

SHAPING BILINGUAL MINDS: COGNITIVE AND SOCIAL DYNAMICS IN L1 AND L2 COMMUNICATION

Saira Zareen

M.Phil Scholar, Department of English, University of Education, Lahore

Tooba Tehrim

Lecturer, Green International University, Lahore

Dr. Jahanzeb Jahan

Lecturer, Department of English, University of Education, Lahore

Abstract

The study aims to analyze the interactional and cognitive patterns that underpin language choice between the first language (L1) and the second language (L2). The sample comprised 500 bilingual individuals hailing from different linguistic and cultural settings: an approach considered common in both quantitatively and qualitatively inclined researchers. Cognitive efficiency and context-selective language response were measured through a Lexical Decision Task and a Code-Switching Paradigm, which supplied quantitative data. Self-administered qualitative questionnaires in semi-structured interviews on social factors, affective reactions, and contextual modifications were used. The analysis of quantitative results showed that participants read and comprehended L1 faster than L2; balanced bilinguals exhibited higher cognitive control and flexibility in switching between languages. The qualitative cross-sectional analysis of language choice showed that the clients select L2 in context-demand and identity-related aspects and L1 in emotional aspects. The ensemble of such findings underscores the dialectic between the social-cognitive processes that the current models of bilingualism acknowledge. The findings reflect views known as the Adaptive Control Hypothesis and expand understanding of contextual and identity regulatory language. The present study has implications for research, education, and practice in bilingualism, workplace communication, and intercultural relations; particularly for increasing understanding of the benefits of BP and the importance of sociolinguistic variation. Future research is urged to apply the longitudinal and naturalistic interface to dissect the changes in communication in bilingual society continuously.

Keywords

Bilingualism, Language Selection, Cognitive Control, Code-Switching, Social Identity, Contextual Adaptation

Introduction

Language plays a significant role in the performance of social relations, definition of cultural affiliation and in organizing the human thought processes. When the globalization advances and people find themselves in communities with others that speak different languages, bilingualism becomes a widespread and important issue. Bilinguals are in charge of the complicated linguistic environments, switching between two or more languages based on the amount of cognitive load, social requirements and context. The option to use L1 or L2 perfectly demonstrates local and global factors involved or internalised into the process. This paper reviews such processes and particularly focuses on the cognitive and social factors in bilingual language choice.

It would be considered that the cognitive system occupies a critical position in bilingual language choice. It was found that keeping two languages active consumes considerable executive effort, especially for inhibiting the unwanted language and activating the right one. However, within the Adaptive Control Hypothesis specified by Green and Abutalebi (2013) it is considered that in all the contexts there should be a variety of cognitive control conditions. This theory postulates that the bilingual's selectivity of language control process depends on situational factors such as goals for a conversation or preferences for talking with certain persons.

Such cognitive mechanisms are highly sensitive to L1 and L2 proficiency and dominance. Research shows that the language used in context involving uncertainty is the dominant one

due to the easy processing upon decoding (De Houwer, 2021). However, the less dominant language meaning can be improved through its regular usage thus a better balance of language selection over time (Bialystok et al., 2020). However, the age at which bilinguals acquired the two languages influences lexical processing it is established that early bilinguals have better switch ease than late bilinguals (Birdsong, 2018).

Neurological reviews add more light into the synergism of the bilingual brain. Structural imaging has also shown that bilateral inferior parietal cortex is involved in bilingual language processing since competition between L1 and L2 activates different areas, and the core part of this competition is exercised in the prefrontal cortex (Hernandez et al., 2020). Hence such results illustrate the higher cognitive demands required for bilingual communication as well as the brain plasticity in handling linguistic tasks.

While cognitive processes regulate endophonic aspects of language choice the exophonic aspects are regulated by social factors. Language includes an element of the cultural and social identity, as well as belonging to a particular group. Everyone knows that bilingual speakers vary their language use depending to the appropriate conventions of society and the desires of the people with whom they are speaking. Pavlenko and Blackledge (2004) however underlines on the aspects of social identity processes in bilingual interactions where language choices involve a question of identity within and without.

Flitting between using L1 and L2 in equal conversation is an instance of the impact which social aspects have on bilingual interaction. Gardner-Chloros (2022) define code-switching as one of the tactics that helps bilinguals to operate in various spheres. For example, a person engaged in a conversation with another may move to use the L2 to convey the impression of professionalism because the interaction is taking place at the workplace, but the same person may shift to L1 midway through a conversation to convey affection because the interaction may be with a relative. They normally work under unspoken social signals, monetarizing with changes of language including the preference that the target audience has, the relation's context and the meaning that is tied to each of the languages.

