Advanced Cognitive Processes
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Lecture – 22
Bilingualism

Hello and welcome to the course Introduction to Advanced Cognitive Processes, I am Ark Verma from IIT Kanpur and we have been talking about language in the past week or so, and today's lecture I wanted to talk about Bilingualism. Now bilingualism is has become more of a norm than an exception nowadays, you will hardly come across a person who speaks or understands only one language, even in places where even in sometimes in remote places you will see, that you will assume that this person probably knows only the local language Hindi, or Tamil, or Telugu or whatever.

But you will see most of these places are also kind of getting affected by a different some different language, or the other suppose for a lot of people they would be exposed to some words of English or the other. So, the idea is more often than not people are now getting used to speaking and understanding more than the one language that is their mother tongue. So, let us in this you know lecture try and understand some of the basic issues related to people who speak two languages and so on and so forth.

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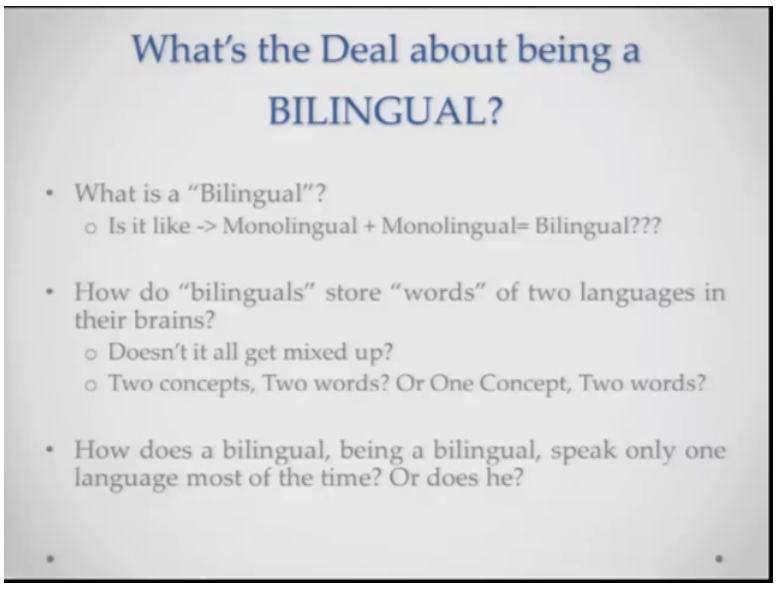

So, actually what is the deal about being a bilingual, now what is a bilingual person, is a bilingual person a sum of 2 monolinguals of monolingual in Hindi and a monolingual in English combine them and does it become a bilingual who speaks both Hindi and English is it like that, or if I ask a different question how was these bilingual people be storing words, words of to languages you know it is it is easy to imagine that all of this could get make sure you go to the market and, you want to buy a fruit and, the fruit is an apple and you know that you know apple is Calle apple in English and [FL] in Hindi.

And you know it might also be possible that you know a third language where the name is something different. So, does not it all really get mixed up in the brain, how is it organized are there 2 concepts and 2 different words, or are they just one concept linked to 2 different words. So, the same concept of apple is linked to [FL] and apple, or let us say there are 2 different concepts. So, [FL] is something really different in your head and apple is something really different in your head, think about it we are trying to you know, we will in the in the course of today's lecture try and look at these you know different kind of possibilities.

Another question that I could ask to ask you is that how does a bilingual, being a bilingual speak only in one language most of the time because so, for example I am a bilingual and I am speaking in English at the moment, but I know Hindi as well. So, is it that at the back of my head I am speaking Hindi as well, or how am I being able to speak in English selectively and not Hindi because, I know both the languages and whatever I am saying I am capable of saying that in both my languages.

So, these are some of the very interesting questions that come you know come to the mind when you talk about bilingualism and, in todays lecture we will try and you know just travels through some of these questions a bit superficially basically because, we do not really want to give all of the time to language stuff today is probably the last lecture in language, but still let us see let us try and survey this landscape a little bit.

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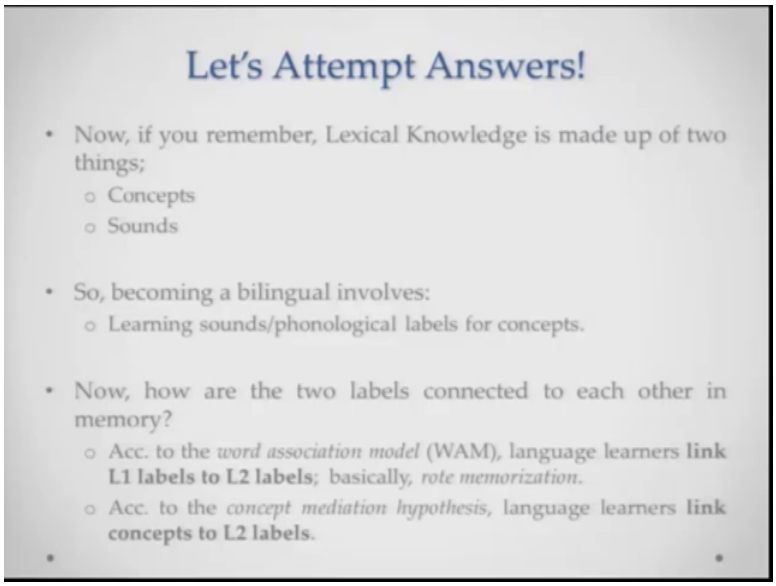

Now, if you remember when I was talking about words I told you that lexical knowledge is 2 things, it is concepts that is the meaning part and it is sound, or form that is the form path. So, becoming a bilingual must involve learning sounds, or phonological labels for concepts. So, basically you should have 2 kinds of sounds or 2 kinds of phonological labels for one kind of concept, this is one of the assumptions that we will begin with.

Now how are these 2 labels connected to the same concept, or how are these 2 labels connected to each other in your memory. Suppose I am you know beginning to learn English at this point in time, how am I doing it am I learning English for every concept that I know of or what I am doing is I have a concept of the you know the apple let us say there is a fruit and, I have a concept of that in Hindi and what I am just doing is I am linking this concept to the word in English.

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Suppose for example, I can I can show you I have this concept of this fruit and I Know that this is referred to as [FL] in my language what I could do is I could actually either link it to apple, or I could make these connections. So, this is one of the things that people have thought about and there are 2 hypotheses which were given to explain this, one of them is the word association model the word association model basically ah thinks that language learners are linking L 1 lables to L 2 labels. So, what they are basically doing is they are not making this connection here, but they are making this connection. So, this is basically what the word association model talks about.

Another model that is the conceptual mediation model the conceptual mediation model basically says that, we do not really need to make this link between these 2 phonological labels, we must rather make the link from the concept to labels of both the languages. So, the concept mediation model says that the concept itself is connected to phonological labels of both the languages.

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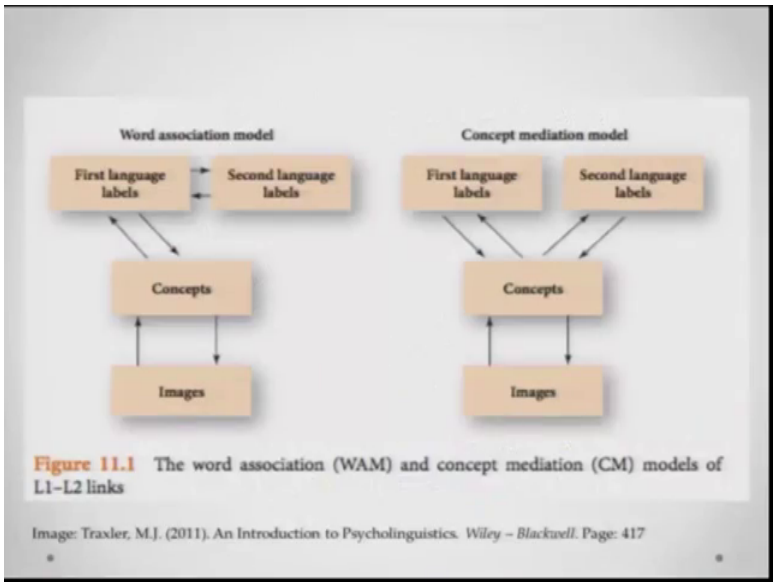

This is how the word association and the concept mediation model, you know shape up. So, you have the first language labels and the second language lables, you will see that the concepts are not connected to the second language labels, they are basically connected just to the first language labels, which are connected to the second language labels. This is the word association model, then you have the conceptual mediation model, which says that the concepts are connected to both the first language labels and the second language labels.

