

Fundamentals of language Acquisition

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Week 01

Lecture 05

Lec 5: Cultural theory of language evolution

Hello and welcome back. We start with lecture 5 today, and with this lecture, we will be completing the first module, which is our first week's discussion. So today we will look at the cultural theory of language evolution. So far, we have looked at various aspects of language evolution, primarily from the biological standpoint. Biological standpoint in terms of what the biological underpinnings are and how they are studied in terms of analogous and homologous structures across species, and so on and so forth. And we also looked at various debates within it.

So, now we will move on to the cultural theory of evolution. Now, the cultural theory of evolution is not exactly a new thing. Language has been considered part of the cultural aspects of any given species and any given group of humans for a very long time. And we have already seen how, during the time of colonization, when the Europeans went and discovered various new worlds, there was a discussion about how the primitive people became civilized and what the important criteria are on the basis of which people can transition from a so-called savage population to a humane society; what those important factors are, and language was considered one of them.

So, language was important in terms of civilizing people; as a result, it is part of the cultural tradition of any community, along with art, literature, music, and so on. Literature, of course, is a much later development, but art and music go hand in hand with language. That was how the old ideas had been around. In the 19th century, Humboldt and other scholars also talked about the same idea: that languages should have a status similar to art and music. So, during this time, it was also the beginning of philology as a discipline.

So, it was considered a cultural and historical phenomenon. Why is it historical? Because, in terms of historical linguistics and cultural understanding of language during

those days, it was already well known that languages have changed, languages have split, you know, languages have converged and diverged through various kinds of processes, and new languages have come into being while older languages have changed as well. So, all these processes were explained using a tree structure with branches emerging through human contact, convergence, and divergence. Thus philology of that time contributed a great deal to understanding the evolution and change of language through the ages. Now this was the 19th century, but of late the same ideas and theories have become stronger in recent times, and it has emerged as a counter of some sort, or let us say a complementary standpoint with respect to the biological understanding of language evolution.

Now there are certain differences in the biological and cultural aspects of language evolution. The main perspective among the non-evolutionary position that we have already seen is that those proponents, those scholars, do not believe that language actually evolved. It was believed to be sudden; it appears to be sudden because of some kind of mutation. So, that standpoint typically takes the perspective that language is somehow special and cannot be connected with cultural aspects. Language has different modalities.

In fact, that is where the modularity of the brain and the, you know, language-specific areas and so on, all those ideas come from. So, it is not connected to, nor is it part of any other cultural aspect of humanity; that is the idea. And as a result, there is no reasonable expectation that general laws of cultural evolution would apply in a uniform way across language and other contrastive domains like religion, technology, group organization, and so on and so forth. So this is where the primary juxtaposition lies. Because the cultural evolution theory places language alongside other kinds of cultural evolution, be it the evolution of religion, the evolution of technology, the evolution of group organization, or social structure—you know, all of these things.

So, according to Dideu and other scholars in the cultural tradition, this position is based on a few misconceptions about the notion of language itself and about how language functions in a society. So, they go on to discuss these misconceptions in detail. Due to the brevity of time, we will simply mention some of them, but the references are, of course, added for you to look up. So, some of them have a language that is biologically fixed. So, this is one of the primary areas where misunderstanding, or let us say a lack of understanding, always occurs.

So, this is only biologically fixed, but the cultural theory says that although we do not really deny that language needs certain kinds of biological underpinnings. However, the ability to speak is important, but it is not specific to language. We have already seen how

many of those structures that were considered to be unique to humans were also found to be present in many other species. In fact, some of them go all the way back to the initial stages of the evolution of animal species itself. So, these are not special for language, which is one area.

Then comes the idea that language changes constantly. Now, language, of course, changes; that is a well-known factor. But then, even there, it is not, you know, a uniform phenomenon. Certain aspects of language change faster than certain other aspects. Some aspects of language are far deeper and less prone to changes than others.