Two general cultural patterns that influence bilingual language use are worthy of consideration. There are languages that have more prestige and can be linked with a particular type of use, for example, educational, commercial or media (Wei, 2020). These associations are embraced by bilinguals so that social hierarchies as well as cultural values determines the choice of language to be used in a particular context. The use of language and culture in the context of Bilingualism presents sociolinguistic aspects of Bilingual communication.

Context, therefore, forms a base on which cognitive and social factors will come into play in determining language use. Language choice between the L1 or L2 depends on settings, topics and communicative goals in the life of bilinguals. According to Gullifer and Titone (2020) in professional contexts when W is valued over Sp and clarity and formalism matters, bilinguals are likely to employ L2 especially when enrolment is tied to technical-vocubularly or international communication. On the other hand, L1 is used in social situations where using of emotions and culture perspectives is more appropriate.

It means the meaning of text is not just carried by the context generic to the situation in which communication takes place. Prolonged stay in certain situations affects not only clients' language choice, but their fluency as well. Bailey et al. (2007) note that immersion in an L2-dominant milieu, as an example, results in the upsurge in L2 practice even in domains previously predominantly an L1 (Beatty-Martínez et al., 2021). Any such changes are indicative of the process's fluidity, and its ability to be influenced by the surrounding context. It is also important placed on the shoulders of the interlocutors as they help in construction of context. According to the research work done by Bhatia and Ritchie (2013), bilinguals align

with the language used by others in discussion in a bid to ensure effective understanding as well as bonding. This adaptive behavior brings out the issues of interpersonal relationship in bilingual conversations and shows how cooperative language use is.

There is, nevertheless, the following gaps in knowledge about bilingual language use after substantial advancements in the past. Most of the previous work investigated antecedents to consumer creativity from either a cognitive or social perspective, without considering the relationships between the two dimensions. Furthermore, the results of most studies are obtained from lab experiments based on rather unnatural and limited conditions of bilingual interaction (Hartsuiker & Pickering, 2020). This research aims to fill these gaps by proposing an integrated model of CBI that considers both cognitive and social processes in ecologically valid settings. This way, the present study will seek to analyse the bilingual individuals' processes and consider both the internal and external factors that appear to come into play as the participants strive to overcome the LCM. Such findings bear significance not only for theories of bilingualism, bilingual education, and second language acquisition but also for intercultural communication and language policy.

The choice of language in the L2 context depends on cognitive, social and context areas in Bilingual language selection. Code switching shows that human linguistic system is dynamic and that movement back and forth between the two languages is a real situation. As a result, the present research advances knowledge and debate concerning bilingualism by examining the complexities of language choice in cognition and society in a practical manner. In this regard, it aims to extend the knowledge on bilingual communication and the impact on the society.

Methodology

Research Design

This research used quantitative and qualitative research to assess the mental and interpersonal factors involved in the process of using L1 and L2. The approach that has been chosen with the use of both quantitative and qualitative data provides a rigorous yet holistic picture of the findings reflecting structural and statistical aspects of language as well as participants' perceptions and evaluation of the process. Quantitative experimental studies were used to investigate the cognitive processes while qualitative interview approach was employed to give an outlook of the social and contextual factors influencing the language choice.

Participants

A total of 500 bilingual participants were selected through purposive sampling in order to achieve a diverse cross sectional selection. The criterion used to select the participants was that they should be fully proficient in their first language and their second language. Other variations in language selection were also compared using balanced bilinguals and dominance based bilinguals participants. Due to possible age differences in various mental activities, the subject assembler was restricted to candidates within the age of 18–45 years. Besides, the participants represented different linguistic and cultural backgrounds with L1 and L2 English, Spanish, Mandarin, and French. The participants' language dominance and proficiency were evaluated based on their response to the Language Experience and Proficiency Questionnaire (LEAP-Q) (Marian et al., 2007).