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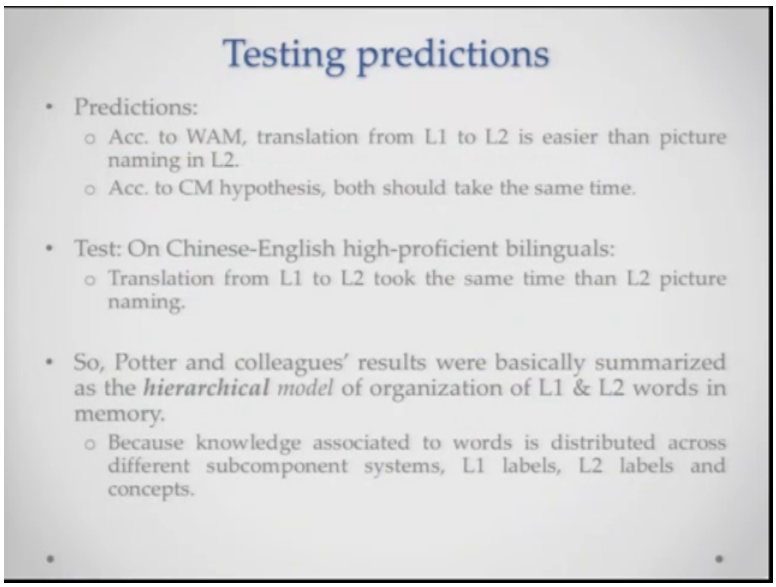

Now; obviously, one would like to test these predictions. So, these predictions were tested and the hypothesis was that according to the word association model, translation from L 1 to L 2 should be easier than picture naming in L 2. Just if you look at this, if you have to translate from L 2 L 1 to L 2 you do not really need to go from the concept, you can directly go to the L 2 or either ways if you have to come from L 2 to L 1 again you do not really need to go through the conceptual model, you have to go from the first language label.

According to your concept on the other hand, both of these things should take the same time if you are translating from L 1 to L 2, or you are translating it, or basically you are just picture naming in L 2 both cases you are kind of looking for the link between the conceptual may concept and, the L 2 labels. So, let us see what happens, they did this experiment on Chinese English very high professional bilinguals, who were good in both English and Chinese and they asked them to do translation, they found the translation from L 1 to L 2 takes the same time as compared to L 2 picture naming.

Now, this basically led to this you know assumption, or this basically kind of really established that the conceptual mediation model might be the correct one, pottering colleagues basically summarized this these findings and other similar findings as the hierarchical model of organization of L 1 and L 2 words because, they are saying is that knowledge is knowledge associated words is distributed across different sub component systems L 1 labels L 2 lables and the concepts.

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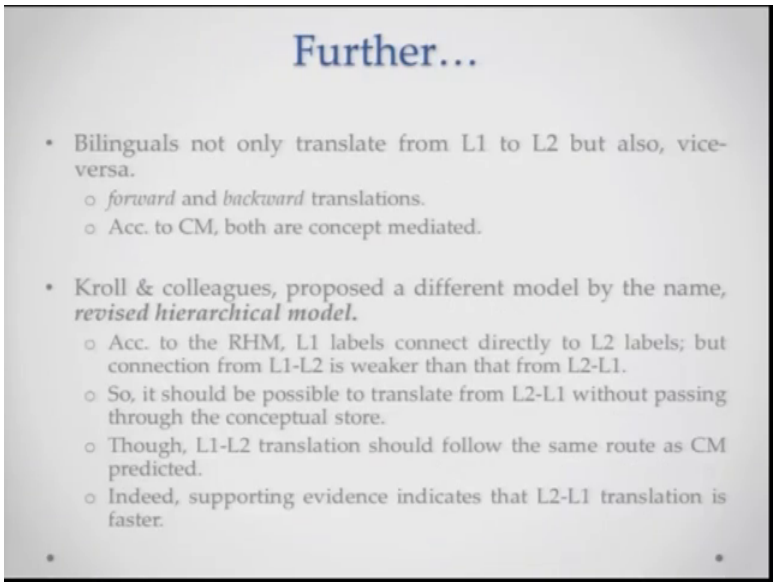

Now if you really think of it people do not only translate from L 1 to L 2, they also translate from L 2 to L 1. So, there are both forward translations and backward translations. According to conceptual mediation model again, if you look here both are mediated by you know the conceptual module and, both should take the same time both are concept mediated, Judith Kroll and colleagues they proposed a different model building on the earlier model and, they named it the revised hierarchical model.

The revised hierarchical model of bilingualism says that L 1 labels connect directly to L 2 labels, but the connection from L 1 to L 2 is slightly weaker than that from L 2 to L 1 I talked about why is this important. So, in this case it should be important it should be you know possible to translate from L 2 to L 1, without passing through the conceptual mediation storm, also L 1 to L 2 translation should follow; however, the same route as the concept mediation model had predicted through the conceptual storm. Indeed people have found supporting it evidence that indicates that L 2 to L 1 translation is faster than L 1 to L 2 translation; we will see how this model looks.

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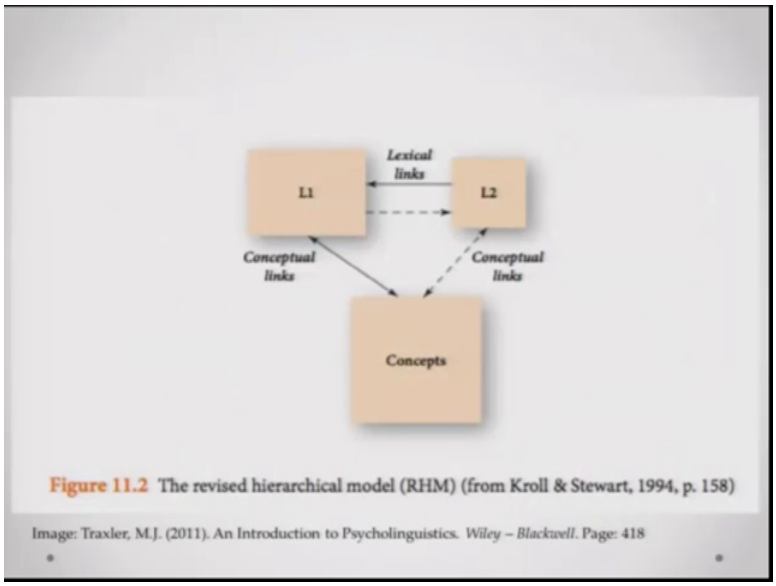

So, if we see this is the revised hierarchy model by Kroll and Stewart in 1994 and, you see there the conceptual links are stronger between L 1 L 1 and the conceptual store and, the links between L 1 and L 2 is slightly weaker, but the link between L 2 to L 1 is slightly stronger. So, if you have to translate from L 2 to L 1 you do not really need to go through the conceptual link store, but if you need to translate from L 1 to L 2 you might need to go from the conceptual mediation store.

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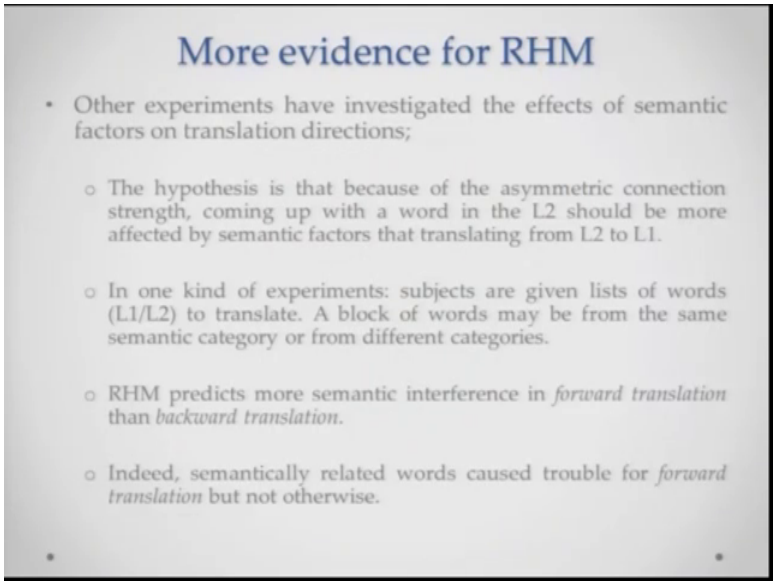

now this is basically how the model predicted and, how it looks like there is some more evidence about this let us look at that.

Other experiments have investigated effects of semantic factors on translation direction, whether you are going from L 1 to L 2 or you are going from l L 2 to L 1. Now I just remembered that if not probably not really said a bit about L 1 and L 2 L 1 is basically your first language, it is the mother tongue. So, to speak it is basically the first language that the child masters, or learn when the child is very small, I mean the child is born L 2 is basically in any acquired language that the child acquires at different stages in life it could sometimes be simultaneously with the first language, suppose somebody is born into a bilingual parenthood, or suppose language that the child learns in school or later in occupation and so on and so forth.

Now, coming back the hypothesis basically L 1 to L 2 translation is easier or L 2 L 1 in translation is more difficult or the other way, now is basically because of this asymmetric connection strengths that this model is talking about, you see that the connection strength between L 1 to L 2 is weaker than the connection strength between L 2 to L 1. Now because we are talking about this asymmetric connection strength coming up with a word in L 2 should be more affected by semantic factors, then translating from L 2 to L 1 ok, because it will take it is going to require that much more effort.

