EFFECT OF AGING AND LINGUISTIC DOMINANCE ON LEXICAL RETRIEVAL IN URDU-ENGLISH BILINGUALS: A PSYCHOLINGUISTIC STUDY

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Candidate of Master of Philosophy at the National University of Modern Languages do hereby declare that the thesis EFFECT OF AGING AND LINGUISTIC DOMINANCE ON LEXICAL RETRIEVAL IN URDU-ENGLISH BILINGUALS: A PSYCHOLINGUISTIC STUDY submitted by me in partial fulfillment of MPhil degree, is my original work, and has not been submitted or published earlier. I also solemnly declare that it shall not, in future, be submitted by me for obtaining any other degree from this or any other university or institution.

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ABSTRACT

EFFECT OF AGING AND LINGUISTIC DOMINANCE ON LEXICAL RETRIEVAL IN URDU-ENGLISH BILINGUALS: A PSYCHOLINGUISTIC STUDY

The shift from local to global world order has inclined people to acquire more than one language. This shift has opened various domains for scholars from different areas of research, which may include linguistics, psychology, anthropology and sociology. The study is based on the exploration of the impact of aging and linguistic dominance on lexical access among bilinguals. It intends to find out whether aging affects lexical recall or not, and whether linguistic dominance in any of the two languages (L1 or L2) affects lexical retrieval in the non-dominant language or not. The theoretical framework for this study is based on the study conducted by Rossi and Diaz (2016) for studying the impact of aging on lexical retrieval. Moreover, this study challenges the work of Sullivan et al. (2018), who claim that the reason behind slower lexical retrieval among bilinguals is the competition account and not the weaker link hypothesis. However, this study uses weaker link hypothesis proposed by Gollan et al. (2007, 2008, 2011) to find out the impact of aging and linguistic dominance on lexical retrieval. The data has been collected from bilinguals having Urdu as their first language (L1) and English as their second language (L2). These participants are further sub-divided into four groups such as: young bilinguals with L1 dominance, old aged bilinguals with L1 dominance, young bilinguals with L2 dominance and old aged bilinguals with L2 dominance. Lexical retrieval is measured using psycholinguistic experiments: Translation Task, and Semantic Written Fluency Task in Urdu and English. Moreover, a comparison has been made between the results of these tasks based on age and linguistic dominance. The scores are measured, and their mean values are calculated. The findings of the study reveal that there is no effect of aging and linguistic dominance on lexical retrieval. The results of the study have important implications for the applied linguists working in the field of Second Language Acquisition (SLA), English Language Teaching (ELT) and bi/multilingualism.

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Chapter 1

INTRODUCTION

Language is a distinctive characteristic that distinguishes humans from other creatures. The ability to communicate in a well-defined language that can be recorded and transferred has helped human beings advance in different spheres of life. Researchers have delved into the topic of linguistics because of the cognitive abilities associated with language use and other pertinent factors. Moreover, over time due to changes such as digital commutation, inter-racial marriages, and a shift from local to global world order, humans have started mastering more than one language. Due to these reasons, with the growing number of bilinguals, the interest of researchers in studying the two or multiple language usage and processing has grown during the last few decades.

The researchers have been taking a lot of interest in understanding the psychological and linguistic abilities of bilinguals. The effects of bilingualism on some abilities like problem-solving skills, metacognitive awareness, varying thinking, attention control, and managing working memory load have been part of the ongoing debate in the field. Some scholars are in favour of bilingualism as for them it has a positive impact on the mind and bilinguals' ability to deal with two languages helps them develop better cognitive abilities. On the contrary, for others, bilingualism has a negative impact on thinking abilities because two languages continuously compete and hence affect their cognitive abilities. The net value of bilingualism has been the topic of debate for years, yet it has not lost its relevance. The full complexity of the bilingual effect is yet to be explored.

To add to the ongoing debate, this study explores the relationship between bilingualism and the cognitive skills of its speakers by focusing on the effects of bilingualism on lexical recall. The main question that this study tries to address is whether the dominance or preference of one language over the other and the time one has spent speaking two languages slows down or accelerates the person's lexical retrieval.

A wealth of literature is present on the physiological and neural models that are devised for examining the language processing along with aging. This research

focuses only on psychological models. It discusses the bilingual language processing models and then the integration of these models with aging and language dominance. The chapter on literature review presents a detailed discussion on the models formulated for investigating the programming of language in bilinguals.

For studying the impact of linguistic dominance and aging on bilingualism, this study incorporates only Urdu as a first language (L1) and English as a second language (L2).

1.1 Statement of the Problem

Failure in lexical retrieval is associated more with bilinguals as compared to monolinguals since bilinguals have to juggle with more than one language regularly. Whether their struggle with recalling and selecting from two languages increases or decreases as a bilingual grows in years is one of the concerns of this study. The study endeavors to find the answer to: if aging facilitates bilinguals to recall the words from the desired language or vice versa. The second issue that the study intends to explore is the effect of linguistic dominance on lexical retrieval, i.e., if one of the two languages becomes dominant over time and to explore how does that dominance affect the lexical retrieval in the non-dominant language. The present study aims to study the two significant factors, aging and linguistic dominance, among Urdu-English bilinguals with the help of psycholinguistic experimental methods.

1.2 Objectives of the Study

This research aims to examine the:

i. Impact of aging and linguistic dominance on word recall among bilinguals.
ii. Differences in the bilinguals' responses based on their age gap and language usage (first or second).

1.3 Hypothesis

This research assumes that bilinguals have slower lexical retrieval as compared to monolinguals because of frequency lag and competition account. Building upon this assumption, this research study hypothesizes that:

Hypothesis 1 (H_1): With aging, lexical retrieval becomes slower.

Null Hypothesis (H_0): Aging does not affect lexical retrieval.

Hypothesis 2 (H_2): Linguistic dominance in one language affects lexical selection and retrieval in the other language.

Null Hypothesis (H_0): Linguistic dominance in one language does not affect lexical selection and retrieval in the other language.

1.4 Significance of the Study

Until recently a large portion of linguistic processing and mechanism had been based on monolingual speakers, and relatively less has been examined about the language system of bilinguals. However, in this very age of globalization and advancement in technology, bilingualism and bilingual memory require more and more attention to be examined. Moreover, the change in language of bilinguals due to aging is still not determined explicitly and the matter of its extension and complexity has received very little attention in the field of research.

One of the purposes of this research is to bring together the two areas of concern, the first one is aging and the other one is bilingualism, in the domain of scientific and social fields. Experiences that seem to be successful in sustaining functioning are of great interest because of the constant media attention on the elder society and the requirement for activities to prevent cognitive impairment. Additionally, the past ten years have seen a tremendous surge in research on the cognitive effects of bilingualism, making it a fascinating field to explore. The study aims to study the effect of aging on bilingualism. Health professionals as well as academics and learners in the subject of linguistics will be intrigued in the study's findings.

Another main significance of the study includes the processing of the English language in terms of age and dominance among Pakistani bilinguals. The results can be beneficial for applied linguistics and sociolinguistics scholars who are studying the causes of the failure of correct English language usage by Pakistani students and society. Moreover, the study adds to the ongoing debate that either bilingualism has a positive or negative impact on a bilingual. In this way, the study theoretically challenges the competition account and is based on the assumption that the weaker link hypothesis is the reason behind the slower lexical retrieval among bilinguals. In short, the significance of the study lies in the fact that till date there is no significant research has been done in Pakistan to study the impact of aging and linguistic dominance among Urdu-English bilinguals.

1.5 Delimitation

The study proposes to focus on only two variables, age and linguistic dominance, affecting language processing. It aims to stay confined to only these two factors instead of involving the age when Second Language (L2) is acquired, educational background, social as well economic factors, or the way second language is learned (either simultaneously or sequentially) by the bilinguals. 40 Urdu-English bilinguals are selected for finding out the impact of aging and linguistic dominance on lexical retrieval, twenty participants are selected from each of these two age groups: 12 to 20, and 30 to 40.

1.6 Research Methodology

The research methodology for the study consists of primary collection method. For studying the impact of linguistic dominance and aging on lexical retrieval in bilinguals, two psycholinguistic tests: Translation Task and Semantic Written Fluency (SWF) Task were applied. SWF tasks were further divided into letter fluency task and category fluency task. Moreover, linguistic background and preferences of bilinguals were also analyzed through questionnaire.

Participants were assessed on their performance in English to Urdu and Urdu to English translation tasks and based on the scores they gained in SWF tasks. The mean value of their scores was calculated for comparative analysis of groups on the basis of aging and linguistic dominance. To study the significance of the results, students' t-test and regression model were applied. The statistical analysis of tests then provides the findings of the study.

A total of 40 participants were taken into consideration. All these participants were further categorized into four different groups based on their age and linguistic dominance. The criterion for the selection of participants was that they were supposed to have Urdu as their first language(L1) and English as their second language (L2). They must belong to any of the two age groups, either 12 to 20 or 30 to 40. They were supposed to spend more than 13 hours per day, either L1 or L2, to be considered as dominant in that specific language.

1.7 Theoretical Framework

Theoretical framework for this research is based on the claims proposed by Rossi and Diaz (2016) for studying the impact of aging on lexical retrieval. According

to them, it is still unclear whether and to what degree age-related language changes affect the two languages differently, and this problem has not gotten much attention. However, research has been done on the hypothesis that the two languages can be differently modulated by adult-onset language changes. For instance, Goral, Spiro and Obler (in preparation) used the Boston Naming Task and a semantic fluency task in both languages to assess 78 English-Spanish speakers between the ages of 50 and 78. In spite of the fact that language proficiency tests showed that these speakers were equally competent in both languages, their results showed that age was only a predictor for one of the two languages (i.e., the L1 English). This indicates that the languages of the bilingual person may be affected differently by changes in language processing brought on by aging. These findings, along with the hypothesis that a bilingual's two languages may be differentially impacted by age-related changes in language processing independent of proficiency. Based on these findings, this study assumes that with aging language process is affected and tries to find out the degree of change in language processing due to aging.

Moreover, Sullivan et al. (2018) claims that the reason behind slower lexical retrieval among bilinguals is the competition account and not the weaker link hypothesis, however this study retests his study and take weaker link hypothesis proposed by Gollan et al. (2007, 2008, 2011) as a reason behind slower lexical retrieval.

Moreover, the study is based on the notion of 'bilingual individuality' as claimed by Grosjean (2008). According to him, each bilingual has different usage of both languages, and therefore has various language repertoires. This idea helps to classify bilinguals in terms of their linguistic dominance.

1.8 Organization of the Study

This research study is organized systematically in the following manner.

This first chapter lays out a comprehensive introduction, presenting an explicit picture of the whole research, covering and highlighting basic concepts related to the study, and stating research hypotheses, statement of the problem, and the delimitation of the study. It also briefly discusses the research methodology and the theoretical framework for this present study.

The second chapter provides the literature review, which consists of a detailed review of the relevant research already done in study. The chapter presents critical discussions and insights, and an awareness of dominant arguments, theories,

and approaches in the field. It provides an analysis of the relevant published works linked to the purpose and rationale of this study. It lays out the basis for the study by highlighting the research gap based on the preceding discussion.

Next, the third chapter provides the theoretical framework and research methodology. Depending on the theoretical, methodological, and epistemological review of the studies already done in the selected domain, the researcher chooses a theoretical framework, which provides a structural framework for the study. The research methods and procedures along with the details of sampling and participants, data collection resources and the analysis are stated. It states the whole mechanism employed to carry out the research.

After the explanation of the research methodology, the fourth chapter provides the analysis of the data collected through the research. It consists of descriptive explanations of the responses made against the demographic questionnaire and psycholinguistic tests, by the participants.

The fifth chapter provides the findings and discussions. Detailed analysis carried out in the previous chapter provides the findings for this study. This chapter discusses the findings in the light of the hypotheses set for the study. It also discusses the results and provides supporting evidence and detailed explanations for the outcomes.

The concluding chapter briefly summarizes the hypothesis, theoretical framework and methodology of the study. It also highlights the results and findings of the study, and the contributions this study has made in the relevant area of research. Recommendations for further research are also given in this chapter.

Chapter 2

LITERATURE REVIEW

This chapter provides a detailed review of literature related to this present study. The literature review offers a critique of the pertinent published works thereby highlighting a gap for this study. It comprises seven sections. The first section provides definitions of bilingualism. The second section discusses various models proposed for language processing in bilinguals. The third section highlights the processes involved in lexical retrieval in bilinguals. The fourth section points out the relationship between age and bilingualism. The fifth section defines the connection between language dominance and bilingualism. The sixth section elaborates the mechanism behind the translation in bilinguals. The seventh section highlights the research gap built on the updated critical discussions from the work cited earlier in this chapter.

