Language, Culture and Cognition: An Introduction

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Module - 05
Part - 01
Lecture - 11
Language acquisition

Welcome to the module 5, part 1. Today, we will discuss about Language acquisition.

So, let us take a quick look at the journey so far, kind of a recap. So, till now, we have seen that language, in both its structural as well as functional domains, is inextricably related to the neuro-cognitive as well as socio-cultural aspects of human experience. So, not only is language connected to the mechanisms within the brain, within the cognitive apparatus, but also, it is informed, and it is in a constant interaction with, the socio-cultural environment, the input from the outside of the human body.

So, there is a mixture of various factors that give rise to what we see in terms of language output. So, we have seen that, through various aspects of language, starting with the category formation process and how it is expressed in language, the framing of an experience and then, schemas and metaphors and metonymy and so on and so forth. Various experiences of human life and how they are closely connected to the fundamental aspects of human cognition, which is then revealed through language. So, this is what we have seen till now.

Now, let us turn to yet another very interesting angle of language, which is that of learning, how does language learning take place?

So, in this segment, we will look at a few important points in this domain. So, we will start with language acquisition in children. Typically, when we are talking about language acquisition in children, we will be referring to first language acquisition. So, within first language acquisition, there are various standpoints theoretically, some of them are belong to one category of theory, some of them belong to another category of theories.

And ultimately, more or less, it all, we can categorize them, the various theoretical positions can be categorized either belonging to the nature or the nurture part of the nature-

nurture debate. So, while talking about these theories, we will look at only few of the scholars we will be able to look at, but the most important ones among them will be Skinner, Chomsky, Luria, Vygotsky, Piaget, Sellers, Bandura, Bruner and so on.

And then, we will be talking about language acquisition in terms of social cognition. And of course, there are very two very important concepts as far as language acquisition is concerned, the notion of 'critical period hypothesis' and the idea of 'the theory of mind'. So, theory of mind and its role in language development in terms of both typical and atypical children will also be covered in short.

And then, we will move on to on the role of 'joint attention' as in how attentional mechanism in terms of joint attention in case of children, shape the way language acquisition takes place. And then, we will conclude with some of the recent latest developments in this domain, as to where research is today as we speak. This is the roadmap we will follow.

Now, first language acquisition. Children learn language under normal circumstances, this is not this is a no brainer. Every normally developing child learns to speak and masters language within a very short period of time. So, it is understood that this capacity to learn language is innate, humans are born with the capacity to speak. Of course, as we have seen in the introductory lectures, that language may not be entirely, exclusively human, but largely, the complexities of various kinds of you know language manipulation, with respect to various other factors might be human.

So, this is the capacity that is understood to be an a very important part of human being human if not , an exclusive criteria. So, but the type of language that one will speak is not pre-decided, it depends on the kind of circumstances one is born into. And there are stages of development: starts with you know babbling, cooing and one word stage to two word stage and so on and so forth; that is stages of development that is also universal, almost universal there are children everywhere speak learn to speak in the same way.

However, it is on the surface, a very simple affair, every child learns to speak, normally speaking under normal circumstances, every child learns to speak and that too remarkably fast. But that is exactly where the question is, how is it that a very complex phenomena of language, a complex phenomena of the understanding of the rules of language as well, as

in the structural rules of language, as well as the usage of the same tool, how is it that it is done it is mastered in such a remarkably short span of time.

Now, compare this, compare language learning with respect to any other complex learning mechanism, for example, mathematics. Children master mathematics at a much later stage as opposed to language. So, that is what! Language is a complex phenomenon, it is not a simple thing it though it is it appears simple, but we have already seen through various aspects of it that it is not simple at all. There are so many layers to it, there are so many interactions to master and so on and so forth. So, how is it, how is it done?

So, that is where the primary debate has always been, primary scientific inquiry has been as to how children do, what they do with respect to language. Children master language at a very remarkably fast pace; by the age 5 or 5, they are fluent speakers of whatever language they are born into. So, that is where thea large number of theoretical standpoints have come into being.

And there are the linguists and psychologists, most notably psychologists, most of the theories have come from psychology, and also from linguistics to try and find out what is the underlying mechanism that makes children master language, even when the other complex mechanisms do not seem to be doing so well with children it takes much longer time for example, mathematics.

So, before we go into the details of each of these stalwarts who talked about and who have given us theoretical understanding as to how this probably happens, let us just look at, let us try to kind of box them into types of theories. So, on the at the be at the beginning we will talk about the behaviorism, the theory of behaviorism. We have already this discussed about behaviorism in the introductory part.

Behaviorism was one of the most important, most influential theoretical standpoint in psychology till 1950's, 60's or so which believed that the human behavior is what we need to study, and that behavioral output is a result of an input system. So, there is a stimulus-response sort of a loop that is at the core of various learning processes of humans and that included language.