Similarly, all humans have an equal command of language. The idea of the ideal native speaker is that all humans will have a similar kind of competence; native speakers will have a similar kind of competence. But this may or may not be entirely true. For example, I quote, "Language acquisition continues through the active adult years as new rhetorical skills and new social arenas are mastered." For example, certain complex terms, like the acquisition of the triangular kin terms, are used.

So, basically, the point here is that we keep learning language throughout our adult lives. Of course, there is a certain time frame within which the primary ideas or primary structure should be in place, which is the famous critical period hypothesis. But that does not stop us from learning a language throughout our lives because we come across newer understandings, newer rhetoric, as well as newer social realities, and the language keeps changing through all of that. So, one particular example that I have added here is a very complex kin system with kin terms in a particular language that Evans has talked about. Now, these kinds of complex structures require the community to spend more time well into their 20s as they continue learning.

So, this idea is also not entirely tenable. All languages are equally complex. Now, this idea was generated in a way to counter Eurocentrism because, again, the idea was that European languages are superior and the European race is superior due to the colonial period. So, as a result of which this idea was proposed that all languages are equally complex. However, the latest findings point towards the possibility that some languages do have differences in terms of structural complexity; not all languages have a similar kind of structural complexity.

That is also a new finding. And it was also believed that the complexity of language is inversely proportionate to technological development. So, the more technologically developed a society is, the more simplified the language will be, the more homogeneous the language will be, and the easier the language will be to identify and understand. This too has been countered, and one of the main counterpoints that has been proposed is that

you need sophisticated measures of complexity. To understand what we mean by complexity, we need more sophisticated measures; hence, it may not always hold true.

So, on the basis of these kinds of differences and points of departure, let us now come to what exactly cultural evolution of language is and what it basically entails. Now, on the one hand, biological investigation focuses on aspects of language at the individual level; for example, all the biological underpinnings: vocal tract, brain, etcetera. Cultural studies, on the other hand, look at interaction and learning as main points. So, human as a part of a society, as a part of a whole, a part of, you know, a cog in the machine sort of understanding, and as a result of which learning and interaction take center stage in the cultural theory of evolution as opposed to the strictly biological underpinnings. Now, cultural evolution is generally understood to be important for a variety of animals, not just for humans, and as a result, it indicates a very deep evolutionary route.

There are various important studies I have quoted one here that show that cultural evolution is actually a constantly ongoing process across various species. So, using cultural accounts of language evolution often depends on computational modeling, psycholinguistic experiments, psychological experiments, and linguistic data. But a large amount of work has actually been done using modeling, computational modeling, agent-based modeling, simulation, and so on and so forth. But to some extent, they also use the theories also utilize developmental and comparative data. So, cultural interaction and learning bias are the most important things that have been studied through modeling, of course.

So, we will see; we will look at them one by one. Learning bias is one of the most crucial aspects of the cultural theory of language evolution, as put forward by a number of researchers. One of the most important names in this regard is that of Simon Kirby. We will look at his contribution shortly. But first, let us find out what learnability or learning bias means.

Now, in order to survive, a language must be learnable and useful. Something that is very difficult to learn will not be learned and passed on. That is the basic idea here. So, if a system, if a structure is easy to master, if a structure is easy to learn, then it will evolve, it will spread, it will be transferred, and so on. So, for example, learning the simple rule of plural is better than the rote learning of all the plural forms in the English language.

Now, the English language has irregular forms and regular forms. Suppose, imagine if all the plural forms were irregular, each going its own way; it would be very difficult to learn. Hence, because the majority of the words follow the rule, it is easy. So, this is a very simple example of what learnability means. Because there is a rule, it is easy to

learn, and because there is a rule, it is also useful for applying the same rule to the new words that can be coined.