2.1 Bilingualism

Bhatia and Ritchie (2014) claim that literature on bilingualism provides a variety of definitions. Bloomfield (1933) cites a commonly accepted definition of bilinguals that implies that bilinguals possess the ability to speak two languages just like the native speakers of those languages. However, bilinguals, according to Haugen (1969), are the ones fluent in one language, able to produce complete, constructive expression in the second. According to the above mentioned statement, people with varying levels of fluency and competency in their second language (L2) are classified as bilinguals.

From Grosjean's (2010) exhaustive definition of bilingualism, it can be deduced that persons whose linguistic ability in both languages fluctuates in relation to a particular domain can be regarded as bilinguals. Furthermore, he defines bilinguals as those who use two or more languages daily. Valdés and Figueroa (1994) provide a broad definition of bilingualism, describing bilinguals as those who are linguistically competent in more than single language. According to Hakuta (1986), such encompassing criteria provide foundations for the study of Second Language Acquisition (SLA) within the subject of bilingualism. Including SLA in the discipline of bilingualism also enables researchers to investigate the contextual and temporal

variability of language abilities and usage, which is best examined using the culturally structured methodologies of SLA (Larsen & Freeman, 2007).

While these more inclusive definitions of bilinguals have advantages, they are also being challenged to assume that bilinguals include all non-monolingual persons. These implications effectively correlate bilingualism with multilingualism (Angelis, 2007).

2.1.1 Language usage and bilingual distinctiveness

Bilinguals frequently learn and use their languages for a variety of purposes, with other people, and in multiple life areas (Grosjean,2008). He (2010) cites language usage as a key factor in determining bilingual identity. According to Grosjean's (2008) Complementarity Principle Model, linguistic requirement evaluates a bilingual's degree of proficiency and distinct territories can specify an individual's competency for both languages. This suggests that bilinguals are rarely competent in all realms of both languages. He asserts a theoretical multilingual characterized as per 16 various spheres of existence, such as family, work, acquaintances, and media, symbolized by 16 non-interlocking hexagonal forms. All bilinguals might be arranged in a similar manner.

Therefore, for Grosjean, usage and context will vary depending on the bilingual, resulting in a unique, complicated, and distinct biographical profile that is distinct from that of any other bilingual. In a previous piece, Grosjean (1997) emphasized that bilingual's structure of entire linguistic catalogue aids in explaining the reasons behind their seldom attainment of complete along with equal proficiency in both of languages and are thus not always effective transcribers. Few bilinguals may not be able to comprehend the statement from one of their two languages because of less understanding of that language's culture and stylistic variations. These shortcomings result in issues of interpretation because of lack of required transmission abilities and memory processing. Grosjean (Ibid) claimed that the complementarity principle must be considered as a prerequisite for interpretation mentoring: unlike ordinary bilinguals, interpreter must gain knowledge to put their languages in use to gain equivalent goals, in comparable areas of life, and with nearly equivalent individuals. This is a task that most bilinguals rarely have to perform.

Moreover, he (Ibid) notes that the CPM provides the reasons behind the gradual alteration in bilinguals' profile. He elaborates by describing his own experiences that

how schooling and travelling to other countries has brought variations in his L1 during seven years. The Complementarity Principle Model by Grosjean adds to this study:

1. Because of variables such as language usage frequency, language availability, and attenuation, a large percentage of bilinguals gain command in one of their languages more effectively as compared to the other language.

2. As it highlights the intricacy of distinct multilingual profiles for everyone.

3. Since it demonstrates that, regardless of expertise level, personal characteristics evolves gradually and in reaction to external factors.

2.1.2 Bilingualism and linguistic exposure

The process of language processing in bilingualism is influenced by many factors, besides aging and linguistic dominance. The following studies suggest that factors such as an age of exploring L2 and cultural background of bilinguals also impact their language processing.

Studies by Portocarrero et al.,(2007) provide evidence of average score attained by bilingual group on standardized tests of English vocabulary. Their performance, however, was much worse than that of monolinguals taking part in the same study. The outcome of the study was however not unexpected, given the monolinguals likely had a longer and greater exposure to English than the bilinguals, born in the United States. This research implies that, despite arriving in the United States before puberty and achieving a good command over English vocabulary, some non-native speakers have low grasp over English vocabulary than their monolingual counterparts. However, in the studies where researchers examined the performance of early bilinguals (group arriving to the U.S. before the age of 10) and monolingual native speakers, the difference in expertise in English vocabulary diminishes.

Additionally, if bilinguals were able to communicate in both languages, they would likely have a better linguistic vocabulary than their monolingual colleagues. Nevertheless, in studies employing neuropsychological evaluations of non-native speakers using monolingual norms, the difference in English vocabulary, must be taken into account, despite the years spent in country of the language and having a good command over the language. Aligned with previous research, this data shows that the younger an immigrant is when they arrive in the United States, the greater their final English vocabulary. The monolingual and bilingual groups' phonological fluency was

comparable. Nonetheless, as compared to the monolingual group, the bilingual group did much worse in semantic fluency.

Other research has revealed that bilinguals score poorly on semantic tasks, instead of verbal fluency. This performance trend was in comparison to monolinguals (Gollan et al., 2002; Rosselli et al., 2000). Some studies speculate that this performance pattern may be related to higher cross-language interference for bilinguals when recalling concrete terms vs non-concrete words. Consequently, it was expected to witness a greater difference in the average performance between the monolingual and bilingual groups for the Animals and Kitchen categories than for the Actions category.

Portocarrero et al., (2007) discovered substantial average performance differences between the Animal and Action categories but not between the Kitchen and Action categories, therefore their hypothesis was only partially validated. According to Rosselli et.al. (2000), lexical knowledge is related to semantic fluency whereas, phonological fluency is linked to executive functioning-related activities; hence providing an alternate reason for the divergent pattern of performance in verbal fluency between the two groups.

Since the bilinguals in the sample of Portocarrero's (Ibid) study were from a group with lesser English vocabulary than the native monolinguals, there is a possibility that they could not create as many words for the semantic tasks. Culture is another factor for contrasting differences in the mean performances of the two groups. Due to the diverse cultural backgrounds of the bilinguals in the sample, some of the English translations were probably unknown. In the Kitchen category, for instance, certain cultural groups may utilize fewer things than the American culture and hence develop fewer words than monolingual natives. Intriguingly, this study discovered that the performance gap between monolinguals and bilinguals in the Animals category was substantially larger (in favour of monolinguals) than in the other two categories. Therefore, it is also likely that the bilinguals did not know the English equivalents for certain creatures or were exposed to animals native to their home countries for which there is no translation.

There are various limitations to the study discussed above. For instance, not all bilingual participants spoke the same original tongue. Individuals' native language skills were not explicitly tested. Even if they evaluated themselves as equally good in both languages, there is no certainty of their true proficiency in their home tongue. In

addition, this study's findings are based on a small sample of bilinguals (with specific profiles) and hence, the applicability of these findings on other bilingual groups may differ.

This helps to conclude that non-native English speakers are increasingly referred for neuropsychological assessments in the United States. As a result, many bilingual persons are assessed with instruments normed for monolingual English-native speakers. There are performance disparities between non-native bilinguals and native monolinguals, according to this and the other research. Lastly, these variations in performance between monolinguals and bilinguals highlight the need for normative data on bilingual populations.

2.2 Models for Language Storage, Access, and Retrieval in Bilinguals

Knowing many languages can have a significant effect on the neurological or mental systems responsible for language understanding. Bilinguals, for instance, understand words that are verbally articulated and frequently gain access to data at a time, in both languages (FitzPatrick & Indefrey, 2010; Marchman, Fernald & Hurtado, N. 2010; Marian & Spivey, 2003a, 2003b; Thierry & Wu, 2007). Furthermore, lexical frequency and neighbourhood density, two language-related characteristics known to influence monolingual processing can have an impact on bilingual managing in both, inter and intra languages (Van Heuven et al., 1998). Bilinguals are also influenced by characteristics such as the year in which they acquired second language, comparative capability in both languages, as well as language supremacy that are unique to multilingual experience (Bates, Devescovi & Wulfeck, 2001; Kroll & Stewart, 1994a; Marian & Kaushanskaya, 2008). The computational modelling of language processing enables the construction of simulated, controlled settings in which various variables may be adjusted to anticipate their effects on processing. Moreover, models might be crucial for enhancing or improving an existing idea of how language systems function.

The framework established by monolingual language processing literature prepared the path for the development of bilingualism computational models. The theories of monolingual connectionists had an impact on many earlier models of bilingual language processing. The Bilingual Interactive Activation+ (BIA+) model is one example (A. F. J. Dijkstra & Van Heuven, 2002; Van Heuven, Dijkstra & Grainger, 1998; Grainger & Dijkstra, 1992) of expansion of the Interactive Activation concept,

which was created for a single language (McClelland & Rumelhart, 1981). This paradigm focused on visual/orthographic input processing in bilinguals.

Similarly, the Bilingual Model of Lexical Access (BIMOLA; Grosjean, 1988, 1997) was impacted by McClelland and Elman's (1986) TRACE model of monolingual language comprehension. Li and Farkas (2002) recently developed the Self-Organizing Model of Multilingual Processing (SOMBIP), a dispersed neural network framework that uses unsupported knowledge to record bilingual lexical entry. This model was influenced by Miikkulainen's (1993,1997) self-organizing DISLEX model, the TRACE model of monolingual speech perception developed by McClelland and Elman, (1986) affected the Bilingual Model of Lexical Access (BIMOLA; Grosjean, 1988, 1997). Zhao and Li, (2007, 2010) enhanced several SOMBIP model's characteristics to develop DevLex-II. This self-coordinating pattern depicts the interaction and evolution of bilingual lexicons.

Remarkably, these bilingual processing theories increase the complex interplay between a bilingual's two languages by extending past monolingual research rather than simply adding a second language to the design that already exists. This occurs because the two languages of a bilingual person connect, which can be seen in a wide range of methods, highlights some issues and concerns associated with bilingual language processing. BIA+ and SOMBIP, for instance, rely on an incorporated vocabulary, whereas BIMOLA isolates the two languages at the lexical level. The interaction between a bilingual's two languages is influenced by differences in system architecture. This concept may be observed when an integrated lexicon permits lexical elements from different languages to interact. Separating languages may also reflect more extensive autonomous lexicon processing. The models have specific presumptions regarding how lexical items should be categorized. For instance, BIA+ requires the use of language labels to designate entities as L1 or L2 when mixing two languages at the word level.

On the contrary, neither BIMOLA nor SOMBIP conclusively indicates language involvement. BIMOLA employs 'global language' knowledge for words categorization, whereas SOMBIP uses the phono-tactic standards of the input itself. Lexical structure and categorization challenges are crucial to any model for processing a multilingual language. Bilingual Language Interaction Network for Comprehension of Speech (BLINCS) is a new benchmark of bilingual spoken language processing that

records bilinguals' active language processing so that it may be examined how the lexicon might be organized or categorized in bilingual language tasks. Understanding of the stable models of the bilingual processing system can be gained by using localist approaches such as BIA+ and BIMOLA, but the variability of the bilingual system needs to be observed manually. This variability is observable, as bilingual language processing can be affected not only by prolonged attributes but also by brief characteristics that promptly changes (Bates et al., 2001; Kaushanskaya,Yoo, & Marian, .2011; Kroll & Stewart, 1994a). A model can grow more efficiently to depict the flexibility intrinsic to multilingual processing by incorporating a learning mechanism, such as the self-establishing aspect of the SOMBIP.

As a result, BLINCS incorporates distributed and localist models' traits for accurately reflecting the actual working of bilingual verbal language understanding. The BLINCS model, a particular computational model of spoken language processing in bilinguals, also accounts for the progressive development of cross-linguistic lexical stimulation (Shook & Marian, 2013).

Bartolotti and Marian (2012) asserted that the discussion on bilingual language storage, access, and retrieval has been ongoing for decades. Diverse scholars developed theories to reduce the psychological and cognitive complexity of bilinguals' language ability. These theories seek to describe the interplay of two or more languages active during the understanding and production of language.

