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 Sciences at IIT Kanpur. I have been talking about comprehension processes in bilinguals and multilinguals in this series of lectures. And now we are sort of going to look at in the previous lecture we actually looked at the fact that word forms are getting activated across the two languages of a bilingual.

And we saw a bunch of experiments that actually showed that orthography and phonology across the two languages for words is getting activated. Now in the current you know lecture what we will do is we will review some evidence of parallel phonological encoding across the two languages of a bilingual. Now NAS was one of the first to employ the lexical decision task to provide evidence that during visual word recognition of L2 words bilinguals assemble these words phonological forms just as native L2 speakers would do. The study used Dutch English bilinguals who were presented with L2 English stimuli.

The non words in this study were letter sequences that followed the phonological rules of English and looked like normal English words. However half of them were cross language pseudo homophones basically that when they were pronounced using the you know spelling to sound rules of English they would sound like actual L1 Dutch words. For example, the words snay and roak actually sounded sound like words snee and rook from Dutch. The remaining non words were non homophonic controls for example, prusk or floon which do not sound like Dutch words. Here you can see that if the bilinguals are activating you know phonologically you know the words from the non target language it would become slightly difficult to say no to words like snay and roak because they are actually similar to words in the bilinguals first language which is Dutch.

Exactly in the data participants took longer to reject the cross language homophones than they took to reject non homophonic non words and also made more errors to the former. These findings were taken to suggest that the participants indeed generated phonological forms of the present non words applying the English spelling to sound rules just like native English speakers would do and that is why they ended up with candidates that sounded like actual Dutch words and hence the delay in rejecting them. These

findings therefore, provide very important evidence for the fact that even non native speakers of English utilize the English grapheme to phoneme or spelling to sound rules to generate the phonological forms of English words when reading them. This is slightly important in the you know to consider that basically what we are saying here is even a bilingual is reading the second language L2 in this case for Dutch English participants English is their L2 using the same process just as the English native speaker would do. So, reading or decoding words in a different in a second language is not any in any way very dissimilar to the way native L2 speakers would do or probably it will happen in very similar ways like we have been using to decode like you know individuals used to decode the words from the first language.

Now another study in this respect was conducted by Jarrad and Kroll in 2001 who investigated the issue of whether bilinguals apply spelling to sound conversion rules in both of their languages in parallel or only that of the target language upon stimulus presentation. The authors use the word naming task with English French and French English bilinguals. Now I have been using some of these names you know some of these bilingual names in the past lectures also just taking some time out to explain that when I am saying English French bilinguals and basically mean that their first language was English second language was French and when I am saying French English bilinguals it basically means that the first language is French and the second language is English. When I am saying that they are balanced bilinguals then I am basically implying that both that these bilinguals are equally proficient in French and English and when I am not using the word balanced bilinguals or I am going out and saying unbalanced bilinguals or I am saying that English is dominant or French is dominant then I am basically talking about scenarios where one of the languages is better known to these participants than their other language. Moving on three types of English stimulus words were presented visually one type of word containing a body that is pronounced in the same way in English such as drip, gulp or gosh these words were supposed to be having English friends only.

So, they are basically pronounced across the English language in the same way in different words. The second type of words have inconsistently pronounced word bodies which were basically set and they were said to have English enemies. So, for example, the words bread and the word steak in the words bread and steak the ea you know body part and the ea phoneme is actually pronounced differently. So, -ait versus -ait. Finally, there were words also that had French enemies.

So, for example, words containing bodies that are pronounced differently, but in French ok not in English, but in French. For example, the you know the setup ea in English versus ea in French. Now these last type of words were basically included in the study to

find out whether longer naming times could be were being obtained for English words as you know with which having French enemies as well. If this were indeed the case see such a result would imply that words from the non target language are also taking part in the competition for naming hence revealing parallel phonological activation of English and French spelling to sound rules. Further Sheridan and Crowell included a couple of more variables in the mix.

One was the relative fluency of the participants in the two languages and second they included a block of French filler words to be named in French in between two blocks of English naming trials. All right to check whether French spelling to sound rules you know to check whether the application of French spelling to sound rules would happen only French had been recently used or not. All right. So, as I was saying when you are talking about English French or French English bilinguals we are also sort of in some sense making a statement about which is the first language, which is the second language and in a lot of studies you will see when I am saying balanced they are equal proficiency in both languages unbalanced they have more proficiency in one of the two languages. This is an important factor in all of these bilingualism studies that I have been talking about since production to you know basically the three lectures of this chapter.

