



ADVANCE SOCIAL SCIENCE ARCHIVE JOURNAL

Available Online: <https://assajournal.com>

Vol. 05 No. 01. Jan-March 2026. Page#.4953-4968

Print ISSN: [3006-2497](#) Online ISSN: [3006-2500](#)Platform & Workflow by: [Open Journal Systems](#)

The Influence of Code-Switching on Cognitive Processing and Lexical Retrieval: A Psycholinguistic Study of Urdu–English Bilingual Speakers

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Abstract

Code-switching, the alternating use of two or more languages within a single discourse, has become a defining feature of communication among bilingual speakers. In multilingual societies such as Pakistan, Urdu–English bilinguals frequently switch between languages during academic, professional, and everyday interactions. Previous work has mainly focused on the sociolinguistic and discourse-related aspects of code switching, but relatively little has been explored about the cognitive consequences of code switching, especially the effects it has on lexical retrieval and language processing. In the present study, the impact of code switching on the cognitive processing and lexical retrieval of Urdu–English bilingual speakers is explored by adopting a psycholinguistic approach. This study draws from the Inhibitory Control Model, Bilingual Interactive Activation Plus (BIA+) Model, and Adaptive Control Hypothesis to explore the cognitive mechanisms involved in bilingual language selection and lexical access. A mixed method research design has been suggested, which includes lexical decision tasks, picture-naming experiments, reaction-time measurement, and semi-structured interviews with the university students who regularly use code-switching in Urdu–English. The study proposes that the effect of frequent code switching is increased flexibility in language and increased demands to executive control for language selection and that this would enhance lexical accessibility as a result of the code switching. The results will be of great potential to bilingual language-processing research and empirical evidence from Pakistan, as it is under-represented in psycholinguistic studies. The study will also contribute to the field of bilingual education, language policy, and cognitive theories of bilingual lexical processing by

providing evidence for the effects of everyday bilingual practices on mental language organization and lexical retrieval.

The keywords are Code switching, Psycholinguistics, Lexical Retrieval, Cognitive Processing, Urdu–English Bilingualism, Executive Control, Bilingual Lexicon.

Introduction

Multilingualism in the 21st century has become widespread. The world has become global, migrated, technologically connected, and multilingual, leading to the formation of bilingual and multilingual communities in which communication often involves switching languages. A common form of bilingual language use is code switching, which refers to the systematic switching of languages in a sequence in a conversation, sentence, or even within one utterances.

The study of code switching has taken the sociolinguistic approach as its chief focus traditionally. Its roles in the process of identity formation, group affiliation, conversational approaches, discourse structuring, and social interaction have been studied. These research studies have shown that bilingual speakers employ language switching to negotiate meaning of identities, to express emotions, to provide social solidarity, to signify sociality and to please the interlocutors. While these sociolinguistic explanations continue to be very helpful, they do not fully account for the mechanisms by which bilinguals can switch so quickly and easily from one language to another.

In recent years, psycholinguistic studies have turned to questions of how bilingual speakers deal with two or more language systems in the human mind. Rather than thinking of bilingualism as being constituted by two distinct language systems, modern psycholinguistic models suggest that both languages are active in the process of language use all the time. As a result, bilingual speakers have to switch their language modes and inhibit the interfering language at all times. This process is a complex interplay between lexical activation, inhibitory control, working memory, attention, and executive functions.

Urdu–English language speakers in Pakistan offer a particularly interesting case study for these cognitive mechanisms. The bilingual speech community of Pakistan is one of the largest, in which English is used as the language of higher education, administration, science and technology, and as a language of professional communication, and Urdu is the national language and main medium of communication in daily life. In the classroom, during presentations, on the Internet, via social media and in face-to-face encounters, students of the university are seen using Urdu and English interchangeably. This ongoing alternation provides an abundant natural laboratory to study bilingual lexical processing.

