

## **Lecture-04**

### **Evolution of Language**

Hello, and welcome this course on introduction to the psychology of language, I am Ark. Verma, I have a professor of psychology and cognitive science at IIT Kanpur. In this week we are talking about

various aspects of introduction to language now, what are the various facets of language, what does it mean to have a language, what is language is a language, very similar to animal communication systems and, what are the basic concepts that one needs to understand when we are you know? setting up for a scientific study of language so, I have done that in the last three lectures, today's lecture is going to focus a little bit about the story of evolution of language, I am not really going to, go into, a lot of details about any of these theories that I am going to discuss but, idea was to kind of at least superficially enough present an account of where language might be coming from I expose you to some of these theories, I will in a supplementary material provide say for example you know? references or some of the papers, that might be necessary and you can pick up on, pick up on, them and maybe let us discuss on some of the forums about these you know? Various theories that have something to say about where language is coming from so, the question that we are asking ourselves today is where, is language coming from

Refer Slide Time :( 1:29)

### **Where has language come from?**

“ the evolution of language is far too vast and complex ( and vague) a concept for anyone to say anything sensible about it.” (Bickerton, 2007).

When did, we start having language, when as a species you know? A language emerge in the last lecture I made a distinction between other animal communication systems and, human language you know? We talked about the continuity hypothesis and, the discontinuity hypothesis, evidence for me you know? Favours more or less, the discontinuity hypothesis there must have been instances things that happened in the past, that qualitatively distinguished our linguistic you know? Abilities as opposed to the linguistic abilities, of other species so, different scientists from different fields you know? Psychologists linguists, neuroscientists, anthropologists, have been talking about you know? Where is language coming from, having asking these questions about language and the field in that sense and because, the question is also so, complex the field is so, confused in their sense that Court of Bickerton, makes a lot of sense to me, when he says that the evolution of language is far too vast and complex and rigged a concept for anyone to say anything meaningful about it, or anything sensible about it.” I don't claim that I'm going to say anything sensible about it either, what I am trying to do here is present to you some of these you know? Ideas that people have given about their language might have evolved from and obviously you can pick up from there go and, do your own reading go and do, your own search and if possible inform us about what you think of where language is coming from. So,

Refer Slide Time :( 3:05)

- There can be various perspectives from which the evolution of language can be viewed, and accordingly there are multiple overlapping accounts of language evolution available.

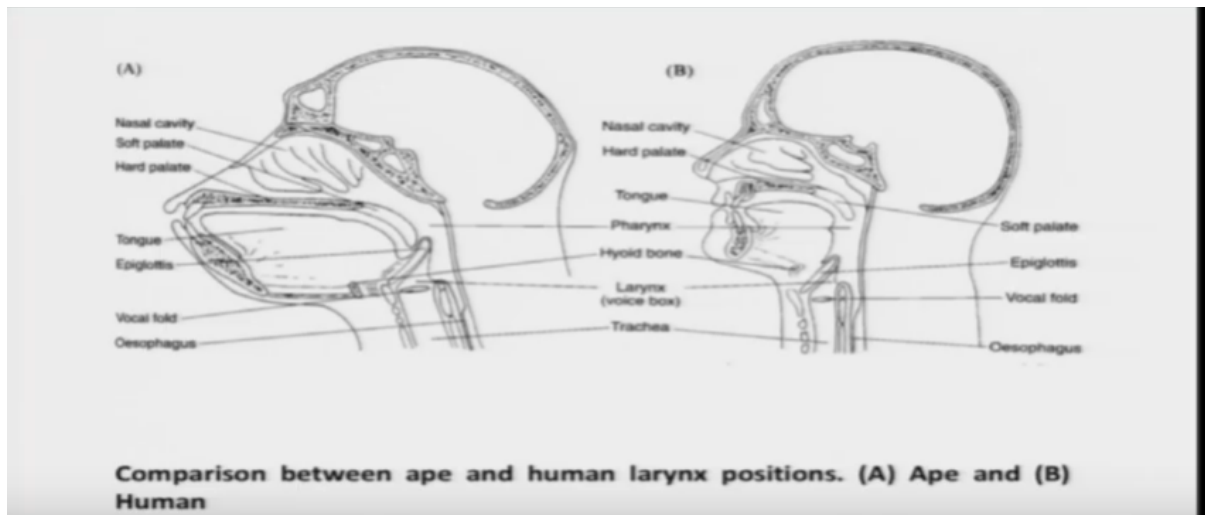
They can be various perspectives as, I was saying to look at where this evolution of language has happened and, consequently multiple accounts  
Refer Slide Time :( 3:11)

### Important developments...

- The size of the brain increased and differentiated from other species around 2.3 million years ago.
- Broca's area, the neural substrate for language production was formed around 2 million years ago.
- The human vocal apparatus differentiated from those of the apes, around 60,000 years ago.
  - E.g. lowering of the larynx, smaller & more flexible tongues, finer musculature of lips and mouth.