2.2.1 The Revised Hierarchical Model

Kroll and Stewart (1994) developed the Revised Hierarchical Model (RHM), which stated that for two languages of bilinguals, there are distinct compartments for lexicons and directly related connections between translation equivalents. This method derives mostly from the work of Potter, So, Von Eckardt and Feldman (1984), that contrasts between the theoretical links that lie in words and the concepts they reflect and the associative links that exist inside both languages.

When beginning to learn or acquire a second language, learners create a strong relationship between the words of L2 and their translation counterparts in their first/native language (L1), but less connection with the common conceptual storage. This is due to the fact that as learners mature, they live and communicate in their L1, causing them to access concepts in their L1 and strengthening the link between their lexical memory in L1 and their recall of concepts. Then, when they begin learning an

L2, they have no concepts to begin with since they do not know about the culture or have a large vocabulary, or how to cope with the language in general, so their brain accesses these concepts through their L1. Then, when they continue to study L2, they begin to develop the uninterrupted connection of L2 with the idea store, but because it did not have as much time to develop, this connection is less strong than the one between L1 and the notions it represents.

Consequently, access to the word's meaning in the L2 is achieved through stimulating its corresponding in L1 and retrieving its semantic meaning. Over time, however, L2 lexical items become directly connected with the notional storage; hence, the necessity for L1-facilitated recall of meaning of words diminishes.

The RHM proposes that L1 lexicon and the conceptual system have stronger connection as compared to one that exists between L2 lexicon and the theoretical store. On contrary, the linkages between the words in L2 to L1 are greater as compared to L1 to L2 association, this is because lexical items from L2 are typically taught by connecting them to their L1 equivalents. This model is a merger of word association model and concept mediation model.

Additionally, with a single conceptual store that contains connections to lexical components in both languages, the RHM separates lexical and conceptual stores. The intensity of these numerous links, either that exists between lexical items or from specific lexicons to the conceptual store, can be changed, it is possible to mimic the structure of the language system across development in simultaneous or sequential bilinguals.

Recently some questions are being raised on the validity of RHM due to bilingual language interactive processing. Brysbaert and Duyck (2010) contested the presence of different lexicons, access to discerning language, and a deterioration in the connection between L2 terms and their meanings, all of these notions were postulated by RHM. However, it is suggested that the RHM fails to address the above-mentioned queries.

2.2.2 Self-Organizing Model of Bilingual Processing

Li and Farkas (2002) developed the Self-Organizing Model of Bilingual Processing (SOMBIP) that provides an examination of the ability of the linguistic structure to automatically shape in a way that accommodates inputs from two or more languages. It was created using connectionist theories of language storage in

monolinguals and bilinguals that self-organize depending on statistical commonalities in input. SOMBIP is proven to effectively isolate languages from store illustrations in a common space when the input is a varied language. In SOMBIP, the auto-structuring models begin when arrangements of nodes are arbitrarily stimulated and dispersed throughout the coplanar region. Then, stimulated units and the units that are adjacent to them, adapt to respond intensely in the future to the identical stimulus. Over time, the reaction of the model to inputs becomes more selective, and functionally different areas that respond to specific forms of information are developed. SOMBIP has two linked self-organizing models, one of which stimulates the involvement of phonological data and the other semantic information. Owing to their parallel semantic representations, the model's design enables translation counterparts to get intimately related at the phonemic level.

Moreover, SOMBIP does not exchange semantic ideas between languages. Instead, each language's semantic ideas are epitomized in a common area inside a self-organizing model. SOMBIP's power lies in its ability to practically isolate languages inside a common storage region based on stimuli that are concomitant, which provides a conceivable system for the development of an incorporated dictionary in bilingual Long Term Memory (LTM).

SOMBIP can apprehend features of progression in bilingual linguistic skills based on their success in acquiring a second language. Speculations of linguistic processing in bilinguals create suppositions regarding language and memory arrangement and the method in which admittance to memory happens; regardless of whether a hypothesis just makes claims around one part of language processing, it makes indirect assumptions about how the rest of the framework is coordinated. The benefit of a model, expressed either orally or implemented computationally, lies in the fact that it pushes the researcher to challenge these implied presumptions. As perceived in the progression of disconnected lexicon to single, a coordinated bilingual lexicon in BIA+, and SOMBIP, assumptions can only be challenged and modified when they are made clear. At this level, the increasing specialization of models of bilingual language processing presents a difficulty. Subsequently, in order to classify and assess conflicting assumptions, it is required from models to clarify ideas and offer a framework on the basis of which they are fabricated.

2.3 Lexical Retrieval among Bilinguals

Various studies are present in the literature that explain the language processing in bilingualism. These studies provide diverse mechanisms for language retrieval. On one hand, some of the researchers favours the notion that either both languages of bilinguals stimulate at a time, or one language of the bilinguals facilitates the retrieval of other language, while on the other hand it is claimed by some scholars that two languages compete for selection. This section explains all these notions along with some models proposed by scholars to explain the psychological processing of language, such as the weaker link hypothesis and the Inhibitory Control Model.

2.3.1 Simultaneous activation of two languages

Many bilingual lexical access theories claim that, during the period of lexicalization in a single language, the semantic framework initiates the lexical nodes of bilinguals' both languages.

The simultaneous stimulation of both languages in bilinguals is confirmed by multiple experimental paradigms. For instance, Colomé (2001) revealed the initiation of non-target lexical conceptions radiation to corresponding phonological representations, by utilizing a phoneme-monitoring test. This assignment requires partakers to assess whether a certain phoneme appears in the spellings of an image or not. Her primary outcomes demonstrated that when Catalan-Spanish bilinguals were presented with an image of a table, they quickly detected the presence of a phoneme that was existing in the Catalan word as compared to the absence of a phoneme which was not existing. Notably, if adverse replies were needed, bilinguals provide delayed responses if the phoneme was absent and a quick reply if the phoneme was present. Such findings demonstrated the coexistence of sub-lexical phonological activation of bilinguals' two languages.

Additional evidence is provided by the picture-word interfering model, which requires the partakers to identify an image by discounting a distracting sentence conveyed either vocally or graphically. For highlighting the procedures involved in lexical access, two significant impacts are employed: the semantic intrusion effect and the phonological facilitation effect. The former impact refers to when the diverting term is semantically connected to the picture being asked and less delay is observed in naming, as opposed to when it is unrelated. It is thought that sluggishness results from lexical rivalry, in the process of lexical selection, amongst active lexical elements. The

second impact refers to the more delays in naming observed when there exists a phonological relation between a distractor and the name of the image being asked, such as dog and doll. Such results are observed due to the enhancement in the stimulation of shared phonemes between the distracting term and the image's tag.

Curiously, Dutch-English bilinguals were asked to identify photographs in English, which is their second language, for instance, 'mountain' (Hermans, Bongaerts, De Bot & Schreuder,1998). Simultaneously, they were introduced to English distractor terms that were neither connected to the image name (such as "present") nor related to the Dutch conversion of the picture name phonologically (such as bench). In comparison to unrelated distractions, these later forms of distractions delayed participants' answers, revealing the impact of phono-translation. This effect is a consequence of the distractor "seat" which additionally stimulates the co-activated name of the picture translation ("berg"). If an image is portrayed as an unrelated diversion, the lexical node in Dutch would be a more formidable contestant than the lexical node in English.

Consequently, this data shows that bilinguals co-activate their two languages and that these languages compete for selection.

2.3.2 Cross-language competition for word selection

In spite of the widespread covenant about the two languages being active at the same time, it is as yet unclear if they are in competition for attention. The findings of Hermans et al. (1998) indicate this to be the case. However, Costa, Miozzo and Caramazza (1999) provide the strongest evidence that cross-linguistic rivalry may not exist. The researchers revealed that when bilinguals are asked to name an image along with a resembling translation of the required word, as a distracting term, partakers label the photos more rapidly as compared to when they are presented with an irrelevant phrase. The toughest contender would be the lexical node that looks like the translation from the required language if languages are crossly compared. It is reasonable to anticipate that translation terms will provide the greatest number of candidates as their semantic intersection with the required term is equally highest. Therefore, words taken as distractors must lessen the delays instead of fostering them in labelling the picture. Researchers hypothesized that facilitation is exhibited due to the absence of interlingual rivalry.

Depending on the above mentioned outcomes, Costa and colleagues projected a model based on the selection of a particular language. Both languages of bilinguals are stimulated but the lexical portrayal of the initiated non-target language does not contest for selection. Relying on this explanation, the method of word selection of bilingual speakers is solely capable of activating the lexical items of the language to be generated. The initiation of words in the non-required language is disregarded by it, without suppressing their activation.

Concerning if there exists a cross-language rivalry during the selection of words in bilinguals, a characteristic of translation words may indicate that there is no cognate status of terms. Cognates are words with phonetic similarities in the two languages of bilinguals whereas non-cognates are simultaneously distinct on the basis of their sounds. Bilinguals' performance has far-reaching impacts because of the cognate position of lexical items. For instance, Costa, Caramazza and Sebastian-Galles (2000) demonstrated that speakers of two languages frequently named the images that have cognate names as compared to the images with non-cognate names. Furthermore, while identifying cognates, bilinguals are not highly expected to experience tip-of-the-tongue (TOT) situations as when recognizing non-cognates. It suggests that cognates are resilient to transient malfunctions of the lexical retrieval system (Gollan & Acenas, 2004). In addition, cognate terms are easier to acquire, more resistant to forgetting, and more responsive to cross-linguistic priming. Similarly, in the therapeutic sessions of aphasic sufferers (Kohnert, 2004) and the treatment of infants having Specific Language Impairment (SLI) (Kambanaros et al., 2017), cognate words induce greater concurrent brain functioning between languages (De Bleser et al., 2003).

The synchronized stimulation of words in bilinguals' both languages has been supported by these impacts of cognate assistance, as well as by their phonological demonstrations and the models related to the selection of the definite language (Costa et al., 2000; Costa et al., 2005). The phonological explanation for the origin of cognate effects states that this assistance happens when the target word and its co-activated phonologically linked translation both actuate the cognates phonologically. This initiation facilitates lexical selection by feeding back to the lexical level. Alternately, Kroll, Bobb and Wodniecka (2006) argued that for selecting a specific language, multilinguals may depend on inhibitory control procedures. However, the extent to which non-target language is stimulated and the competency level of bilinguals

influence the magnitude of demonstration for the selection and rivalry of words. Therefore, it is implied by cognate effects that the selection and competition of words may arise at the level of lexical representation instead of at the phonological one.

In any case, one alternate explanation for the genesis of cognate facilitation effects suggests that impact is because cognates have additional semantic properties contrary to non-cognates (Van Hell & De Groot, 1998). Also, further scholars suggested that to some degree cognates may share their lexical representation, but this idea is more difficult and may only be confined to undistinguishable cognates. However, even similar morphological formations typically result in distinct phonological realizations.

2.3.3 Competition and facilitation in language

Bilinguals' identifying ability frequently exhibits cognate facilitation effects, indicating that both languages may not be in direct opposition with one another. However, outcomes of some other bilingual activities show that their linguistic abilities are influenced by the stimulation of the non-target language; hence, a mechanism is required to govern the cross-linguistic instigation and rivalry. The cost of linguistic mixing is one of the examples of these outcomes.

To calculate the bilinguals' struggles to overcome interlingual rivalry, the evaluation is done by comparing the mixing costs determined through different contexts. These costs are calculated by contrasting a bilingual's performance in picture-naming in L1 and L2 in situations where they can only utilize single languages with settings where they must practice two languages simultaneously. Swapping from situations where languages are banned is distinguished by the mixing cost. In the language substituting assignment, the mixing cost is calculated by contrasting the reaction periods between language repetition trials and the responses in obstructed circumstances.

Numerous research is conducted by varying the situation. Such cases include studies by Prior and Gollan (2011). They determined the mixing costs of both, the first language and the second language, by Christoffels et al., (2007), who does not calculate it in a second language, but instead in a first language only, and by Gollan and Ferreira (2009), Mosca and Clahsen, (2018) who attained mixing costs in the L1 but a "mixing benefit" in the second language. The deductions have been considered proof that bilinguals use global inhibitory processes to inhibit the competition of the non-target language because the prevailing trend of data implies that mixing costs are higher in

the dominant L1 compared to the non-dominant L2: the higher L1 mixing costs will reflect the necessity to constrain the dominant L1 to a greater degree when speaking in the other non-dominant L2. Christoffels et al. (2007) employed the impact of cognate assistance being an indicator of the amount of co-activation of translation terms in restricted and mixed language environments. They discovered that identifying in mixed language contexts does not enhance the extent of cognate influences in L2, rather only in L1, and that only L1 encountered the mixing cost. The researchers interpreted these data as evidence that global inhibitory mechanisms reduce the activation of the dominant L1 gene. Thus, the stimulus of the co-activated L2 words became amplified, resulting in greater cognate effects.