Although there is a high level of Urdu–English bilingualism in Pakistan, the psycholinguistic studies in Pakistan have been fairly limited. The existing work has mainly been concerned with attitudes toward English, language policy, education practices or sociolinguistic issues of code-switching. The cognitive impact of switching languages has been investigated only in a few empirical studies, and more specifically on lexical retrieval, language activation and executive control. Therefore, there are significant gaps in the literature on the effects of frequent code switching on the organization of the bilingual lexicon and cognitive processing.

Lexical retrieval is among the most basic cognitive processes of language production. The mechanism of selecting appropriate lexical items from mental lexicon and simultaneously inhibiting competing lexical

items in the process of speech production. For bilingual people lexical retrieval is more complex since lexical representation of two languages is partially activated. It is therefore essential that the bilingual speaker is able to handle lexical competition so that the speech he generates is fluent. Recent theories of bilingual language processing propose a dynamic, interactive, and language proficiency-dependent process for lexical access, where contexts and factors of language proficiency and frequency of language use, as well as cognitive control processes, influence lexical access.

The Inhibitory Control Model suggests that language production in bilinguals relies on the linguistic ability to suppress the non-target language and to facilitate the target language. This model proposes that language switching involves executive control processes which control the competition between language systems. The Bilingual Interactive Activation Plus (BIA+) Model also suggests that semantic representations from both languages are automatically activated during language comprehension, with the selection process to determine which lexical representation to activate triggered by additional selection mechanisms. In addition, the Adaptive Control Hypothesis proposes that bilinguals who use two languages frequently might have a more robust ECN, as they are constantly practising language selection in different communicative contexts. All of these theories suggest that code switching is an active cognitive process and not random mixing of languages.

Recent experimental findings have also called this into question, as code switching does not necessarily impose processing costs. Recent research has shown that code-switching can serve as a natural cue in the context in which it is used, and that this can enhance comprehension and memory in certain situations for bilinguals. The highly experienced bilinguals might even exhibit better memory performance for information presented in code-switched formats, suggesting that code-switching can aid, not impair, some aspects of cognitive processing.

This study aims to fill this gap by investigating the effect of code switching on cognitive processing and lexical retrieval of University students studying Urdu and English languages. In particular, it examines if code switching helps to access words during language production, lowers retrieval latency, helps to switch between language modes, or raises the demands for executive control. The study aims to shed light on the bilingual lexical processing in a natural multilingual environment by combining experimental psycholinguistic and qualitative approaches to bilingual language use.

This research is not only theoretic psycholinguistic but also has implications for practical purposes. The implications of the cognitive effects of code switching in bilingual education, language teaching, curriculum design, cognitive assessment and language policy in multilingual societies are discussed. Furthermore, empirical evidence from Pakistan can help to advance the study of bilingualism to a geographical level that has not been adequately explored in the study of bilingualism, especially in European and North American bilingual populations.

Ultimately, this study aims to contribute to the growing body of bilingual psycholinguistic research by demonstrating that code-switching represents not merely a communicative strategy but also a cognitive phenomenon shaped by the interaction of lexical activation, executive control, and bilingual language experience.

Literature Review

Code-Switching and Bilingual Language Processing

Code-switching is the regular switching from one language to another in a single communicative event. Previous literature, especially in the field of sociolinguistics, had linked code switching to socially motivated aspects such as identity construction, solidarity, management of the discourse, and management of the conversation. Previous research showed that bilingual speakers do not randomly switch languages, but instead do so in a way that is influenced by social norms, communicative goals and contextual factors. But such sociolinguistic reports do not give much idea of the cognitive processes that mediate the quick and efficient switching in speech of bilinguals.

Recent psycholinguistic studies have suggested a new understanding of code switching as a cognitive process that demands the constant interaction of several language systems. Recent models propose that the bilingual speaker does not turn off one language when using another. Rather, the lexical representations of the two languages are kept active at the same time, so that there is competition during language comprehension and production. Therefore, bilingual language processing requires ongoing activation, inhibition, monitoring and selecting of competing lexical items. This approach brought about a change in the research focus of codeswitching from the social functions of code switching to the cognitive architecture of code switching.

