Psychology Of Bilingualism And Multilingualism
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Hello and welcome to the course introduction of the psychology of bilingualism and multilingualism. I am Dr. Ark Verma from the department of cognitive sciences at IIT Kanpur and in this lecture I am going to continue talking about speech production processes in bilinguals and multilinguals. In the previous lecture we talked about the fact that during bilingual word production activation of semantic notes and phonological notes may be language nonselective. However the selection for production basically what words we are going to actually produce is language selective and that may be one of the reasons why as bilinguals we do not feel a lot of interference from the non-target language when we decide to speak in a particular manner or when we decide to speak in a particular language sorry.

Now so far we have considered evidence from the picture word interference task. In today's lecture we will talk about similar results from the simple picture naming task where there is no distractor only a picture is presented and basically what we are going to see here or what we are going to investigate in terms of the evidence is whether phonological encoding actually happens for the translation of a presented pictures name in the non-target language. Remember for example, I am presenting you the picture of the word apple and whether the sounds sir and ba are also getting activated because it is a translational equivalent of the picture and I have been told to name this picture in English that is basically what we are going to look at. Now if we are able to present evidence for the same we are basically speaking for the models that advocate some kind of a cascaded flow of activation and on the other hand the contrary evidence would support the discrete two stage models.

Remember when we started talking about this we looked at you know discrete model like levels weaver plus plus model and we also sort of considered an alternative you know processing assumption which was materialized in dells spreading activation model which basically assumes cascaded activation among stages. Now to investigate this fact Costa et al., and colleagues used translation pairs of words that may or may not share phonology. Now if you have sort of if you are a bilingual if you know and speak two or two more than two languages you would you would basically be aware of the fact that in some in some cases or a lot of words across two or three languages actually share the phonology as well as meaning. These words are called cognates say for example, the words gat and

gato in Spanish basically are the representations of the picture cat and you can see that they share a large part of their phonologies as well as their meaning. These words are referred to as cognates say for example, in in common parlance you might have listened to the word mother, matra and so on which are cognates of each other because they share both phonology and meaning with you know with each other and they are words from different languages.

However, there are also words that are translational equivalents of each other like the Spanish misa and the Catalan taulla which basically share the same meaning however, the phonology is non shared all right. So, these former types of words are referred to as cognates whereas, the latter type of words are referred to as non cognates. Now interestingly cognates and non cognates have actually been used in lot of picturing studies in with bilinguals because they allow us this chance of testing for co activation in cases where there is an actual phonological overlap between the two words even despite the fact that their language memberships are different. Now the idea that Costa and colleagues sort of were running with was that if the activated lexical notes in the non target language send at indeed send activation down to the phonological level picture naming should be faster for cognates you know because they they share phonology and it will become faster, it will become easier for the system to sort of you know there will be higher activation in those sub lexical phonological components for cognates because they are receiving activation from both sides that word and its translational equivalent. On the other hand if a single lexical note is first selected from the set of activated notes and that is the one that is being phonological encoded and it is going through the further process down as I showed in the levels model only this note would be sending its activation down for the phonological level and then picture naming would be equally fast for both cognates and non cognates.

So, these are the two things that we have to consider. Now indeed picture naming in L2 Spanish by Catalan Spanish bilinguals was found faster for cognate pictures than for non cognate pictures. What does it tell us? It tells us that there is some evidence of the fact that phonological encoding happens for non-target language translational equivalence as well. These results or similar results have also been reported by other studies using Dutch English bilinguals and Spanish English bilinguals. Now in a different study costa and colleagues tested for the hypothesis that the amount of activation sent down to the you know phonological sub lexical level is proportional to the lexical notes activation level.

Basically saying that if the lexical note at the level of lexical selection is highly active it will send down more activation to the phonological level. Say for example, if you are naming a word in a dominant language or let us say if your dominant language is the non target language it will be highly activated and it will send proportional activation down to

the phonological level. Now even now at the phonological level even though let us say the sounds of Hindi for example, are not from the target language they will be highly activated. There will be higher activation there even though your target language to speak or name the picture is English which is let us say not your dominant language. So, if this is indeed true we would observe a larger cognate effect when the non target language is the participants dominant language as I was saying and as for this situation of cognate targets sub lexical representations would receive a larger activation from the lexical notes of the translation equivalent.

Indeed the data confirm this prediction as well and researchers found larger cognate effects when pictures were to be named in the weaker language rather than in the dominant language of the participants. So, now here we have evidence for the fact that there is some degree of phonological encoding for a participants non target language as well. Now from these results the authors interpreted that the pictures names were also phonologically encoded in the participants both languages. Also these results provide support to the cascaded models of speech production wherein the activation at the highest level as I was saying earlier trickles down to the lowest levels as phonological encoding as well. So, both types of models unidirectional cascaded models and interactive activation models or speech production are compatible with these results although on the basis of you know future study Costa and colleagues showed their preference for the interactive model for speech production.