For example, words like blog, vlog, and selfie are new words. Now, we do not really need to sit down and figure out how this should be pluralized, because there is a rule in place which simply uses selfie, selfies, blog, blogs, and so on and so forth. So, aspects of language that are easy to learn and process and that have communicative utility will be stamped in and amplified over successive generations of language use. While linguistic patterns that are awkward to learn or process, or that have little value to language users, will be stamped out is how Christiansen pointed it out in his 2010 paper, which is a very influential paper. Thus, a lot depends on the learner themselves.

So, the person who is learning is a very important agent in the entire system. So, as a result, it depends on him or her. So, the bias towards learnability is what is important. So, language evolves and adapts to the selective pressures imposed by the learners. A successful language should also be useful in that it should be able to convey the multiple meanings that the speakers want to express.

It is, of course, kind of redundant to say that even the same structure of the language and the same sentence can be utilized in multiple ways. That is a telltale sign of a very complex language system. So, we know something can be used as a simple statement; it can also be used in a sarcastic way, in a metaphorical way, and so on and so forth. So, to do all of these, you need a structure where you do not have to spend a lot of your mental energy just to figure out the structure; that is the idea. The rule-governed structure thus helps in easy learning, expressibility, and transfer of the skill through generations; that is how you can summarize this idea.

Now evidence for these accounts comes from agent-based modeling and more traditional psychological experiments, particularly in artificial language learning. So this is where Simon Kirby comes in. Of course, there are many more scholars here, but again, because we have to, this is not a detailed course on evolution, so we will stick to two main scholars: Simon Kirby and Daniel Everett. Simon Kirby is a professor, an artist, and a DJ. Now, what he says is that language evolution can be understood as a complex interaction between individual learning, cultural transmission, and biological evolution in the human population.

So, it is a dynamic process. It is not a single strand of genetics that makes everything possible, but it is the coming together of biological aspects, cultural influences, and individual learning biases that form the idea. He bases his theory on modeling and simulation, primarily modeling and simulation based on the usability, you know,

interaction, and so on. And he bases his ideas, his theories on previous studies carried out by a number of scholars who looked at the evolution of cultural and linguistic practices, namely De Boer and Hurford. So, he agrees that language, at least in part, is a learned behavior. It may not be entirely learned, but at least some parts of it are learned.

So, differences and variations in languages have no obvious correlation with genetic differences in their systems because languages are different. We all know there are as many groups as there are languages, but genetically speaking, that kind of difference is not possible. So, hence these variations must be aspects of the learned part of the cultural system; that is how he puts it. And so there are two things that come out of his theory: one is structure, and the other is iterated learning. By structure, we mean here that learners create a structure in an apparently unstructured system; in this case, the language system.

So, that is what he tries to show through his simulation experiments. So, language is unique because of its iterated learning. What does iterated learning mean? It means that one person learns from another, who in turn learns from yet another. So, it is some kind of chain that goes through; it is not something that you know.

Some sort of Chinese whisper game. So, we learn from the other people around us, and similarly, we pass it on to our next generation, other people who come into contact, and so on. So, we inherit language through two important pathways, so to speak: first, the mechanism to learn genetically, and then the language itself, which is learned culturally. So, there are a lot of different types of experiments. One of them is a naming game. It is very interesting and quite a commonly used structure in this domain.

So, what happens here is that this examines the role of interaction in language evolution. The naming game focuses on a population of interacting artificial agents who are tasked with labeling a particular meaning. So, the meaning is given, and the label has to be given. So, agents begin by generating random strings for meaning, and initially, communicative success is very, very low because different agents are giving different names to it. Over a period of time, what they call generations, generations of artificial agents.

It is very easy to check this in an artificial agent because checking generations of humans will be a very time-consuming affair. So, what they see is that through generations of artificial agents, there seems to be some sort of convergence or agreement on the terms to be utilized for the same meaning. So, initially, there is no communication possible because they do not agree. But over a period of time, they seem to converge on a particular level for a particular meaning. As a result of this, they discard all the previous

levels, and this leads to high communicative success over time.