Experimental evidence shows that bilingual individuals have activation of lexical candidates from both languages when they are presented with either a monolingual input. The bilingual lexical access is non-selective because the cross-language activation also takes place automatically during word recognition, sentence processing and speech production. Previously, it was thought that bilinguals would only access one language at a time, as the findings suggest otherwise and, consequently, support interactive models of bilingual lexical organization.

Cognitive Processing in Bilingual Speakers.

Cognitive processing includes mental functions such as perception, attention, memory, language understanding, decision-making and executive control. These processes become more complicated in bilingual persons as more than one linguistic system can be activated during communication.

Studies over the years have consistently shown that the production of bilingual language involves the functioning of a number of executive functions, such as inhibitory control, working memory, attentional monitoring and cognitive flexibility. Every time bilingual speakers make a speech, they have to select the lexical representations of their intended language and inhibit the non-target language representations from interfering with them. This constant regulation imposes extra demands on executive control mechanisms than do monolingual language production.

An influential hypothesis is that the repeated dealing with competing languages will enhance selected executive functions. While the "bilingual advantage" question remains unresolved, there is a strong consensus that language switching activates cognitive control networks, in particular in bilinguals who switch frequently between different communicative situations. Such control processes are especially clear in switching between languages, lexical decision experiments and picture naming paradigms, and reaction times provide a measure of the efficiency of language selection mechanisms.

Recent investigations of the neurocognitive mechanisms of language processing also show that significant frontal and subcortical regions of the brain that are engaged during the processing of language

are similarly engaged during language switching, suggesting that language switching requires domain-general cognitive mechanisms, rather than simply linguistic ones.

Lexical retrieval in bilingual memory.

Lexical retrieval is the ability of the speaker to access the lexical representation in the mental lexicon during the production of a language. Fluency in speech relies on the ability to quickly activate semantic, phonological and syntactic information of lexical items.

Lexical retrieval is a specific problem for bilingual persons since there is an intermingling of the lexical representation of both languages within a common conceptual system. In the processes of language production, lexical elements of both languages are simultaneously retrieved, and there is a need for efficient cognitive processes to resolve the competition between them.

Picture naming experiments have revealed that bilinguals as a group are slower than monolinguals at naming pictures, particularly because they must deal with the risk of lexical competition to increase retrieval demands. These costs are also likely to be reduced, however, by repeated practice in language selection, if the bilingual language is used frequently.

Lexical retrieval efficiency has also been shown to be related to a number of interacting variables such as:

- language proficiency,
- place the language is used, and
- age of acquisition,
- language dominance,
- contextual cues,
- switching frequency,
- working memory capacity.

Faster lexical access is exhibited by highly proficient bilinguals, which may be attributed to the strengthening of the lexical links between languages with repeated activation. In contrast, weak lexical representations and greater interlingual competition lead to more interference for less proficient bilinguals in lexical retrieval.

Primarily, not just a memory-recalling process, but a process of interaction between the semantic memory, executive control, attention and activation processes specific for the language.

Switching languages is an effect of Executive Control.

The executive control is an integral part of bilingual language processing. Executive functions act as an inhibitory system on attention, inhibit the influence of task irrelevant information, update working memory, and control goal directed behaviour.

The executive control process for bilingual speakers is the mechanism by which they choose the language to be activated, and to suppress the activation of the other language. Language switching is therefore one of the most salient and apparent instances of executive control in natural communication.

The inhibitory processes of Green's Inhibitory Control Model hold that language production depends on processes that inhibit the representations of lexical items that are not wanted. The magnitude of the inhibition necessary is dependent on language dominance, language switching frequency and communicative context. The dominant language is the language that is more suppressed and thus the more strongly inhibited language is the one to be translated into.

Reaction times have been found consistently in experimental studies to increase when languages switch rapidly after, which is known as switch costs. These costs are taken as an indication that bilingual speakers need to switch over cognitive control mechanisms when they switch language. Frequent code switchers generally had lower switch costs than rare switchers, however, suggesting that the efficiency of the executive control may be increased in frequent code switching.