So, language is taught; language is taught by the teachers, by the parents, by any other caregiver and so on and so forth. So, within this larger umbrella term, we will discuss

about Skinner, B F Skinner, the most well-known of them and of course, Albert Bandura. And then, we will move on to nativist theory of language, which primarily owes its existence to Chomsky, Noam Chomsky who opined that children are born with a language learning faculty, the 'Language Acquisition Device' which he called language acquisition device in the beginning, later on he called it Universal Grammar.

So, we are all hardwired to learn language, it cannot be taught to us. The environment may be a supplementary input, but environment does not teach us to speak, we are already pre decided predetermined to be able to speak, the mechanism, the grammar is already there.

And then, we will move on to talk about constructivists. So, language learning in as per them is a part of cognitive, general cognitive mechanism and language learning is 'constructed' through interaction with various of various types. So, here we will discuss Luria, Piaget, Vygotsky, Bruner and so on.

So, let us start with behaviorism. As we have just said that B. F. Skinner was one of the most well-known among the behaviorist theories theorists and who talked about language in terms of stimulus-response systems. So, he says that language can be taught, children are taught to speak by the primary caregivers, by the people around them, the teachers, the parents and so on.

So, we teach children the 'say this' and the child says that and then when so, this is a stimulus response. The stimulus is given by the teacher, the child gives the response and then, there is also a feedback loop. So, if the child does correctly, if the response is correct with respect to the stimulus, there is a positive reinforcement, the child is encouraged, child is rewarded in some sense, child is you know praised and so on.

So, these are positive reinforcements. So, the child understands that this is how it is to be done and then, if there is a wrong response to the stimulus, then there is a negative reinforcement, the correction, the teacher will correct the child and then gradually, child will learn not to utter that. So, basically this is a imitation, kind of a imitation process that the child goes through.

So, language learning, as a result of this is like any other skill, any other skill that is learned through observation, imitation, repetition, errors, rewards and punishments. So, this is the; this is the entire frame within which language learning takes place as per the behaviorist

theories. So, the child will observe, imitate and then, there is a repetition that the child will make and if there is a correct repetition, he or she gets praised, if it is wrong, then he or she gets punished and then, the cycle goes on and this is how language is learnt.

Skinner called it ‘operant conditioning’. So, this kind of conditioning is at the root of; at the root of language learning. Also here, we can also mention Pavlov, the ‘classical conditioning’ all of us know about the Pavlov’s experiment on the dog that there is a particular time when the bell rings and the dog gets food and over a period of time, even in even in absence of food, the dog still salivates when the bell rings. So, that is another kind of conditioning. So, ‘conditioning’ is a an important aspect of behaviorism and in terms of language learning, this is how the loop really works.

So, habit formation and imitation method of second language acquisition also is part of this. So, while teaching second language, the same kind of methodology is used in the teaching material to create a habit, as we have seen that habit formation and imitation is the fundamental rule. So, same thing if you take to second language acquisition, this basic idea has been imported there as well in the in terms of audiolingual method of language teaching.

Yet another important scholar is Albert Bandura, who also largely speaking now, when we say that both Skinner and Bandura can be understood as behaviorists, the we must remember the one thing that they do not really agree on every point, on every aspect of this methodology. There are finer differences, there are finer nuances within each of them, but largely they can be; they can be considered to be part of behaviorist theory may be behaviorist agenda so to say.

So, Bandura also believed that children can acquire language through ‘vicarious learning’ which is also it is his most famous theory is that of social learning theory which is the same thing. So, social learning theory is quite similar to Skinner’s behaviorist theory because it talks about reward and punishment. So, there is an output by the child and then, there is a reward, and which means that if this behavior gets reinforced and if there is a punishment, the behavior does not get to get reinforced.

So, though his theory is similar with behaviorist theory of learning, however, Bandura makes a very significant contribution here and in terms of, there is a slight difference between him and Skinner. Because Bandura talks about cognitive conditioning, cognitive

processes, he includes cognitive processes as part of the language learning mechanism. And he makes it very clear that internal brain mechanisms, internal mental mechanism, cognitive mechanisms are at the root of language learning features, language and learning mechanism that the children put into practice.

So, he added along with previously existing ‘classical conditioning’ and ‘operant conditioning’, he added two more processes he called them ‘mediating process’ and ‘observational learning’ to the existing two types of conditioning. So, basically, there is a mediation and there is also an observational learning which means that the person the learner is given some amount of autonomy which is where one important difference between him and Skinner lies.

Skinner does not give any autonomy to the learner, it is kind of a stimulus response system entirely governed by the teaching method. But he firmly believes, Bandura firmly believes that social learning is and very very is a very very important criteria and says that it has four, it is a four stage process, it has and he names them attention, retention, motor reproduction and motivation, this is how it can be reproduced.

So, these are the four stages of learning language, as per Bandura is concerned. So, you may notice that there is attention is one important aspect here which as we will see as we move on, that many many theorists, many cognitive psychologists, neuroscientists and linguists have agreed on this aspect, that attention plays an extremely important role in learning language as in as it does in all other language processing mechanisms.