So, they wanted to test this in 1 of the experiments in one of the experiments subjects basically are given list of words L 1 words to translate into L 2 and L 2 words, to translate from L 1. A block of words may be from the same semantic category either, or they could be from different semantics at I could give you all fruits, or I could give you mix list which has fruits and animals both.

Now the revised hierarchical model would predict that semantic interference will be found in forward translation going from L 1 to L 2 because, the link is weaker remember you can just look here, then backward translation backward translation from L 2 to L 1 should be easier and should be less affected by the semantic interferences. Indeed they found the semantically related words, was more trouble for forward translation that is going from L 1 to L 2, but not really from L 2 to L 1 because those links were much stronger. So, again you have this evidence which basically kind of supports what the revised hierarchical model says.

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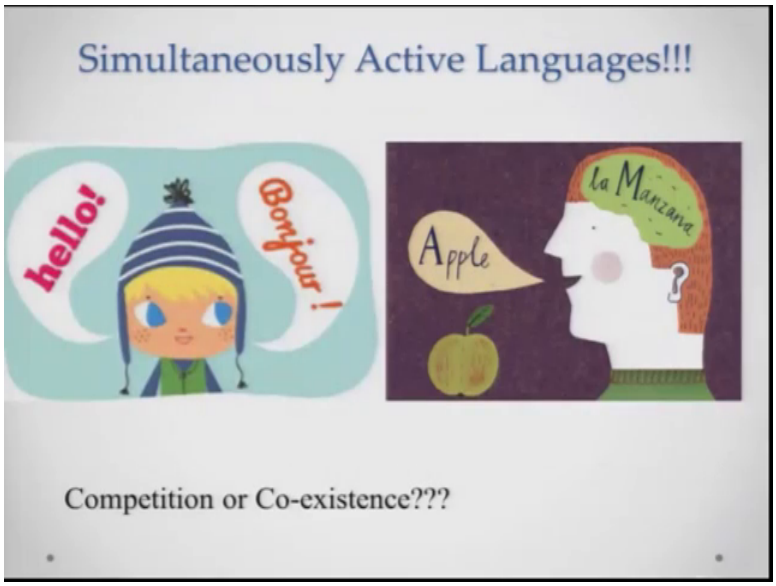

Now, we have talked about how these things would be connected in brain, let us now talk a little bit about whether, or not both of these languages are active at the same time, if these languages are active at the same time, if they are simultaneously activated whether, there is competition between the two languages for speaking and for comprehending or, whether they are you know having peaceful coexistence and everything is fine and stuff let us see.

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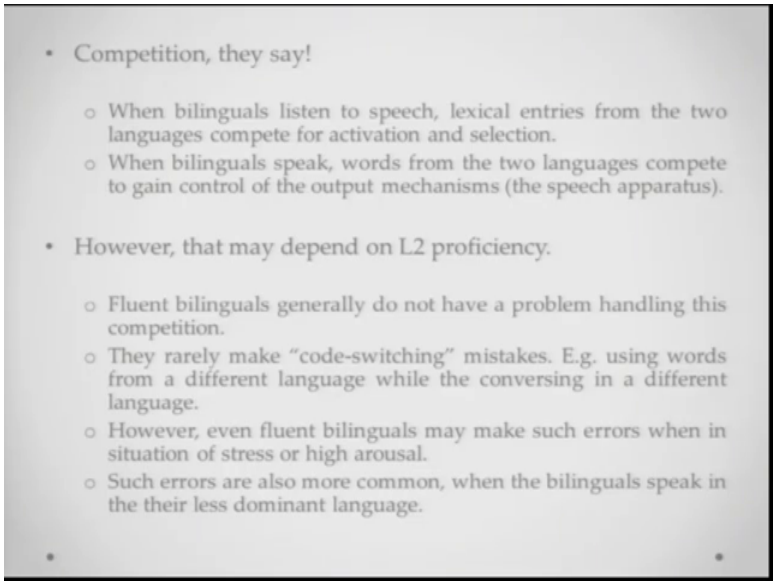

They basically say that there is a lot of competition between the two languages. So, when bilinguals are listening to speech lexical entries from both the languages are competing for activation and selection, also when bilinguals are speaking words from both the languages are competing for being selected and executed through the speech apparatus.

Now, this connection this competition; however, they say can be you know dependent upon, how well this person knows the second language. Suppose somebody has learned the second language, at a very early age you know people are people not send their children to you know English medium convent schools, since the beginning. So, these people these children are acquiring the second language very early in their lives; however, some of us might not be you know going to these English medium schools so early in age, but we might be forced to learn English, suppose when we you know pass our high school exams, or we pass our intermediate exam and, then we join a particular course suppose a lot of people take admission in a particular college, in and the college is English medium; however, their entire education has been in Hindi medium.

So, these people are now mastering the second language a much later in life. So, their proficiency in English was also be going to be a little bit less, as compared to their as compared to the proficiency in English of these people who started learning English much earlier in life.

So, fluent bilinguals generally will not really have a problem handling this competition, they will be able to seamlessly shift between using Hindi and English and going forward translations and backward translations that way, they rarely make code switching mistakes and they will say for example, they not you end up using words from a different language when talking to audience of you know who wants to listen and different suppose for example, somebody is speaking in their class and, they want to speak in English the fluent bilinguals will be able to speak in English, even though their mother tongue is equally strong you know be Hindi, or you know Bangla, or Tamil whatever.

ah The less fluent bilinguals; however, would sometimes make these kind of mistakes even, if they were supposed to speak in English because they not as fluent in English they might start using words from the mother language which is either in Hindi or, English or, Hindi or, Tamil or, Hindi. Also but fluent bilinguals even sometimes can make this error, when they are highly aroused highly emotional some people when they

are highly emotionally distressed, or they are under the you know influence of alcohol etcetera sometimes they would in a high aroused state will make these kind of errors. Such errors are more common when bilinguals speak in their less dominant language, when they are speaking English, they might you can see that they might start using words from Hindi not the other way around sometimes the other way around as well though.

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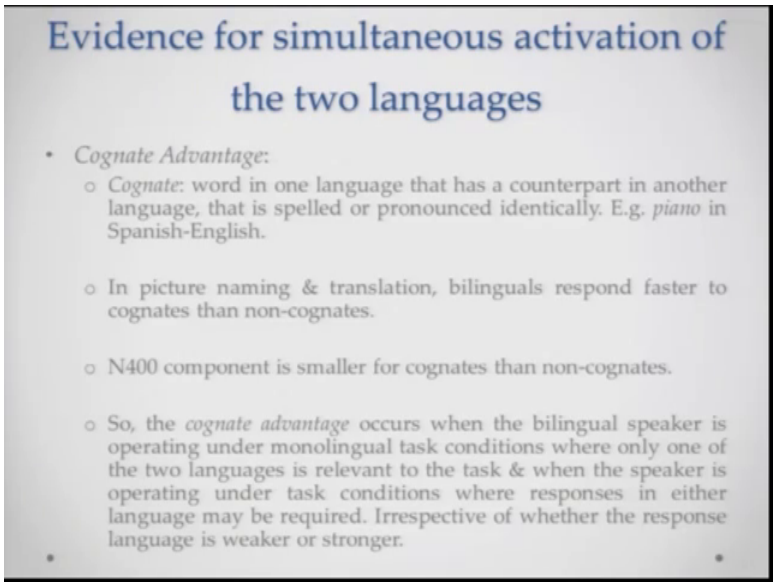

So, is there some evidence is there some experimental evidence about the simultaneous activation of two languages. So, one of the evidences I could point out was the cognate effect, now cognate is basically a word in one language that has a counterpart having a similar meaning and form in the other language. But it is spelt or pronounced identically it is the same word for example, piano is a word in both spanish and English in picture naming studies, where you just show pictures to participants and ask them name them, or in translation studies when you ask participants to translate from one language to the other language, bilinguals have been respond found to respond to faster to cognates.

Because cognate the word is activating both their language banks, you know both their phonological stores or something like that. Now N 400 is being is a component of ERP if talked about what ERP is in one of the earlier courses, but ERP is basically a component that is that indexes your brain activity, it is an electrical component measured by EEG, which basically gives you know the sense of whether something is semantically

integratable, or not now N 400 is a government that is smaller for cognates than for non connates because there might be a possibility that the cognate word has candidate activation in the second language.

Also the cognate advantage occurs when the bilingual is operating under monolingual task conditions as well, when only one of the two languages is relevant to the task and, when the speaker is operating under task conditions, were responding in only one language is permitted. Irrespective of whether the response is made in you know the vigor language, or the dominant language cognate advantage is expected there as well. Suppose I am giving you task and I am telling you, that you have to name all of these pictures in Hindi. Suppose there is a cognate word that has a similar meaning in English, but the pronunciation might be a little bit difficult, or so when such a cognate comes you will experience that cognate advantage, you will name the cognate faster than all the other words who did not have cognates. So, that is the cognate advantage.