So, this is what the game does in a nutshell. This simple bias allows agents to converge on a shared conventional level for a meaning, as a result of which it can be carried forward to the next generation. So, that is the naming game. The iterative learning model is another social learning perspective that focuses on coordination in learning instead of interaction. Language learners do not receive disembodied input; rather, they learn from the output of other language users. So, in the iterative learning model, it begins with agents learning a subset of initially random vocabulary.

Initially, it is random; a subset of the output of this particular generation then becomes the input for the next generation. Since agents receive only a subset of the input but are tested on the entire vocabulary, they generalize patterns to unseen items. Through generations, the list of random words is passed on, and then the next generation is tested on the entire vocabulary; they impose some sort of structure to it. That is what the model talks about. So, just because we know that "blog" becomes "blogs," "selfie" becomes "selfies," and similarly, if you know half of it, you use the same idea and the same structure on the rest of the vocabulary.

Now, this has been utilized by human agents as well. Both human agents and primates. So, with human agents, participants were tasked with learning initially random pairings of nonsense words and meanings. Both the meanings and the words are nonsensical. They do not exist in the real world, and that is why they were used, and their output was transmitted as the learning input for the next participant, much like the artificial agents. Results showed that initially random languages become structured over a period of time.

Now, how does the structure emerge? That is very interesting. So, it highlights the role of cultural transmission in understanding how the mapping really happens over generations. So, over a period of time, they find some sort of structure in the meaning. You can see this; this is what was utilized in terms of meaning, and these are the words.

This is just a small subset of the entire experiment. So, there is no such thing as this. So, over a period of time, what the human agents were found to be doing is using some sort of understanding of the similarity of the structure, be it in terms of the number of angles it has, whether it is filled, dotted, fully colored, or whatever, and accordingly, some sort of structure also begins to appear in its linguistic labeling. So, that is what they have found with respect to the human agent. The most important aspect as a result of this experiment is that initially this entire set has no structure, but eventually a sort of structure starts to emerge. So language gets structure through cultural evolution because here we are talking about one set of speakers giving their output to be used as input for another.

So there is a chain of transmission, and that is how structure eventually emerges; that is the finding. The same study has been done on primates as well, but in the case of primates, of course, you cannot use complex things. So, they have used something like this. There was a study on baboons in which they used random patterns on a grid with 16 cells somewhat like this. And the same kind of model, so one baboon learns this and it is used as the output of the baboon, one is used as an input for another and eventually they start creating some sort of structure even within that.

So, they exhibit structures; specifically, they resemble the tetrominoes, the shape from the classic game Tetris, which involves four consecutive filled cells. So, this is how it happens even in primates, and that is why this finding is very, very interesting. Because this is found in primates, it is also found in human agents as well as artificial agents. So, this has to be tenable to some extent.

Then there is the idea of interacting time scales. So, the biological and cultural perspectives are often thought of as something alternative or, you know, clashing with each other, and so on. However, the new idea that is emerging is that there are, you know, different time scales, and they interact with each other in some sort of structure. This is what Kirby talks about. So, the genetic structure is a long, drawn-out affair.

It happens; genetic underpinning occurs through generations. On the other hand, language requires some cultural input in its development, as evidenced by certain cases of language-deprived children, and the existence of culture radically changes the way biological evolution works in our species. So, strong innate universals are unlikely to exist. We have already seen that we talked about lactose tolerance, and how culture shapes the way your genetic structure will eventually turn out. Of course, it is a long-drawn affair. So, any biological underpinning necessarily evolves on a relatively slow genetic timescale.

The cultural or glossogenetic time scale is, on the other hand, slightly shorter. It involves new words emerging and others dying within a few years, and then the individual time scale is another factor that represents language development. While human children are undoubtedly primed to learn language biologically, linguistic input brings in the cultural realm. So, all these three realms interact with each other, and as a result, language changes, evolves, and passes on.

