

# **Fundamentals of language Acquisition**

**Prof. BIDISHA SOM**

**Dept. of HSS**

**IIT Guwahati**

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**Lecture 04**

Lec 4: Gestural theory of language evolution

Welcome back. Now we will look at lecture 4, and in lecture 4, we will talk about the gestural theory of language evolution. Gestural theory talks about gestures as a precursor to language evolution. However, gestural theory itself has its antecedents somewhat in glottogenetic thought. Now, what is glottogenetic thought? This idea takes us to the naturalistic concept of the evolution of language. Naturally, what would have happened? If you are left without any human interaction, how will you learn a language? That was the question behind glottogenetic thought.

Now, this idea was taken up in a major way in the 15th and 16th centuries; the time that is called the Age of Discovery. Now, this was the age of discovery, a euphemism for the time of colonialism, when various Western powers and explorers traveled around the world and found new people, new languages, new communities, and so on. This finding, this discovery, gave rise to a lot of interesting, theoretically interesting questions among the intelligentsia and the scholars. One of the questions that was asked was how the wild man became civilized.

How did the wild man gain the features of humanity? Now, where does this idea of the wild man come from? When they came across, when they went to Africa for example, the locals were looked upon as some sort of an animal. So, they were not considered part of the human race, they were considered part of the Orang-Utang. So, orangutan was a term used for apes at that time. This was not a specific animal; it was the class of apes. so they were considered part of that community and because they differed so significantly from the westerners it was understood that they are some sort they are called savage they have been called by various names so the people they came across were not sufficiently you know human For one, they did not share the religion; they did not share other kinds of social practices, and so on and so forth.

So, that kind of gave rise to a lot of questions regarding how humans became, you know, more sophisticated and more civilized. One of the answers that came up was language. Language is one of the things that were part of the civilizing process. So, there were many scholars from that time. Harder is one of the biggest names of that time that talked about these things.

Anyway, in this backdrop, one of the people we will be talking about is Giordano Bruno. He is considered among the first who popularized the naturalistic idea pointing to a pre-Adamic origin of language. Meaning, let me just explain a little bit about what this idea of pre-Adamic language is. In the Western countries, the people—the colonizers who went out to find the New World—were Christian. Now, in the Christian belief system, language was given to Adam by God.

Now, the people they encountered in the 15th and 16th centuries in the New World had not heard about Christians; they were not Christians. So, that means the Adamic origin of language does not hold here, which means that language existed. So, the idea of languages predating Adam is what we are discussing here. So, pre-Adamic language is the idea that language was available, that language was possible before Adam. So, Giordano Bruno is one of the first who popularized the idea that the origin of language could be pre-Adamic.

Similarly, this idea was not new during Bruno's time; it had existed since ancient times. In ancient Greece, Epicurus was one of the first to discuss this, and he argued for a natural expression of emotion as the root of language acquisition. Language evolved out of different kinds of onomatopoeic words. So, first it was an expression that came out as an outcome, an outburst of emotion, and which later on, through processes, became what we know as language today. Similarly, we have Lucretius in his poem; he develops the idea and refers to the origin of language as a gesture by a child who does not know how to speak yet.

This was the idea. So, going back all the way to the Greeks and then to the time of the 15th and 16th centuries, around the same time a number of Catholic priests and scholars in the 1600s also favored the Epicurean idea of language developing out of gestures. So, this was not of divine origin, but it was of natural origin that was gaining popularity around that time. We have talked about Vico already, Giambattista Vico. He was a well-known scholar in the, you know, Epicurean tradition.

His theory of language evolution was based on analogy and iconicity. The early communication, according to him, was not vocal; it was gestural. So, out of gestures and various kinds of expressions, language evolved according to him. So, in his book *The*

New Science, he argued that the three stages of development, which mark the epochs of God, heroes, and people, determine the general development of humanity, the development of individual communities, as well as child development. His take is rather interesting, as he talks about different epochs that can be considered epochs in the evolution of humans as well as in the evolution of child development.

So, the first stage, second stage, and third stage are sort of equivalent between a child's development and the human race's development. This is something we talked about at the beginning. So, in the development of the first phase corresponding to the age of God, children primarily try to understand the surrounding creatures and objects with the help of perceptual attributes. In the second stage, which is called the hero phase, children identify with the heroes of the cultures in which they are raised. And with the power of fantasy, they create innumerable imagined situations and roles.