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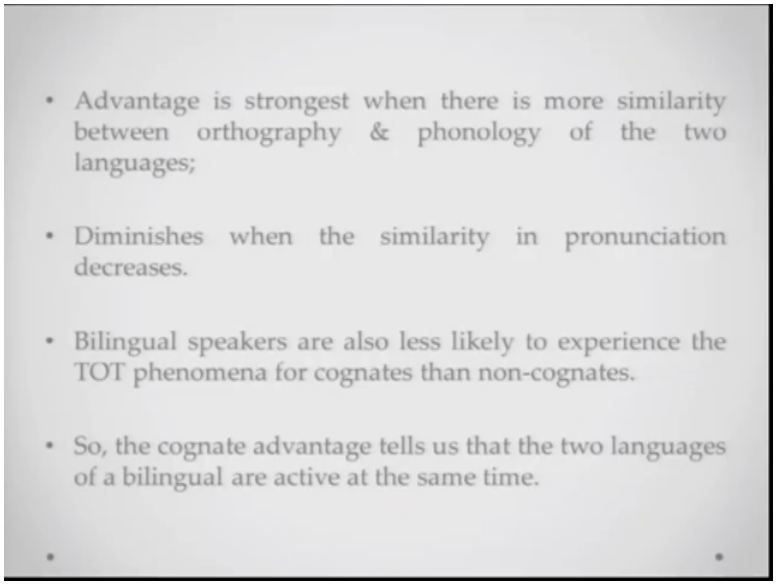

The cognate advantage is also found to be much stronger, when there is high similarity between the orthography and phonology of the two languages because, the meaning is same if the orthography and the phonology and the form is same as well; obviously, the advantage will be at will be magnified. It dimensions; however, when the similarity in pronunciation is a decrease, suppose there is a very different pronunciation of that word in a different language, then what will happen is because of the pronunciation, you will

already get the clue that this is from my L 1, or this is from my L 2 and then the advantage multiple activation will not be there.

So, bilingual speakers are also very are less likely to experience the tip of the tongue phenomena for cognates, than for non convex also the cognate advantage; however, tells us that both the languages of the builing will are active at the same time and almost all the time.

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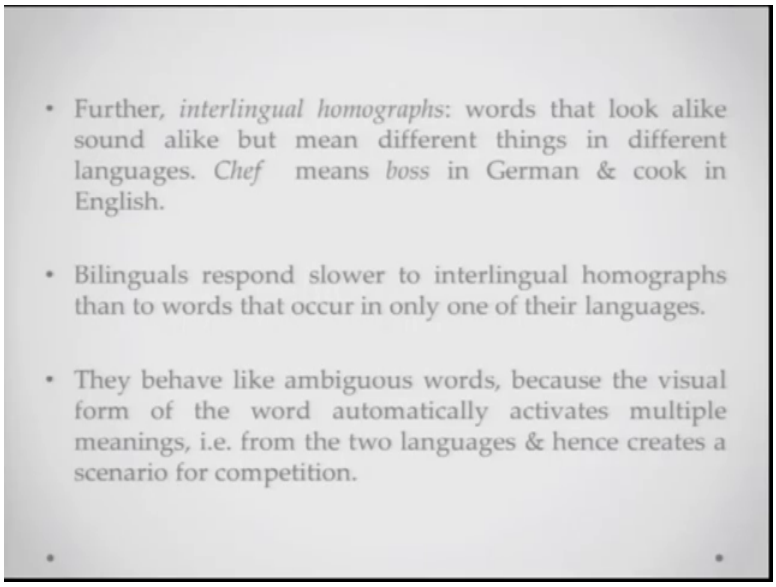

There is another class of words that kind of give us some evidence about simultaneous activation of the two languages, these words are referred to as inter lingual homographs, these words look exactly the same in the two languages; however, they might mean very different things for example, the word chef means boss in German, but it means a cook in English ok.

So, bilinguals have been shown to respond very slowly to these inter lingual homographs because, they are kind of you know trying to compete the you know trying to suppress one of the 2 meanings when they are speaking and; obviously, if you are speaking in a particular context, you probably might be going with one or the other meaning, but even if you are going to name in that meaning, the other meaning is also kind of activate and it is competing for you know selection. These you know these inter lingual homographs, behave like ambiguous words because the visual form of the word automatically is

activating the multiple meanings from the two languages and, hence as I was saying creates a scenario for competition.

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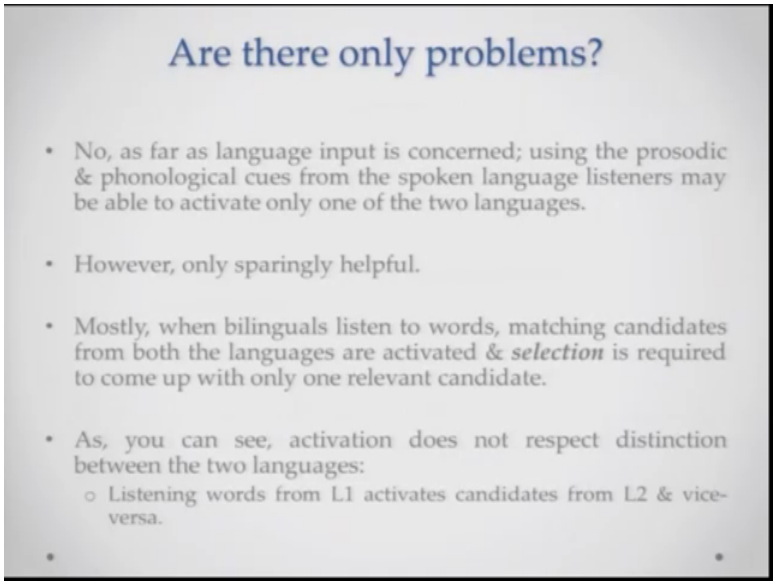

Now, are there only problems coming out of this simultaneous activation, not really because as far as language input is concerned, sometimes help of prosodic and phonological cues we have seen in the language acquisition lectures that prosodic and phonological cues are very important, from the you know so, these prosodic and phonological cues from the spoken language you know a listeners may be able to activate only one of the 2 line.

So, they might use these cues to suppress one of the one of the two languages completely and, just keep activated the language that is relevant to that scenario; however, again this is not really completely helpful, there are other evidences which have shown that people are activating both the languages. So, when bilinguals are listening towards matching candidates from both the languages are activated and, some kind of selection there is required to be able to come up with only the relevant candidate according to that scenario.

Also as you can see activation is not really respecting the distinction between the two languages, when you will see a concept or you seeing a picture, or you are talking to somebody both words you know words from L 1 and L 2 are both getting equally activated.

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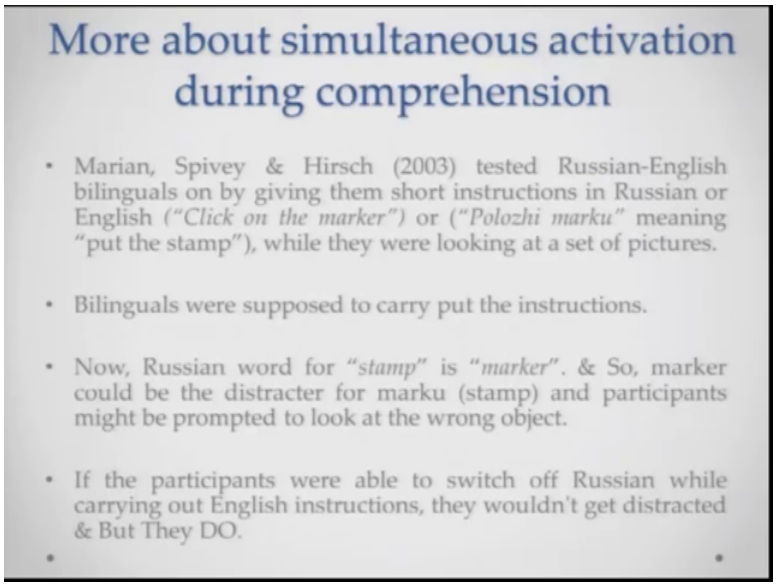

So, let us kind of look at some more evidence about the simultaneous activation. So, Marians, Spivey and, Hirsch in 2003, they were testing these Russian English bilinguals and by giving them instructions in either in Russian, or in English. So, what they were doing is they were actually presenting to them a particular kind of setup, where they would see that 3 or 4 pictures were, there are screen 4 pictures are there, suppose and their instruction would either be given in English, and in or in Russian. So, the idea was suppose there are four things there is a stamp, stamp basically is refered to effort to as marku in Russian and there is a actual marker and, there is a marble and there are some other you know there is one more other thing.