2.3.4 The weaker link hypothesis

The weaker link hypothesis was postulated by Gollan and colleagues (Gollan et al., 2005, 2007, 2008, 2011; Ivanova & Costa, 2008; Sandoval et al., 2010) as a reason for slower lexical retrieval in their native language by bilinguals as compared to monolinguals. This hypothesis is constructed on the supposition that individual who speaks two languages are at disadvantage due to the presence of two different lexical representations for almost all the given concepts, one per language, which makes them use fewer words from each of the languages. Therefore, the linkages amongst the semantic and phonological based lexical items in bilinguals' language are weaker than those links found in the single language used by monolinguals when there is less usage of terms from either of the languages.

Gollan et al. (Ibid.) presented the weaker linkages hypothesis to account for the "disadvantages" found in bilingual speakers' performance during lexical access to their native language as opposed to monolingual speakers. Researchers discovered, by employing numerous image naming assignments and fluency tasks, that bilinguals were sedate at identifying the names of images and hardly generated words as compared to monolinguals, even while they communicated in their first language. The weaker linkages theory postulates that this shortcoming in bilingualism arises due to the presence of two distinct terms for nearly all provided notions for each language. This causes bilinguals to employ each word less frequently than monolingual speakers. Due to less frequent use, the associations between the semantic and phonological structures of words in bilinguals' two languages are incapacitated than in monolinguals' one language. Consequently, regularity effects should have a higher influence on

infrequently spoken lexis than on commonly used phrases, based on the differential relationship between lexical frequency and identifying efficiency. Therefore, the concept of weaker linkages anticipates that bilinguals will have stronger frequency effects as compared to monolinguals.

Ivanova and Costa (2008) reproduced weaker link effect on Spanish-Catalan bilinguals having first language dominance. The results show that they were sedate in naming pictures, as compared to Spanish monolinguals. Moreover, the bilingual drawbacks are moderated by word frequentness with effects being highly definite for words used less frequently than for mostly used terms.

When bilinguals develop terms that are mutual across languages, such as proper nouns or cognates, the bilingual disadvantage disappears or reduces. Gollan and colleagues (2004, 2005) demonstrated, for instance, that unless bilinguals need to develop proper names or cognates, they frequently encounter more TOT situations as compared to monolinguals. In lexical fluency tasks, Blumenfeld, Bobb and Marian (2016) have shown that Spanish-English bilinguals who communicate in their dominant language, English, retain a higher percentage of cognates than monolinguals. Bilinguals' verbal fluency in English seems to be governed by their level of ability in non-dominant Spanish: the more skillful they were in Spanish, the more they preferred to create cognates in English.

Furthermore, the competence of bilinguals' lexical fluency in both of their languages appeared to be influenced by the cognate nature of terms: the lexical recurrence of generated cognate words was comparable in both languages, whereas non-cognates were produced with lower frequency values in the non-dominant language as compared to the dominant language. Such results demonstrate that accessibility to bilingual lexical store is determined on the basis of proficiency level in the non-dominant language, that improves the production of cognate terms as well, all while communicating in the dominant language. It is the case since increased proficiency in non-dominant language results in greater simultaneous activation during the creation of the dominant one. Consequently, it may improve the production of terms having higher degree of simultaneous activation levels as well, such as cognate words. In fact, additional study is required for investigating how language competency affects bilinguals' access to cognate terms in their lexicons and how in bilingual lexical access, the terms’ cognate status interrelates with frequency effects.

2.3.5 Inhibitory Control Model

Inhibitory Control (IC) Model was proposed by (Green, 1998). Even though this model formulates some hypotheses regarding the arrangement of multiple languages in mind, it also acts as a significant factor in depicting the trend of language selection in non-specific language storage and access.

Apart from the lexical-semantic system, the IC Model comprises abstract language schemas that contest to define comparative language stimulations. The action of such linguistic task schemas is mediated by a Supervisory Attentional System (SAS). By blocking the task schema for non-required language, it is possible to communicate with minimal interruptions from another language, in a monolingual situation. It is necessary to overcome latent inhibition and incur a processing cost for exchanging and restarting formerly repressed language (Meuter & Allport, 1999).

Bilingual language experiences are linked to enhanced inhibitory control, which consequently leads to improvements in attention and working memory. These betterments in return benefit the abilities required to acquire a new language (Bajo et al. 2000; Kaushanskaya & Marian, 2009; Majerus et al. 2008). Even though IC precisely depicts a process for regulating the language stimulation but the effectiveness with which inhibitory requirements are controlled may differ among various kinds of polyglots (Costa & Santesteban, 2004), so this model may not be pertinent to overall bilingual dispensation in its present form.

2.4 Bilingualism and Aging

Aging is characterized by a decline in cognitive and behavioural capacities (Park et al., 2002), and language is the most prominent cognitive area (Park & Reuter-Lorenz, 2009). Language as a cognitive capacity has been studied by dissecting the verbal processing of adults, as cognitive capacities fluctuate with aging. Consequently, language performance changes in terms of articulation and recuperation. The study on semantic processing by Alwin and McCammon (2001) and Verhaeghen (2003) reveals that semantic systems improve with age based on their sources of research. Therefore, older persons should have a larger vocabulary, superior word knowledge, and the ability to construct longer and more complex sentences than younger adults (Kemper & Sumner, 2001).

Similarly, Bowles (1989), Burke et al. (1987), and Madden et al. (1993) discovered that semantic priming is more prevalent in older individuals than in younger

adults. Despite data suggesting that adults have a stable semantic system, several accounts indicate that they struggle with language creation and processing. For instance, elderly persons are more likely to use filler words such as huh, eh, speech blunders, and tip-of-the-tongue (Bortfeld et al., 2001; Heller & Dobbs, 1993; Kemper et al., 1990; Vousden & Maylor, 2006). According to Hale et al. (1991) and Salthouse (1996), these mistakes or fillers may be caused by a decrease in memory and speed owing to cognitive aging. It is hypothesized that these lexical deficits are related to the language in use or its phonological nature. Brown and McNeill (1966) investigated this evidence via tip-of-the-tongue (TOT), a condition in which speakers may know what to say but cannot recollect and pronounce the lexical term. During a TOT state, speakers can recall many semantic aspects of the item (e.g., hops are native to Australia and have a pouch) but struggle to recall the required targeted word (e.g., kangaroo). During a TOT, partial information regarding phonology is frequently accessible (e.g., begins with /k/), which further supports the phonological foundation of the phenomena. Indeed, older adults report more TOT experiences and fewer successful solutions than younger adults (Burke et al., 1991).

Recently, Kroll et al. (2013) discovered that the tip of the tongue process occurs more frequently in bilinguals compared to monolinguals. As a result, they experience a prolonged process for image naming in both L2 and L1 and perform poorly when rendering category exemplars. Instead of considering the temporary subjugation of L1 for the formation of L2, Rossi and Diaz (2016) postulated that dominant language may be interpreted in terms of usage frequency. It gives rise to the idea of a weaker connection or frequency lag (Gollan et al., 2008, 2011). This theory states that bilinguals are less likely to utilize both languages concurrently. This assumption raises the question of whether the observed costs to bilingual lexical access in production are a result of reduced operating frequency for both languages or whether they can be explained because of the cross-language competition and inhibitory control exercised on the L1 to allow L2 selection, as suggested by Kroll et al., (2013). The availability of both possibilities can define the speech planning and processing of bilinguals.

Goral et al., 2007 examined the impact of changes in typical language in adulthood on the modulation of two languages in bilinguals. They tested 78 English-Spanish speakers of the ages 50 to 78 based on the Boston Naming Task (BNT) and a semantic fluency task in both languages. Their findings suggested that the factor of age

highly influences language performance, although these speakers had equal proficiency in both languages. These results suggest that aging can play an important role in a bilingual's languages differentially.

The rivalry between the target and non-target words may be seen as a top-down process that employs cognitive control to manage the effect of other languages at every level of language processing. The lag process, on the other hand, may be viewed as a bottom-up process that affects lexical recall in the two languages. The hybridization of these two systems might give a coherent explanation for the lexical processing of bilinguals, according to Rossi and Diaz (2016).

2.4.1 Age of acquisition and a critical period hypothesis

The stage and sequence of language acquisition determines if a child is a simultaneous bilingual or a sequential bilingual. The difference between both, is typically determined by Age of Acquisition (AOA). Children who are simultaneously exposed to two languages during childhood are referred to as simultaneous bilinguals. On the other hand, if a child is exposed to and acquires a second language after having acquired the first language, he/she is said to have experience sequential childhood bilingualism; further divided as 'early sequential bilingualism', where a child acquires second language when is still learning his/her first language and 'late sequential bilinguals', where second language is acquired after a solid base of first language had been developed(Hernandez and Li 2007; Kalia, Wilbourn, and Ghio 2014; McLaughlin 1978).Whereas, Beardsmore (1986) differentiates two types of childhood bilingualism as simultaneous bilingualism being the acquisition of more than one language during pre-adolescent period and sequential bilingualism as a condition where child acquired first language before reaching the age of eleven years.

Though AoA can be utilized as an indication of the difference, there is no consensus regarding the precise dividing line between simultaneous and sequential bilingualism. Individual advances in L1 syntax, morphology, semantics, and phonology have also been used to establish the bilingual type (Heredia & Cielicki, 2014). It is believed that these are learned by age four. L1 learners are regarded to have mastered pragmatics by age seven. A later cutoff age of 12 to 14 years has also been advocated, despite criticism.

According to McLaughlin's (2013) age requirement, simultaneous bilinguals are defined as children who acquired both languages, concurrently, before turning three.

However, children who acquire one language as an infant and the second language after turning three are considered sequential bilinguals. Whereas Baker (2011) accepts this requirement, but with a bit more flexibility- considering children sequential bilinguals as they approach the age of three.

The AoA technique leads to the conclusion that there exists a juncture in a child's life before which it is simpler or more advantageous to develop L2. There has been considerable disagreement over whether learning a language sooner is preferable. According to the Crucial Period (CP) Hypothesis, there is a critical period (before the off-set of puberty) (Lenneberg, 1967) after which native-like language proficiency is difficult to attain. This is because with age, the brain loses its plasticity i.e., neuroplasticity, which determines the person's ability to acquire languages. Lenneberg (Ibid.) argued that people who begin able to acquire or at least initiate learning L2 before the conclusion of the crucial period might attain native-like proficiency. Those who begin learning outside of this window must be clearly instructed.

A considerable study has been conducted on the influence of age of acquisition on final L2 proficiency, however no definite agreement exists on whether the theory of CP is valid and if so, the beginning and ending of the period is highly contested (De Groot 2011). Johnson and Newport's (1989) research of a putative CP in SLA indicated that native-like competency in L2 was unattainable after the age of seven, a finding aligned with the maturational theory of language acquisition. On the other hand, further research revealed the opposite result (Bialystok and Hakuta 1994; Birdsong and Molis 2001). According to Birdsong's (2005) observation, adult students have stronger mental and processing capacities, which enable them to comprehend abstract ideas and acquire a second language more efficiently as compared to younger ones.

Evidence in the field of age and language acquisition also suggest that age directly do not affect the process of learning of language, whereas the learning process is influenced by social, educational, psychological and environmental factors (Marinova-Todd et al. 2000).

Fuchs and Flügge (2014) examine research spreading over decades on adult neuroplasticity and find that major shifts have occurred in perspectives on the extent to which the adult human brain is changeable. It was originally believed that chronic stress had only bad effects, but it has since been discovered that, under some conditions, it can improve brain neurons. They (Ibid.) argue that the adult brain cannot be titled as

fixed, instead mind should be open for accepting various neurogenesis impact on cognitive skills in late ages.

Birdsong (2018) synthesizes some of the main points regarding bilinguals; he emphasizes the role of both simultaneous and sequential bilinguals, which he refers to as "inter-individual variability" or "non-uniformity" (p.1), and similar to Singleton and Ryan (2004), he emphasizes the influence that motivation and other psycho-social factors play in the acquisition of second language in bilinguals. He concludes by highlighting the intricate interplay of these factors with the age of acquisition and development of the brain.