And in the end, the transition from childhood to adulthood is connected with the acquisition of abstract thinking, which marks the entry into adulthood. This is something that was later built up by Jean Piaget as well, the various stages of human child development, which kind of corresponds to some extent with this idea. Another important name is that of Lord Monboddo. He was a Scottish judge and was considered eccentric by many. He wrote a six-volume book called *The Origins and Processes of Language* in 1774.

Here he also gives an account of the naturalistic account of the origin of humans as well as language. He also uses the term orangutan; he opined that humans originated from apes, basically saying that they came from orangutans, and he argued that the original language consisted of monosyllabic words in the imperative mood, basically meaning there was no syntax—monosyllabic simple vocalizations that too in the imperative mood. For his thesis, he drew examples from a large number of non-European languages, and he actually gives a very interesting comparative study among all of these languages, because of which he is also considered the father of philology. And he attributed, probably for the first time, various skills such as socialization and knowledge of rudimentary technology to these apes, although they lacked language. This is also something that we know today.

The roots of this were sown in the 1700s when the higher primates had a lot of skills. Today, of course, we take it for granted. Then comes Mandeville. This is another person who is in the same tradition and is attributed to the social natural emergence of language theory. Now, while Monboddo talked about orangutans as the source of language, their monosyllabic vocalizations are the source of language.

He also considered the feral children as some sort of a link between the apes and the

humans of today. On the other hand, Mandeville talks about early human language as having developed from gestures, much like Giambattista Vico said. So, this is the slight difference between him and Monboddo. Mandeville, in his famous poem *The Fable of the Bees*, suggests that children use gestures, as this is the most natural and expressive form of communication, which is not very difficult to understand. You can see small children before they start vocalizing; they do use a lot of gestures like pointing and so on.

So, many consider him the original scholar to propose the gestural origin of human language. However, more people know about Condillac than about Mandeville. So, the majority of scholars do attribute the origin of the gestural thesis to Condillac. So, Condillac's timing is from 1715 to 1780. His work is "*Essay on the Origin of Human Knowledge*," which was published somewhere around 1746.

It was widely influential during the Enlightenment in Europe, not only because of the content of his work, but also because he himself was a very influential man at that time among the elites. So, he proposed the same thought experiment in which two children, a girl and a boy, find themselves in the wilderness and live in seclusion before they gain knowledge of any language. He then asked whether they would discover a language themselves and, if so, what it would be and how it would develop among the couple's descendants. The same kind of thought experiments that we have seen many people doing before him ask: if you leave a child outside of human influence and with no human contact, what will the child do? What kind of language will it develop, and how? This is the same idea that he talks about, and he kind of agrees on the point that the children will begin to communicate with each other using natural language consisting of emotional cries accompanied by the movement of their entire bodies. This is similar to what Vico also said: that you will have gestures and some sort of expression of emotion, a spontaneous expression of emotion.

So, this combination of gesture and pantomime would eventually become conventionalized, accelerating communication. Conventionalized means that initially they will be arbitrary; over a period of time, each signal and each sign will mean something. So, this will become a word of some sort. So, from this stage to the vocal language would take a long time mainly due to the stiffness of the tongue; that is how he put it. So, the gestures will develop into a conventionalized structure which, in turn, after a very long time, will turn into vocal language, and which, according to him, will take time because of the stiffness of the tongue.

Successive generations of children would have contributed to this development due to the elasticity of their articulatory organs. These are the precursors to the gestural hypothesis that were put forward much later. So, they form a group that is called

glottogenetic thought. Now we come to the modern day. According to the gestural hypothesis, the primary idea is that language originated phylogenetically from gestures.

So, gestures came first, and this was followed by language. And this theory has been juxtaposed with the vocal auditory hypothesis, according to which the origin of language can be traced to non-linguistic vocalizations, some sort of vocal sounds, which in turn became language. So, these are the two important theories that are juxtaposed to each other. Let us focus on gestural theory for now. This theory, of course, has antecedents, as we just saw.

