

Abstract of the thesis

Introduction: Language, following the Cognitive Revolution, is seen primarily as a higher mental function, working in tandem with other such faculties, like attention, executive functions and so on. Hence the focus has shifted from the analysis of the surface structures to how language is processed online, in a dynamic fashion, on the go. This underlines what goes on in the human mind when one either comprehends or produces language; the factors responsible behind the scene, that regulate how one processes language. Following this, the notion of bilingualism and bilingual language processing has been a much focused and discussed topic among researcher. Current discussions on bilingualism in the scholarly circles have focused on issues as myriad as social, cultural, cognitive, psychological, developmental, educational and even political aspects, alongside the obvious linguistic factors and has seen immense growth from the Revised Hierarchical Model (Kroll & Steward, 1994), Bilingual Interaction Activation Model (BIA, Dijkstra & van Heuven, 1998), Inhibitory control Model (Green 1998) to the recent Adaptive control hypothesis (Green & Abutalebi, 2013). The Adaptive Control Hypothesis specially has gained much traction with researchers finding compelling evidence (Hartanto & Yang, 2016; Verreyt et al., 2015) for the importance of interactional context on bilingual language processing. In tandem with this is the research on the influence of cultural context on language processing which first started a decade ago and is still continuously finding evidence. Thus, the main emerging trend in bilingual language processing research today is on the influence of context, be it linguistic context or non-linguistic context like culture.

In this background, the main aim of the study was to examine the role of context in bilingual language processing. In order to achieve that, the study investigated two areas that concerns with the role of context, i.e., cultural context and linguistic context. This thesis is one of the first attempts to study the role of culture and interactional context in language processing in Northeast India where various cultures reside side by side and where bilingualism is the norm and not an exception. The thesis is innovative because the studies compared various groups of bilinguals in terms of age, geographical setting, educational level and socio-cultural context. The thesis also gives a comparison between immigrant and non-immigrant population and university student and non-university student.

In terms of the cultural context, there is a need for research in places where there is a close contact between L1 and L2, where L2 is not distant as in the case of English and the cultures

and languages co-exist. India provides a good example of such a possibility where language and cultures have co-existed for centuries and where bilingualism is a norm and not an exception. India has a complex linguistic network and has generated bi or multilingual people with interaction between various linguistic groups. And, more often than not the two languages of these bilinguals are local languages, learnt through social interaction and not through formal training. The complexity is even more visible in the north east region which is an area of ethnic super diversity. Each of the states have their own distinct cultures and languages. Bilingualism prevails between intra-tribal and inter-tribal communities in this region. Therefore, it will be interesting to see how the contexts impact language processing within this set up. This study tries to look at pairs of languages from Nagaland and adjoining areas where the two languages are from two different groups and cultures. Moreover, the bilingual speakers are often bicultural in the Northeast Indian context, owing to the fact that these various groups have lived side by side for centuries. This kind of setting offers a unique opportunity to choose different bilingual groups, with varying degrees of social interactions with each other.

In terms of bilingual language switching context, although there is an increased understanding of the nature of mental representations and processes in bilingual lexicon, there is not much research on simultaneous bilingualism in India. Few researchers in other countries have studied Indian bilinguals (Bialystok & Viswanathan, 2009; Bialystok et.al., 2004) and few studies by Indian researchers have explored the cognitive mechanisms in Indian Hindi-English bilinguals (Singh & Mishra, 2014; Singh & Mishra, 2015). This is another area where the NE Indian setting is interesting as many people here learn their L2 in social settings rather than in a formal one. As a result, it quite common to find near simultaneous bilinguals here. Depending on the social fabric and hierarchy among the languages spoken, the pattern of switching also changes.

Main goals: Given the above discussed background, the current work proposed to investigate some of the finer aspects of bilingual language processing and its relationship with contexts of use, in some North east Indian bilingual groups. Primarily, better understanding of the ‘bilingual experience’, through careful choice of contextual cues, selection of bilingual groups based on factors of social relationships of different types, as revealed through different task conditions are the main focus of the study.

Method and participants: This study is based on experimental methods, using reaction time based behavioural tasks. There were a total of eight experiments, four on the role of cultural context and four on linguistic context. The participants belonged to different bilingual communities for each of the experiments. In order to factor in the different types of social interaction patterns, connect to one's own culture, type of second language spoken etc., participants for the eight experiments were chosen from different geographical areas. Primary focus area for all the experiments was the state of Nagaland and different Naga groups spread across Northeast India as well as the rest of the country. Along with Nagaland, other states that were relevant for the study are Manipur and Assam, primarily because the Naga groups under study reside in these places. The bilingual groups studied are Rongmei-Meitei, Ao-Sangtam, Ao-English bilinguals. Rongmei, Ao and Sangtham are Naga languages while Meitei is a Manipuri language. Also studied were Naga groups who has Nagamese-English as their L2-L3 combination.

