

Psychology Of Bilingualism And Multilingualism
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Hello and welcome to the course introduction to the psychology of bilingualism and multilingualism, I am Dr. Ark Verma from the Department of Cognitive Science at IIT Kanpur. As you know in this course I have been I will be talking to you about different aspects of bilingualism and multilingualism. But in today's lecture I am going to start with a very interesting topic I am going to start with the aspect of acquisition of language in bilinguals and multilinguals. Now before I talk about the you know the various aspects of language acquisition in bilinguals and multilinguals it is important to understand that when you are talking about acquisition we are mainly first talking about the acquisition of the first language.

That is the more biologically you know biologically specified one where we are studying how an individual learns their first language. Most of these research techniques most of the experiments that we will go through are basically focusing at infants and when infants are acquiring their first language. A lot of time what happens is that infants are exposed to more than a single language at the same time. Say for example in cases where they are born to bilingual parents.

Say for example you are born to parents one speaks Tamil or the other speaks Hindi and you are exposed to the two languages at the same time. These scenarios are referred to as simultaneous bilingualism and this has been one of the most interesting phenomena for psycholinguists to understand how an individual is simultaneously acquiring the two languages that they are doing. Now again a very interesting fact is that when you are talking about acquisition you are going to talk about very young children infants almost sometimes a day old or even a few hours old to infants up to you know the critical period say for example up to 2, 3 years, 4 years of age. So a variety of methods a different kinds of methods are needed to study and investigate these you know the acquisition of language different aspects of language acquisition with these individuals. So before we go to some of the experimental studies that have investigated language acquisition in younger infants and you know younger children and infants we probably should have some idea of the methods and the techniques that are used to do this or perform these investigations.

In today's lecture I am going to talk mainly about the methods that have been used to

understand these things right. So let us sort of begin with this thing that you know when we are dealing with infants when we are dealing with very very young children who are not able to respond to us as opposed to say for example I am conducting an experiment with 18 year olds or 20 year old or 40 year old they if I give them a task they will be able to respond if I ask them to press a key they will be able to press a key if I ask them to name a word they will be able to name a word and I have ways of inferring that response I know okay if I have asked you to name apple in English you name apple if I asked you to name the picture apple in Hindi you name saibe and then I can say oh the person you know did make this response in so and so milliseconds and you know they were probably faster in the first language slower in the second language and that sorts of gives me an idea of how you know good or bad you know you are in the two languages. Now that is pretty straight forward and easier to do and a lot of us work with only adults when we are talking about bilingualism research and so on, but people who are interested in language acquisition their main subject is infants their main subject pool the main participants are infants and when we are dealing with infants one typically does not know how to collect data what are the best ways to collect data and if you have collected data how do you interpret it. It is also in a lot of cases not that straightforward I mean you might think that the infant is looking in a particular direction, but the infant might be sort of looking in a particular direction not because of the stimulus manipulation that you are doing, but for something completely different. So, it is not that straightforward to interpret the data collected from the infants as one would most likely be making indirect guesses and you know you will have to take a number of measurements you will have to design your experiments that much more clearly so that that much more carefully you know so that the inferences that you are making are scientifically valid.

So, that presents a very interesting challenge and researchers who work with language acquisition have therefore designed rather ingenious ways to you know work with infants and to sort of understand the various stages of acquisition of language that they go through. However, it is very imperative that any inquiry in language acquisition starts at the very beginning. When we are talking about you know how are people how are children learning language we cannot start let us say at the sentence level we cannot start maybe even at the word level we have to start at the very beginning we have to start at the stage where they are just picking up sounds when they start just you know detecting one sound is different to other or not when they are detecting when they are learning to produce let us say pa,ba, ma and so on and so forth. So, it is unavoidable that you learn that you work with infants and it is unavoidable that you work with them at the earliest possible stage. So, as I said for that one would need ingenious methods to collect data about language acquisition from the infants that taps into these different chronological stages of language acquisition.