How to know how to translate between languages and what it is to be cognitively flexible.

Cognitive flexibility relates to the ability to shift rapidly between task, mental representations and behavioural strategies. In view of the fact that bilinguals frequently switch languages, many researchers have claimed that there is a potential for bilingual language experience to promote cognitive flexibility. The Adaptive Control Hypothesis is that the bilingual interactional contexts have an effect on the development of executive control. Individuals who regularly encounter heavy code switching situations regularly rehearse language selection, conflict monitoring and resolution in the cognitive control system. While studies on the general bilingual advantage are inconclusive, recent research shows that frequent code-switchers are more flexible in language-related tasks. Being bilingual does not in general translate to better cognitive skills, but rather to enhanced control of cognitive processes, especially in the selection of language and in monitoring conflicts.

Thus, code switching should not be considered as a weakness in the language skills but rather as an adaptive cognitive skill.

Urdu–English Bilingualism in Pakistan

The situation of Pakistan is a unique multi-lingual setting where Urdu is a national language and English is the language of higher education, government affairs, law, science and technology and international communication.

Students are using Urdu and English in classroom discussions, lectures, presentations, assignments, in digital communication and social interaction, on a regular basis. Code switching has become the norm in communication and not an exception.

In spite of this bilingualism, most of the studies conducted in Pakistan have focussed on:

- language attitudes,
- classroom code-switching,
- English language teaching,
- language policy,
- identity,
- sociolinguistic functions.

Few studies have used psycholinguistic methods such as lexical decision task, reaction-time task, eye-tracking or picture naming paradigm to study the bilingual lexical processing of Pakistani speakers.

Therefore, empirical studies on cognitive consequences of code switching between Urdu and English are limited to a small number of studies. This imbalance requires experimental psycholinguistic research in a multilingual context of Pakistan.

Theoretical Framework

The study is underpinned by four theories of bilingual language processing that complement each other. Inhibitory Control Model (Green, 1998)

According to the Inhibitory Control Model, bilingual language production relies on the ability to inhibit the non-target language and facilitate the use of the target language. Switching between Urdu and English thus involves executive control processes as a way of controlling lexical competition. The model predicts measurable switch costs and points to inhibition as one of the crucial processes in bilingual lexical retrieval.

Bilingual Interactive Activation Plus (BIA+) Model

In the BIA+ Model the automatic activation of the lexical representations from both languages explains bilingual word recognition. Language selection results from the interaction of orthographic, phonological, semantic, and contextual information, rather than from one language being completely turned off. This model assumes that lexical access when reading a bilingual text is non-selective.

Rewritten Hierarchical Model (Kroll & Stewart, 1994)

The model is distinguished between lexical and conceptual links between the two bilingual languages in the Revised Hierarchical Model. It is likely that early bilinguals are more likely to be using the lexical associations between languages, while more fluent bilinguals are getting to the concept directly. The model of the language proficiency and language dominance can be used to understand that language proficiency has an impact on lexical retrieval while switching languages.

Adaptive Control Hypothesis (Green & Abutalebi, 2013)

In the Adaptive Control Hypothesis, it is suggested that the requirements of various bilingual interactional situations influence executive control processes. The frequent alternation of language demands ongoing monitoring, inhibition and coordination of tasks, which results in adaptations of cognitive control systems. This theory suggests that frequent Urdu-English code-switchers would have more efficient language control system than infrequent code switches.

Conceptual Framework

This study conceptualizes the framework of the study on the basis of the present psycholinguistic theories of the bilingual language processing and it seeks to understand how code-switching between Urdu and English in a particular context can affect the cognitive processing of the bilingual by impacting lexical retrieval and executive control. The framework considers code switching frequency as an independent variable, the efficiency of lexical retrieval and executive control mechanisms as mediating variables, and the outcome of cognitive processing as dependent. It suggests that if bilingual speakers switch back and forth between Urdu and English, the lexical representations of both languages are being used continuously and therefore the cognitive system must coordinate between the two languages, while at the same time minimizing interference from the non-target language.