Now, consistent with previous monolingual studies, Jared and Kroll observed longer latencies and more errors for English words with English enemies than for English words with English friends which is acceptable because for English words with English enemies you will basically see that the participant would be confused in naming that whether I have to use the pronunciation such as bread or whether I have to use a pronunciation such as steak. This is acceptable and this is something that you would expect. However, the effects from cross language trials were slightly more mixed. Let us look at them. The data showed strong interference from French enemies when the English naming blocks followed the French naming blocks.

Remember they had used the French filler naming block, but these effects were not found when the English naming preceded French naming session. So, when they were just naming in English without any activation of French there was no cross language interference found. However, when they named in English after they had recently named French you can see that there is a slightly higher activation of the French lexicon which is leading to some kind of interference in the naming of these words with French enemies. This suggests that the recent activation of that you know of a particular non-target language lexicon may be a very important factor in deciding whether cross linguistic phonological activation is happening or not. Now, another study that sought to sort of provide evidence for parallel phonological encoding in a bilingual two languages was conducted by Van Leiden, Boseman and De Groot.

In this study Dutch English bilinguals were tested on a slightly new task. This task was referred to as a bimodal matching task wherein on every trial a printed word was displayed and simultaneously a speech segment consisting of a vowel and followed by a consonant was presented orally. In more detail the printed word was always a word in the participants L2 English for example, the word mood and the speech segment was the correct or incorrect pronunciation of the words body oo in mood it is oo and the participants here were required to decide whether or not the speech segment match the printed words body by pressing a yes or a no. So, for example, if I am presenting you the word with mood speech segment is oo and you can say ok this matches the words body and you will press yes. If I am presenting the word mood and I am presenting the speech segment oo then you will say oh this does not match and hence I should press a no button.

Now the critical comparison in this study was between two kinds of trials. First in one of the types of no trials the speech segment was derived from the Dutch enemy of the printed English word. Remember the grapheme is the same or the pronunciation is different. For example, a Dutch word which has the same printed body, but a different pronunciation for example, for the word mood it may be accompanied by a presentation of the body of the word lood, rood or brood which are basically pronounced as the English word load. Now the grapheme is exactly the same, the letter string is exactly the same, the pronunciation is different.

For bilinguals it is interesting because for them they would know that this pronunciation matches it in Dutch, but does not match in English and it will make it a slightly more difficult condition to navigate. Another type of no trials were basically controlled trials in which the English printed word did not have any enemy neighbors in Dutch. Now what happens in the results? In the results the former type of no trials actually led to a higher number of false positives suggesting that the printed English words were actually activating the phonology of the neighboring Dutch or the non-target Dutch language giving rise in some sense to some kind of parallel phonological encoding in both English and Dutch. Similarly using the mass priming methodology, Brysbaert, Van Dyck and Van de Poel tested French monolinguals and Dutch-French bilinguals for identifying French targets that were preceded by either Dutch or French primes. In a homophonic Dutch-French condition these primes were Dutch words or Dutch like non-words, you know words that were not Dutch words but sounded like Dutch.

And these words if pronounced according to L1 Dutch letter to sound conversion rules were homophonic to the French target words. So basically they were very similar to the French target words. Say for example, let us look at the examples here. The prime target

were foot and fout basically where foot basically resembles the Dutch word foot, vout basically resembles the French word vault and the pair sur and sard whereas ser is basically a Dutch like non-word because the grapheme is Dutch like non-word and sard is basically French for death. Now performance in this specific condition was compared with the graphemic control condition where on an average the prime shared same letters, the same amount of letters as the corresponding homophone prime did but without sharing any phonology.

So for example, folk and vout whereas they basically share you know the graphemes, the spelling is very similar but the pronunciation is very very different. Now in the French-French condition the primes were French like non-words that were either homophonic with the target or and you know graphemically similar to it or unrelated controls. Now the dependent variables in this study was the percentage of correct target identifications and any difference in the performance was to be interpreted as evidence for the homophonic relation between target and prime basically saying that the target and prime were basically leading to similar pronunciations. Now even though the participants were not aware of these primes because they were being presented very momentarily in a masked fashion in the French-French condition identification performance was better for targets preceded by homophonic primes than for targets preceded by homographic control primes. So in some sense basically you are seeing is what you are seeing is that the phonological representations of the primes are actually being sort of generated and they are interfering in some sense with the lexical decision task.