So, observes the child, the learner observes others’ behavior, pays attention, observing means you pay attention, so, that is when you observe so, paying attention and then the child retains those information that is important for future reference. And then of course, the motor reproduction, as in the output and then, motivation so, this is where the motivation part is where Bandura and Skinner agree. However, in the in terms of the cognitive representation, there is a slight difference. So, that is about behaviorism.

Now, we will talk about Noam Chomsky, the towering figure of modern linguistics. So, Chomsky is credited with the creation of this generative school of linguistics. Chomsky’s criticism, scathing attack on B F Skinner basically was one of the major reasons of behind the gradual disappearance of behaviorism to a large extent, as we have seen in the introductory lecture along with Lashley and others.

So, Chomsky attacked the behaviorist theory by saying that there is something called a ‘poverty of stimulus’; one cannot possibly, it is not humanly possible to teach the children all the possible utterances in a particular language. The child that grows up by the time of it is at attains 5 years of age, the child starts speaking, child starts producing sentences that it has never heard of.

So, if language is entirely dependent on stimulus and response system, how does it, how does a child produce sentences that it has never heard of? How does it create complex sentences? How does it give you know produce sentences that are you know in formulations that that they have never been taught explicitly? So, that cannot be, stimulus response system as a result of which is a cannot cannot explain how children are capable of doing that.

And we all know that it is true, children are capable of, how often you will see we will be astonished as you know when the child is beginning to speak, one fine day the child comes up with a very complex sentence, with a very you know interesting formulation, sentence formulation, syntactic structure which we nobody or none of us would have ever spoken to him or her.

So, there are this kind of the he pointed out various such problems with the Skinner’s the theory and he brought in the idea that it is ‘innate’, you cannot teach, all we can do is there are certain stimulus in the environment that are probably important, but not as important as the innate ability of the child to learn and speak language. So, that there is an in know an ‘universal grammar’ that all of us are our brains are embedded with. So, there is a structure, there is an algorithm that makes us learn language, though not somebody teaching us, this is the primary understanding of Chomsky’s innateness hypothesis.

So, and this particular mechanism that what he called LAD in the beginning and later on universal grammar is that this is responsible for language learning, nothing else. And he also made a very important observation, very important standpoint in terms of language functions that it is modular in nature. Meaning that, the brain, the that aspect of language mechanism in the brain is insulated from other mental functions, it does not have to depend on any other mental or cognitive functions in order to be useful. So, language function is complete in itself, it has a modular structure.

So, these are the two important, most important contributions of Chomsky in terms of language learning. So, innateness hypothesis, that children are born with the capacity and therefore, they will anyway speak with or without teaching, and secondly, language is modular, it does not depend on any other mental mechanism. And he also gave primary importance to syntax, sentence structure, not meaning, meaning was not really useful as far as Chomsky is concerned.

Similarly, we also have Sellars, who is again there are differences between them, there are not exact they do not talk about the same things, but largely, Sellars also believes in Chomsky's innateness hypothesis, however, he has his own way of presenting it. So, he says that there is a prior abstract knowledge before the acquisition of language, this is where that that is where the innateness hypothesis comes in.

Sellars compares language to games, in which thoughts, assertions etc. are positions and communication, interaction, intelligibility etcetera are the goal. So, it is like a game, language is like a game where there are there is a interaction of various kinds between these two segments. So, what is important according to Sellars, is how we learn to move from one position to another.

So, he suggests that the distinction between pattern governed and rule governed behavior. A competent language user, without intention exhibits pattern governed behavior that is what he says. Whereas a beginner language game player initially will recognize the rules in the linguistic pattern and gradually becomes competent, as he understands, as he acquires a clear understanding of the game of the rules and so on.

So, Sellars and Chomsky both agree on the innateness aspect of it, but Sellars gives a different slightly different take on this in terms of language being like a game, where there is a difference between pattern and pattern understanding and rule understanding. Now, we come to the constructivists. The constructivists are those psychologists is primarily a group of psychologists who have talked about how language is learned and what are the mechanisms in terms of a kind of a construction theory.

So, the primary understanding of this standpoint is that the knowledge resides in the human mind, knowledge is there. So, this is understood to be a cognitive mechanism, knowledge is there in the brain, it but it is constructed. We are not we do not come prepared with all the rules and everything in place, it is not we are not a finished product. Human beings

have their brains where knowledge is stored, where knowledge originates. However, that knowledge is constructed, it is a; it is a process, it is not a given so, it is neither innate nor it is passively absorbed.

So, innate it when we talk about innateness of course, we go back to Chomsky and his followers and if we talk about you know passively a passive absorption of knowledge, we talk about the behaviorists. So, cognitive constructivists differ from both of these in the sense that they talk about knowledge being constructed by the agent himself, agent as in the human being, the learner, the person who is constructing knowledge. So, the learner has an active role in this particular theoretical understanding.