Quantitative Data Collection

For the quantitative part of the study, there were two tasks designed as experiments. The first one was a Lexical Decision Task (LDT) a task by which participants decided whether the string of letters that had been presented to them was an L1 or L2 word with the time taken and the accuracy rate being measured in order to determine the cognitive control and proficiency of the participants. The second activity was a Code-Switching Paradigm in which participants

provided the last part of the sentences that would make sense in L1 and L2; this enabled exploration of the relative frequency of switching and the context in which it occurs most frequently. All these tasks were performed in a lab with standard settings to integrate coherency and E-Prime software which assisted in data acquisition by the participants..

Qualitative Data Collection

The qualitative aspect involved conducting interview based on a set semi structured questions whose focal point was on the social and contextual dimensions that determined language choice. Asked to follow up on Macaro and Pronin's (2006) study the open-ended questions posed aimed at capturing participant language use in a variety of social settings including, at home, at work, and in public domains. It may be a documentary, a fiction movie, a comedy or any type of feature film and participants were also questioned about cultural affiliation and affective bond to L1 and L2. Both the interviews were audio taped and transcribed literally and then the data was analyzed thematically to display patterns in language behavior.

Data Analysis

Various data analysis methods were used in this study and included both quantitative and qualitative to offer a prevalence-depth dimension. The performance data from the Lexical Decision Task and Code-Switching Paradigm were scored and analyzed on the Statistical Package for the Social Sciences (SPSS) Version 28. Data collected consists of participants' reaction times, accuracy as well as frequency of switching between languages and descriptive statistics Both two-way ANOVA tests were also carried out to test the effects of language dominance and context on language switch. Multiple regression analysis was used in identifying which operandi is influential in deciding a language to be used, proficiency, dominance, and context among them. Regarding the analysis of the collected data, the approach to the analysis of qualitative data and the chosen technique of thematic analysis is described below as following the Braun and Clarke's (2006) framework, though the current authors modified them methodologically. The data collected through interviews were analyzed systematically using codes through the help of NVivo software.

Ethical Considerations

Issues of ethical nature were woven in to this research as outlined by the University of Education Lahore Ethical Review Board. All participants were ensured about their rights to volition as well as the anonymity of their data and their right to withdraw their data at any given time. All data collected in the study were deidentified and protected according to the GDPR guidelines..

Limitations

As the presented methodology aimed at making the research more objective, some limitations can be noted. The greater number of participants provided a more generalized result still there are some issues with the representation of BiLs. Also, there was bias in which the results depended on the participants' own view of their level of fatigue. In conclusion, some of the experimental tasks may not have realistic effects, perhaps in a strictly controlled setting making the validity of the experiments rather low . However, the present study adopted a mixed-methods approach and has therefore conceptualized bilingual language use under both cognitive and social paradigms to arrive at the complexity of bilingual language choice..

Results

In this section, findings from quantitative and qualitative part of the study together with cognitive and social factors determining bilingual language choice are highlighted. In this work, key findings are spelt out in tables to enhance easy understanding and presentation.

Quantitative Results

Lexical Decision Task (LDT)

The analysis of the Lexical Decision Task revealed significant differences in response times and accuracy between L1 and L2. Participants demonstrated faster response times for L1 words (M = 450 ms, SD = 30 ms) compared to L2 words (M = 580 ms, SD = 45 ms), indicating higher cognitive efficiency in processing L1. Accuracy rates were also higher for L1, with participants achieving a mean accuracy of 95% for L1 words compared to 83% for L2 words. Balanced bilinguals exhibited smaller disparities in response times and accuracy between L1 and L2 compared to dominance-based bilinguals. These results are summarized in Table 1.

Table 1: Response Times and Accuracy in Lexical Decision Task (LDT)

Language	Mean Response Time (ms)	Standard Deviation (ms)	Accuracy (%)
L1	450	30	95
L2	580	45	83
Balanced Bilinguals	465	35	92
Dominance-Based Bilinguals	600	50	80

Code-Switching Paradigm

The Code-Switching Paradigm provided insights into context-driven language behavior. Participants performed more frequent code-switches in informal scenarios compared to formal ones, with an average of 3.2 switches per sentence in informal contexts versus 1.1 switches per sentence in formal contexts. Regression analysis indicated that context significantly predicted code-switching frequency ($\beta = .62, p < .001$), with informal settings promoting higher switching rates. Balanced bilinguals demonstrated more frequent and fluid switching behavior than dominance-based bilinguals. These results are detailed in Table 2.