The framework premise is that bilingual speakers have an integrated mental lexicon in which the lexical items from both languages are linked at semantic, phonological and conceptual levels. Lexical candidates are activated simultaneously during language comprehension and production, not sequentially. Therefore, bilingual users have to continually decide on the correct language for the appropriate communicative situation, while inhibiting the activation of the other language's lexical items. This process is automatic, dynamic and highly reliant on cognitive control mechanisms that control language selection.

The frequent use of code-switching is regarded as a type of ongoing cognitive practice which develops the bilingual speaker's capacity to control competing linguistic systems. All the time when it switches

from Urdu to English, or from English to Urdu, one language has to be activated and the other language has to be inhibited. This frequent activation of executive control mechanisms, such as inhibition, attentional control, working memory, monitoring, and cognitive flexibility, is likely to enhance the efficiency with which bilingual speakers manage language competition. The code-switching model argues against code-switching as being a type of linguistic interference or deficiency and instead regards it as an adaptive cognitive process where the speaker uses the ability to switch between two language systems in operation.

Executive control is located in the middle of the conceptual framework because it plays a mediating role between the code-switching behaviour and lexical retrieval. During communication with bilingual speakers, executive control mechanisms keep track of context, assess communicative intentions, suppress lexical competitors and select the most appropriate lexical item. Efficient executive control minimizes lexical competition, decreases retrieval time and improves speech fluency. On the other hand, low executive control may cost more in processing, leading to slower lexical retrieval, hesitation, and more interference between languages.

The second important mediating construct in the framework is lexical retrieval. Lexical retrieval involves the retrieval of word representations from the mental lexicon in speech production and understanding. For bilinguals, lexical retrieval is a process of resolving competition between a number of lexical candidates that remain active in both languages (Urdu and English) simultaneously. The framework suggests that lexical activation by frequent use of code switching could lead to greater lexical accessibility, which would result in the more rapid retrieval of words in either of the two languages. Concurrently, the framework acknowledges that the efficiency of lexical retrieval can be different depending on the level of language proficiency, language dominance, frequency of language use, age of acquisition, communicative context, and cognitive control differences.

The framework also includes the Adaptive Control Hypothesis (Green & Abutalebi, 2013) that proposes that the distinct bilingual interactional contexts will influence executive control abilities over time. Students of universities studying both Urdu and English regularly engage in academic debates, class presentations, digital communication and informal discussion in which they switch between the languages. Regularly using language switching will be expected to enhance monitoring, attentional control, conflict resolution and cognitive flexibility, which will lead to better efficiency in bilingual language processing. In this view, code-switching is not simply a linguistic phenomenon but a cognitive adaptation process that is a continuous process of change between communicative demands and executive control processes.

With the basis of these assumptions, this study aims to propose that the Urdu–English code switching frequency has a significant impact on the cognitive processing as it affects executive control and lexical retrieval. Habitual code-switchers should be able to exhibit higher lexical retrieval efficiency, quicker reaction time, better language selection, and higher cognitive flexibility compared with less frequent code-switchers. The framework also recognises, however, that contextual factors, including language proficiency, education, frequency of use, interactional setting and cognitive differences, influence these relationships. Thus, the interaction of code switching and cognitive processing is modeled as a dynamic rather than as a deterministic one.

In general, this conceptual approach is a synthesis of cognitive, linguistic, and psycholinguistic approaches in a single explanatory model. It frames code-switching as an active cognitive process which influences the bilingual language processing system by regularly cycling between activation, executive control and language experience. The study aims to illustrate the relationship between the everyday language use of bilingual students, in Urdu–English context at the University of Pakistan, and the language retrieval and other cognitive functions, and to provide empirical data to the field of bilingual psycholinguistics.