The learner gradually builds up knowledge upon the foundation of previous experience. So, as we go on and on, we on the first experience, we gain some knowledge, keep it stored, there is another set of experience, we match them and then, build up on that you know build up on that understanding on the, as we have from the previous experience and so on and on. So, it is a gradual process, it is a continuous process where the learner has an active role to play.

The psychologist supporting constructivism believe that cognitive development takes place in tandem with the agent's reaction with the world, whether it is the natural world or the socio-cognitive, socio-cultural world and so on and so forth. So, there are slight differences among them as well as we will see.

So, though not many actually consider Luria as among the constructivist, but we will still include him in this group, because he also talks about how the understanding of a child, of the children's understanding of various kinds of skills also depend on many other factors. So, it is something that you know there are mental mechanisms through which the child functions and as a result of which it is also part of you know 'constructing knowledge'. So, that is why we have included Alexander Luria here.

So, he was a German neuropsychologist in fact, Alexander Luria is considered the father of modern neuropsychology and a large part of his work was the result of his duty as a doctor for his treatment of the injured soldiers of Second World War. So, the lot of soldiers who were who had brain injury, he was treating them and this is when he realized, he was this is when he actually did a lot of his studies on how the brain functions and brain regions and the experiences and the interaction between them actually work out.

So, his ‘functional organization of the brain is one of his major contribution to neuropsychology and where he showed that there is a dynamic reaction between, interaction between experience and the brain structure which is something that is taken as a given today, but during Luria’s time, it was not. So, that is where his contribution makes a lot of sense.

So, psychology of in terms of language, in term in terms of psychology of language, he talked about he studied about the functions and dysfunctions in terms of language. And his he has in fact, give his contribution is immense in terms of finding out various kinds of aphasias, So, he gives a long list of aphasias of various types and in terms of sensory, semantic and motor aphasia.

But what we are interested here in this particular segment, we are not talking about aphasia as of now so, we are talking we will be talking about the cognitive processes, the model of cognitive process that Luria gave us. So, he says that language and in general, psychological processes, are represent brain functional systems. So, what we see, the output, the language or any other mental function is basically a result of the functional system in the brain, in the; in the physical brain.

So, brain areas, various brain areas work together to any for any particular function to be carried out, including language. So, this is an important observation. Of course, again today, we know it as a as almost like a common sense, but at that time, this was not so commonly understood. So, he says that brain different brain regions, different neuronal networks come together to carry out one simple, one single function, mental function, it can be language, it can be any other function.

And he gives this types of, this is a structure that attention, arousal, motivation, planning and processing as the finer aspects of that process.

So, there is that there is this you know the various nodes of particular process that attention, attention is like when you, this is actually this model was of course, not given by Luria, but it is based on his understanding, it came out slightly later by Naglieri and Das, he they created the PASS model. This is the pass model basically refers to planning, attention, simultaneous and successive processing as to how, what is the core of mental mechanism, what is the core of any kind of psychological process, be it language, be it anything else, you need to have certain, you know, the segmentation is like this.

So, one the first and foremost is paying attention. Remember Bandura also retains this, Bandura is a later psychologist so, he also retains the ‘attention’ part. So, attention, paying attention is the first important, most important basic understanding, basic ingredient for any kind of process to be initiated. So, first to pay attention, what is it and then, there is an arousal as in what to do with it and then of course, there is a motivation and planning and processing.

So, based on Luria’s idea, PASS model of cognitive assessment was created later during his lifetime, but by some of his followers. So, this is how the PASS model looks, this is from this the credit goes to Naglieri and Das.

So, the stages are like this. So, there is an input, from the sensory organs and then, there is a processing where you have sorting, analyzing and interpreting and then, there is an output which is the behavior of any kind of action. And arousal basically refers to the mind getting alert as to asking for asking what is it? What is it that has to be done? So, it is questioning the input.

And then, attention of course, it is orienting attention to the same thing and survey is the surveys what is what has come in just now from the sensory input. And then, lexical ambiguities can be processed simultaneously whereas, syntactic ambiguity of deep structure and surface structure can be understood as successive processes. Remember PASS models simultaneous and successive processes.

So, there are so, there is input, there is a processing with respect to arousal and attention and then, there is a processes either it is simultaneous. So, in terms of language function, some language functions can be considered simultaneous like for example, lexical ambiguity understanding and syntactic ambiguity in terms of deep and surface structure is considered to be successive. So, basically this is what; this is what Luria talks about in terms of language function.

So, this structure remains same, some of the aspects may be highlighted in case of language or some other aspects can be highlighted for any other kind of mental mechanism, but the structure, the thematic structure remains the same. So, here he studied he actually studied arousal, motivation and dialogue in spontaneous speech, to arrive at what is understood to be ‘automatic verbal behavior’. So, what we see as an automatic verbal behavior has you know and in the background, this kind of processes which he actually studied.

And he also teamed up with Vygotsky and carried out a lot of work on social, cultural, influences in language as well. However, after Vygotsky's moved on, he concentrated on other areas due to, also there were some other problems. So, anyways so, through these investigations, he arrived at the conclusion that language cannot be a studied independently but must be tied to understanding cognition, that is exactly why we are talking about Luria.