Table 2: Code-Switching Frequency Across Contexts

Context	Mean Switching Frequency (Switches/Sentence)	Standard Deviation
Informal	3.2	0.5
Formal	1.1	0.3
Balanced Bilinguals	3.5	0.4
Dominance-Based Bilinguals	2.8	0.6

An analysis of switching types revealed that intra-sentential code-switching (switches within a sentence) accounted for 68% of all observed switches, while inter-sentential switching (switches between sentences) accounted for the remaining 32%. This pattern suggests a preference for seamless integration of both languages in communication. These findings are presented in Table 3.

Table 3: Types of Code-Switching Observed

Type of Code-Switching	Percentage of Total Switches (%)
Intra-Sentential	68
Inter-Sentential	32

Qualitative Results

In this section, findings from quantitative and qualitative part of the study together with cognitive and social factors determining bilingual language choice are highlighted. In this work, key findings are spelt out in tables to enhance easy understanding and presentation..

Contextual Adaptation

Discussing their behavior in the given context, participants described the patterns and strategies they employed when choosing vocabulary, lexemes, and external variables depending on the situation, topic, formality, or preferences of the partner. L2 was most of the time required in formal situations, while L1 was reserved mostly for informal or family situations. They ten said, “when I am in the company or in meetings and things like that, I automatically code-switch to English [L2] because it sounds more professional, though at home and with my family I speak my [L1].” This accommodativeness points to the fact that explicit reference must be made to context when selecting the language to use.

Social Identity and Group Membership

Thus, language choice was strongly associated with social identity and the need to conform either to cultural expectations or those of specific groups. Interviewees commonly appealed to L1 to express their cultural affirmation and establish relationships with fellow people. On the other hand, L2 was used to gain socialization in multicultural or professions environments. For instance, a participant said, “Using my first language, Spanish, with my family helps me feel related to my culture but using English, my second language at work, makes me feel like I belong”. This theme is closely connected with the concept of language, which defines a person’s position in society, or to which group he or she belongs to.

Emotional Resonance

This kind of subject matter requires the use of L1 as participants argued that there is higher, emotional involvement in L1. Further, as participant A said, “If I am angry or upset I can pent up in L1.” It just feels more natural.” Conversely, L2 was related to pragmatic or neutral topics, which are considered transactional in frame bilingual interactions.

Integration of Quantitative and Qualitative Findings

The juxtaposition of the quantitative and qualitative results presented here demonstrates that a number of cognitive and social factors regulate bilingual individuals’ language choice processes. The numerically established effectiveness of L1 as well as the findings on the effects arising from context regarding code-switching provided evidence that contributed to the development of the theory, while the themes reflected such facets as social identity, emotional appeal, or the context as essential factors that also inform language choices. Collectively, these findings paint a fairly picture of how bilinguals manage their L1 and L2 resources in order to fulfil cognitive requirements and/or social pressures..

Discussion

This study contributes to understanding of the mechanisms of cognitive and social factors that motivates bilingual people in language choice, and results are consistent with prior research and can be discussed further. The significance of these findings is then outlined, together with comparisons with other research and the broader applicability of the findings to bilingual interaction. Analyses of the quantitative data showed that a) there were faster and more accurate responses to L1 than to L2, b) participants responded more accurately to L1 than to L2 in LDT. These results support Green and Abutalebi (2013) who as part of the Adaptive Control Hypothesis explain that bilinguals have lower cognitive load when using their preferred language. The observed discrepancies between balanced biculturals and dominance based biculturals are subsequent to similar research that identified that balanced biculturals demonstrate better executives control processes (Bialystok et al., 2020). This work further

builds on these results by further demonstrating that the processing of L1 and L2 in balanced bilinguals is more equivalent and they are also significantly better in such dynamic language tasks as code-switching.

As it pertains to the study presented herein, the observation of intra-sentential code-switching groups with studies by Gullifer and Titone (2020) whereby they noted that the flow of switchings in the middle of different probes within a single sentence depends on the context in which the conversation takes. But the fact revealed here that the frequency of code-switching is higher in the informal context flags use of bilingual language as context-sensitive. This is in line with Beatty-Martínez et al. (2021) who emphasized the effect of context on deployment of contextualised linguistic tools in bilingual situation.

The observed qualitative results showed that the choice of language depends on situational aspects like, the formality and, speakers' language language pull. The way participants employ L2 in formal context conformity is consistent with Wei (2020) on how bilingual engages with social context related to translanguaging. The post also reveals the findings of Pavlenko and Blackledge (2004) concerning the role of personal and emotive contexts that people tend to prefer L1 in that way.