Methodology

Research Design

In this study, a mixed-methods research design is used to explore the effects of code switching in cognitive processing and lexical retrieval in Urdu-English bilingual university students. An approach that is especially suitable is a mixed-methods approach, as it allows for a quantitative experimental approach and a qualitative approach that will afford a full examination of bilingual language processing. The quantitative component involves the application of standardized psycholinguistic tasks to measure objective measures of lexical retrieval efficiency and cognitive processing, while the qualitative component involves the exploration of experiences, perceptions and language switching patterns of bilingual speakers in naturally occurring communicative situations.

The study is convergent parallel mixed methods design, where quantitative and qualitative data is gathered in the same stage of the study, analysed separately and merged in the interpretation of the results. The design provides opportunities for numerical data from reaction-time measures and lexical retrieval tasks to be understood in conjunction with participants' self-reports of code-switching experiences. The two types of evidence together can provide methodological triangulation to increase the validity and comprehensiveness of the study.

Research Setting

The study will be carried out in selected public universities of Pakistan where Urdu and English are used as medium of instruction, interaction and communication in the classrooms. In these institutions, the students study in a naturally bilingual atmosphere where they often switch languages between Urdu and English while delivering lectures, presentations, group discussions, assignments, and using digital communication. These are ideal contexts for studying the habitual use of code-switching as they involve natural bilingual interactions instead of experimentally-induced language switching.

Participants

The target group is English and Urdu bilingual undergraduate and postgraduate students of public universities. Using purposive sampling the participants will be selected on the basis of their having good proficiency in Urdu language and their having good proficiency in English language and they do use code switching in both their academic and daily communication.

There will be approximately 80-100 bilingual students who will be involved in the quantitative phase of the study. This is a sufficient number of subjects for reaction-time studies as well as statistical comparisons, but not too large for a university-based psycholinguistic study.

A sample of 15-20 participants will be asked to engage in semi-structured interviews from the larger sample. The participants will be recruited to represent various levels of code switching frequency,

language proficiency, gender, and academic disciplines so as to represent a variety of bilingual experiences.

Inclusion Criteria

Participants must:

- indigenous speakers of Urdu or have learned Urdu as an early childhood language;
- have functional skills in English acquired at the University level;
- regularly communicate in Urdu and English in academic and social settings;
- not have any diagnosed speech, language, hearing or neurological impairments;
- agree to be part of the research and give permission to participate.

Research Instruments

In order to examine cognitive processing and lexical retrieval four research instruments are used in the research, which are complementary.

Language Background Questionnaire

Each participant will take a language background questionnaire, similar to well-known language profile questionnaires for bilinguals. The questionnaire will gather data on the following:

- age,
- gender,
- academic programme,
- the passage of time since English was learned, and
- self-rated language proficiency,
- daily language use,
- frequency of code-switching,
- preferred language in various communicative situations.

These background variables will help to interpret differences in lexical retrieval and cognitive performance.

Lexical Decision Task (LDT)

The Lexical Decision Task is one of the most widely used experimental techniques in psycholinguistics for examining lexical access. Participants will view a series of letter strings presented individually on a computer screen and will decide as quickly and accurately as possible whether each stimulus is a real word or a non-word.

The stimulus list will include:

- Urdu words,
- English words,
- code-switched lexical items,
- pseudowords,
- cognate-like distractors.

Reaction time and response accuracy will be automatically recorded using experimental software. Reaction times and accuracy will be interpreted as the efficiency of lexical retrieval, if they are faster and more accurate, respectively.

Picture Naming Task

Lexical retrieval in language production will be tested using a computer-based picture-naming test. They will be shown coloured pictures of common objects, actions or concepts and will be asked to identify each picture in Urdu, English or according to experimentally controlled switching conditions.

The task will assess:

- lexical retrieval latency;
- naming accuracy;
- switching costs;
- speech hesitations;
- language selection efficiency.

VOTs will be measured digitally for precise measures of lexical access.

Semi-Structured Interviews

In addition to the experimental results, semi-structured interviews will be conducted to understand participants' experiences of using two languages and code switching.