2.4.2 Transmission Deficit Model

Based on the proclaimed node-based hierarchical activation, Burke et al. (1991) presented the Transmission Deficit Model (TDM), one of the theories that view semantic and phonological abilities as distinct. According to this idea, any object or part of an item is recalled by the activation, which spreads throughout the system via spreading activation. This theory postulates that, as a result of all language processing linkages weakening with age, semantic systems become more linked than phonological systems. For example, if a semantic link weakens, the relationship between the word "cat" and its attribute "furry" becomes less robust. However, semantic hints like meow, four legs, and the pet might aid in retrieval.

On the other hand, there is less redundancy in the phonological system, particularly in the item labels. If the speaker encounters difficulty retrieving the /d/ or /g/ phoneme while attempting to recall the word 'dog,' there are no other phonological cues to assist him, resulting in a retrieval failure. Therefore, in such cases TDM is used to explain the behavioral impairments in older age groups, as being more pronounced in the phonological system.

2.4.3 Inhibition Deficit Theory

Another central approach, the Inhibition Deficit Theory (IDT), has been proposed to examine the cognitive-based performance of elderly individuals. It was hypothesized that a decline in inhibitory processes is the cause of performance disparities among older adults (Hasher et al., 1991; Hasher & Zacks, 1988). According to Lustig et al. (2007), inhibition can enhance attentional focus and regulate irrelevant information.

The inhibitory deficit idea is supported by studies indicating that old-age individuals tend to make more 'off-topic' conversational utterances (Arbuckle et al., 2000)- attributable to inhibitory deficiencies in regulating the sequence of thought and keeping the focus of the conversation. Whereas some studies have failed to discover that old-aged individuals exhibit greater off-topic speech (Beaudreau et al., 2005), and they scored even higher than individual from younger age groups (James et al., 1998; Pratt & Robins, 1991). These findings put a question mark on the notion that conversational conduct of elderly persons has deteriorated qualitatively.

2.5 Language Dominance and Bilingualism

In earlier times bilinguals were classified on the basis of their competency in either of the languages, ranging from ‘minimalist’ to ‘incipient’ bilingualism (Diebold, 1961). According to these studies, a person who has the ability to form only basic conversations in a second language will be classified as bilingual. Whereas the definitions given by other researchers such as the one given by Haugen (1953) according to which bilingual is a person who can form “complete and meaningful utterances in the second language” (p.7); or Hall's (1952) definition where a person has basic “competency and control of the grammatical structure of the second language” (p.14), fall within the range defined by Diebold (1961). Bloomfield (1933) anticipated that the highest level of competency would need the bilingual to have native-like control over the languages that he /she speaks (p.56). However, this definition poses a challenge as it requires an unavoidable level of balance between the languages spoken. For instance, Baker (2011) stipulates that such bilingual must have an equivalent level of proficiency in all spoken languages, hence making it extremely difficult to meet ‘balanced bilingualism’ (Beardsmore, 1986, p.7). Valdés (2003) defines one concept of dominance by placing bilinguals on a spectrum comparing the varied competency in the spoken languages. In her research based on case study of immigrant children, she establishes that while comparable competencies are in two languages are theoretically possible, in reality the bilinguals do not have same access to both languages in exact situation and realms of interaction, therefore they cannot develop comparable competencies in both spoken languages.

According to Birdsong (2014), the observed difference between competency in the two languages in terms of two distinct axes; dimensions and domains, define the dominance of one language over the other in bilinguals (p.1). He further defines

characteristics such as linguistic competence, processing of the meaning and production of sentences in a language as being on the dimension's axes (Ibid., p. 2), which may be evaluated for the spoken languages to determine the individual's innate talents. On the domain's axis, he inserts the activities selected by bilinguals or the context in which the bilingual is placed. Thus, domains are the 'contexts and actions in which distinct linguistic abilities are engaged' (Ibid., p.3). The relationship between dimension and domains, as defined, provides hints regarding the multifaceted characteristic of dominance, which also depends on the types of testing tools applied.

2.5.1 Language dominance and proficiency

Referring to Valdés research as mentioned in the previous section, dominance refers to the relative competency of the bilingual in both languages and therefore it varies from 'equi-lingualism' – a condition where the bilingual has two native languages to a second-language learner with whose abilities in each language may vary greatly. Measurement of dominance is based on relative competency in each language, or the degree of ability to read, write and converse in any one given language.

Developing further onto this, Birdsong (2014) compares dominance with proficiency. According to him, dominance is defined by 'internal reference and relativity'(p.3) as evaluations of domains and dimensions of second language (L2) are contrasted with domains and assessments in the first language (L1) for the bilingual. Norms external to the particular L2 user are used to evaluate proficiency in comparison to monolingual native speaker' controls over the language (L2). He argues that since dominance is internally relative, a bilingual with dominance in either one of the languages, may not be expected to have high competency in the other language, instead would have a lower level of proficiency. In a case where two balanced bilinguals are compared, i) one with high balanced competence in the two languages and ii) the other with low balanced proficiency in both languages, it becomes clear that proficiency and domination are also two distinct concepts.

According to Treffers-Daller (2016), there is "significant terminological uncertainty concerning balance and dominance" (p.235) in both theoretical and practical sense (Ibid., p. 263) and explains the growing trend toward evaluating relative dominant proficiency. In her work, she further negates the concepts related to 'global or generic dominance' and instead inclines towards dominance as characteristic to be studied within given criteria for a specific task under study (Ibid.: 261-265).

2.6 Process of Translation in Bilinguals

Even at a fundamental level, research findings regarding the link between bilingualism and interpreting/translation have been contradictory. Though the idea of "natural translation" has existed for decades now, the practice of translation carried out in unscientific setting by an untrained person is still common (Harris & Sherwood, 1978, p.155). According to Harris, a translatologist, all bilinguals can carry out translation on some level and that "translation and bilingualism have coexisted" (p.155.) Translation, according to Schleiermacher (1813), is just a mechanical operation that can be completed by anybody with a reasonable command of the spoken languages. For Toury (1995) bilinguals have an innate propensity for translation. For a considerable amount of time, these ideas have reflected the common notion of interpreters being born instead of being produced as an outcome of some training (Baigorri-Jalón 2014; Lonsdale 1996).

Various factors can influence bilinguals' ability to produce well translated script, however for Grosjean (2008) domain-specific acquisition is the primary reason. Furthermore, it has been observed that bilinguals are characterized on the basis of balance, dominance and proficiency whereas interpretation requires something else. Similarly, Macnamara (1967) and Lambert et al. (1959) discovered no association between participants' bilingual skills and the rate of translation.

According to Paradis (1979), the translation process is significantly distinct from the mechanism underlying speech. While quoting instances of aphasic individuals with having difficulty conversing in one of their languages due to brain damage, were able to translate into that language when it was uttered in another. Echoing Grosjean (2008), and Paradis (1980) further develop that it is unusual for bilinguals to acquire their second language through acquiring translation counterparts, explain lower level of expertise on vocabulary and interpretation of the language. Baker (2011) agrees: "bilinguals are not always effective interpreters" (p.111). Translation presupposes that the vocabulary of both languages is identical. A similar terminology might not exist. Additionally, expertise in multiple (two or more) languages is insufficient.

According to Seleskovitch (1998), only proficiency in a language may not necessarily mean that the person is a good interpreter; it is the medium and process of interpretation, where the interpreter is able to develop an understanding of what is being said and is able to put his talent and skill to work. While Seleskovitch (1998) restrain

from commenting on the nature of this skill, she suggests technique is acquired through training and should not be mistaken for “innate linguistic understanding” (p.69). According to Gile (1995a), professional training enables interpreters to "maximize their performance and realize their full potential" (p.3) though, he does not elucidate on the source of this potential. Longley (1968) concurs that linguistic aptitude is not identical to interpreting skill and may be developed via training (p.51). Kopczyski (1980) identifies the necessity for a "particular psychological predisposition"(p.24), whereas Jones (1998) describes SI as "an unnatural activity [...] that must be nurtured"(p.72). Gile (1995a) notes that some textual translators are unable to interpret concurrently, although having the same language proficiency as an interpreter. Gillies (2013) and Weber (1989) examine interpreting from a somewhat different angle, that of the trainer, and find that interpretation is not a part of education, instead it is more likely a trade. Interpreting is a talent or, more precisely, a group of skills, which may be explained and comprehended quickly, but which require much more time to acquire in practice.

In short, if interpreting requires a certain "flair" that may be polished through experience, it is uncertain whether the bilinguals (either simultaneous or sequential) can interpret automatically. Neither is it certain that one group will possess a natural edge over the other.

These investigations have demonstrated that co-activation is task-dependent, in cases where behaviour is being studied. Nonetheless, significant evidence exists suggesting that a crucial role played by inhibition in bilinguals (Kroll et al. 2015) and in translation and there is substantial data on non-selectiveness of lexical access and competition between the languages spoken by the bilingual (Macizo et al. 2010 ; de Groot & Starreveld 2015).

Grosjean (1997) claimed that which of the two languages of the bilingual is more active is determined by the circumstances- a conclusion supported by many studies. High levels of co-activation of the two language systems are expected to result via translation. Instead of plotting the horizontal view of translation against the vertical one, Schaeffer and Carl (2013a) claimed that translation is best defined as both an early and a late impact, i.e., early for ‘relatively automated process’ of translation that are more bilingual that late processes which are more monolingual.

In addition, typical eye movement metrics cannot effectively characterize the mechanisms peculiar to the translation task. This deficiency is addressed by the eye-

key span (Dragsted & Hansen, 2008; Dragsted, 2010) and the extent to which Source Text (ST) reading and Target Text (TT) typing co-occur. Schaeffer and Carl (2013a) hypothesized that contemporaneous ST reading, and TT typing are evidence of common representation activation and automated processing. The extent to which Source Language (SL) and Target Language (TL) items share representations is anticipated to alter both, early and late processes of translation.

2.7 Research Gap

Sullivan et al., (2018) discussed two explanations for the slower lexical retrieval in bilinguals. The first one is the 'weaker link hypothesis' or 'frequency lag account' (Gollan et al., 2005, 2008, 2011) which assumes that there exists an indirect effect of bilingualism on lexical retrieval and the reason behind delayed lexical retrieval in bilinguals is due to the presence of two different lexical representations for almost all the given concepts, one per language, which makes them use fewer words from each of the available languages. The second explanation is the 'competition account' which predicts that the need to overcome conflict between cross-language competitors lead to slower word retrieval in the bilinguals (Abutalebi & Green, 2007). His study favours the competition account as a source of slower word recall in bilinguals. However, this present study is based on the assumption that it is the weaker association, not the cross-language competition, between lexical representations and concepts which slow down the word recall in bilinguals. Therefore, this study will adapt the weaker link hypothesis by applying techniques different from the one applied by Sullivan et al. (2018). They used picture naming task but this study uses psycholinguistic tests such as, Translation Task and Semantic Written Fluency Task. Moreover, this study compares bilinguals based on their age, not bilinguals with monolinguals as done in previous studies.

The results of the study from Rossi and Diaz (2016) raise some concerns and hence provide the gap for this research to find out if the participants have dominance of one language, be it their L1 or L2, and how would it affect the modulation of two languages. This concern laid down the foundations for this very study. However, instead of incorporating Verbal Fluency Task, BNT or TOT, this study intends to use Semantic Written Fluency Task which further includes letter fluency task and category fluency task.

2.8 Summary

Firstly, this chapter sheds some light on the various definitions of bilingualism stated by different scholars (Bloomfield, 1933; Bhatia & Ritchie, 2014; Haugen, 1969; Grosjean,2010). This present study regard bilingual as one defined by Grosjean. He defined bilinguals as individuals who utilize more than one language on a daily basis.

Secondly, it discusses the various models proposed for studying the language processing in bilinguals such as the RHM and SOMBIP. These models are designed by eminent psycholinguists (Kroll & Stewart, 1994; Li & Farkas, 2002) for understanding the process of language storage, words access and recall. The working of these models and their limitations are highlighted in the chapter.

Thirdly, to investigate how lexical retrieval occurs among bilinguals, various approaches are discussed. The approaches being discussed include the theory of activation of both languages of bilinguals, competition and facilitation during word retrieval, weaker-link hypothesis and the IC model. The contradictory claims provided by these approaches regarding word accessibility in bilinguals are discussed.