Now, they were actually either and given an instruction in English saying click on the marker, or they were given an instruction in Russians in Polozhi marku. Now the idea is that because they are as soon as they are listening from click on the marker, because marker till mark it is also going it is you know very close phonological neighbor of marku which is the stamp, a lot of the times they would basically be looking at the stamp as well. So, this is basically a demonstration of the fact that because of the phonological activation because of the phonological neighborhood, the participant is getting distracted towards the stamp as well because, we are talking about Russian English value also both proficient in Russian, who are proficient in both English and Russian.

Now, if the participants because they are listening this in English, if the Watsons are using this instructional cue to suppress Russian completely then, they should not have looked at the stamp, but we see that these participants were not really able to switch off Russian even though the instruction was in English and that is why they were definitely getting distracted with you know and distracted by looking at the stamp. So, in a sense there is simultaneous activation in spite of whatever the instruction language is.

So, what does this tell us, it tells us that two languages have shared lexical representation; both the languages of the bilingual have shared lexical representations.

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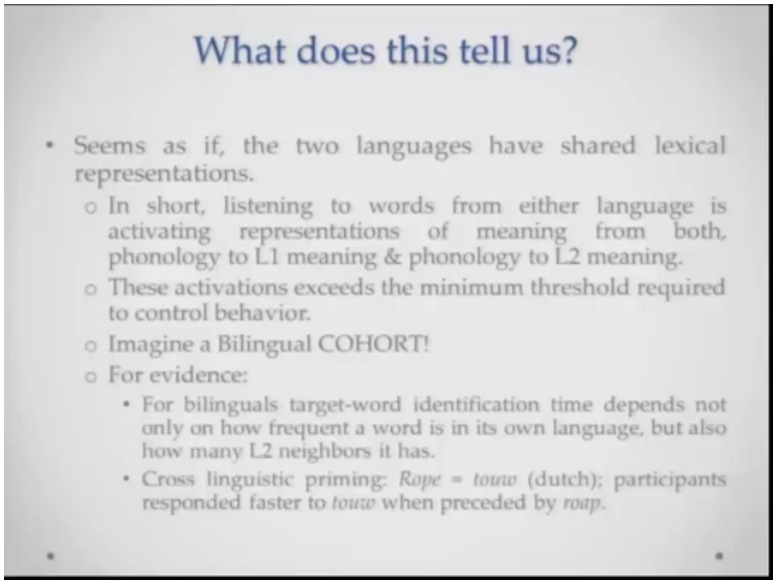

In short listening to words from either language will activate word from the other language and vice versa and, these phonology to meaning connections will be activated in both the languages, but these activations sometimes exceed the minimal threshold required to control behavior that would lead to interference and production problems. Imagine if you remember I was talking about the cohort model in the language production class remember, in place of the cohort in the monolingual setting, who have which has matching words from the same language, there is another parallel cohort from the other language as well.

Now, you do not really have to choose just from your language, but also choose from the other languages as well, or suppress distracters from both the languages just to be able to select the target word, which is either of the two languages. Now evidence for this has

basically came up in a particular task, where bilinguals were basically asked to do some kind of target word identification and, their target word identification was found to depend not only on how frequent a word is in, it is own language, but also what the frequency of this is in the second language. And also how many neighbors it had in the second language. So, if there is a word it has some neighbors in L 1 it has some neighbors in L 2 both of these neighbors will compete for selection with this target word and, that will basically add to the time that you take in producing this word finally.

So, they did this cross linguistic priming study where this the word was rope is said as tau in Dutch participants responded much faster to tau, when it was preceded by roap which is a phonological you know phonological neighbor to ropeo. So, even if you are saying roap and you looking it you know presenting it as a phonological neighbor the word tau is getting activated. So, you see cross linguistic priming is happening here.

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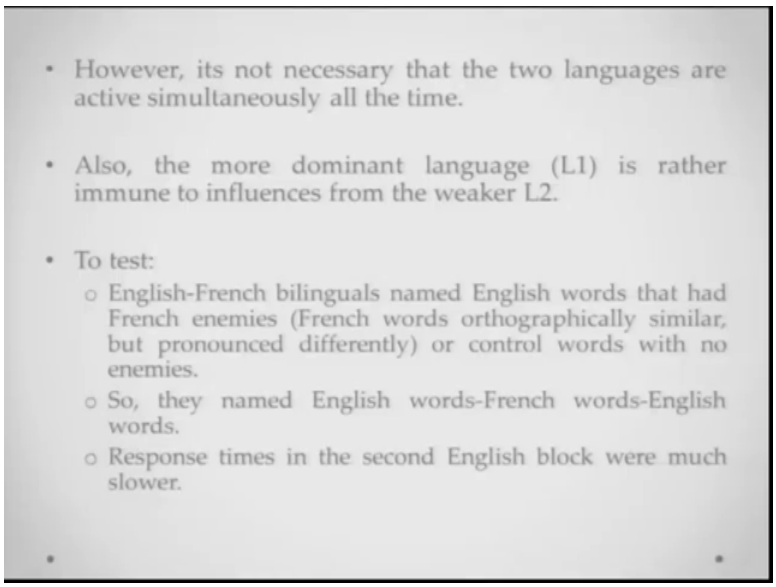

However it is not really necessary that both the languages are active all the time, I mean there has to be some way in which the one of the two languages can be suppressed. So, it has been shown the more dominant language, L 1 is rather immune to the influences that are coming to from l 2. So, L 1 to L 2 influence is much more because again L 1 is one is the language that you acquired early in life, you practice it more often than your L 2 etcetera L 2; however, is something that you have acquired more recently. So, this one will be weaker, in that sense the influence from L 1 to L 2 will be slightly stronger, as

compared to the influence from L 2 to L 1. Now this is just ah hypothesis probably at this point and they wanted to test this.

So, English French bilinguals first language L 1 is English, second language L 2 is French, English French bilinguals named English words, that had French enemies. So, these they were naming English words which has competitors in French; French, words orthographically similar, but they are pronounced differently although, or control words which had no enemies. So, I am as a English French bilingual I am asking I am naming something in English and, basically the words I am going to name either it will have a enemy in French a very closely activated word, or it really not have an enemy in French.

And the sequence was first English words were named no problems, then French words were named now you see French is activated, then I again English word surnamed, it was found that the second block when I was named in English was much slower than the first block, because big just prior to the second block French has been activated by me because, I was naming in French. So, this cross lingual activation is there and is playing an important part.

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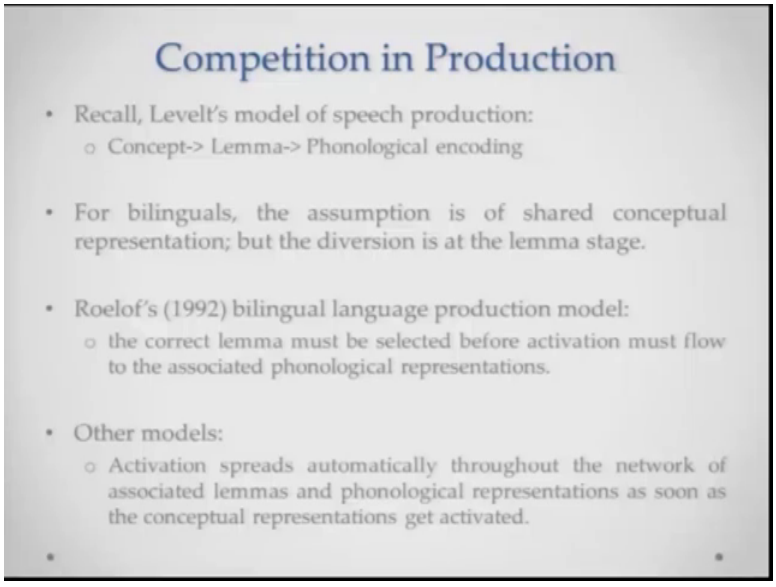

Now, all of this is in comprehension this also happens in production as well. So, if you remember the levelts model of speech production, there was a concept and then you selected the lemma and, then you started with phonological encoding. Now for bilinguals the assumption is of shared conceptual representation, but there has to be a diversion at

the lemma stage. So, activation basically is spreading automatically throughout the network of the associated lemmas and phonological representations, as soon as the conceptual representations are getting activated. So, the idea is that everything is getting activated, but from the lemma stage onwards language specific activation should be there.