More interestingly in the case of studying bilingual or multilingual acquisition one needs to find ways of probing the acquisition of not one, but two linguistic systems. Is the child acquiring sounds of the first language is the child acquiring the sounds of second language can the child distinguish between the sounds of the two languages or not. These are some of the very interesting questions that researchers who are interested in language acquisition need to look into and ask. So, what are the stages how do you study how do you sort of draw this landscape before you enter the you know phase of inquiry. So, just for reference sake if I were to divide the stages of language acquisition for children I could divide them into these four parts. The first is distinguishing between speech sounds distinguishing between say for example, phonemes are the basic sounds of a given language English has around 40-44 phonemes a, b, c, d, e, f and we are basically talking about these sounds a, b, a, you know, k, ca etcetera.

So, there are so many of these sounds similarly Hindi has so many of these different sounds. One of the first things that an infant need to do is to be able to categorically differentiate between the two sounds because unless they are able to differentiate between these different sounds of a given language they will not be able to later combine them to create words. So, that is one of the fundamental most ability is that the infant has to sort of pick up. The second is they have to start recognizing words how would they recognize words they would recognize words as combination of sounds that I have already learned and at the moment I am talking not about reading but mainly auditory words. They have to understand recognize words they have to later relate these words to meaning say for example, when I am saying baby what does that mean when I am saying bottle what that does mean when I am saying apple what does that mean all of these things the children have to acquire and they do that at a rather rapid pace.

You might be amazed to know that children around you know 14-15 months of age already start speaking in one or two word sentences and by the age of two years almost they are speaking in slightly you know longest sentences as well. So, while all of these tasks and you will see as we go ahead are rather sophisticated they actually happen at a very rapid pace with children. So, these methods that we are going to talk about are that is why defined with a lot of care with a lot of you know intuition that they will tell us what stage of or what are the aspects of language that the children are acquiring at different stages of their life. Finally, once the children have sort of picked up words from sounds and attach those words to meaning that is when they have to pick up aspects of grammar that is when they have to pick up or learn how to combine words to create sentences. So, this is in some sense a rather rough chronology of how children learn languages but the idea that I am sort of proposing to you here is that pay attention to how changes happen in individuals linguistic repertoire as they are going through each of these stages of acquisition of language.

And you will see that when we are probing different stages of language acquisition our methods are changing, our tools are changing and the questions that we ask are also changing. Let us begin. Now, the first and the simplest methods that have been used to investigate aspects of language acquisition in children would simply need to rely upon their natural responses. What are the natural responses of a child? When you are talking about very young children they do not even have control of their head, they cannot even sort of move their head to the left or the right and you have to sort of build upon responses they can naturally give. They can sort of look at things, they can be orient their ears towards listening something and these are some of the natural tendencies or instinctive responses that the researchers are banking upon to understand whether the children are acquiring these aspects of language.

Now, these responses therefore would be primarily sensory responses that are inferred through either visual or auditory behavior. If they are listening to something if you have been around you know very young infants you will know that when they are looking at something or when they are hearing something you can infer that you can understand oh the child is listening to something. In a room where there is no noise coming and suddenly let us say a bird chirping is heard you will see that the child orients itself to listen to you know to listen to that noise. You will be able to infer that through their visual behavior also through their auditory behavior not that say for example that they move their ears like some animals do, but you would be able to infer that the child is paying attention to that sound. The stimuli also that you use to sort of you know investigate some of these questions with these children would also have to be visual and auditory and they will have to be very simple stimuli.

You are not going to be using stimuli like full words and full sentences typically at least at the beginning to basically infer whether the child has acquired the word meaning or not. Typically, what we start with and what researchers of language acquisition start with are very very simple sounds of a given language phonemes as I have been talking about. And at best what you are trying to get is whether the child is paying attention to the stimuli, whether the child is being able to identify this stimulus, whether the child is being able to discriminate between the two stimuli that you are presented. Say for example you presented ba ba ba ba ba and then you presented ba ba ba ba ba pa. So, at that point you are basically interested in knowing whether the child is being able to make this distinction because if the child is being able to make this distinction you are going to be able to infer that the child has acquired these two categories of phonemes.

And this is typically how the initial investigation of language acquisition really goes about. Now let us talk about some paradigms. One of the paradigms that has been most

commonly used to investigate child language acquisition is referred to as the habituation paradigm or the familiarization paradigm. Here young infants are repeatedly exposed to the same stimulus as I was saying visual or auditory ba ba ba ba ba or something like that. So that they can start identifying the stimulus.