Even though he has not been called a constructivist as such, he is one of the first psychologist, neuropsychologist to talk about language in terms of other mental functions. Remember, Chomsky does not agree, Chomsky says language function is complete in itself. However, Luria going back to Luria he says that language cannot simply be understood in terms of it itself alone, it has to be understood.

So, basically that is where the attention and the planning, these are not language, these are not language independent functions, these are other mental functions like psychological functions, cognitive functions that are not,(these are)nonlinguistic in nature. But the in order to in order to give us what is considered automatic verbal output, we need the help of these kinds of various other mental mechanisms.

Also, we need to look at the input system, input as in from the sensory input whether it is visual or auditory or you know tactile or whatever all these kinds of input information is also important and then, we need to collaborate with the output mechanism, sensory motor mechanism, in order to have an output. So, those things need to be taken together if we have to look at and if we have to really understand how language function works. So, that is why that is what Luria talked about.

And then, we move on to yet another the towering figure, Jean Piaget. Jean Piaget was a child psychologist and he stressed that language learning was an is an integral part of cognitive development so, you see the similarity. And it is linked to biological maturation, this is a very significant contribution of Piaget, he talks about that as a child matures biologically, through stages of life, cognitive development also follows. And then, language also figures in features in one part of that, during that developmental stage.

So, there are these 4 stages that Piaget talked about that is sensorimotor stage from birth to 2 years of age and then, preoperational stage 2 to 7 years and then, it goes on like this.

So, in the first stage, mental representation and schemas are formed. We did talk about Piaget when we talked about image schemas that children when very small children, infants in fact, when they interact with the world, the physical world, they their repeated experiences do give rise to certain 'schematic' understanding of the world. So, there is a thought process that is getting prepared, that is getting you know concretized at that stage, when the child interacts with the physical world and forming those schemas of experiences.

So, the child understands the world, understands the experiences through different kinds of schematic representation that has already that we already have experimental evidence now. And language starts to appear at the end of the first stage. So, all of us know that children by the time they are 2 years of age, they are they are already in a in one or one-word, two-word stages, they are already speaking. So, this is when the child realizes that words can be used to represent those objects and feelings.

So, till now, it was prelinguistic stage, preverbal stage, it was only in terms of the schematic representation. At the age of two onward, that representation gets a voice, so to say it gets a label in terms of language. So, language now represents those very schematic understanding that the child was already creating. So, thought in this case precedes language as far as Piaget is concerned.

So, in this stage a child starts thinking, but the thought is egocentric, it is driven by self-gain that is what as far as Piaget goes. Thus, according to Piaget, mental development occurs before language development, a particular amount of mental development, cognitive development is already in place before the child starts to speak.

He does not highlight the socio-cultural and environmental setting too much and because thought is already thought precedes language so, language does not really influence thought, as far as Piaget is concerned. So, according to Piaget, language is driven by thought and mental development precedes language development. This is, in a nutshell, what Jean Piaget talked about in terms of language development. So, that the schematics structure is already there, thought processes are already quite to a large extent there and then, the child starts to learn language when it is time.

Now, Vygotsky on the other hand, Lev Vygotsky based his theory on constructivist learning, constructivist learning theory and put emphasis on culture and environment to a

large extent. He stressed the importance of social environment in understanding human interaction because the language is not spoken in a vacuum that we have already seen. So, language is situated within a socio-cultural environment. And this is how the child learns that this is; this is how the child's the language development really takes place, with a significant amount of input from the environment.

A child's development appears on two planes as far as Vygotsky is concerned, social and psychological plane and there is a strong relationship between these two. So, on the psychological level, of course, there are those cognitive development that is happening stage by stage, but the same time and at the social level at the social plane also, child is constantly getting input from outside world and this strengthens his cognitive development.

So, according to Vygotsky's philosophy, language plays a crucial role in shaping the overt behavior of an individual as well as influencing the covert behavior, that is thinking.

So, in fact, he talks about private speech and then, he says that private speech later on develops into what is it kind of goes underground and it becomes 'thought' that is what is covert behavior. Overt behavior is the language output and the covert behavior is basically thought. And he also talks about, he gives various other kinds of ideas also in terms of ZP; ZPD and scaffolding and so on and so forth, all these basically refer to the socio-cultural conditioning that the child goes through.

So, this is a very crucial for skill development of a child, which the child can use for developing higher mental functions on his own. So, this view expresses the idea that an individual's experiences form and shape the behavior of that particular person.

So, this is inner and private speech. Vygotsky also gave an importance to the inner speech of the person, the private speech of a child and he says that there is the transition between social and inner speech is very important and this private speech diminishes as the child grows gradually after a period of time and then, it kind of becomes his thought process. So, it becomes the inner speech or the verbal thought.