Findings:

- A. Cultural context:** The results from the experiments examining the effect of cultural context points towards few things. In the first two experiments, the participants did not show the effect of the incongruent condition. This means that the presence of the culture cue had no effect on the processing in comprehension task in the first two experiments. But this effect was found in the Ao-English study. This means that the presence of English iconic picture had an effect on Ao in comprehension. This finding shed light on the importance of cultural distance and proximity. In the Rongmei-Meitei and Ao-Sangtam experiments, since the communities under study were living in close proximity with each other and even bicultural in the case of the Ao-Sangtam study, the participants did not regard the other culture as something different or 'foreign'. These two groups have been living side by side for decades and have shared their cultures, traditions and languages and this might have played a role. The two groups in our study are highly proficient bilinguals who use both the languages on a daily basis. Thus, the type of bilingualism and usage might also have played a part in the results. But in the Ao-English study, English language is a language that is held in a higher status and esteem as compared to Ao as is the case for most languages in India or in most parts of the world. Also, the culture associated with the English language i.e., America or United Kingdom is very different from that of the Ao culture. the participants performed better in the English block as compared to the Ao

block and the effect of the incongruent condition was also more in Ao block which shows that the presence of the L2 culturally significant image had an impact in L1 recognition. This might be the result of an English dominant environment as is common with university student pool. Even though our participants were university educated high proficient L2 speakers, the effect of the incongruent cue was still seen. This is in line with previous findings where cultural and linguistic distance resulted in interference of L1 recognition or production in the presence of L2 cultural icon.

Secondly, a common thing that was observed in Rongmei-Meitei and Ao-sangtam study was that in both experiments, the participants showed shorter RT in L2-L1 direction as compared to L1-L2 which is in line with previous studies (Kroll et al., 2006). The results from the two studies is consistent with similar findings from production studies where L1 has been found to be more affected by mismatch culture cue/interlocutor.

Thirdly, the Ao-Sangtam study, also tried to look at switch cost. In the experiment, we had two groups of bilinguals, Ao-Sangtam and Sangtam-Ao. In both the groups the mixed block had shorter RT in both language directions which were statistically significant. This means that the participants did not suffer any switch cost. This finding is in line with many others' that shows that shifting language may not always be more difficult than staying in one language. Absent switch cost is typical to bilingual comprehension, and not of production. This experiment was not a case of typical language-switch as we switched the direction of translation rather than one language that needs to be comprehended. Nonetheless, absent switch cost was observed, or rather a switch benefit, even when same manual response had to be given. One thing to be noted here is that the Sangtam-Ao group had higher RTs in the L2-L1 direction in the single language block and in both the language directions in the mixed block. This means that overall, the Ao-Sangtam group performed better than the Sangtam-Ao group. Such a result could be due to various reasons but one important and crucial factor could be the social relations between the two communities. The Ao community had and still have a strong influence in the region. And hence the Sangtam-Ao group has a more respectable attitude towards the Ao language than the Ao-Sangtam group towards the Sangtam language. And though the effect of the incongruent condition was not seen from the results, the presence of the culture cue might have had some sort of interference resulting in delayed response.

The findings from these experiments suggests that the background and ‘bilingual’ experience play a huge role and these factors could be the key to finding more about bilingualism and the different mechanisms associated with it. The findings from the experiments differs from existing literature and points towards the importance of looking at the types of bilingualism and bilinguals and suggests that not all data from WEIRD countries might represent the whole bilingual community. The findings from non-WEIRD bilinguals points towards a different perspective of looking at bilingual language processing. Speakers who live in a community where bi/multilingualism is a norm may be better at conflict monitoring than those of immigrant population from western countries. The study till now show that for bilinguals whose socio-cultural environment demands an active participation in language switching on a daily basis might exhibit a different pattern in language processing as compared to immigrant bilinguals or bilinguals whose cultures are farther apart. In places like India where bilingualism is a norm and not an exception, bilinguals have to deal with more than two languages and cultures simultaneously, they might be more adapt to ignore irrelevant cues and focus on the target language. This could suggest higher executive control and point towards evidence for Adaptive Control Hypothesis (Green & Abutalebi, 2013).