Initially when you will introduce the stimulus to the child, the child will listen to it, but once it is become sort of monotonous and the child has sort of picked up whatever information needs to be picked, the child's interest will gradually start going down. That phase is referred to as the habituation phase. For example, you said ba ba ba ba ba again and again and the child is sort of got used to it and has identified the stimulus. The child's attention will go down and gradually you can infer that they are now not listening to that sound anymore. Initially they are probably listening to it, initially they are sort of going to pay attention to it, but once they have sort of been habituated with the same sound over a period of time, they will sort of you know stop paying attention to it and that is when you know that the habituation or familiarization has happened.

And remember when you are talking about very young infants, it does not stay for too long, their memories are not that long and they will probably not remember these for longer periods of time. So, what may happen is if you want to retest with another stimulus, maybe you can use the same stimuli after a period of a few days. Now once the habituation is established, there is a subsequent test phase in these studies and what really happens is that the researchers would try and check if the infant had learned the previously presented sound, this they would do by presenting a new speech sound and basically inferring whether the child distinguishes between these two or not. So, for example, when I am doing ba ba ba ba ba and pa, if the infant's response changes slightly, I would be able to know that the infant has detected the difference between the previously presented sound which was ba ba ba ba ba and a newly presented sound which is pa. For comparison of this basically change in response on some trials what I would do is I will just continue saying ba ba ba ba ba and then again say ba in probably the same tone and we will see that the child does not pay more attention to it.

So, on some trials which we are on which we are making the measurement, we present the same stimulus in the same fashion and we will see that there is no change happening in the child's behaviour and on the say on a different trial at the same place we will present a different sound and if the child is paying attention to that or the response is changing, we will infer that the infant was capable of detecting the difference between the two sounds. This is one of the most fundamental abilities of the children that they acquire and is referred to as categorical perception, more about this as we go ahead. Now, another paradigm which sort of relies on another very instinctive response tendency of individuals has been referred to as the high amplitude sucking procedure. Now, what

is the most basic response that an infant would have? The most basic and the most instinctive response that the individual would have would be the suckling behaviour or the nutritive behaviour, they would suck at the mother's breast to gain food and that is something that they are born with. It is not something that they learn but researchers have been ingenious to sort of also exploit this natural suckling tendency of the infants to sort of gauge a certain kind of response from them.

Typically what happens in this high amplitude sucking procedure paradigm is that they are attached to an artificial pacifier which would sometimes provide you know a nutritive stimulus or not and basically what typically happens is that the infants would start suckling on it naturally. There are two dependent variables here, one is the rate at which the infants are sucking at the pacifier and the other is the amount of pressure that they are applying at the pacifier. So, one is basically the frequency of sucking that one could measure and the other is the pressure which is measured in amplitude, how much pressure the infant is applying on the pressure transducer that is attached to the pacifier and both of these variables sort of give us an idea about whether an infant is responding in a particular manner to the presented stimulus or not. The HES paradigm has actually been used by a lot of researchers more specifically Imas and colleagues in around 1971 to decipher the phenomenon of categorical perception. As I was mentioning whether the infant can distinguish between two presented sounds or not, whether the infant can hear the difference between two speech sounds that represent two different phonemes.

Say for example, ba and pa represent two different phonemes and whether the infant can actually differentiate between the two can be inferred through the HES procedure. Basically by you know the index of how their sucking pattern changes, researchers have been able to infer whether they were able to detect the difference between these two sounds. Now, ba and pa they are different in terms of what are called voice onset times basically which is a variable that pertains to the amount of time that proceeds after you started speaking something and the vibration of the vocal cords. And these voice onset times basically are typically integer values you know they it could be positive if the vocal cords are vibrating after the sound has been produced it could start vibrating before it. So, then the values will be negative or they could start vibrating at the same time that you are producing the sound and when then the value will be 0.