The following are typical questions that will be asked during an interview:

- times that participants switch language;
- ease or difficulty in recalling words;
- use of appropriate vocabulary; and
- active effort of language switching;

– Influence of academic and digital environment on bilingual language use.

The interviews will take about 30 to 45 minutes and will be audio recorded with the consent of the participants and then transcribed word for word for qualitative analysis.

Data Collection Procedure

Four sequential stages of data collection will be undertaken.

First, ethical approval will be gained by the relevant university research committee. Then, the heads of departments will be asked for a permission to recruit participants.

Second, participants will fill out informed consent forms and language background questionnaire.

Third, participants will complete the Lexical Decision Task and then the Picture Naming Task in a silent laboratory or computer classroom. All participants will be given the same instructions. Participants will be familiarized with the procedures by short practice trials before beginning each experimental task.

Lastly, some of the participants will be invited to semi-structured interviews. Interviews will be conducted one-on-one in a quiet room where there is not much distraction and can be encouraged to give in-depth answers.

The total time per participant should be about 35-45 minutes for the quantitative session and 30-45 minutes for the interviews.

Data Analysis

Quantitative Analysis

The Statistical Package for the Social Sciences (SPSS) will be used to analyse quantitative data.

The following will be included in the analysis:

- Descriptive statistics (mean, SD, frequencies);
- Cronbach's Alpha reliability analysis (where applicable);

- independent-samples t-tests;
- one-way ANOVA;
- Pearson correlation analysis;
- multiple regression analysis.

Reaction time will be cleaned for accuracy (correct responses only) and for statistical outlier (using a cut-off score), before further analysis on lexical decision and picture-naming tasks. The mean reaction time and latencies for naming will then be compared between the different levels of code switching frequency among participants.

The significance level for statistics will be set at 0.05.

Qualitative Analysis

Thematic analysis (Braun and Clarke, 2006) will be used to analyse interview data.

The analytical process will include:

1. familiarisation with the data;
2. initial coding;
3. searching for themes;
4. reviewing themes;
5. Identifying and identifying themes;
6. producing the final report.

Themes that come out of the stories of the participants will be matched up with quantitative data to see where there are overlaps or differences.

Validity and Reliability

Trustworthiness of the study will be enhanced using several procedures.

If the problem is quantitative, then:

The use of standardized tasks in psycholinguistics will be used;

The same testing conditions will be used;

- pilot testing will take place prior to the studies;

The internal consistency will be checked statistically.

In the qualitative component:

- interview guides will be reviewed by experts;

Member checking will be done if appropriate;

- peer debriefing will be used during thematic analysis;

The findings will be strengthened by using methodological triangulation.

Ethical Considerations

The research will adhere to internationally accepted ethical conduct guidelines in research with respect to human participants.

Detailed information on the objectives, procedures, benefits and potential risks of the study will be given to participants and written informed consent will be obtained.

There will be no compulsion to participate and they will be free to leave the study at any time, without penalty.

The confidentiality and anonymity of the respondents will be ensured during the research. All data sets will be anonymized with the removal of identifying information and digital files will be stored on password protected devices to ensure only the researcher can access them.

All participants will be protected from physical and psychological harm and all information collected will be used for academic and research purposes only.

Implications of the Study

The present study has several theoretical, pedagogical, methodological and practical implications for the study of bilingualism, psycholinguistics and language education in multilingual countries like Pakistan.

Theoretical Implications

In theory this study is one of the many that investigates a phenomenon known as code switching and tries to understand it as a psychological phenomenon and not only a sociolinguistic one. Although most previous research on code-switching has focused on its communicative functions related to identity, discourse organization and social interaction, the current study broadens this perspective by examining its link with cognitive processing and lexical retrieval. The study combines the Inhibitory Control Model, the BIA+ Model, the Revised Hierarchical Model and the Adaptive Control Hypothesis to create a holistic view of how bilingual speakers control competing linguistic systems during their language production and comprehension.