Are available, before we go to them let us talk about some of the important biological neuro scientific developments that might have happened, some of those are available for us to see say for example the size of the human brain increased and, differentiated from the brain, of other Apes other species, almost around 2.3 million, years ago so that was probably one of the very significant aspects that eventually could have led us, to have language the second important development was this development of Broca's area, Broca's area, is an area, in the motor cortex of the brain, the motor cortex of the brain, is the area of the brain that takes care of you know? Performing a fine and you know? Large motor movements say for example the fact that, I can use my fingers; in a particular way the fact that I can use my tongue, in a particular way to speak language, it's probably you know? Controlled by, the motor cortex of the brain more, specifically this region that is referred to as the Broca's area so, the Broca's area, probably was formed around up to 2 million, years ago so these two could have been the biological predecessors of how, language started evolving physically some of the developments also happened, which would have paved the way for us to acquire speech and, this was basically something that happened as recently as 60,000 years, ago which is the lowering of the voice box, that is **larynx**, in the ape the voice is slightly you know? On the top you can see here.

Refer Slide Time :( 4:44)



In this figure, you can see that the voice box, of the ape is slightly a higher, as compared to the voice box, of the human and, the lower voice box of the human basically allows her to create that kind of airflow, to create the kind of speech that we are you know? Capable of doing.

Refer Slide Time :( 4:59)

**Important developments...**

- The size of the brain increased and differentiated from other species around 2.3 million years ago.
- Broca's area, the neural substrate for language production was formed around 2 million years ago.
- The human vocal apparatus differentiated from those of the apes, around 60,000 years ago.
  - E.g. lowering of the larynx, smaller & more flexible tongues, finer musculature of lips and mouth.

Also smaller inflexible tongues, finer musculature, of lips and, mouth all of these when go to, go a long way for us to have speech so, these developments probably happened around sixty thousand years, ago so that this is probably the time where in brain wise and, physical apparatus wise, we will ready to have some sort of speech, some sort of vocalizations, could start and may have led to language so, this is there but, it's not really.

Refer Slide Time :( 5:27)

- However, the more important problem to trace, when talking about language evolution, faced by linguists, was to trace the evolution of “syntax” or “grammar”.

The physical aspects that people are actually really worried about, it's more the “syntax” or it's more the “grammar” aspect that people are continuously asking questions about at where is, you know? Where does, this start from where did, human languages suppose say for example or human vocalizations developed a rule-based pattern so, as to eventually develop into language. They're two, kinds of perspectives that are possible I'm not really talking in a very exhaustive sense

Refer Slide Time :( 5:56)

- Two major views have been put forward in this debate:
  - Biological Perspective
  - Social Perspective

Two interesting perspectives that are easy to see if you reading material on evolution of language, ones the predominantly biological perspective that says that you know? Language is unique to the human species it is unique to the biological and, genetic makeup that we have and, in that sense the, the explanation of where syntax might have come from, is more biologically rooted, the other interesting ideas it's basically propounded by, people who believe that this whole concept of syntax is something that is predominantly sociological, in nature and there's a society's **LD develop** different aspects of cooperation they in develop different aspects of how, they talked about the world and their way of describing the world probably led to formation of the grammars that are existing in those languages, at the moment so these are two slightly, opposite views of where syntax might have come from let us look at them slightly closely. So, in the biological perspective is a very interesting paper by

Refer Slide Time :( 6:59)

- Hauser, Chomsky & Fitch (2002) distinguish between:
  - Faculty of Language Broad: includes two organism-internal features, a *sensory-motor system* and a *conceptual-intentional system* that mediate language within an individual. Also, FLB includes a biological capacity to learn and master any human language.
  - Faculty of Language Narrow: a computational system (narrow syntax) that generates internal representation and maps them to the sensory motor system via phonology and to the conceptual-intentional system via semantics.
    - Includes the capacity for recursion.
    - Is recent, and uniquely evolved in humans for the purposes of language.