That is the finding of Kirby and his associates. On the other hand, we have Daniel Everett, who is also a proponent of the cultural evolution theory of language. So, he starts one of his books like this: "in the beginning, there was a word", and then he says, "No, it

was not." So, the primary idea behind Everett's theories is that, he is an anthropological linguist, and most of his theories are based on his decades of work on the Pirahã language in the Amazon. So, he says that language emerged as an instrumental product of certain cognitive capacities of the human brain to meet some of the requirements of being the kind of social animal that humans are. So, basically, the kind of social life that you have, the cognitive necessities of conducting yourself in the world, these are the deciding factors in what kind of language will emerge and what kind of language will not emerge.

So, for strengthening mental skills like thinking, reasoning, mathematics, symbolic logic, and so on. So, here the idea is that language is not only a tool for communication, but it is also a tool for creating overall cognition as we know it. So, language is a, as he calls it, a cultural tool, a tool for shaping the way members of human communities behave, think, and know. So, that is what cognition is all about. So, Everett entirely rejects the idea that language is innate and says that there is a combination of human capacities that make human language possible.

So, these combinations of capacities he divides into physical, cerebral, and cognitive, and he also calls them platforms. So, each platform is made up of a set of what he agrees are the basic capacities or capabilities. Specific to humans, but not to language. So, humans have these, you know, the basic physical abilities, which are in terms of the biological, then the cerebral, and then, of course, the cognitive. So, all of them converge on all these platforms; briefly, the physical platform is the body, of course.

So, all of them converge to create language as a tool. As a result, he focuses on the learned aspect of language as a skill and not on the inherited aspect. And then, because of the environment in which you find yourself and other factors, he stresses the cultural aspects of language. So, here he gives, of course, many examples primarily from Pirahã, but also from other languages and how culture affects language. The gamut runs from vocabulary to idioms to grammatical structures, categories, syntactic constructions, and what have you. So, his main theory is that language and culture are inseparable, and hence they would have helped in the development of each other.

So, language and culture coevolution is what he is a proponent of. Another theory, which is also not a simplistic one, but due to the brevity of time we would not be able to discuss in detail, is called the vocal theory. So, we had biological theory, cultural theory, and now we have vocal theory. Vocal theory is actually, though sometimes it is proposed in juxtaposition to gesture theory, sometimes it is understood to complement gesture theory; similarly, vocal theory has been understood as part of biological theory, and so on and so forth. So, even though we are discussing them separately, they have a lot of give and take among themselves. So this theory says that primarily human language developed from

simple vocalizations such as those found among other animals.

So the vocalization is a result of certain kinds of emotional necessity, whether it is fear or, you know, some sort of excitement or something. So, the vocalization that you see in other animals is how it started with humans as well; that is the basic idea. So, even though it started with emotion being the driving factor, as things changed and the vocal theory evolved, now the emotional aspect is not taken as a central aspect but as one of the factors, if not the central factor. Now the focus has moved to the articulatory innovations, such as the complex phonetic-phonemic repertoire, the nature of the syllable structure, vocal learning, the descent of the human larynx, and so on. So, all the way back in 1922, Jespersen claimed that our ancestors sang out their feelings long before they were able to speak their thoughts.

So, this is how we trace the origin and the history of vocal theory. In the recent past, Fitch has referred to music as an example of bare phonology. So, the connection between the music and the spoken language has also happened. Brown is another scholar in this domain who puts emphasis on the phylogenetic basis of cognitive structure rather than the Darwinian issues of adaptiveness and selection mechanisms. So, theories are basically based on two standpoints: language as a mode of communication that is the dialogic view. The dialogic view of language evolution talks about the focus on social interaction, where you have to interact with other people in society, as a result of which language evolves in a particular way.

On the other hand, language as a cognitive tool, which we were just looking at with respect to Everett, is a tool for thought. So, now if we consider the dialogic view, vocal prosody forms an integral part of it. So, vocal prosody is at the root of spoken language as well as being an important part of music. So, that is where the vocal theory draws a parallel between spoken language and music, taking prosody as the starting point.