Now, researchers have actually also investigated the possibility of the different representations of cognates and non-cognates as a source for the cognate effects which could suggest that that the effects that we have just seen are observed not because of phonological encoding, but because cognates are represented slightly differently in the mental representations. However, other studies have looked at to this idea in some more detail. For example, Colome kept the participants in their study completely ignorant about the bilingual nature of the experiment and ensure that the non-target language was not present in any which way stimulus materials you know environment etcetera in the setup in any way. So, Colome utilized a version of the phony monitoring task first using the studies of monolingual speech perception. She adapted the task as a component of the picture naming task.

Her participants who were Catalan Spanish bilinguals were presented with pictures for which they had to tacitly generate names and then monitor the presence of a particular sound. So, in this sense they will be shown pictures of which they do not have to really name them, but tacitly generate names, but monitor the for the presence of a particular noun. For example, if I am asking you to name the picture of vegetable let us say mutter I am basically asking you that ok I am showing you the picture of peas I am asking you to

sort of you know tacitly name this picture and look for whether the sound ter comes here or not ok. So, what she did was in her first experiment participants were shown a letter on the screen and they were asked to transpose it mentally into a sound. So, they were shown a letter let us say m p b etcetera and they would say ok convert this into a sound and they would do it oh l means lerp means p means per etcetera.

Following that the letter was removed from the screen and a picture was presented which had to be named tacitly and what the participants who are supposed to do was basically to indicate as fast as possible whether the sound in the preceding letter actually fell in the name of this picture as well. So, if the sound was present in this picture they had to press one button if the sound was not present in this picture they had to press another. Into other experiments the pictures were presented slightly earlier than the letter. So, first the picture is coming and then the letters were coming. Here the experimenter ensured that the participants had no reason to believe that their bilingualism was being tested and that the non-target language Spanish was in any way present in the experimental setup.

Now interestingly in addition to trials that required a yes response say for example, if I am asking you to monitor for m and the sound of the picture contains the mer sound you will say yes. In addition to these kinds of trials there were two types of no trials one in which neither Catalan or Spanish name of the picture carried the sound and the other in which the pictures Catalan name remember they had to do in they had to name the pictures in Spanish in which the pictures Catalan name did not contain the specified sound, but whose name in Spanish actually contained the specified sound. Say for example, I am asking you to monitor for the sound m and you have to name the pictures in Catalan, but the Catalan name does not carry that sound which is table tau la, but the name misa in Spanish carries the m sound. Now these kind of trials would be slightly harder to reject because we have seen that there is co activation of the translational equivalence of that concept. So, both tau la and misa are activated and if the participants are sort of aware of that activation in some sense when they are sort of doing this task they will find it more difficult to reject the m sound even though it is not really present in the target tau la.

So, if the pictures name is actually phonologically encoded in both the languages of these bilinguals the trials of the second type would be harder to reject for reasons that I just explained. Indeed, in all three experiments the response types were longer for this second type of no trial which provides us evidence for the language non selective phonological encoding. Another experiment was done that investigating the same thing was conducted by Rodriguez-Fornells and colleagues in 2005 wherein Spanish German bilinguals and monolingual German speakers were tested and they were presented with pictures and asked to perform a go no go task. So, the idea was when the pictures name

contained a particular vowel they had to push a button which is a go response and if it started with the consonant they had to let it pass without pressing the button which is the no go response. Alternatively they had to push the button when the pictures name in the target language started with the consonant and had to withhold a response when it started with the vowel in the non target language actually.

Now to be able to perform this task the phonological representation of the pictures name needs to be mentally inspected. For bilinguals the target language switched between blocks of trials and so for example, on some trials it would be Spanish and sometimes it would be German. Although for German monolinguals the task was only in German and they have to just monitor the names in German. Authors in this study collected both you know collected three types of responses, behavioural responses, ERP data and fMRI data. Although I will keep keep my discussion to only behavioural data for you know just simplicity purposes.

Now the pictures name the stimuli the pictures names were so selected that in half of the trials the names of these pictures would basically provide the same responses in both the languages. So, they either both started with the vowel in both German and Spanish or they started with the consonant in both German and Spanish. On the other half of the trials the two languages would invite different responses. Say for example, there would be a conflict the response starts with the vowel in let us say German and consonant in let us say Spanish. So, the participant will be conflicted as to whether I should press the button or whether I should not press the button.

Basically what would happen this lead to it would lead to slowing of the response times. Both the behavioural and the brain data suggested that phonological activation of the non-target language actually takes place because for bilinguals and not for monolinguals the percentage of correct responses was lower in the coincidence condition and overall bilinguals made more errors and responded more slowly than monolinguals. These findings indicate that the pictures name in the non-target language was also being retrieved at least some of the times causing interference on the trials where it invited a different response from the non-target response. So, this one here is non coincidence condition sorry. Now, we have seen that we have seen evidence so far that there is a certain degree of language non selective phonological encoding also taking place when the bilinguals are preparing to produce words and we have seen that happen through the simple picture naming task.

