know there is an aspect of language that people have to be born with and will not be learned or cannot be learned for that matter.

Also there is a distinct neural structure in the brain that is dedicated to language acquisition comprehension production etcetera. And these you know neural structures do not perform any other tasks are not connected to any other cognitive functions for that matter. Also one of the things that are you know implicit in this assumption of modularity is that language needs to be computationally autonomous.

So, the idea is if language were to be a completely modular function it will have to be a standalone autonomous thing as I was trying to say here. So, production processes, comprehension processes etcetera do not need to interact with things like knowledge. Suppose you have to talk about an apple this is not really linked here, but just to tell you that in the current or in the contemporary view of language as a cognitive function ah; we are kind of thinking of language as being linked to each of these things. And for the most part you can think that all of these arrows R by directional because there is a lot of exchange or interchange between both of these different kind of cognitive functions.

Between language and so, many other cognitive functions; so, that is again one of the views that was there about language, but it is not really moved. And this view which I have been talking about that all of this language and other cognitive functions are linked is basically referred to as the interactionist view. So, the interactionist view of language says that language and other cognitive processes might not only be interacting with each other, but they may even be overlapping as far as car you know different component processes are concerned.

So, let me give you an example if you have to talk about you know your vacation; if you have to talk about the now you know the trees that, you saw in your vacation you have to use a lot of this knowledge or you have to use a lot of the content from the system that contains your knowledge. You have to use a lot of content from how your concepts are organized and that is what is being referred to in the interactionist view that language is basically contained in so, many of these different processes that language interacts with so, many of these different processes

Now, there are different ways in these interactions might happen things like say for example, it could be a discrete model there are these discrete modules that interact with each other, you can draw it slightly differently in a cascaded way. A cascaded way means

that some activation is happening in the language module which will also activate some of the other modules things like language or attention of perception.

Or they could be you know a non interactive bottom of a that something starts from perception, it goes to knowledge then it comes to language things like that. And again these might not be you know these arrows when you are talking about a bottom up strictly whatever kind of pressing might not might or might not have you know bi directional connections.

One of the other views could be the top down processing you or the in you know totally interactive processing you could be the fact is that there are back and forth connections between the bottom up process. Suppose I have to describe a scene I am looking at the perceptual inputs as well and I am creating a particular you know description of that using my language. Also I am at the same time borrowing from the top down centres from the memory, from the knowledge centres and kind of both of these processes are coming and meeting in somewhere in the middle and that is what is leading to what my language is.

So, this is this is slightly important that one view of language was that language is modular it is a very domain specific, it is genetically determined and it is not really interact with that processes.

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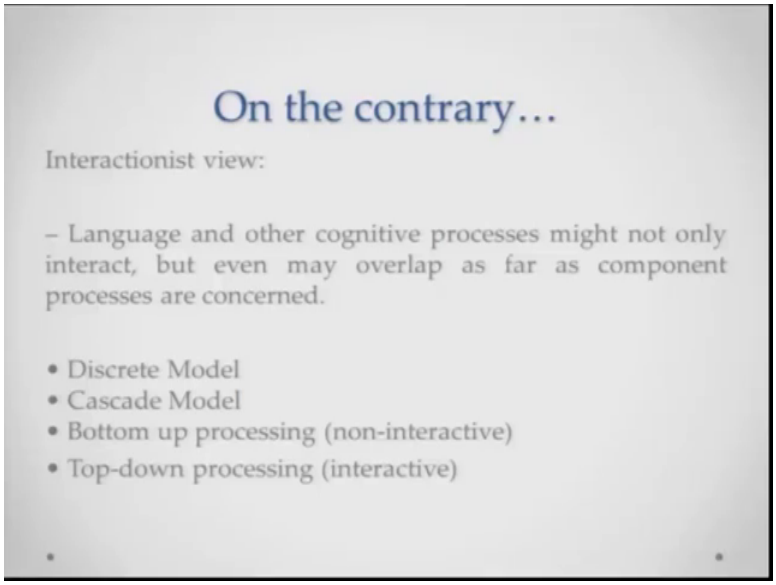

But the more prominent and a more logical probably way of seeing this is that certainly language interacts with. So, many of the other cognitive processes and there are ways in this in which these interactions are possible again. So, this is pretty much what I wanted to talk about in terms of what language is or what are the basic you know his historical views of language.

So, I will stop here and in the next lecture I will talk a little bit about evolution of language.

Thank you.