So, we have already seen that within the, within the constructivist theory, there are many people however, they all are not, they do not all talk about the same thing in the same way. Of course largely, there is a there is a common understanding, that knowledge like any

other knowledge language also, language learning is also a constructive mechanism, it is the learner constructs the knowledge of language in terms of both psychological and social input.

So, psychologically there are cognitive developments of stages and then, the child actively interacts with the natural world as well as with the social world. And in it is a an interaction, dynamic interaction, between these various inputs that the child constructs, is his own understanding of a particular skill, the skill development whether it is language or otherwise. However, there are some finer nuances, some finer differences, though they have been mentioned before, but this gives you this is a chart form that gives better that highlights those points.

So, biological maturation in terms of Piaget is what leads to cognitive development, but Vygotsky thinks society and cultural environment leads to cognitive development and so on, there are many of these things. Activity as far as Piaget is concerned should be individual, but Vygotsky stresses on the social activity that the child interacts with the other people in the environment, with other you know socio cultural aspect of his environment not just himself and the natural environment and so on.

Similarly, there are differences between Sellars and Bandura and so on.

And then of course, there is Jerome burner, who again has given us a three-stage developmental trajectory of children. So, in the first stage, it is inactive stage which is psychomotor stage followed by iconic stage when the visual imagery emerges and then, the symbol symbolic stage that is when abstract image and language comes in.

So, basically to summarize, that there are of course, this is the list is not exhaustive here even there are many more scholars, Lenneberg for example. But roughly, if we look at the primary take-away from these various theoretical standpoints, there is on the one hand the universal grammar, the proponents of universal grammar that says, that believes that language is a task too demanding to acquire without specific innate equipment.

So, there must be a language component in the brain, which is enough, you know it has there has to be, because it is too complex a mechanism without a dedicated equipment for this. On the other hand, constructivists underline the importance of linguistic input along

with general cognitive mechanism and social interactions. So, the this is the primary difference between the two types of theories.

However, let us not forget that Chomsky also agrees that the social environment, the linguistic environment is also important, it is not that it is not important at all, but he gives more importance to the mechanism that we are born with. But on the other hand, constructivists do not believe in an innate grammar, they believe that this is constructed, the child's language learning, the child's understanding of language and its usage and so on, all the different facets of a complex mechanism called language is constructed, actively constructed by the learner by these kind of various interactions.

Now, yet another important aspect when you talk about language learning in case of children is the notion that of 'critical period hypothesis'.

What is critical period? Critical period is basically a biological thing, a biological notion that there is a very small, temporal window in the postnatal, early postnatal life of biological entities, where certain specific skill sets should be in place. For example, birds that the chicks of birds must learn to fly at a particular within a particular short span of time, after hatching. Similarly, the hunters the should also learn to hunt in at a very within a specific time so, this is the critical period.

So, this is a temporal time window in early postnatal life, when specific experiences are crucial for the development of certain skills. And for many other less complex nervous systems, like animals with less complex nervous system, behavioral repertoire, like foraging, fighting strategies etcetera are developed by intrinsic developmental mechanisms and are in place early.

So, because these are innate mechanisms, it is understood that any innate mechanism, so for a bird to fly is an innate mechanism, for a predator to be able to hunt is ah is an instinct, it is innate. So, those innate capacities must be in place at a very early stage of life, this is what is what critical period is all about. And nervous systems of complex mechanism, complex animals like with higher animals, are influenced by particular circumstances and these experiences are crucial for the development of those innate capacities.

For example, birds, in case of birds, imprinting happen in a severely restricted time window in early postnatal period of life.

In terms of humans, in case of humans, because language is understood to be one of those innate capacities in like many other animals have. So, we have language as an innate capacity so, it must also be following a particular critical period, critical period of learning beyond which it is not possible. So, language learning, because it is already innately guided, it is dependent on this time of type of time window and this is what is so called critical period hypothesis.

But it is slightly more difficult in case of humans to delimit, as to what is exactly the time window. There is no pinpointed time that we get, there is a lot a lot of disagreements, some scholars agree that the critical period for language learning ends at 10 years of age, some says pre-puberty so, 12 years of age and so on and so forth. But beyond so, it is there is a, but there is a time window, within which the children must be able to have the entire language skills in skill set in place.

So, but is it really the case, how do we know that there is a critical period in terms of learning language for children? There were some cases of feral children which have strengthened this idea of critical period hypothesis that if the children do not learn language within a particular specific point time window, they will never learn it.

One the most famous cases of feral children are that of Genie and Isabelle. Genie of course, is not her real name, in the story of Genie is very famous, it happened in 1970's, a severely abused girl child, of an abusive father, who was brought up in a dark room without any human contact till she was 13. So, she was discovered at the age of 13 so, she was already in the teenage bracket, and she had as a result of which as a result of the abusive upbringing, she did not learn any language.

So, nobody was allowed to talk to her and if she made any sound, any vocalization, she was beaten very severely. So, after she was rescued, there were efforts to teach her language, to teach her to speak and though she eventually learnt some aspects of language, but she never ever mastered it. So, there are in fact, there are this case is has been so complicated that initially, the scientists were allowed to work with her, but later on they were not allowed and so on.