B. Interactional context: In the next four experiments, the study tried to look at the interactional context or linguistic context of bilinguals and see if it has an effect on the overall executive control and functions. Experiment 5, 6 and 7 looked at two group of bilinguals i.e., dual language context bilinguals and single language context bilinguals in linguistic as well as non-linguistic tasks. In both linguistic and non-linguistic task, the results shows that the DLC participants performed faster than the SLC participants. The DLC participants incurred less switch cost than the SLC participants in the language switching comprehension task. They also incurred less interference cost by the incongruent condition in the ANT experiment and thus were able to respond faster as compared to the SLC participants. In the Simon task also, they were able to monitor more efficiently the conflict of the colour coded boxes and the spatial orientation and thus they were able to resolve the conflict faster resulting in overall faster reaction times. Thus, the results from the experiments involving the DLC and SLC participants show that the linguistic context of a bilingual plays a crucial role in bilingual language processing which in turn could affect overall cognitive control and processing. The DLC participants were bilinguals who

somewhat maintained a balance use of both their languages (Ao and English) as compared the SLC participants who kept their two languages separate and hardly used the second language at home. The DLC participants exhibited advantages over the SLC participants across all the three experiments. This shows that the context of the DLC participants enhances efficiency conflict monitoring and taking advantage of cues in both linguistic and non-linguistic task. This finding is also in line with previous studies that show that balanced bilinguals showed less switch cost (Guerrero et al., 2015) and faster in Stroop and delay-gratification task (Verhagen et al., 2015). Experiment 8 examined two languages, both non-L1 but with different linguistic and social statuses. In this experiment also that the context of the bilinguals was found to play a major role in language processing. This experiment explored the social status held by the two languages under examination and the results indicated that the perception of the language by the people is very important while studying bilingualism. Because Nagamese is considered only as a trade language and a medium of communication, it is lower in hierarchy as compared to English which is considered as a language of the higher and educated society. Thus, this perception of the languages probably played a role in the performance in this experiment. The participants might have subconsciously repressed Nagamese especially when it is presented in a mixed setting with English, resulting in higher reaction times in Nagamese recognition as compared to English recognition. This is a working theory. Another point to consider is that English is the primary language for most university students and so English becomes the dominant language as compared to Nagamese. Thus, dominance might have also played a role in the outcome of this experiment. The results on the interactional context so far points towards the importance of context in bilingualism studies. Not all bilinguals have the same social, political and economic experiences. But these experiences shape the usage of their languages.

Key contributions: One of the crucial gaps in the literature and previous findings was that most of the research on bilingual language processing are from WEIRD countries and do not account for the multifaceted distinct bilingual experiences outside of the western countries. Thus, this study tried to explore this gap in the literature by conducting experiments with non-WEIRD population. The findings from the study are interesting as most of the findings did not corroborate the findings from previous research specially in the role of culture cues in bilingual language processing. The findings suggests that in populations where bilingualism

and biculturalism is a part of everyday life, the effect of culture on language processing may not be visible, or at least become harder to detect as cues such as culture becomes unimportant or less salient in interactions in these types of populations.

Another important factor investigated in this study was the role of interactional context on bilingual language processing. Even though the DLC advantage was observed in experiments 6 and 7, such an effect was not seen in experiment 5 as the DLC and SLC participants showed similar performance. This poses the question as to what extent the interactional context affects control in general. Experiment 5 was a linguistic task and as such the DLC participants should have exhibited faster response time as predicted by the ACH. However, the modulating effect of the interactional context was seen only in experiment 6 and 7, which were non-linguistic response inhibition task. Therefore, the findings from the study suggest that the functioning of domain general and domain specific regions might be different as we did not see the effect of the demands of the interactional context on language specific task. This needs further probing with neuroimaging studies to truly understand the computations carried out by the different regions of the brain specially in terms of language control and executive function, using this variable. Experiment 8 tried to investigate the role of relative social status of second and third languages in language processing. As expected, the participants incurred higher reaction time in the Nagamese recognition as compared to English. The higher status of English resulted in higher activation of English leading to shorter reaction time. This finding only cements the idea of taking into consideration the social, economic and linguistic background of the bilinguals in research.

Recent theoretical framework like the ACH have come up to highlight the importance of context while studying bilingual language processing. Therefore, this study posits a base to continue this important line of investigation of taking into account the distinct bilingual experiences and the non-WEIRD population. There is no doubt that the culture and interactional context of the bilinguals do have an effect on language processing. But to what extent and more crucially it remains to be seen if such effects can be generalized for bilinguals in bicultural bilingual/multilingual societies.