In modern times, these are the names that are most commonly associated with gestural theory: most importantly, Hewes, Arbib, and Michael Corbalis. Now, there are variations within the theory itself; not everybody says the same thing, but just as we saw in the biological marker theories, there is a Saltationist view as well. There are some amounts of similarity and some amounts of dissimilarity, but because they all agree that gestures predate language, we all put them together under the same category. Now, these are some of the variations. There are more minor variations as well, but these are the most important ones.

The gestural hypothesis has primarily two types of stands. One is the gestural proto-language hypothesis. Now, this hypothesis assumes that proto-linguistic communication before vocal language emerged relied mainly on gestures functioning on isolated signs devoid of syntax. So, there was no syntax, just like monkey gestures by other kinds of animals or higher primates, where gestures stand for, let us say, a lexical entity; there is no syntax, so to say. That is what the idea says: gestures stand for words and represent their reference.

Hewes and Arbib are the most important scholars in this field. Next comes the gesture before speech hypothesis. This assumes that gestural language emerged before spoken language and highlights that its function was limited to the transmission of non-verbal information such as emotion. Now, there is a third variation, which is called the gesture and speech hypothesis. This focuses on the close link between speech and gesture in the context of a linguistic expression.

They assume that language development always engages both modalities, the vocal and the visual. So, these are the three primary differences within the gestural hypothesis of the evolution of language. Now, let us look at a couple of them, the most important one of all. Hewes, we will talk about first. The modern hypothesis regarding gestural theory was formulated by the American anthropologist Hewes.

He is very popular, well known for an important paper called "Primate Communication and the Gestural Origin of Language," which synthesized data from a diverse number of fields and argued for the gestural hypothesis. Around that time when his theory came out, we already had some studies carried out on the higher primates and how they could be taught various kinds of sign language and so on. So, he collected all the data, put them together, synthesized them, and on that basis, he came up with this theory. The main argument of his came from the finding that apes could be taught a variation of sign language, but they could not be taught human vocal language. That was one of the primary bases for his theory.

Hominins, whose cognitive abilities must have been much like those of modern nonhuman apes, were capable of creating a gestural proto-language. That was his conclusion based on his observation that apes could be taught sign language. So, if modern apes can use sign language, in some sense we can think of them as precursors to modern humans doing the same things. So, as a result because apes cannot be taught to speak we also were like them, we also used gestures that was the idea. Secondly, their vocalizations are involuntary emotional reactions and are used even when there is no one around to listen, which means this is not a targeted sort of communication system; it is not a communication system; it is just an outburst, just an expression of emotion of some sort; this is the idea.

So, this is not primarily utilized for communication as the goal. These are the most important ideas that he put forward, and he also states that gestures have not been completely replaced by language, as gestures are part of our communication even today. All of us are, in fact, aware that there is an entire sub-discipline looking at gestures and their importance in communication systems, cross-cultural differences in gestures that we typically see accompanying speech, and so on. So, gestures have not gone away completely; they still exist, and different aspects of modern culture are rooted in gestures, like painting and vocal communication as well.

So, there is, for example, poetry and so on. Later, his later publications provided a solution for the modality transition. What do we mean by modality transition? Because he talks about gestures predating vocal language, there must have been a transition from gestures to vocal languages. How do you take care of it? His earlier publication, his original paper, does not give a very good explanation for that. But in his 1996 paper, he talks about some sort of explanation where he discusses mouth gestures and sound symbolism coming together to make the transition possible. However, this process is also not very clear even in his theory.

How does that happen? That is not very clear. Another big name in this domain is

Michael Corballis. He kind of developed on Hewes's idea in later times. His key point was that skilled motor movements and language are typically both supported by Broca's area. He bases his arguments mostly on neurological findings that both motor movements and language are, you know, housed in Broca's area. Broca's area is responsible for both gesture and speech; hence, there has to be a connection that is the idea.

He finds a brain basis for connecting gestures with vocal language as a result of this. And even today, brain imaging studies reveal a close connection between motor movement and speaking in humans. As I have just said, a lesion in Broca's area impairs your speech production. You cannot say that the articulatory system gets affected.

So, this is what he said, too. So, that in case Broca's area is responsible for both gestures. So, we have a brain basis to support our hypothesis that gestures predated human language. So, in non-human primates, this area is, of course, used for complex gestures. Another area, another finding from neuroscience that he utilized was the discovery of mirror neurons. Now, what is a mirror neuron? Mirror neurons are those neurons that get activated when one is doing an action or watching others do the same action.