So, there are lots of controversies with respect to the claim that she even learnt anything at all. But everybody agrees, all the scholars agree that even if she had learned the basics

few words here and there, but she never was a proper, like good speaker of the language, English language. This was one case, and she was discovered at 13 years of age.

Now, there was another case of Isabelle. Again, an abusive upbringing where she was present in a dark room till the age of 7. So, her only human contact was her deaf and mute mother and as he as a result of which she had no language. So, when she was found, she was thought to be deaf and mute, like her mother because she could only make some sort of noises and had an extremely low IQ and so on. So, her mental age was you know placed somewhere around one and a half years of age.

However, after being rescued, she was put through an intense amount of training and she later on got up and learned to speak. So, the success of Isabelle and the failure with respect to Genie actually have strengthened the critical period hypothesis to a large extent. Because Genie was discovered after at 13 so, which is beyond the critical period of learning language, critical time window of learning language and Isabelle was discovered before that so, at age 7, so, she could still be taught.

So, this was these this these instances had strengthened the idea that there is, in fact, a critical time window within which language must be understood. So, that it so, that is that means, there is a certain amount of rigidity in the human brain with respect to language learning capacity.

So, the we also find out later on that language dependent on auditory vocal loop are found to be represented in particular cortical regions for all of us, auditory vocal loop as in when language is spoken and heard. The same cortical regions, same areas in the brain, same areas in the surface of the brain, in the cortex of the brain, are also found to be representing language for native speakers of sign language, American sign language.

So, language, not only the spoken language, the verbal language, but also the sign language, are represented in a particular brain region, meaning that there is an abstract representation in the brain of language, rather than the ‘kind of language’. So, this points to the fact that the left hemispheric specialization is a characteristic feature of language itself, language in its abstract form.

Like what Chomsky said that there is an abstract form, there is an algorithm sort of thing that is there in the brain and not a byproduct of sensorimotor factors. So, this is the brain, the rigidity of the brain structure, that we are referring to.

However, there is also a you know plethora of data coming in from neuroscience; neurosciences and neuropsychology where we see that the brain is also capable of showing remarkable amount of plasticity. So, where do we find those? One of the most critical proof of this was found in the study by Sadato et al 1996, where they found that blind individuals who are asked to discriminate Braille dots, have significantly higher blood flow compared to sighted controls in the visual cortex.

What is happening here is that primary visual cortex is useful, it is the area, it is the brain area that processes visual information coming in through the visual apparatus, from our eyes. So, whatever information we get from our eyes is getting process, does get processed in the visual cortex. In case of blind individuals, that part, of course, is not useful for the same kind of stimulus.

So, what is happening in this particular case was that when those same the people who are visually challenged, were asked to discriminate Braille dots, basically reading Braille something in Braille, those that particular experience, the tactile input, tactile sensory input was getting processed in the visual cortex. Now, how is it possible that the visual cortex which is not any more useful for visual input is being used for tactile inputs.

If the brain was rigid, if the brain regions are rigid, this could not be possible, but this has been possible. This the study showed that this is the case so, the visual cortex was getting activated by touch which means the brain is plastic, brain can show a lot of plasticity.

In the domain of language, research has proved brain plasticity with regard to learning languages as well. So, there are many various outputs, we will discuss only a few here one of them is Tallal et al's study, that shows that extensive training in rate modified speech and temporal discrimination to language learning impaired children, resulted in them learning language.

So, if you modify the rate of speech and the temporal segmentation, temporal discrimination, it is possible to teach children who are otherwise you know who are otherwise showing impairment in language learning. And that and she has her group

showed that this is possible even in case of children, who have crossed the critical age of learning language, the critical period or time window.

Similarly, there was another study, that reported where a child had her damaged left hemisphere removed, our left hemisphere, we speak with our left hemisphere so to say. So, the language areas are situated in the left hemisphere of our brain. Now, there was a child who had her left hemisphere was severely damaged and it had to be finally, surgically removed, the left hemisphere is removed.

This child goes on to learn language at the age of 9 years, like after the age of 9 years that is that was that is that when the experiment had the surgery happened. So, this suggests that see when the left hemisphere, which is responsible for language learning is removed entirely, which means that this child learnt language with her right hemisphere which is not the traditionally believed domain of brain that is responsible for learning language.

So, if the brain is not you know does is not capable of plasticity, this will not happen. But it has already happened, the study has already proved that. So, this suggests that language can be learnt with the residual abilities of the right hemisphere if the inhibitory effects of damaged left hemisphere is removed, even at an advanced stage. In terms of language learning ability, age 9 is quite late, because till then, she had not learnt anything because the left hemisphere was damaged.

So, which means that inability to learn a new language at a later stage in life may be because of reasons other than critical periods. So, there are some proof coming from this kind of various studies that show that it is possible, it is possible to learn language at a later stage of life and it is possible to master the language probably also. However, they may not be the reason may not be a critical period, reason may be somewhere else.