Fourthly, the connection between age and bilingualism is studied with the reference of various linguists' works (Bowles,1989; Burke et al. 1987). It discusses the linkages between bilingualism and aging, the impact of age of acquisition on bilingualism and a Critical Period Hypothesis. The Transmission Deficit Model and the Inhibition Deficit Theory are mentioned to provide the impact of aging on the process of language related activities, such as conversational utterances, phonological and semantic accessibility (Burke et al.,1991; Hasher et al.,1988).

The fifth section of chapter discusses the studies related to the relationship of language dominance and bilingualism. It explains various points of view of different scholars who provide varying criteria for bilinguals to be labelled as dominant in one of their two languages (Diebold,1961; Hall ,1952; Birdsong,2014). Scholars state that being dominant in one language does not mean to be proficient in that language, rather they both are distinct concepts (Birdsong). Therefore, this present study incorporates the factor of dominance only, not proficiency.

The sixth section of literature review provides an overview on the linkages between the translation process and bilingualism. It states the difference between interpretation and translation and how being bilingual impacts the translation process (Baker,2011; Seleskovitch,1998).

The seventh section links previously mentioned insights in literature review, and an awareness of differing arguments, theories, and methodologies in the relevant area of study with the research gap for the present study.

Chapter 3

RESEARCH METHODOLOGY

The research methodology chapter first discusses the theoretical framework and then secondly it explains the research design. Thirdly, the chapter discusses the method employed for this present study. Fourthly, it states the tools required for research purposes such as materials and questionnaires. Fifthly, this chapter provides the methods employed for data collection and then lastly, it discusses the procedures and techniques applied to analyze the gathered data. The chapter on research methodology also covers the evaluation and justification of methodological choices being made.

3.1 Theoretical Framework

The review of literature helped to establish some understanding of various models and their application in analyzing and examining cognitive abilities of bilinguals. Bilingualism is given a central attention in this research; however, the definition of bilingualism itself has a vast range of directions and dimensions. However, this research is based on Grosjean's (2010) exhaustive definition of bilingualism which states that bilinguals are the ones that require and utilize more than one languages or dialects in daily routine. They are considered as a person, as per Grosjean, whose linguistic ability in both languages fluctuates in relation to a particular domain.

This study aims to explore the linguistic experiences of bilinguals and to sort out if bilinguals are at a disadvantage. It is based on the supposition that bilinguals encounter slower lexical retrieval as compared to monolinguals. Various researchers provided several explanations for this phenomenon. Out of those two explanations, as discussed by Sullivan et al. (2018), include: the ‘weaker link hypothesis’ or ‘frequency lag account’ (Gollan et al., 2005, 2008, 2011) which assumes that there exists an indirect effect of bilingualism on lexical retrieval. The second one is the ‘competition account’ which predicts that the necessity to settle a dispute between cross-language rivals is the reason behind slower lexical recollection in bilinguals (Abutalebi & Green, 2007; Green, 1998; Kroll & Gollan, 2014). Sullivan et al.’s (2018) study suggest that the cause behind slower lexical retrieval in bilinguals is due to the competition account; however, this study retest his claims and employed the weaker link hypothesis proposed by Gollan et al., (2005, 2008, 2011) as a reason behind slower lexical retrieval.

The notion behind frequency lag is that bilinguals' slower lexical retrieval is a result of their less frequent usage of words from each language, which ultimately leads to weaker linkages between concepts and words (Gollan et al., 2008). Eventually, bilingual language usage patterns result in weaker phonological and semantic connections in each lexical system, in comparison to monolinguals. This is because it is simpler to generate words that are produced more frequently. In this manner, the weaker linkages theory draws a comparison among the trends of language usage, bilingualism, and frequency effects. For this study, it was assumed that if a bilingual spends more time speaking one specific language would weaken the linkages of semantic and phonological representation in the other language. This assumption is supported by the weaker link hypothesis.

The weaker linkages theory differs from other hypotheses in that it attributes the effects of bilingualism to frequency, a process that affects accessibility in all languages, rather than to mechanisms more tailored to the bilingual situation. Particularly in the part of the production system where frequency impacts on all speakers are the largest, the weaker links should be "weaker."

Prominently, both processes, the weaker linkages and interference hypotheses are not necessarily contradictory, they can be applied concurrently for describing various sorts of bilingual effects on language processing. As a result, the question may arise either a mechanism is significantly more efficient in describing bilingual performance towards a specific assignment or in comparing. In such a case, the weaker connections explanation is particularly crucial in finding out if there is a correlation between age and dominance with lexical retrieval. Therefore, the weaker link hypothesis (Gollan et al., 2011) will be employed as a theoretical framework for this study.

This present research is based on the claim that as in the study of L1, its processing, acquisition and generation are examined through errors or slips of the tongue since it is the only way of exploring the architecture and functioning of the L1 mental lexicon (Brown & McNeill, 1966; Burke et al.,1991; Fromkin, 1984; Garrett,1975). Similarly, a study of L2 activation and processing can also be analyzed on the basis of errors. These errors are regarded as linguistic evidence of mental processing. Here lexical error will be defined narrowly as a replacement of an intended required target word with the non-targeted word (Ecke, 2001).

Based on Grosjean's (2008) claim of ‘Bilingual Individuality’, this research is built on the theory that all bilinguals have different usage of language depending upon the purpose, situation, and usage and thus have their total linguistic repertoire. This would help to classify bilinguals based on their age and linguistic dominance.

Birdsong (2014) defines dominance as an imbalanced proficiency and usage in one language over the other. Moreover, these disparities in usage and linguistic skills are discovered through two distinct axes, which include dimension and domain. The axis of dimension includes innate abilities such as competency, fabrication and dispensation of language, that is determined within both languages of the bilingual. The domain’s axis deals with the contextual application of language. It consists of surroundings in which bilinguals practice their linguistic abilities. This concept of the relationship between dominance and domains provides useful indicators for the many elements of dominance, depending on the type of test used on bilingual participants in each study. Based on the sort of test on which bilinguals are evaluated in any study, this description of dominance and domains association provides useful signals to the various elements of dominance. For this research, the inherent abilities of bilinguals will be tested through the dimensions of dominance as suggested by Birdsong.

Friesen et al. (2015) worked on Verbal Fluency (VF) as it is one of the widely accepted techniques for measuring lexical retrieval ability by various psychologists and psycholinguistics. Shao et al., (2014) worked on two frequently used types of VF tasks, which are; Semantic fluency and Phonemic fluency task. The present study employs a similar technique for data collection to analyze the linguistic abilities of bilinguals. However, since the test is written one, therefore, instead of Phonemic Fluency task, a Written Semantic Fluency task is used.

3.2 Research Design

The architecture of research adopted for the study is based on the Translation Test (TT) and Semantic Written Fluency (SVF) of the bilinguals of two different age groups, to find out the effect of age and linguistic dominance, in any of one language.

The influence of the age of bilinguals on lexical retrieval will be analyzed through the following distinctions:

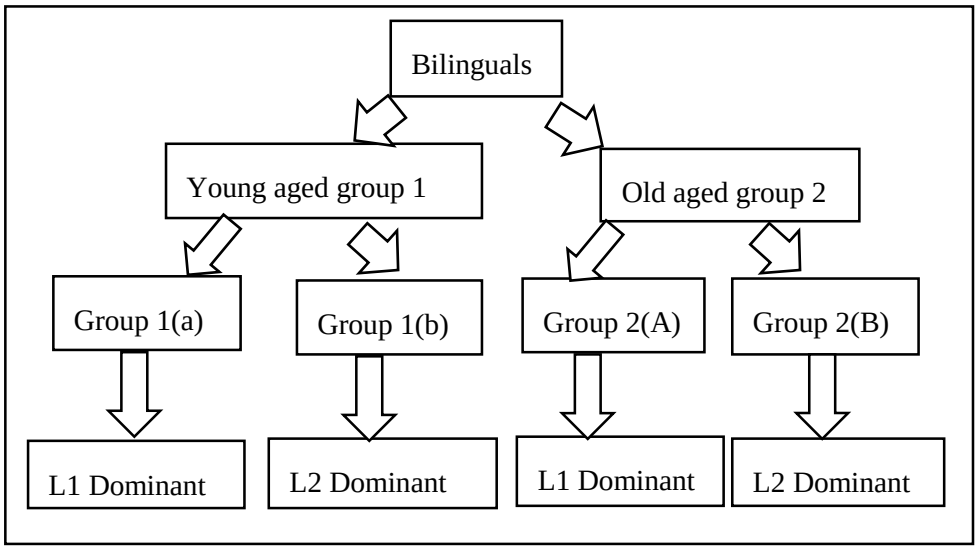

Figure 1 Classification of Bilinguals' Group

Group 1 includes bilinguals aged 12 to 20, while group 2 includes participants of age 30 to 40 years. Group 1 is further sub-divided into 1(a), which is for the participants having Urdu as their dominant language, and 1 (b) for the bilinguals having English as their dominating language. In the same way, group 2 is sub-divided into 2(A), for bilinguals having their L1 dominant (e.g., Urdu for this study) and 2(B) for L2 dominant bilinguals.

Group 1(a)- Younger bilinguals with L1 dominance

Group 1(b)- Younger bilinguals with L2 dominance

Group 2(A)- Older bilinguals with L1 dominance

Group 2(B)- Older bilinguals with L2 dominance

To determine the impact of aging, group 1a) and 1b) are combined to form one young-aged group. Similarly, group 2A) and 2B) are joined to form one old-aged group. Then the comparison is made between the lexical retrieval of these two groups. This research design can be simplified through following equation:

1a) plus 1b)- Young-aged bilinguals

2A) plus 2B)-Old-aged bilinguals

The difference in the test scores of young-aged group and old-aged group helps to study the impact of aging on lexical retrieval.

Moreover, for finding the impact of linguistic dominance on lexical retrieval group 1a) and 2A) are joined together to form one group of Urdu dominants, and group 1b) and 2B) are to form one collective group for English dominants. Such as:

1a) plus 2A)- Urdu(L1) dominant bilinguals

1b) and 2B)-English (L2) dominant bilinguals

The difference between the marks gained by L1 dominant bilinguals and L2 dominant bilinguals shows the impact of language dominance on the lexical retrieval in the alternative, non-dominant language.

According to the Weaker Link Hypothesis-the linkages amongst the semantic and phonological representations in bilinguals' languages are weaker than those links found in the single language used by monolinguals when there is less usage of terms from either of the languages. To test if there is more usage of one language over the other (comparison between old and young bilinguals, comparison on the basis of language dominance) and to find out if it would validate or challenge the WLH, only age and language dominance (L1 OR L2) were taken into consideration.

Three variables are set, out of which 2 are independent variables, such as age and linguistic dominance, and the other one is dependent variable, lexical retrieval. Age is calculated by asking the age of the bilinguals and linguistic dominance is quantified in terms of hours per day(Hrs./day). Lexical retrieval is measured by calculating the marks gained by the bilinguals in the set psycholinguistics tests.

3.3 Research Methods

In order to collect the data, two psycholinguistic experiments have been employed, which are mentioned below:

3.3.1 Semantic Written Fluency Task

This task is regarded as one of the most widely used neuropsychological tests for studying word retrieval. It consists of a Letter Fluency (LF) test and a Category Fluency (CF) test (see Appendix 3). Both these tests emphasize the control of the executive and semantic memory procedures, consequently making them applicable for studying potential bilingual advantages in word retrieval. Goral et al.(2007) also used these tests, 'animal naming' for semantic based list-generation (Animals) and the letters F, A, and S for letter-based list-generation (FAS; Benton & Hamsher, 1976). Therefore, this study adapts the WF task as one of the ways, to examine lexical retrieval in Urdu-English bilinguals. Moreover, the word retrieval in fluency tasks is measured in a set time of 2 minutes and 30 seconds for fluency tasks (for Urdu and English collectively) by setting the timer on stop watch.

3.3.1.1 Letter fluency task

The letter-fluency task requires participants to create as many lexical items as they can in a given time. A letter cue is provided to the partakers and they are supposed to produce words having those letters as initials. For the English task, the letters F, A, and S were used, and for Urdu ف۔س، ا were shown as an adequate stimulus. 30 seconds were given to bilinguals to perform the Urdu Letter fluency test and 30 seconds for the English Letter fluency test.

3.3.1.2 Category fluency task

In these tasks, participants were asked to name as many words as they could for the semantic categories of "animals" (including birds), separately in both languages, i.e., Urdu and English. The time restriction was again one minute for each sub-task, i.e., 30 seconds for the Urdu Category test and 30 seconds for the English Category test.