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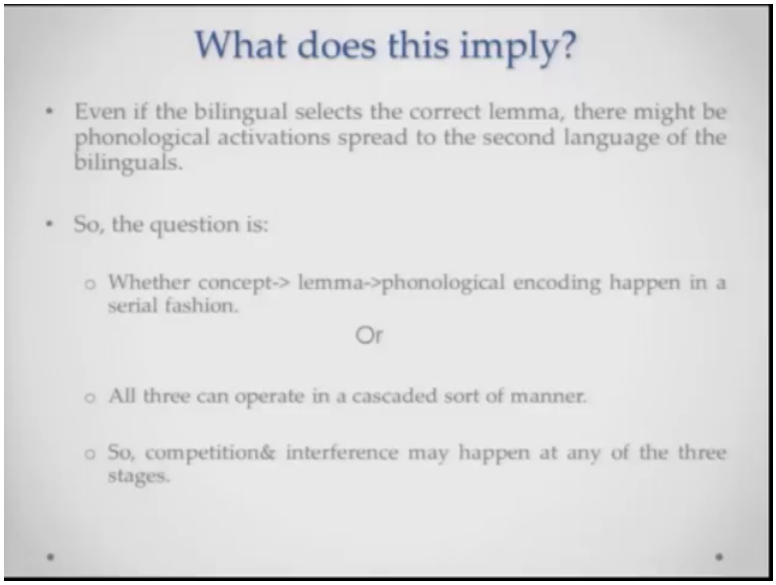

What does this imply? Even if the bilingual selects the correct lemma there might be phonological activations spread to the second language of the bilingual. So, what happens is whether this concept lemma phonological encoding is happening in a serial fashion, or all three can be operating at the same point in a cascaded sort of a manner, cascaded is basically activation at one level will inspire activation at all the other levels.

So, then you have that combination and interference might happen at any of the three levels. So, caramazza wanted to test it he tested, it through the picture word interference task, it was found by bilingual pay attention to a picture while trying to ignore the simultaneously presented distractor. So, this was basically the task they were they had to name a particular picture, but there was a simultaneously presented distracter as there also that has to be you know that was spoken and they had to ignore it.

So, they did this study with Dutch English bilinguals and the task was that participants were trying to name pictures, using the English names words like mountain while that they were listening to distracter stimuli. ah

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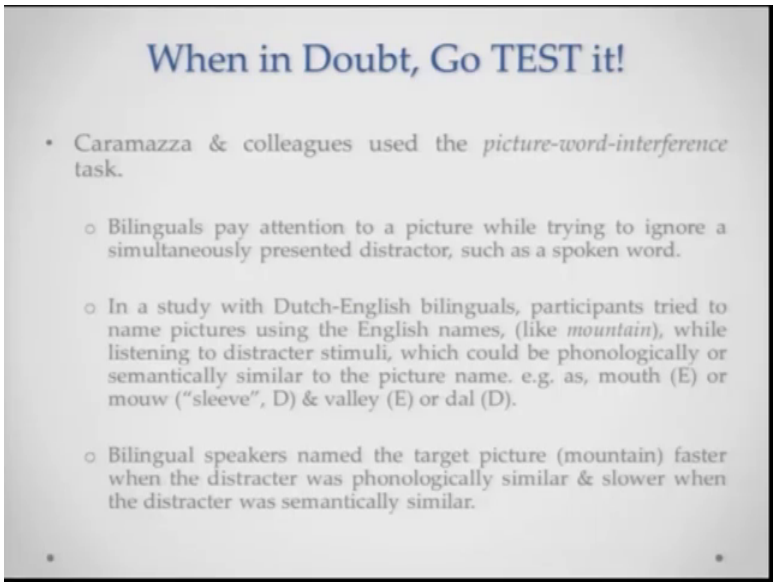

Which could be phonologically, or semantically similar to the picture name so, if they have to name mountain and the picture is of a mountain, they could either listen to a distracter in mouth, which is English distracter, or mouth which basically means sleeve, but it is a phonological distracter in Dutch, or Valley which is you know distracter it is in English, but is semantically related or dull which is a distracter in Dutch, but is exactly the name of mountain in Dutch. It was found again I will just repeat it they have to name mountain in English and they could have phonological destructors, or semantic distracters phonological distracters is mouth, or mouth English and Dutch semantic distracters Valley or Dal English and Dutch.

Bilingual speakers name the target ah mountain target picture mountain much faster when the distracter was phonologically similar and, much slower when the distracter was semantically similar. So, in some sense the interference is probably happening at the semantic station that is what is slowing this down.

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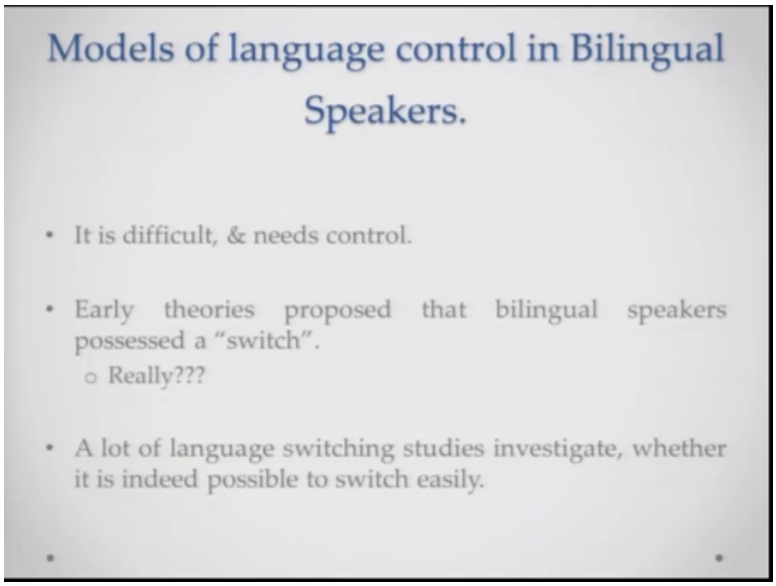

Now, again I showed you some of the evidence of simultaneous activation and competition and so on and so forth. I think I have made my point that, you know there is this competition going on and if this competition is going on it needs, some kind of control some people have offered that bilinguals probably might have a switch, you know you switch to one language and they switch to the other language, when the scenario is very different a lot of language switching studies have been have been investigating, whether there is indeed a switch like this.

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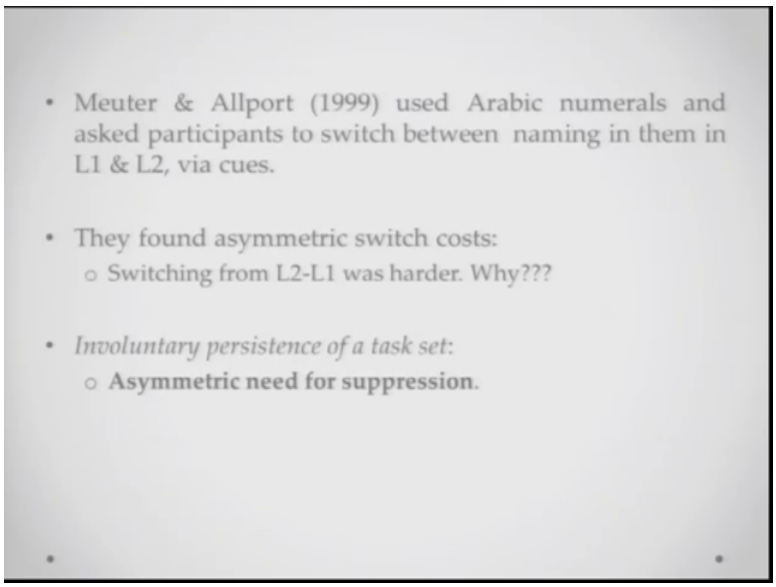

So, they did this Meuter and Allport in 1999 they use Arabic numerals and, they asked participants to switch between naming them in either in English or in Arabic. They found naming from L 2 to L 1 was harder as compared to switching to name from L 1 to L 2.

Now, why would this be, why would be that if I am speaking in English coming back to Arabic will be difficult, if I am speaking in Arabic going back to English is easier. Now there is basically this kind of an effect is referred to as the involuntary persistence of task edge because, one of the tasks is easier or stronger this task persists. Now the idea is here the asymmetric switching cost is because, English or my first Arabic or my first language is stronger.

So, if I have suppressed this and I am speaking in English now, when I have to come back from English to Arabic, I have to take away this stronger suppression, that is why this will become difficult if I mean speaking in Arabic and, I have just suppressed the weaker language that is English coming back from Arabic to English, will be easier because I just have to take away the weaker suppression. So, this is again one of the explanations.