The concerns related to social identity and group membership were clearly identified in the context of the qualitative analysis of the participants' discourses; here, L1 was employed to keep in touch with the cultural roots, whereas L2 was used to assimilate into the professional or into the multicultural context. Hence, these results contribute to Gardner-Chloros (2022) who in their work explained code-switching as a unifying social tool to navigate interactions and achieve the status quo of identity. This study further enriches such perception by identifying how these identity-related language decisions play out in context and among varying groups of people.

In this study, one of the main features is the analysis of cognitive and social aspects in the selection of bilingual language. In contrast to prior study that provide different information involving just cognitive factors (Green & Abutalebi, 2013) or social factors (Pavlenko & Blackledge, 2004), present research gives information about how these things act mutually. For example, the quantitative result that context affects frequency of code-switching aligns well with the phenomenological view that participants switch languages based on situational constraints and norms. It also encom Thresholds.takes with Hartsuiker and Pickering's (2020) plea for a view on bilingual communication that involves both internal and external factors.

Thus, the findings of the present work have significant implications for studying bilingual interactions in natural contexts. Therefore, for bilingual education and language policy, it is shown that both L1 and code-switching for pupils depend on the optimal efficiency of cognitive processes and sufficient proficiency in their language. For instance, in the development of balanced bilingual, implemented through early and authentic language experiences, there could be newpoints to improved cognitive control and thus better language shift. Additionally, the politics of language conduct stress the fact that multicultural environments that involve use of language require culturally appropriate strategies during work and community interacts.

This paper contributes to bilingual theoretical models regarding the interplay between attention and social factors. This research contributes toward closing the gap between cognition and social approaches toward knowledge construction of bilingual language use.

This work makes a contribution to the existing literature in that it supports most of the findings but at the same time reveals avenues for future research. For example, the preference for intra-sentential SC is inconsistent with results from Bhatia and Ritchie (2013), who noted more frequent inter-sentential switching in fixed contexts. This difference might be related to the

participants' characteristics or the tasks given to them; therefore, cross-cultural and task comparisons are called for in future studies.

The limitations of this research also have to be addressed prior to offering the conclusion of the study. While the big sample size increases external validity the experimental manipulations may not match ecologic language use. Also, the quantitative data are based on the self-reports of the participants making the results of the qualitative part more prone to bias, as participants are likely to respond in a way that may not reflect their language use. Future works should incorporate more naturalistic and longitudinal designs to capture bilingual communication as exists and develops over time.

Consequently, this research yields complex data regarding the mental and contextual processes in bilingual language choice. When combined with findings from quantitative research, it elucidates the internal structure and external factors and makes important theoretical contributions to the concept of bilingualism. Not only are the presented findings directly in line with previous studies but also, the body of knowledge on bilingual competence is expanded with information about how bilinguals operate within their language repertoire in various settings. These findings have major implications for education, policy, and intercultural communication and lay groundwork for the next round of research to be built on.

Conclusion

Their present research discussed the cognitive and social aspects of bilingual language choice with an emphasis on the internal and external factors. The results demonstrate that decision-making process of the informants to use either L1 or L2 depends on two factors: One is cognitive benefits and the second is social benefits. Analysis of the results showed that L1 is handled faster than L2 as evidenced by the performances of the Balanced Bilinguals who exhibited well-ordered cognitive control and flexibility of language. A primary finding was that while code-switching behaviors were most likely to happen in informal contexts, intra-sentential switching was the most frequent type identified. These patterns reveal how bilinguals are able to address situational requirements that are put in place. Where as qualitative results contributed better understanding towards the social and emotional aspect of language choice. Mature and adolescent immigrants claimed that L1 is used to preserve cultural and personal feelings while L2 is relevant to the formal registration and introduction to the working environment. With respect of these two types of meanings , it proves that language is used as a tool in thinking and as a signal of group membership. Quantitative and qualitative research findings together provide a broader picture of bilingual interaction and merges the gap between cognition and sociology. Such outcomes can have implications for bilingual education, business language and interculturality. Efficiently addressing needs of balanced bilingualism in Education and raising awareness of sociolinguistic diversity can positively impact society where several languages are used. More studies should be undertaken in terms of both longitudinal and naturalistic research designs, in order to understand change in the use of L1 and L2 in adult L2 users. The current work advances knowledge about bilingualism and highlights possibilities for future lines of research cutting across cognitive science, linguistics, and social psychology.

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