In addition, the study provides empirical data with respect to the Pakistani bilingual context which has not been studied in comparison with other contexts in international psycholinguistic literature. The majority of theories that have been created and tested have involved European and North American bilingual populations. Investigating Urdu–English bilingual speakers will help researchers see how well these theories apply to South Asian multilingualism, and foster the cross-cultural validation of bilingual language-processing theories.

Pedagogical Implications

The results of the present study hold significant implications for bilingual education and teaching of English in Pakistan. The use of code switching has been seen negatively in educational contexts as this may sometimes be mistaken as being a lack of language proficiency. If, however, bilingual language switching is demonstrated to help in the retrieval of words and to aid in efficient cognitive processing, then such assumptions might have to be rethought.

Teachers can benefit by understanding code-switching as a cognitive asset for learning, comprehending and communicating. Instead of strictly adhering to the bilingual dichotomy, the educational institution can use flexible bilingual pedagogies which can effectively use both Urdu and English for conceptual understanding and vocabulary development. This can be useful especially in the context of higher education where students often find themselves immersed in sophisticated academic arguments or information conveyed in English, but needing to discuss them in Urdu.

The study can also benefit curriculum developers through the identification of the cognitive benefits of balanced bilingual language use. Knowing how bilingual students access lexical information can help inform better instructional practices, assessment practices, and language support programmes.

Practical Implications

This study has implications for practical applications beyond the school setting. Results could have implications for speech-language therapists, educational psychologists, cognitive scientists and language

assessment professionals serving bilingual populations. An increase in knowledge about bilingual lexical retrieval processes can help in the design of more adequate language assessment instruments that take into account the normal cognitive processes of bilingual language use as opposed to bilingual speakers' performance based on monolingual standards.

The results also can help inform language policy makers in creating language policies that acknowledge the bilingual competence as an education and cognitive asset. Multilingual societies like Pakistan where both Urdu and English are used in academic, professional and social settings should have evidence-based language policies that do not enforce rigid distinctions between the languages, but acknowledge the realities of bilingualism.

Methodological Implications

The methodology exhibited in the study highlights the advantages of an experimental psycholinguistic approach and a qualitative study approach. The use of lexical decision tasks along with picture-naming experiments, reaction-time measurements and semi-structured interviews gives a more complete picture of bilingual cognition than using any one of these research methods alone. The mixed methods approach could be useful as a model for further studies of bilingual language processing in multilingual settings.

Conclusion

The use of code switching is a natural part of the bilingual communication process and is a multifaceted phenomenon of language and cognition. It is a linguistic competence and is not evidence of linguistic incompetence, but rather a mechanism that bilingual individuals use to optimally control two language systems in order to achieve their communicative goals. It is therefore crucial to understand how cognitive processes support code-switching if a better explanation of the present theories of bilingual language processing is to be developed.

The aim of the present study is to explore the effect of Urdu-English code switching on cognitive processing and lexical retrieval using the familiar psycholinguistic theories and experimental and qualitative methods. The study is based on the concepts of the Inhibitory Control Model (ICM), the Bilingual Interactive Activation Plus Model (BIAP), the Revised Hierarchical Model (RHM), and the Adaptive Control Hypothesis (ACH), which conceptualise bilingual lexical retrieval as a continuous activation, inhibition, monitoring, and language selection process.

The research aims to address a gap in the bilingual psycholinguistic literature which has been focused mainly on the western bilingual population, by concentrating on Urdu-English bilingual university students in Pakistan. The study might serve as a contribution to ongoing theoretical discussions on bilingual lexical organisation and as a source of practical information for language education, bilingual assessment and language policy in multilingual societies.

Overall, the study highlights the need of acknowledging bilingualism as a cognitive asset, instead of a linguistic disadvantage. The need to grasp the mechanisms by which a bilingual speaker accesses lexical information and manages multiple languages will continue to be a pertinent subject of study in psycholinguistics, given the growing importance of multilingual communication in the educational, professional and digital fields. The results of this study are expected to contribute to the literature on researchers, educators, policy makers and language practitioners interested in understanding the

cognitive processes underlying bilingual language use and the contribution of code switching to bilingual communication.

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