Emotional meaning, according to the rules of expression, is also attached to it. So, basically, it starts with the idea that prosody is the basic concept. In fact, sometimes you do not even need to speak the entire sentence; prosody does the work for you. So, one example that many scholars have talked about is, like, you know, using just the word "bee" with an exclamatory tone. So, if you just say "bee" in that exclamatory tone, you are actually warning the other person that there is a bee; you better be careful. So, as a result, this vocal theory takes prosody very seriously, considering that prosody is the most important thing on the basis of which structure is imposed.

So, prosody is the first thing, and then, by virtue of the prosody involved here, it is a complete sentence. So, as a result, the emotional semantics is portrayed as important in

this theory. So, the idea here is that of a prosodic scaffold, the model that has been proposed and carried forward by Brown and many others. This model, in which overall communicative intent—whether it is intentional, emotional, or other—is the primary factor being conveyed in speech, and in which the combinatorial and compositional mechanisms of speech, words, and utterances act to fill out a prosodic scaffold. So, as I was saying, the prosodic structure makes the skeleton of it, and on top of that, we add the other things.

So, that is how language evolved. So this is composed of the affective prosody and the linguistic prosody. Affective prosody refers to the vocal expression of emotions, and then we have the set of both local and global mechanisms for conveying emphasis, like stress, prominence, and so on. Brown, of course, proposes the Musilanguage as the joint prosodic precursor to music and language, and he says that only after that, at a later stage, syntax and other things will appear. So, this is how he gives a list of features for his Musilanguage system, and this is quoted from Brown's 2017 paper: a list of 12 features that he talks about, which connects and binds together music and language.

So, the musilanguage system he talks about. Recent findings show a surprising parallel between language and birdsong. We have already discussed this. So, we will not get into the details. So, it is not really too far away. And that is why I said that vocal theory has some connection with biological theory as well as some connection with gestural theory.

So, the parallel between birdsong and human language is, of course, recent findings that tend to support the ideas. And even at the level of neurobiological substrate, we have again seen that regions in the forebrain controlling vocal production have been identified in humans, as well as in three independent lineages of songbirds showing convergent specialization. However, in birds that do not sing, like chickens, and primates that do not have any language, like macaques, there is no direct projection connecting the vocal motor cortex to the brainstem. So, basically, there are certain kinds of, you know, converging neurobiological substrates that have been found across species as well.

Now, this is in brief. So far, we have discussed the prominent theories of language evolution. Now, at present, of course, the positions are not very strict, or, you know, watertight compartmentalization. At present, the theories have gone through a lot of changes in view of the various kinds of findings. So, first of all, current research often does not consider language as a unique anthropoid phenomenon; instead, it is now viewed through the lens of ongoing human evolution and strict adherence to communicative goals. Language adapting to and reflecting different aspects of the environment illustrates that linguistic diversification is not simply an accumulation of random changes over time. Similarly, the emergence of multimodal and usage-based

theories of language evolution has brought in robust new frameworks in terms of correlation and causation models.

So, a lot of remember that in the beginning of this module we talked about how computational modeling is playing a major role in understanding human evolution as well as language evolution. So, this is what we are talking about: lots of new models have come up, usage-based and multimodal as well. Neural correlate models have added further knowledge about the interconnectedness of language with other aspects of human cognition. Thus, understanding the evolution of language is no longer an isolated field of study focusing on language only, but an integral part of the evolution of humans, how human culture evolved, how technological advancement happened, and so on.

So, within that broader scope, we now look at language evolution. not as a strictly separate sort of understanding, strictly separate kind of modular understanding. So, this is where we complete Module 1. It was a very brief overview, and I hope you will look up the references.

I have added adequate references. These are some important books to read, followed by other resources. So, next week we will start with module 2. Thank you.