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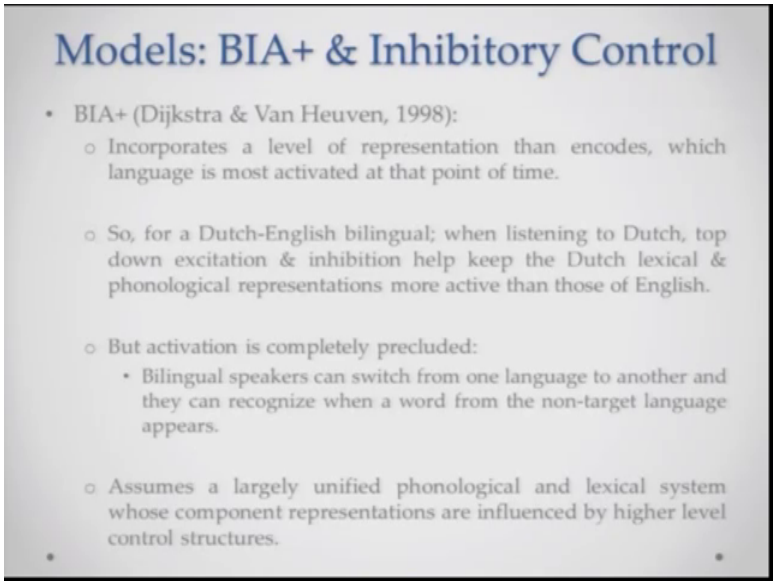

For this basically there are different kinds of models proposed for control of languages, this is basically the reason for asymmetric suppression. So, they found this asymmetric suppression and this was very interesting finding that kind of governed, a lot of you know consequent research on language switching in bilingualism. So, because this is

there they also eventually came up with particular kinds of models that were talking about control of the two languages in bilingualism, Alice discussed 2 models again rather briefly because it is it is not really a major part of this course, but one of these models is called the bilingual interactive activation model, I will talk about a slightly recent version of it is the BIA plus model, which was given by ton Dijkstra and Walter Van Heuven in 1998.

Now, the BIA plus model basically incorporates a level of representation that encodes, which language is most activated at that point in time. So, for a Dutch English bilingual when listening to Dutch the top down excitation will and inhibition will help keep Dutch lexical phonological representations more active than those of English, also the activation of the other language will be completely precluded. So, the idea is that bilingual speakers would be able to switch from one language to another, as soon as they recognize that when a word from the non target language is coming.

So, as soon as I am a bilingual and I am kind of receiving words, as soon as I see that the word in Dutch is coming I will completely switch to Dutch and start speaking in Dutch. As soon as a word in English is coming I will come back switch back to the English and start speaking in English. So, this kind of model assumes largely that a unified phonological and lexical system would operate, where component representations are influenced by higher level control structures, let me show you how this model looks.

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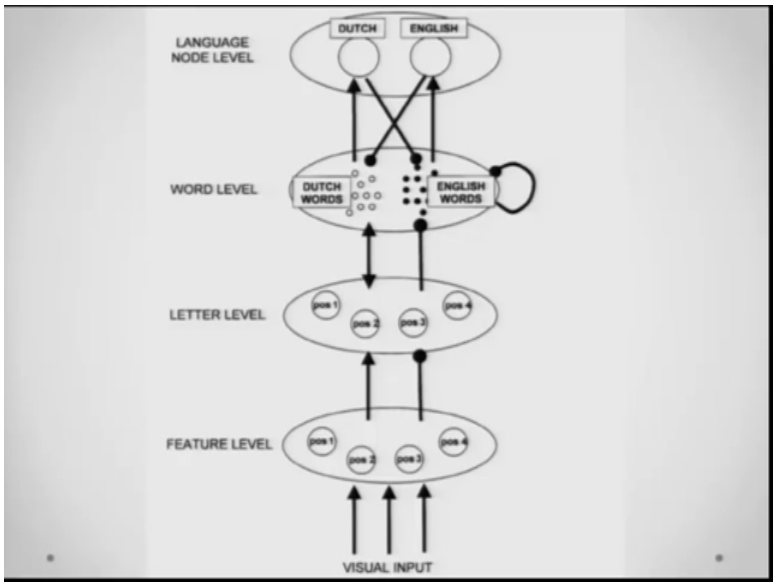

So, you see that there are feature level letter level and word level representations, much as you would have seen in the trace model I talked about earlier, but there is a higher level which is the language node level which has Dutch and English.

And you will see the connection from Dutch to English words is inhibitory and, connection from English to Dutch words is also inhibitory. So, the idea is this is where there is you know the lot of control is exercised on which language basically one has to speak.

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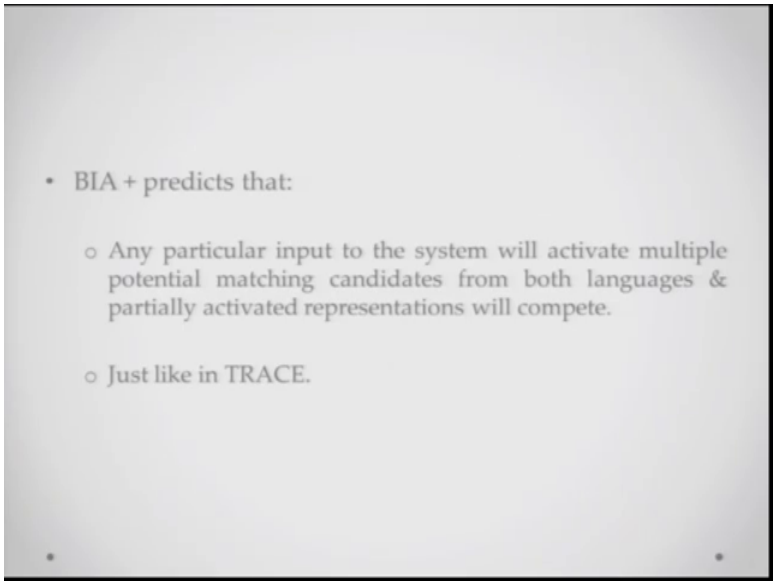

So, BIA plus model predicts that any particular input to the system, will activate multiple potential matching candidates from both the languages and, partially activated representations from both the languages will complete, this competition will basically be resolved by the higher level language structures.

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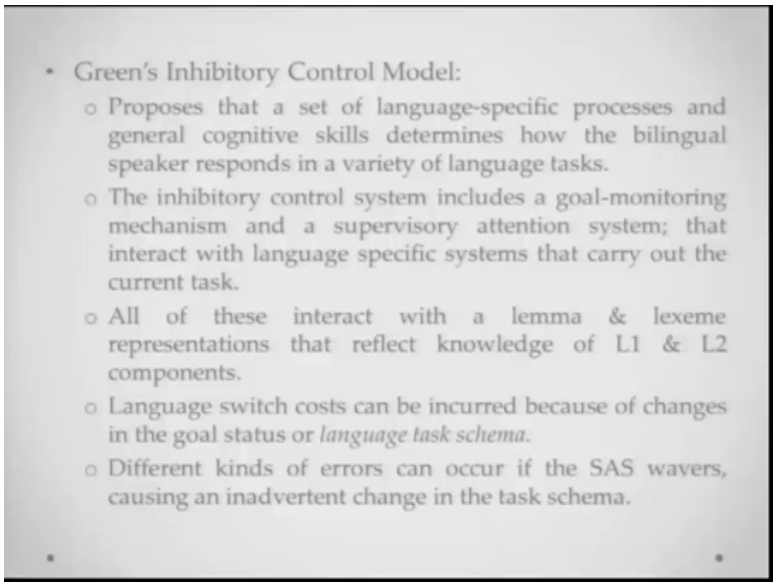

Another model which basically talks about this aspect of control a little bit more directly is called the David greens model of inhibitory control. Now David greens inhibitory control model proposes that a set of language specific processes and, general cognitive skills basically determine how the bilingual response in the variety of language tasks. So, if this model basically takes the view that performance of bilinguals in different tasks, will basically vary according to the task parameters.

So, they propose an inhibitory control system that includes goal monitoring mechanism and a supervisory attentional attentional system. So, goal monitoring system and SAS that interact with the language specific systems that are carrying out recurring tasks, suppose the task is picture naming or let us say the task is responding to the semanticity of pictures in English and Hindi, suppose there they belong to same semantic category or different semantic. So, depending upon the tasks that I am doing, the language the task specific system, or the supervisory attention system will shift my attention from one language to the other language, all of these things will interact with the lemma in Lexin representations that reflect knowledge of L 1 and L 2.

Language switching will language switching costs can be incurred because of changes in the gold status, or the language task schema. So, the idea is when the task requires me to switch from one language to the other language, I have to switch the tasks heading from that of English to let us say Dutch or from English to Hindi, or whatsoever. Now

different kinds of errors can occur, if the SAS is not functioning properly and it is causing inadvertent change intarsia, suppose for example, I am emotionally highly aroused and the supervisory attentional system somehow automatically shifts my attention to the second language, and I start speaking the second language. So, those kind of errors can be there.