Now, if you remember the model that I have talked about if you remember that of the levels model of speech production that I am using as the base to explain you know these phenomena. We started with conceptual preparation, we went to formulation wherein we

did morphological encoding morphological specification then we went to syllabification phonological encoding phonological word and then finally, articulation. Now, this is the entire series of steps that are phonologically taken in the levels model although it is you know a discrete step by step sort of model. Now, if you look at this we have shown that at lexical selection levels there is language non selectivity. We have seen that at phonological levels which is at the bottom there is language non selectivity.

It certainly begs the question that what is happening in the middle. It basically implies if you know you would give that liberty that some kind of language non selectivity must be happening in the middle stages as well. Say for example, at the level of you know morphological encoding and so on. So, let us look at this thing in a little bit more detail which obviously, had got researchers also interested because they were interested in looking at whether grammatical encoding is language selective or language non selective. This might be interesting because if you see at least levels model talks about this existence of this representation called lemmas.

Remember when I mentioned that lemmas actually carry both syntactic and semantic information about the concepts that we are talking about. So, since the lemmas carry information about the words syntax and also it mediates the conceptual and phonological levels of the production system. If you know and also since there is evidence for phonological language non selectivity in phonological encoding it makes sense for us to assume that there should be some kind of language non selectivity in the middle stages as well. Let us look deep into this. So, there are three studies that I am going to talk about that looked at the assignment of grammatical gender to a word in the response language and whether it is influenced by the gender of its translational equivalent or not.

So, let us have a look at these studies. Now Rodriguez, Fornells and colleagues had German Spanish bilinguals and German monolinguals perform a go no go task where the go no go decision depended upon whether the grammatical gender of the tacitly named word. The participants were required to push a button when the grammatical gender of the pictures name in the response language was masculine and not when it was feminine and vice versa. The pictures were selected such that on half of the trials the names in both German and Spanish requested the same response and had the same gender, but on the remaining half the pictures in the two languages had different genders and therefore, required different responses. In another study Costa and colleagues study they employed the more common overt picture naming tasks wherein the participants had to respond with a noun phrase consisting of both a noun phrase and a corresponding definite article he her and so on.

They tested bilinguals whose two languages had similar grammatical gender systems like Catalan Spanish or Italian French or different gender systems such as Croatian and Italian because Croatian also has neutral gender. Finally, in the third study they used the same procedures and Costa and colleagues and tested German Dutch bilinguals in on a task of Dutch L2 Dutch picture naming and included both pictures and names that were Dutch German cognates as well as non-cognate pictures that is pictures with totally dissimilar genders in German and Dutch. Let us look at the results. Interestingly while all three studies were very common and had similarities they actually produced disparate results. The bilinguals in Rodriguez, Fornells and colleagues actually responded slowly on and made more errors on the trials that had different genders in you know the two languages and these findings do suggest that an interfering influence from the non-target language is there and thus language non-selective grammatical encoding is a possibility.

On the other hand in none of the five experiments that Costa and colleagues performed the authors obtained a difference between the same gender and different gender condition it was basically on chance. Even not when the bilinguals two languages had very similar gender systems and in all cases the performance of bilinguals were very similar to that of monolinguals. The authors concluded that this could have been because the two gender systems of the of a bilingual in these two languages are functionally autonomous. Now you see here we are sort of getting different results across these different studies. On one hand we have Rodriguez, Fornells and study where basically see language non-selective grammatical encoding is happening.

On the other hand in Costa's five experiments we are actually seeing no difference between bilinguals and monolinguals performance basically telling us that maybe gender computation in both these languages are independent of each other. Let us look at the third study. Now in Lemhofer and colleagues study basically revealed that the cognate status of the stimulus materials is also an important variable that could affect their results. These authors obtained clear effects of cross language gender compatibility versus incompatibility much like Rodriguez, Fornells and colleagues although they found that these effects were much larger for cognates than non-cognates. So let us say in two out of three studies we see language non-selective grammatical encoding whereas in one study we do not find any evidence for this.

Also in this third study we see we find that cognate status because it shares meaning and maybe therefore gender probably sort of confounds the findings that we can take back from here. So to sort of conclude this the few studies that have examined the grammatical encoding in bilingual speech production we can you know we can say that the evidence is unequivocal and the findings are not really converging. However, they do at least warrant the conclusion that under certain circumstances grammatical encoding may also be

language non-selective such as phonological encoding has been shown to be. That is all that I wanted to talk to you about in this lecture. I will see you in a different lecture with a different topic. Thank you.