Hauser Chomsky and Fitch in 2002, where they talked about how, evolution of language might have happened, they say they specifically talked about two aspects, they talk about the Faculty of language broad, which is basically having two organism internal features, which they say as a sensory motor system and a conceptual intentional system they say this mediates language within the individual motor system with which we you know? Interact with the world and a conceptual intentional system which typically governs this you know? Degree of interaction also, this Faculty of language broad includes a biological capacity to learn and master any of the languages on the face of the earth so, for example this is something that makes us ready to acquire any language you know? Wherever we are born, whatever languages our parents speak, this is what we make us learn those language, the more important aspect is the Faculty of language narrow which is a computational system that is responsible for generating internal representations and mapping them onto the sensory motor system using the phonology so, this is something that is slightly more computational in nature and also includes this capacity of recursion and how, do we create new elements by, combining earlier elements, how does this process of embedding go about Okay? How, is it that the brain can computationally handle, you know? This generation of new information this whole concept of productivity, generativity, using you know? This particular principle of recursion so, this is something that is very interesting and, this is something that Chomsky and, colleagues feel is unique to our species they say, that Faculty of language narrow or this whole system of recursion is something that is unique, to our species and that is probably the deciding factor of why our species has language and, the other species do not so, this is one interesting point here in this figure you can see

Refer Slide Time :( 8:57)

## The Biological Perspective (Hauser, Chomsky & Fitch, 2002)

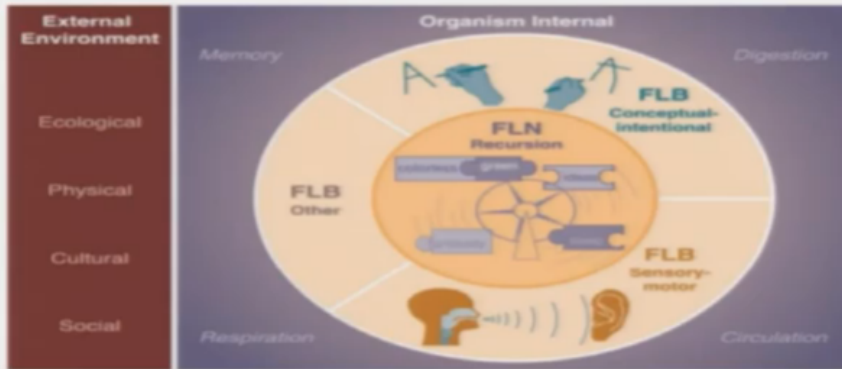


Fig. 2. A schematic representation of organism-external and -internal factors related to the faculty of language. FLB includes sensory-motor, conceptual-intentional, and other possible systems (which we leave open); FLN includes the core grammatical computations that we suggest are limited to recursion. See text for more complete discussion.

Faculty of language broad which is a very, which is a sort of a generic thing which has a conceptual intentional system and, then there's a sensory motor system say for example thoughts and, desires and you know? What you want, to talk about probably figure out and the knowledge that you have of the world that you want to, communicate probably a forms part of this conceptual intentional system and then how, do you execute that probably then happens through the sensorimotor system. Okay? I'm not really going into a lot of detail of these things you might obviously you know? Catch hold of these papers and then you will get to know, in much more detail about what Chomsky Hauser and which have to say. Okay? The other idea of what or where language might have come from comes from this concept you know? Comes from this, example of Daniel Everett, Daniel Everett was you know? An evangelical Christian who travelled to these different places, to spread the Word of God as it May and he, he comes across this particular tribe of hunter-gatherers living in the Brazilian, Amazon forests, he figures them out that you know? That they are referred to as the piraha and, he cost their language, as speed aha language and he lives with them for over 30 years, he documents their language, he documents their social traditions, cultures and everything and then he writes a paper about that and he describes the language and its characteristics, what he documents is that some of the very basic features, of language as described by, Chomsky in colleagues, that should be there in any language are absent here, say for example the language does not have regression we've talked about this in the first lecture as well you might go back and talk and listen to that just to revise this but, say for example it does not have the traditional number terms.