Ba and pa are interesting in the sense that they are basically produced in the same way they are both plosives you basically block the air using both of your lips and then release there say for example, ba and pa it is basically the same way of producing but the vocal cords vibrating is sort of a little bit different and there is a difference of around I think 15 to 20 milliseconds which basically distinguishes between whether you know ba has been spoken or pa has been spoken. Infants are sensitive to this they use this to be able to

distinguish between the two sounds and that sort of gets indexed in a bunch of paradigms one of them is the H-A-S paradigm which has helped people to distinguish or decipher the capability of categorical perception in children. Another interesting paradigm which is also very you know ingenious is the heart rate paradigm. The heart rate paradigm exploits the fact that an increase in attention to specific stimuli can be indexed by an increase in the heartbeat of an individual or of an infant. So, the idea is when an infants when infants are introduced to new sounds suddenly their heart rate would increase basically indexing that they are paying attention to that stimulus.

Once that sort of goes down you will know that the infant is now habituated to the stimulus and then in the test phase you can present a different sound and infer whether the infant is being able to distinguish between these two sounds or not. Another interesting paradigm that we could talk about is the preferential looking technique or the preferential you know or the listening technique in some cases a variation of that I am going to talk about the preferential looking technique in some sense. Now, the preferential looking technique is used with slightly older infants when they have gained the control of their neck and they can move their neck to the left or the right side. What typically happens is that younger infants around that age when they have sort of got control of their neck they will look at the source of the sound. So, if the sound say for example, when I am at the moment I am looking at a camera, but there is there can be a speaker on the left side or on the right side when the sound is coming to the left side I will look to the left side when the sound is coming to the right side I will look to the right side just like an infant.

And an infant would sort of and you would be able to infer where the sound is coming from depending upon where the infant is looking at. Typically, what happens is infants again as in previous procedures are familiarized with a certain kind of stimulus say ba ba ba and pa pa pa then suddenly you know a new stimulus is introduced. Now, the source of this novel stimulus is where the infant would direct their attention to and more often than not they will turn their head to look at that side. So, if the infants notice the difference between the two speech sounds they will look at the source of this new speech sound and hence the researchers would be able to infer the detection of this difference and this is this is sort of very very interesting. Now, a similar technique that sort of builds on the same thing was introduced by a Camilla Nelson and colleagues which is referred to as the head turn procedure where what typically happens is that the two speech sounds are emitted from two different speakers as in the previous one and basically what happens is the familiarization starts with keeping a light between the two speakers and that light sort of you know lights up when the infant is looking at it and it gets extinguished once the infant is been looking at it.

After the infant is familiarized to looking at the light a sound may you know be produced from the left or the right side of the you know speaker and a light would sort of light up there and the infant would look at that side. This would sort of again as I said help the researchers to infer whether these infants were able to detect the differences between the auditory stimuli that they have been presented with. Once the infants have learned to make this criterion head turn again you know you can sort of present the sound on either of the two sides and the infant looks at it and that this paradigm has been used by a lot of researchers to investigate the listening behavior of infants. Now, these were some of the techniques that have been typically utilized with infants when we are talking about acquisition of language behavior and these will be some of the paradigms that we will talk about in the next lecture when I am going to talk about a lot of experiments about different aspects of language acquisition with children. This is pretty much that I wanted to sort of share with you today, but a parting word would be that while there are these different paradigms available one would wonder that okay which paradigm should I use as a researcher.

Now, the choices of the paradigm is basically governed by the question that you are asking and the participant pool that you are sort of focusing. If you are working with very very small infants who have not yet gained control of their neck, you will not be able to use the preferential looking or the head turn procedure you will probably rely more on the HAS technique or the heart rate paradigm. If you are dealing with slightly older infant you might want to sort of focus on you know the head turn procedure or the preferential looking technique. More importantly it also depends upon what is the question that you are asking. Are you asking them to make a simple difference between the phoneme ba and pa or you asking them to sort of you know recognize whether a particular word has been heard by them or not or whether you are trying to ask a question about whether they are recognizing the prosody of a particular nursery rhyme that their mothers had trained them with.

So, depending upon the question that you are interested in asking and depending upon the participant pool that you are going to be working with basically the paradigms are chosen and as I said earlier based upon different stage of language acquisition that you are interested in your tools and the method would also sort of change. So, that is all from me about the methods and tasks I will meet you in the next class and we will talk about more experiments in language acquisition. Thank you.