3.3.2 Translation task

This task is used as a substitute for picture naming as used by Sullivan et al. (2018) since their studies approve that the reason for slower lexical retrieval among bilinguals is due to competition account instead of a weaker link hypothesis and this very study aims to employ his studies. Moreover, another reason for adopting TT is, as proposed by Kroll and Stewart (1994), that there exists a direct link association between translation equivalents from both languages of the bilinguals. Therefore, to study the linkage in both languages, TT is the best choice.

The list of words was designed keeping in mind the selected age groups. Very difficult words were not selected because of a young aged group viz. 12 to 20, and too simple words were not selected because of the older age group, 30 to 40. Therefore, the list consists of words ranging from a frequency of 300 to 21000 (taken from Corpus of Contemporary American English-COCA).

The translation task of 1 minute (30 seconds for both languages) is designed by selecting some commonly used words from English and Urdu for the alternative word-to-word translation (see Appendix 4). The number of right and wrong responses for such words is analyzed to examine the retrieval efficiency in bilinguals.

3.4 Research Tools

To collect data in terms of participant profiling and for measuring the lexical retrieval among bilinguals, the following tests and questionnaires were used:

3.4.1 Questionnaire for demographic profile

To determine fluency and dominance, age and background of language/s usage of the bilinguals, Moore's (2018) questionnaire is adapted, which is further the amalgamation of the Bilingual Language Experience and Proficiency Questionnaire (Marian & Kaushanskaya, 2007) and Bilingual Background Questionnaire by Montrul (2012).(See Appendix 2)

Many researchers such as Flege, MacKay and Piske (2002) have highlighted two approaches for analyzing dominance in bilinguals; the first one is the objective approach (as it is evaluated by the researchers) and the other one is the subjective approach (as it is reported by the bilinguals themselves).

Given the time constraints, it was not possible to measure language dominance objectively, such as through outside evaluation of pronunciation and semantic assessments of bilinguals. Therefore, the self-reporting method (subjective) was used in which they judged themselves on the basis of their own language background on a self-rating scale for their usage of one or two languages.

3.4.2 Material for lexical retrieval

Lexical retrieval of the bilinguals is gauged through the Translation task and Lexical fluency task. The Translation task is used to collect the instances of Urdu to English and from English to Urdu words, while the Semantic fluency task is used to measure lexical knowledge and lexical retrieval through the letter fluency task and semantic fluency task.

3.5 Data Collection

The primary data collection method is applied. The researcher interacted with the participants in person for data collection. Partakers were instructed about the tasks and their written consent was taken prior to the test (see Appendix 1).

Participants were restricted to repeat the same words in their different forms in both letter and category fluency tasks. It was stressed that creating the same word with

multiple finishes within the similar case, for instance, sun and sunny, would result in only one entry.

Goral, et all. (2007) employed list-generating tasks in which 1 minute was given to the participants. Likewise, in the present study, 30 seconds for each word on both English fluency task and Urdu fluency task, and 30 seconds for both Urdu to English translation and English to Urdu translation (collectively one minute) were given.

To gather the responses of questionnaire and to get the consent from participants, Google Forms were utilized. Tests were conducted face-to-face on paper; the responses/answers were marked according to the set criteria which were later recorded in Microsoft excel for calculation.

3.5.1 Sampling

Two groups of participants are selected depending upon their age, which is further subdivided based on L1 or L2 dominance.

Aged based groups	Young-aged Bilinguals	Old-aged Bilinguals
Age range	12-20 years old	30 -40 years old

Table 1 Aged based sampling of participants

The age brackets for the study were 12 to 20 and 30 to 40. The purpose for selection this age groups was to compare the individuals who spend less time speaking any one specific language with the bilinguals who spend more time of their life speaking that one specific language.

The gap of 10 years is considered in order to find the difference between age groups. The 10 years' gap is given between the two age groups to examine a trend of aging on linguistic dominance.

Moreover, the criterion is set to determine the language dominance of the bilinguals. If a participant spends more than 13 hours per day in speaking either L1 or L2, he/she is labelled as Urdu and English dominant, respectively.

Groups on the basis of Linguistic Dominance	Urdu-dominant bilinguals	English-dominant bilinguals
Hours per day	If Hrs./day in L1 $\geq$13 hours	If Hrs./day in L2$\geq$ 13 hours

Table 2 Sampling based on linguistic dominance

The participants are therefore grouped as Urdu dominant and English dominant depending upon the time, they spend using that language.

3.5.2 Participants

Participants are assumed as bilinguals with their L1 as Urdu language and English as their L2. The participants are the bilinguals who use both, English and Urdu, in their daily life, regardless of the proficiency level. 20 participants from each group are analyzed. An equal number of L1 dominant and L2 dominant participants from each group, that is, 10 out of 20 had Urdu as their dominant language while 10 out of 20 had English as their dominant language, for this study. The notion is based on the studies of Bialystok et al., (2004) who used 20 participants in each group, monolinguals and bilinguals, for his study. Moreover, the rationale for the selection of such participants is to compare bilinguals in terms of their age and linguistic dominance.

3.6 Data analysis

Questionnaires are analyzed to categorize the participants on the basis of age and linguistic dominance. Also, tasks are checked and lexical items having initials from the required letter were marked as right response. Similarly, for the translation task, all participants were marked out of 10 based on the correct equivalent translated word. The accurate and unique words produced by each participant were calculated to determine their overall grades. The responses from the participants while performing the actual tasks were recorded using the digital stopwatch.

Microsoft Excel 2016 is used to calculate the scores obtained from all psycholinguistic tests in average and to generate graphs based on the mean values.

Moreover, to analyze the statistical significance of the findings, t-test and linear regression model are employed, through Microsoft Excel 2016. To test the 1st hypothesis, t-test is used. T-tests are hypothesis tests that evaluate one or two groups' means. Hypothesis tests employ sample data to infer population attributes. For this current study 2 tail sample t-test in conducted since the purpose is to analyze the difference between the means of two sample groups (young and aged bilinguals). To analyze 2nd hypothesis, linear regression model is used. Two various cases are set to verify 2nd hypothesis. The 1st one is: impact of L1 dominance on lexical retrieval in non-dominant L2 and the 2nd case is impact of L2 dominance on lexical retrieval in non-dominant L1. For both these cases, regression model is separately applied on both

of them. Additionally, to study the collective impact of aging and linguistic dominance on lexical retrieval in all four groups, multiple regression model is used, since here are two independent variables, and one dependent variable.

Moreover, for significance threshold (α) is set to be 0.05. This value serves as the cutoff. It indicates strong evidence against the null hypothesis, as there is less than a 5% probability the null is correct.

Chapter 4

DATA ANALYSIS

The chapter on data analysis provides a detailed examination of the data gathered through questionnaires and tests. This chapter is divided into three sections. The first section provides a comprehensive explanation of the responses regarding demographic information by all four groups of bilinguals (mentioned in the following *Table no.3*). This section thoroughly discusses the participants' age, their dominant language, preference towards language usage and proficiency. The second part of this chapter portrays the evaluation of the outcomes of translation and fluency tasks, performed by bilinguals. The third section analyzes the data through statistical approaches, such as the t-test and regression analysis model.

The codes are provided to all the groups of participants, as shown below:

Codes	Groups
1(a)	Young aged bilinguals with Urdu (L1) dominance
1(b)	Young aged bilinguals with English (L2) dominance
2(A)	Old aged bilinguals with Urdu(L1) dominance
2(B)	Old aged bilinguals with English (L2) dominance

Table 3 Coding for bilinguals' group

These set codes are referred to their relevant group in this study.

4.1 Demographic Profiling of Bilinguals

This section of data analysis consists of the exploration of questions asked by the bilinguals regarding their language background, usage, preference, and proficiency. This section also includes a general overview of the bilinguals' age and language dominance.

Depending on the dominant language, whether it be Urdu(L1) or English (L2), bilinguals are divided into two groups, which are, the English dominant group of bilinguals and the Urdu dominant group of bilinguals. These two groups are further divided into sub-groups depending on age, either young or old as shown in table 3.

Following is the general overview of these groups.

4.1.1 Urdu dominant bilinguals

The group of Urdu-dominant bilinguals consists of 20 participants, n=20, out of which 10 were of age between 12 to 20 years (group 1a) and the other 10 were of age from 30 to 40(group 2A). These participants are marked as Urdu-dominant since they spend more than 13 hours per day speaking or using Urdu in their daily life. Moreover, the group has the majority of female participants. They make up 70% of the group while the other 30% are male members. Further demographic profiling of this group's participants is discussed in the following section.

The analysis of data shows that most bilinguals spoke only one language before the age of 3. This implies that the participants become bilinguals after the age of 3. 80% of the participants claimed that they did not speak both English and Urdu before 3 years of age, while 20% were not sure about their childhood language experience before age 3.

Moreover, 90% of participants declared that they only heard Urdu from the environment. While 10% of participants received both, English and Urdu from their surroundings, from the time of their birth to 3 years of age.

Furthermore, all of the participants agreed to the statement that they prefer communicating in Urdu only with their friends at the present time. None of the participants use English while talking to their colleagues or class fellows.

The analysis of the responses shows that most of the participants who are at the school level use English only. Statistics show that 50% of participants have to use English as their coursework language, other 30% of students have to utilize both, English and Urdu for academic purposes, whereas only 20% of the participants are not enrolled in any educational institute.

The data produced regarding the proficiency level of the participants of the Urdu dominant group shows that 60% of them possess neutral proficiency, while the other 40% have limited proficiency in their non-dominant language L2. However, all participants have native-like proficiency in their dominant language, Urdu.

4.1.2 English dominant bilinguals

The group of English-dominant bilinguals had 20 participants, n=20, with 10 aged 12 to 20 years and the other 10 aged 30 to 40 years. These participants are

classified as English-dominant because they spend more than 13 hours per day speaking or using English. Furthermore, the majority of the group's members are female. They constitute 60% of the group, while the remaining 40% are made up of men. Further demographic profiling of this group's participants is discussed in the following section.

Data evaluation reveals that the majority of bilinguals spoke both English and Urdu before the age of three. This suggests that the subjects were bilingual before the age of three.60% of participants reported that they have spoken both English and Urdu, whereas 30% claimed that they have not spoken two languages before the age of three. The remaining 10% of individuals are unsure about their childhood language experience.

Moreover, 70% of participants reported hearing Urdu and English in their surroundings. While the remaining 20% of subjects acquired solely Urdu from their surroundings from birth to three years of age.

Furthermore, 70% of participants agreed with the assertion that they currently prefer English for talking with their peers. While the other 30%, regardless of being English dominant, use Urdu when conversing with coworkers or classmates.

According to the study of the responses, the majority of the participants who are attending school solely use English. According to statistics, 50% of participants need to use English as their coursework language, 20% have to use both English and Urdu for educational reasons, and 30% are not enrolled in any academic institution.

According to the data collected on the proficiency levels of the members of the English-dominant group, 50% of bilinguals have a native-like command of their L2, 25% have limited proficiency and the remaining 25% have neutral proficiency in the dominant language, English. However, 60% of participants speak their non-dominant Ll with native-like proficiency.

4.2 Data from Psycholinguistic Tests

This section of data analysis consists of the figures gathered from the tests, conducted to investigate lexical retrieval among bilinguals. Following are the graphical representations of the results of the tasks which include, Translation Task from English to Urdu (TEU), the Translation Task from Urdu to English(TUE), the Urdu Fluency Task (UFT) and the English Fluency Task (EFT).

4.2.1 Test result of group 1a)

This group consists of young bilinguals from age 12 to 20, having Urdu dominance. The mean of their responses towards all the tasks shows the following results:

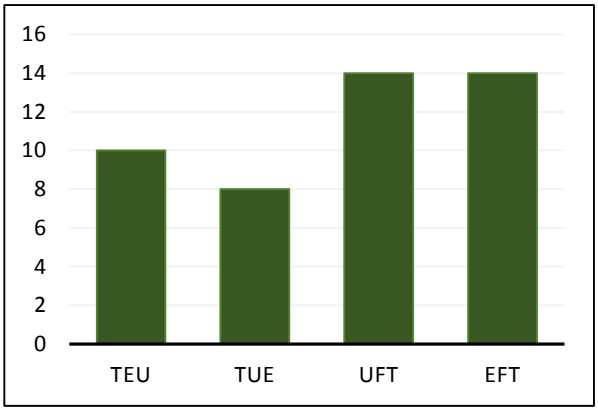

Figure 2 Test scores of Group 1a)

Regardless of being Urdu-dominant, the participants, on average, performed better in EFT than in UFT. Moreover, they executed the task successfully from Urdu to English translation rather than English to Urdu translation.