In this case, in this child's case, it was the brain the damaged left hemisphere, in some other case something else, which can be corrected because the brain is remarkably plastic, it cannot be. Because the plasticity we will discuss in the next in yet another segment in more detail where we will see that brain is remarkably plastic, it has it can adapt to a lot of demanding scenarios so, it is it cannot be possible that language cannot be learnt, it is another skill set, it can be certainly learnt.

However, latest findings, but research in this domain is still going on and we have new evidence every other day that informs us about finer nuances in within this domain. And latest some latest findings suggest that critical period may not hold for language learning as a whole, as in one will not be able to learn language at all, that kind of position is too strong to take.

However, there might be some aspects of language, some grammatical aspects of language that might get affected. So, it might so, ultimately critical period might hold, but only for certain grammatical aspects, what not language learning as a whole. So, within even within grammatical aspect, a smaller, some smaller aspects of grammaticality that might get affected. So, this is about critical period hypothesis which is a very important notion in terms of language learning.

Another understand, another theoretical standpoint with respect to children's development, because we are looking at language and development language line learning, acquisition in children in terms of various other kinds of developments as well. It is almost in it is not possible to differentiate that from other mental abilities. So, there is another notion called theory of mind.

So, what is theory of mind? This is a very very important socio-cognitive skill, this is something this is at the root of human behavior, at the root of human mental capacities and it involves developing a sense of what others are thinking. We automatically know by looking at another person, what he or she might be thinking and what we can predict the behavior of others and so on. So, this helps us form our responses in a given scenario. So, this is critic and this is a theory of mind.

So, this is not something we are born with, humans are not born with the understanding that people have unique beliefs and thoughts, this is a learnt behavior. In that in childhood, children do not know, very small children do not understand that what she is thinking is not the same as what another person is thinking. So, this is a learnt behavior. Hence, 'Theory of Mind' is learnt.

This stage is arrived at through various developmental stages that a child goes through. This includes the notion of attention, that is something we will bring up again and again attention and intention of others as well as imitation of others' mental states.

First stage is that of attention. Children learn very early that looking is not just seeing, but also a tool to be selectively used for to gathering information. In fact, remarkably remarkable findings in this domain has come out that children who are very small like infants, 4 to 6 months old infants, understand that attention is a crucial. So, they know that how to channel others' attention as well. So, they know that looking is not just seeing, but also a tool that can be used for getting more information about that particular aspect in the scene.

So, they have been found to be utilizing this mechanism to in their parents to get attention to themselves. As early as 7 to 9 months of age, children are capable of understanding attention in others, the behavior shows that. The development of this social skill is an important predecessor to developing 'theory of mind', ToM as we call them and Simon Barron Cohens contribution in this domain is immense.

So, this is the beginning part. So, children start understanding that there is a mechanism of attention, they understand their own attention that they can actually get more information by paying attention to certain things, they can also modulate their parent's attention towards themselves by using those skills. And this is on which the later on theory of mind is built upon.

This stage is followed by acting and knowing that people can act on that, catches their attention so, goal directed behavior starts from that particular aspect. This behavior is dependent upon intention so, attention followed by action and intention and people can have various different kinds of intentions and therefore, different behaviors. These are the components that gradually give rise to what we understand as theory of mind.

So, imitation is often understood to be another important aspect; however, there are disagreements among researchers on this. Children use pretend play, all of us have seen children playing know like kings and queens and teachers and students. So, pretend play is a very very important and integral aspect of children's development, this is the time that reflects, that shows us that they have developed the understanding that different mental states are related to, attributable to, different characters.

So, they know how a teacher will behave and how the teacher's behavioral output is depends on the intention and attention mechanism of the teacher. So, the teacher understands things like this, which is different from the students in the same given bigger

scene. So, by the time, children are capable of pretend playing, we understand that that they have the ‘theory of mind’ in place. This is something that is common and taken for granted however, this does not happen all the time.

So, theory of mind refers to the ability to attribute mental states to oneself and to others. The idea that others have intents, beliefs, pretentions, knowledge etcetera and that these can be different from one’s own. So, we have a mental state, another person has another mental state which includes all these attributes, pretension, belief, knowledge and so on.

In normal population, this grows by the time the humans are about, human child is about 5 years of age. This is when they start and the pretend playing. However, atypical population, like children suffering from ADHD, autism spectrum disorder etcetera are shown to have delayed development of this attribute.

So, it entails what critical what theory of mind basically entails is that other people have thoughts, beliefs etcetera. In short that mind that can be different from our own. So, mental states there are differences in mental states, as a result of which mental states because mental states cause behavior so, this difference in mental states can also cause difference in behavior. And once one understands that one can also predict the behavioral output in another person. This is not just human, this is not exclusively human, this is also found in many other primates, even birds and rodents.

So, we will look at the some experimental details of theory of mind development in children in the next part.