So, for example, somebody playing football or a simpler job like writing on the board, and you are looking at somebody else doing the same thing, the same kind of neurons will get activated; those are called mirror neurons. So, these neurons are spread across the brain, but most notably, they are seen in Broca's area 44 and 45. So, these neurons would have provided early speakers with the feedback they needed about others' intentions and perspectives. Now, what this last point means is that because mirror neurons get activated when you see somebody else doing the action, this means that you kind of are able to be in their mental shoes. That is why we see, you know, in the people getting emotional about a dropped catch, a missed run, or a run-out, or something, because you are imagining yourself there.

Your mirror neuron is helping you feel that, right? So, this is what he actually said: that because mirror neurons have this particular function, this would have provided, in the prime case of our ancestors, some sort of feedback about how this works. So this was necessary. So, mirror neurons are another domain of proof as far as Corballis goes. Another important parallel that he points out is that of sign language, which has a grammar as complex as that of the vocal auditory loop language.

So, this is another proof, according to him. He, however, does not say that gestures turned into language, unlike his predecessors, who say that gestures came first and then language happened; gestures converted to language, he does not say that. He says that he considers both of them as speaking, which is another kind of gesture, a facial one. So,

something similar to what Hewes also said about mouth gestures. So, Corballis says the same kind of thing about facial gestures, and he also takes help from the motor theory of speech perception, which was proposed by Lieberman. Our understanding of language is derived from how words are produced rather than from the sound itself.

So, when I understand somebody, when I am able to figure out the sounds, it is not because of how they sound. But how they are produced, what happened behind the scenes to produce that sound, and this is the motor theory of speech perception given by Lieberman. So, the same theory is also used by Corballis in support of his theory about gesture preceding language. So, the gradual transition from manual gestures to the increasing use of gestures of the face and mouth could also have co-occurred with the increasing involvement of the hands in tool-making. So, he brings in a large number of, you know, different kinds of probable inputs into the evolution of language.

Around the same time, according to him, humans also started making tools, and his theory has been supported by many others: that when we started to create tools is when finer cognitive abilities began to appear among humans. So, this is when a large number of gestures shifted from the hands to the face, probably to the mouth; that is the idea. Researchers have also used studies from the field of developmental psychology to support gestural theory. Infants typically learn to express the concepts first through gestures, like pointing at a toy or something, before they start to express them with spoken words.

Then comes Philip Lieberman; his book *Eve Spoke* came out in 1998. His primary focus is on the neural basis of language evolution. According to him, language does not only serve the purpose of communication; it is also a part of thought. This is not just a one-off thing; this is not just a tool for communication, but it is part of the thought process itself. The reason is that language is inextricably connected to motor control, attention, and other aspects of human behavior.

So, he is one of the most important theoreticians in this field. He says that the chimpanzees have latent linguistic abilities. Neanderthals and other archaic humans also possessed some sort of linguistic abilities. Similar parallels can be found for all human behavior. So, the same neural structure exists among many other animals, whether they are our close cousins, higher primates, or other animals. So, just having the neural structure is not enough, which means that the neural structure does not mean having the same kind of functions.

So, you can have different kinds of functions from that same neural structure; this is the primary thesis. So, neural structures that date back to species that lived millions of years

ago and served other purposes have been recycled to regulate speech. The primary focal point of Lieberman's theory is that neural structures evolved over time; neural structures have been repurposed for different kinds of activities and different kinds of functions. So, the same neural structure that had a different function in another animal millions of years ago has been repurposed for humans to speak; that is the baseline idea. And his theory is based on the argument that existing neural structures have been repurposed.

For example, he gives many examples of how the cerebellum and the hippocampus are archaic structures, and today they play a role in cognition. They have existed since time immemorial. Other examples that he gives are the subcortical basal ganglia that appear in early anurans, the tailless amphibians; this goes back all the way to that time. But the same structure has a different purpose in the case of today's humans. This regulates motor control, including speech, not just speech but many other motor controls.

Similarly, this supports neural circuits linking the prefrontal cortex, posterior cortical regions, and other subcortical structures. These circuits are active in linguistic tasks and lexical access, comprehending distinctions in meaning conferred by syntax and the range of higher cognitive tasks, including executive control. The basal ganglia play a critical role in conferring cognitive flexibility. So, these structures go all the way back to the tailless amphibians, but in humans, the functions are like this. Also, the cingulate cortex was found in the therapsids, which are archaic mammal ancestors.