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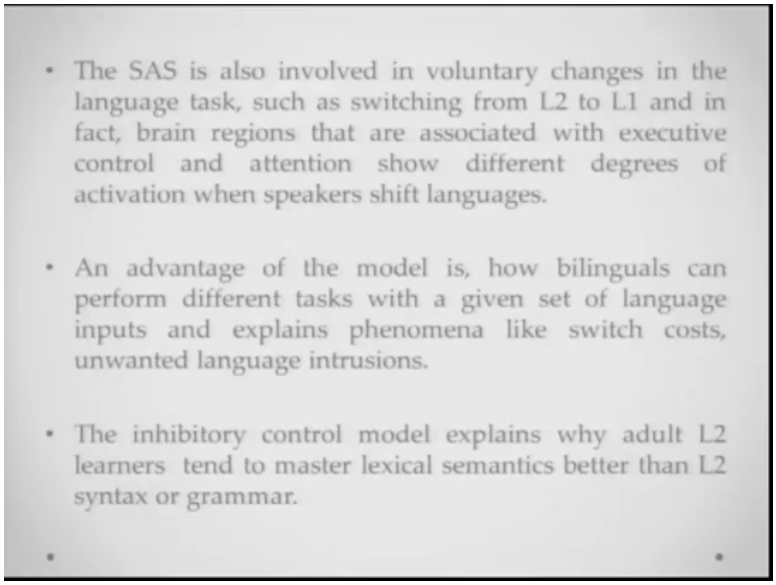

Now, the SAS also has been found to involve in voluntary changes in the language are suppose for example, there is a free language switching tasks and, I am free to name in either in L 1 or in L 2. So, such as switching from L 2 L 1 in fact, what will happen is that the brain regions that are associated with executive control, inhibition of response activation of response selection of response and attention, they will show different degrees of activation when shifting different languages.

Now, an advantage of this model which talks of a task schema, language task schema and supervisory attention system and, a goal specific system the advantage is that it kind of explains how bilingualism, how bilinguals can perform different tasks with a set of language inputs and, it kind of also explains how phenomenons like switch cause an unwanted language intrusions will occur. So, the inhibitory control model in that sense explains why adult L 2 learners tend to master lexical semantics better than L 2 syntax, or guard because all of these are happening at the word level.

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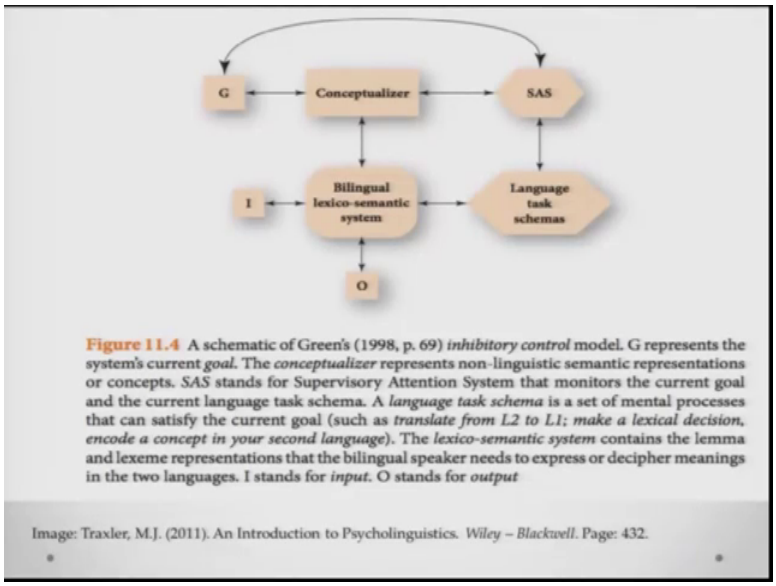

Figure 11.4 A schematic of Green's (1998, p. 69) *inhibitory control* model. G represents the system's current *goal*. The *conceptualizer* represents non-linguistic semantic representations or concepts. *SAS* stands for Supervisory Attention System that monitors the current goal and the current language task schema. A *language task schema* is a set of mental processes that can satisfy the current goal (such as *translate from L2 to L1; make a lexical decision, encode a concept in your second language*). The *lexico-semantic system* contains the lemma and lexeme representations that the bilingual speaker needs to express or decipher meanings in the two languages. I stands for *input*. O stands for *output*

Image: Traxler, M.J. (2011). An Introduction to Psycholinguistics. *Wiley – Blackwell*. Page: 432.

So, here you can actually look at the inhibitory control model as given by green, you will see that there is this bilingual lexical lexico semantic system, which is connected to the language task schema which is basically sensitive to what kind of task is there, then the language task schema is connected to the supervisory attentional system, which is basically diverting my attention to what kind of task I have to do and, this is connected to g which is the goal directed schema.

So, what is the goal of the task what is it that the task requires me to do, also there is a conceptual conceptualizer which is again the meaning portion of this model. So, aligne basically what is happening is that this kind of model is taking into account not only the final goal of the you know task, it is also taking into account how do you need to switch from one language to the other language in order to complete the task.

So, again you saw both of these models the BIA plus model and the inhibitory control model. And kind of tells us that; obviously, bilingualism requires efforts these kind of arrangements to exist, for you know bilingual speakers to be able to perform almost seamlessly across there both languages.

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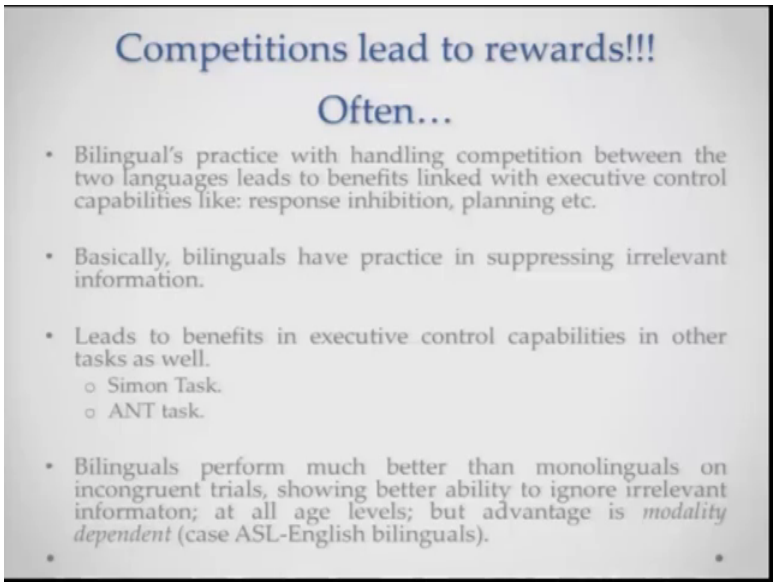

Obviously, scenarios of competition would lead to some kind of rewards, you know something you have been doing over and over again, some difficult tasks you have been achieving over and over again might lead to some kind of advantages.

So, it has also been shown that bilinguals practice with handling competition between the two languages, often leads to benefits linked with executive control capabilities like response, inhibition response planning task switching on completely unrelated tasks as compared to language tasks. So, it has also been shown across a range of studies that, you know bilinguals have very good practice in suppressing irrelevant information, if you give a particular kind of a distracted separation tasks bilingual and, the task is suppose you have to you know click on the red circle and there are many distracters which are green circles blue circles etcetera, or red squares bilingual probably would be easy a bilingual person would probably be find it easier to suppress other distracters and perform better in the goal selection task.

There are specific tasks such as the Simon task and the AND task, which kind of really require these kind of executive capabilities and, it has been shown that bilinguals have performed at these tasks much better also. So, taking together all of these findings we can say that bilinguals have performed much better on monolingual much better than monolinguals on incongruent trials you know, when there is a kind of a response compatibility issue and, they basically show a better ability to ignore irrelevant

distracters irrelevant information at all age levels; however, it has also been shown that this advantage might be modality depend, suppose you are doing a visual task and you have to suppress distracters in visual modality is easier, suppose if you are doing a visual task you need to suppress distracters and the auditory modality that might be a bit difficult.

So, this is I think all from me about bilingualism, I have tried to give you a flavor of whatever the different issues in bilingualism are and at the end tell you a little bit about the fact that bilingualism might be advantageous.

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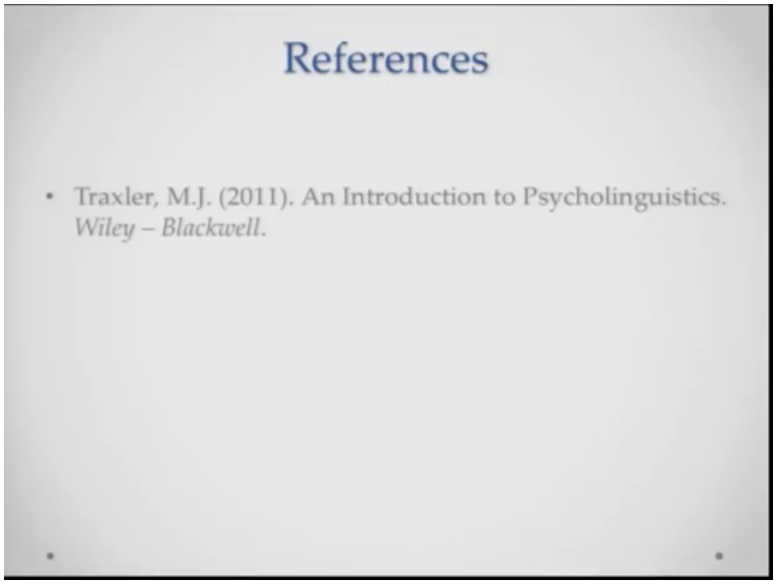

Thank you.