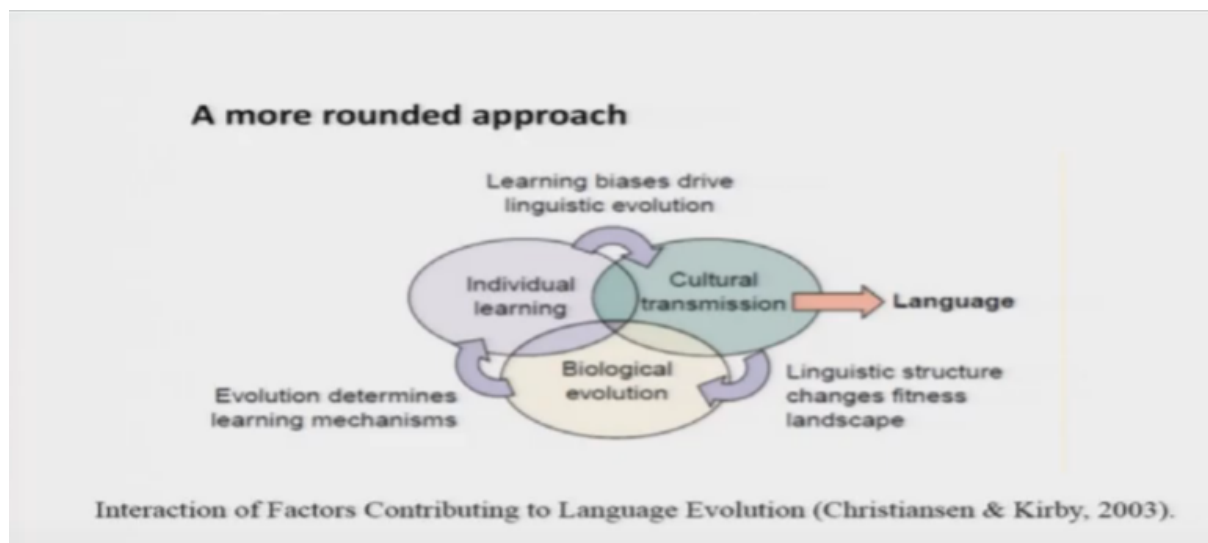
Refer Slide Time :( 10:50)

## Social Basis of Language Evolution

- Language systems have become complex due to the process of transmitting through generations. E.g. grammaticalization (going to gonna).
- Cultural transmission triggered and facilitated language evolution.
- Daniel Everett, presents Piraha, language of the Piraha tribe in the Brazilian Amazon, as a language lacking recursion, opposing the claims of Hauser et al., 2002.

Kind of things so, he says that language is in that sense coming from a different place to these people it's not really coming from biology, per se because, if it were to come from biology, these people are biologically, the same as other people and they should have all of those features, that the other languages have, their language probably is coming from a different place, their language is coming from their traditions, cultures, customs and in that sense their grammar is different the nature of their language is different so, kind of says that you know? This is coming more from the social anthropological customs, grammar is probably coming from their societal practices.

Refer Slide Time :( 11:32)