They were the transitional mammal like reptiles. That is how old the structure is. This cortical part was and still is involved in mammalian mother-infant interactions. It also controls laryngeal phonation. It is active in directing attention in cognitive tasks, and so on. So, the basic idea that he presents is that these same kinds of neural structures can be traced back millions of years.

But today, the same structures we carry, humans carry, but with a different kind of function. So, as a result, he has contributed largely to the debate about natural selection and abrupt changes. He turns to Darwin for support of his theory. Darwin stressed the gradual nature of natural selection. However, he also knew that there were abrupt changes during evolution, such as the change from aquatic to terrestrial life.

Even though Darwin says that there is natural selection which works rather slowly through evolution, he does say that there are stages from the aquatic to the reptile to the amphibian to the mammals, and those kinds of stages have also been proposed by Darwin. So, as a result, Philip Lieberman also goes back to that idea, and his solution for this type of evolution was recycling, adapting an organ for a new purpose that takes care of this kind of process. Current studies also confirm that recycling is a general process,

which includes the cerebellum and the basal ganglia that Lieberman discusses extensively, and which initially appeared to have been adapted for motor tasks functioning in cognitive tasks, including language. So, this is how Philip Lieberman proposes his idea. The primary thesis is that the neurobiological structures present in humans are also found in other animals; they have just been repurposed.

He strongly disagrees with Chomsky that language suddenly appeared because, remember, Chomsky said that language initially, he says, was 50,000; later on, he readjusted it to 200,000. But whatever the timeline, it appeared suddenly. And how did it appear? There is a single computation called merge that is part of his SMT theory. This operation yields the defining characteristic of all human languages which is basically according to Chomsky which is complex sentences with embedded clauses.

Now this is how it came about. And this system accounts for the acquisition of language by children, and its sudden evolution takes exactly two syntactic elements and puts them together. This is how Chomsky's idea of language evolution worked, which Lieberman severely criticized. Because he says this makes no sense, different languages put two different things together. Chomsky's initial theory was primarily based on the English language.

So, in that case, it would be that the two items could be the determiner and the noun. But not all languages work like that. Chinese does not use determiners. So, this means that the variation across the world's languages, taking care of all the typical features of those languages, has to be genetically encoded. That variation to be encoded in the human gene through a mutation, all of a sudden, is kind of a far-fetched idea according to Philip Lieberman. So, this whole idea, as a result of which Lieberman calls it belongs to 'the realm of fantasy'.

So, you see how back and forth we are going between the various kinds of theorists and scholars with respect to the various kinds of biological markers and how they have been debating the same thing. So, he concludes that human language evolution is a natural selection acting on heritable biological variations. Biological variations came first, and then they were inherited; that is how this gradually happened. Natural selection worked on that, acted upon it, and then that is how language came into being. Natural selection acting on genetic and epigenetic events over the last 500,000 years enhanced human capacities.

So, it is not only genetics but also epigenetics. What is epigenetics? Epigenetics is the environment in which we find ourselves. There is an idea called the ecological brain. So, the environment within which the child develops means both the natural and the cultural

environment. So, depending on that, over a period of time, certain kinds of traits become your genetic traits or your inherent traits.

One good example of this is lactose tolerance versus lactose intolerance. So, nowadays we find a lot of people who are lactose intolerant. Now, according to the theories of both Lieberman and others, the idea that most people, many humans across the world, are tolerant of lactose means that sometime during the evolutionary stages, humans domesticated cattle, cows, goats, and other sheep, resulting in changes to food practices and dietary habits. And this change in food practice over a period of time became kind of coded genetically into lactose tolerance. On the other hand, you have people who probably did not go through this.

So, as a result, you can conclude that this did not become part of their genetic inheritance. So, with those people probably who lived in communities where milk was not part of the dietary practices. So, as a result of which there are people who are lactose intolerant. So, these kinds of epigenetic factors combined with the genetic underpinnings are how human evolution happened, according to Lieberman. So, disease susceptibility is one of the examples he gives. So this is where we complete our lecture 4; in lecture 5, we will take up the other theories, both the cultural theory of language evolution and the theories about the vocal theory of language evolution. Thank you.