Now this phonological priming effect was observed equally in both monolingual and bilingual participants indicating that L2 speakers did exhibit automatic phonological encoding in the same way such as the L1 speakers. Again remember the first study by Nasse what we are seeing here is that both L2 and L1 speakers are you know creating the same orthography to phonology to meaning conversion just as readers of L1 and L2 are doing. Now interestingly the bilingual participants here also showed the same effect in the Dutch-French condition as large as in the French-Dutch condition. These results were later replicated by Dyck and colleagues as well which tells us that the process is somewhat universal and is happening across language pairs and across language conditions. Now the studies reviewed so far can lead to the following suggestions.

First during visual word recognition of L2 words bilinguals are found to assemble phonological forms of these words just like native speakers. Secondly that this process is automatic and unconscious. Thirdly under specific circumstances the GPC rules of both these languages are of both the languages of a bilingual are applied in parallel which seems to be a universal phenomena as we just saw. Now as I said earlier evidence

for parallel phonological encoding has been shown across different types of scripts as well not only in the similar scripts such as you know Dutch and English are using are written using the same Roman script but also in language pairs where the scripts are slightly different. For example one of the studies was conducted by Thierry and Wu which included English monolinguals and Chinese-English bilinguals and these participants performed a semantic decision task when they were presented with pairs of English words that were either you know related or not say for example post mailbox you would say yes novel violin you would say no.

Now this is basically they are present being presented with English words nothing Chinese here. However unknown to the participants the stimulus materials were manipulated on a hidden variable. The Chinese translations of these words say for example the translation for the word post or the translation of the word mailbox could carry you know in half of the semantically related words could basically share a homographic you know a logographic character. So in some sense what we are seeing here is while these words are semantically related half of these semantically related words actually share orthography as well whereas half of their semantically related words do not share orthography. What will happen in this scenario? The Chinese translations of the remaining half of the stimulus pairs did not as I said did not share any form resemblance.

In the results the monolingual participants were not really affected by the hidden forms a similarity factor because obviously they were unknown to you know the orthographic overlap in the word pairs but they only exhibited the effect of semantic manipulation which is as you know expected. However the bilingual participants showed a different pattern of responses for the shared character word pairs on the one hand and the non-shared character word pairs on the other. These effects were obtained in behavioral as well as ERP data which tells us that bilingual participants are capable of generating orthographic to phonological conversions or parallel phonological encoding even in languages where the scripts are not using written using the same kind of scheme. Another study in this area was basically done by Golan, Foster and Frost who tested Hebrew-English bilinguals using a priming paradigm. Now this is interesting because Hebrew and English also use a completely different alphabets and hence the primes were masked so that they could not be perceived consciously.

So the primes were presented for very brief periods and they were masked so that there was no conscious perception of the primes. The parimes on the other hand were clearly visible to the participants for which they had to make lexical decisions. On trials wherein both the prime and target were words they could either be both words from the same language which is the same language condition or the language of the prime and

target could be different which would be the between language condition. Also the primes and targets in between language conditions were either translations of one another or they were unrelated words. So for example, you could use the translation of one word to use as a prime and its translation in another language to use as a target.

Again so they have both semantic overlap as well as you know orthographic overlap. Now some primes in the translation simile shared a cognate relation with the target whereas others did not. Now this is the critical part. Because Hebrew and English are written in different alphabets when I am talking about cognates and not talking about orthographic similarity in a typical manner, I am talking about actually phonological similarity.

They sounded the same. They may have the same meaning, but they also sounded the same. In the results, a reliable translation priming effect was observed which basically refers to a difference in the response times for translation stimuli on the one hand and matched unrelated prime target stimuli on the other. However, the translation priming effect was limited to primes in the stronger L1 than to the targets in the weaker L2. So which basically tells us that this effect is happening more in the L1. So importantly these effects from L1 to L2 were larger when primes and targets were cognates than when they were non-cognates.

So basically a higher degree of overlap both in the sound and the meaning is basically required here. These findings were taken to suggest that bilinguals can indeed activate spelling sound correspondences in the non-target languages almost automatically. That is all that I wanted to share with you about parallel phonological encoding across a bilinguals two languages. I will talk to you about different aspect in the next lecture. Thank you.