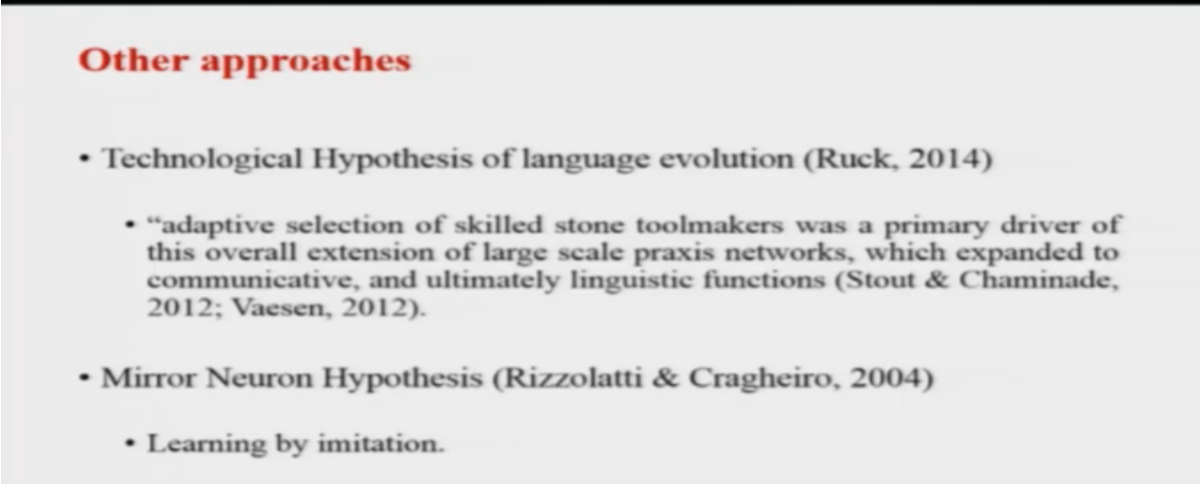


These are the two competing approaches, a more balanced approach was put forward by; you know? Christensen and Kirby in 2003, paper where they say that there are so, many factors that interact with each other to bring about the evolution of language. Okay? So, they say that there must be degrees of evolutionary you know? A biological evolution, that determines some of the learning mechanisms so how, the genetic makeup, etc moves it determines what kind of learning mechanisms will happen and these learning mechanisms kind of you know? Move further through individual learning so how, you're going to learn what is the information that you pick up, if you've picked up, particular information that becomes almost that gets transmitted culturally through generations and goes on and, on and, on and, that kind of also you know? Changes how people are acquiring him so, he says the acquisition of language, the evolution of language, is a combination of individual learning, cultural transmission and, biological evolution and, language kind of comes about at a juncture of all of these



you know? As a combination of all of these so, that is again one an interesting view of how, language might have come about, the other interesting hypothesis, as well say for example.

Refer Slide Time :( 12:47)



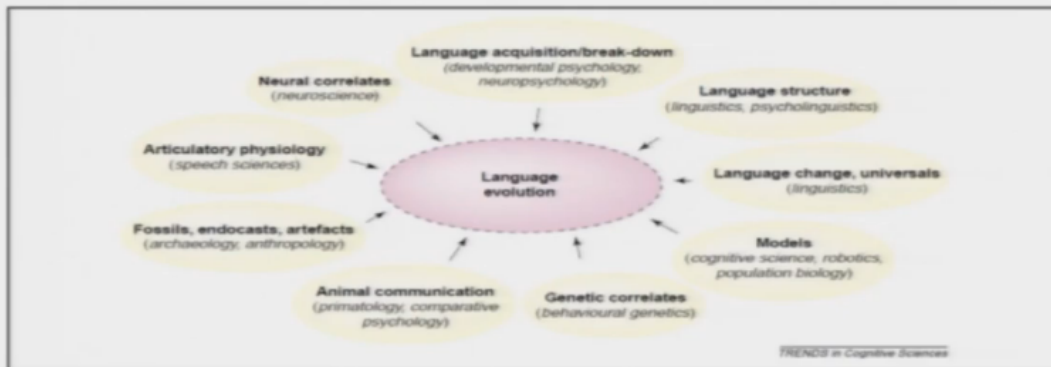
**Other approaches**

- **Technological Hypothesis of language evolution (Ruck, 2014)**
  - “adaptive selection of skilled stone toolmakers was a primary driver of this overall extension of large scale praxis networks, which expanded to communicative, and ultimately linguistic functions (Stout & Chaminade, 2012; Vaesen, 2012).
- **Mirror Neuron Hypothesis (Rizzolatti & Cragheiro, 2004)**
  - Learning by imitation.

The technological hypothesis put forward by, Leonora and others they say that you know? When see humans started creating tools, when they started manufacturing stone tools that would have kind of you know? Led to the particular changes in the motor networks and, those motor networks would have facilitated you know? The particular movements and, the particular sophistication in our vocal networks and, eventually we learn language, that is again one view, of how language might have come about another interesting view is the mirror neuron hypothesis, that language is basically come by, come to us by, you know? This ability that we have to imitate, others gestures so, for example there is the system of neurons in the front of the head which are referred to as the mirror neurons and, what these mirror neurons allow us to do, is that they allow us to, learn by imitation if you doing something I can look at, that activity and I can, try and replicate that activity maybe something happened someday, somebody created a vocalization and, the other person repeated that vocalization and, then others imitate that foreplay so it's, probably you know? Happen through that you know? Chain of you know? People learning from each other and so, on I'm not really again going into the detail of any of these hypotheses, much rather I would like you to read, some of these I have put the references here, please read some of them and, these should give you an idea of how language evolution actually comes about, we can end this.

Refer Slide Time :( 14:20)

## Overview of research on Language Evolution



With an overview of how, research on language evolution really you know? Happens again boring from Christensen and Kirby in 2003, there are these different fields that are, looking at where language is coming from articulatory physiology, archaeology, anthropology, psychology, you know? Primatology, behavioural genetics, linguistics, psycholinguistics, there's so, many of these fields who are you know? Conducting their research who are conducting their investigation, on various aspects of language evolution and if one has to really say something interesting sensible as bcurtin had put it, about language evolution it can only be through a combination of you know? These various findings you know? And overview that kind of combines findings across fields and then attempts to give a bird's, eye view of how language might have come about so, that's all probably I had to say about evolution of language have not really gone into the detail of any of these theories which was not really the point anyways but, I hope that you picked up something about the evolution of language in this lecture thank you.