4.2.2 Test results of group 1b)

The group of young bilinguals from age 12 to 20, with English dominance, is labelled as group 1b). The mean of the tasks' results was calculated, and it produce the following graph:

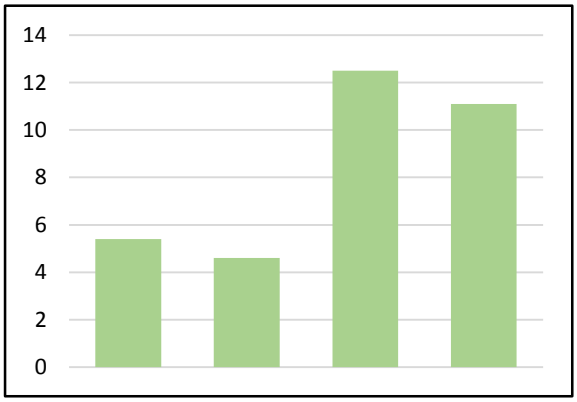

Figure 3 Test scores of Group 1b)

The findings of the result depict that these English-dominant participants, on average, produced more lexical items in Urdu instead of English. Moreover, they performed well in English-Urdu translation as compared to Urdu-English translation.

The outcomes of this group 1b) are opposite to the result of the previous group, 1a).

4.2.3 Test results of group 2A)

This group consists of elderly aged participants, who are dominant in the Urdu language. Their responses to all the tasks were analysed and the mean was calculated. Following is the graphical representation of their result.

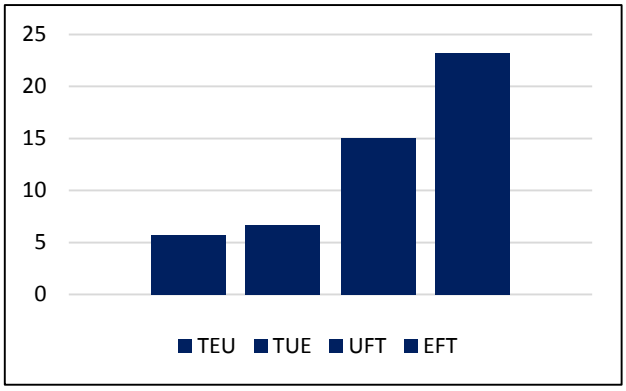

Figure 4 Test scores of Group 2A)

The findings of tests show that the old-aged group with Urdu dominance (2A) and the young-aged group with Urdu dominance (1a) produced the same results. Both groups, on average, were more fluent in making lexical items in the English language rather than Urdu. Similarly, their translation task result is also the same, both groups performed better in Urdu to English Translation instead of in English to Urdu Translation.

4.2.4 Test results of group 2B)

This group comprises old-aged bilinguals, who have English as their dominant language. The calculation of the results of the tasks yielded the following graph:

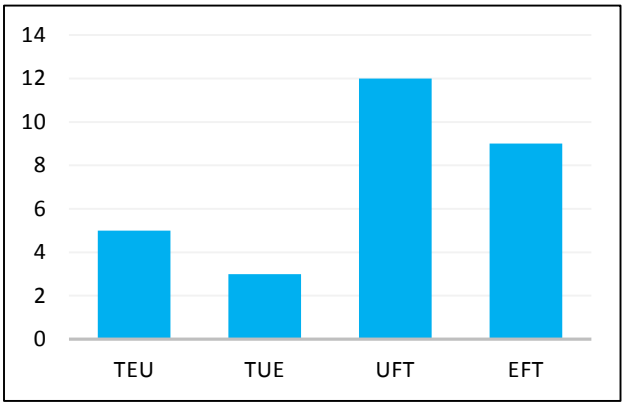

Figure 5 Test scores of Group 2B

As shown in the above figure, participants, on average, were more fluent in the English language. There is a significant gap between the UFT and EFT. Moreover, they translated better in Urdu to English rather than from English to Urdu.

4.3 Comparative Analysis of Test Scores

The analysis is done between the two different age groups of bilinguals, young and old. The scores gained in tasks by young bilinguals are compared with the scores gained by old bilinguals. The difference between the means of scores, hence, provides the impact of aging and answers the inquiry that if there is any effect of aging on lexical retrieval or not.

The comparative study of two age groups produced the following outcomes:

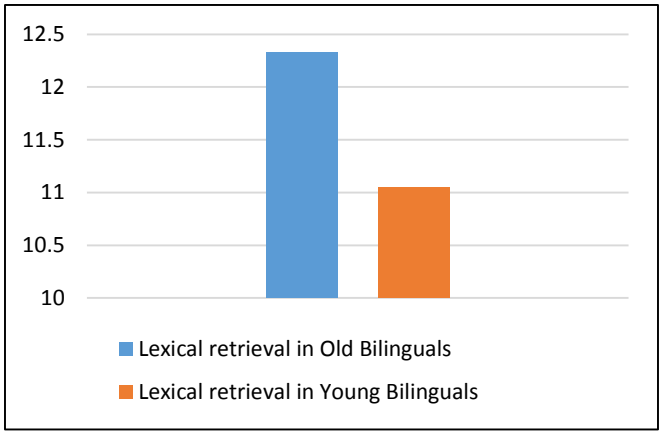

Figure 6 Comparative analysis of young and old bilinguals

Figure 6 portrays that bilinguals in their age of 30 to 40 years are able to retrieve the words more frequently as compared to bilinguals aged between 12 to 20 years. However, these figures are further analyzed statistically to determine the significance of the difference in aging and its impact on word recall through a t-test, discussed later in this chapter.

Another comparative analysis is done to investigate the impact of linguistic dominance on lexical retrieval. Since there are two languages under consideration and the study proposes to examine the impact of one dominant language on the lexical retrieval in the other non-dominant language, therefore, two cases are formed:

1st Case: The impact of Urdu dominance on lexical retrieval in English

2nd Case: The impact of English dominance on lexical retrieval in Urdu

The average of test scores attained by Urdu dominant groups is compared with the average of scores gained by English dominants. The difference in the performance, hence, shows if there is any impact of linguistic dominance on lexical retrieval in the non-dominant language or not.

The following graph shows the comparison of lexical retrieval based on linguistic dominance.

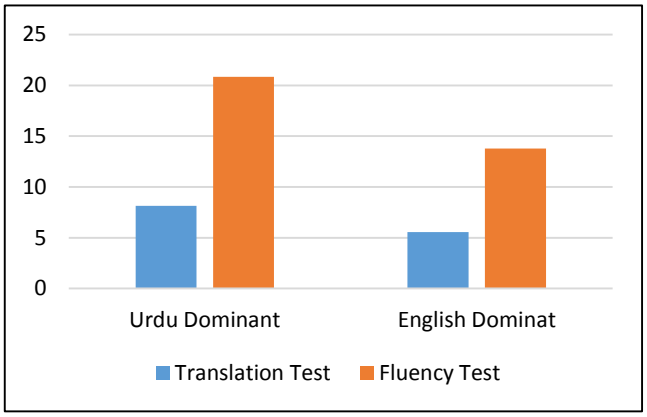

Figure 6 Comparative analysis of Urdu and English dominant bilinguals

Figure 6 graphically represents that Urdu dominant bilinguals have less impact of non-dominant language English on word recall. In comparison, however, English dominant bilinguals are more influenced by their dominant language and produced fewer words in the non-dominant, Urdu language. Moreover, to determine the significance of the impact of one language over the other, regression analysis is done.

4.4 Statistical Analysis

This section of the chapter provides the analysis of results based on a statistical examination. The t-test and regression analysis are done to determine the significance of the findings. Depending on the set variables of the present study, two tests are employed. To test the significance of aging on lexical retrieval, a t-test is used. For analyzing the significance of the impact of linguistic dominance on word recall, linear regression analysis is conducted. This section, firstly, provides the overview of the mean values of test scores of all four groups (1a,1b,2A and 2B). Secondly, this section reports the results of the t-test. Thirdly, it states the regression analysis outcomes. In the end, the collective impact of aging and linguistic dominance on lexical retrieval is examined through multiple regression analysis of the data.

This section discusses the average age of bilinguals and the duration they spend speaking in their dominant language. Participants were asked to write their ages and the hours (from the range given) they spent per day speaking the dominant language. The responses were then calculated to determine the mean(M) values, as shown below:

Test performances based on age	Urdu Dominant			English Dominant		
	Age	Duration (Hrs./day)	Lexical Retrieval in English	Age	Duration (Hrs./day)	Lexical Retrieval in Urdu
	M	M	M	M	M	M
Young	16.9	14.5	31.2	16.3	15.7	17.9
Old	32	16.2	26.8	35.1	15.2	20.8

Table 4 Age, duration and lexical retrieval of Urdu and English dominant bilinguals

To determine the impact of age linguistic dominance, collectively, the numbers shown in above table are employed.

Urdu-dominant bilinguals are assessed only in English retrieval tasks and English-dominant bilinguals are assessed based on their performance in the Urdu retrieval task only because the purpose of the present study is to analyze the impact of the dominant language on the other non-dominant.

The following table depicts the number(n) of participants in each sub-group, mean(M) and standard deviation (SD) values of all four psycholinguistic tests, performed by all participants:

Psycholinguistics Tests	**Urdu Dominant**				**English Dominant**			
	Young		**Old**		**Young**		**Old**	
	n=10		n=10		n=10		n=10	
	M	SD	M	SD	M	SD	M	SD
Translation Test(English-Urdu)	6.3	3.7	5.5	0.71	5.4	2.3	5.7	1.6
Translation Test (Urdu-English)	7.6	2.3	8.7	1.25	4.6	2.0	6.7	0.7
Fluency Test (Urdu)	17.3	3.9	15.6	3.47	12.5	2.5	15.1	5.1
Fluency Test (English)	23.6	5.8	18.1	3.38	11.1	2.3	23.2	3.5

Table 5 Mean scores of psycholinguistic tests

The mean scores gained by the L1 and L2 dominant bilinguals from both age groups, old and young, in all translation tasks, Urdu to English and English to Urdu,

and both fluency tasks, English and Urdu, are shown in above table 5. This data aids in finding the impact of linguistic dominance on lexical retrieval.

4.4.1 Aged-based comparison

To analyze the effect of aging on lexical retrieval, and to test hypothesis 1, age is compared with the performances of bilinguals in all four psycholinguistic tests. The means of all score tests is labelled as lexical retrieval. Moreover, the young group consists of 20 participants of age 12 to 20, out of which 10 are English dominants and 10 are Urdu dominants. Similarly, the old group of bilinguals constitutes of 20 total participants, out of which 10 are English dominants and 10 are Urdu dominants. However, since the focus is only the impact of aging on retrieval therefore linguistic dominance is not taken under consideration for this present case.

Firstly, the scores of the Urdu to English and English to Urdu translation tasks are added to generate total scores in the translation task. Similarly, two sub-tests of fluency, the English fluency task and the Urdu fluency task, are summed up to gain an overall average of fluency tasks. The following table shows the mean values of the translation task and fluency task performed by young and old bilinguals:

Mean of tests	Translation Tasks	Fluency Tasks	Total Scores
	M	M	M
Young Bilinguals	6.0	16.1	11.1
Old Bilinguals	6.65	18	12.3

Table 6 Mean scores of results of young and old bilinguals

The following table 7 depicts the mean(M) and standard deviation (SD) of age groups and scores gained by the bilinguals in the translation task and fluency task.

Aged based groups	Age		Overall test Scores	
	M	SD	M	SD
Young Bilinguals	16.6	2.4	11.05	3.67
Old Bilinguals	33.55	2.8	12.3	1.9

Table 7 Mean of age and lexical retrieval

The T-test is run on the mean values of test scores for lexical retrieval and age, for both young and aged bilinguals' groups to determine the statistical significance of

the difference between average scores. A two-sample t-test is performed to compare lexical retrieval between young and age group. The analysis produced the following results:

	Lexical retrieval in Old Bilinguals	*Lexical retrieval in Young Bilinguals*
Mean	12.33	11.05
Variance	3.57	13.46
Observations	20.00	20.00
Hypothesized Mean Difference	0.00	
Df	28.00	
t Stat	1.38	
P(T<=t) one-tail	0.09	
t Critical one-tail	1.70	
P(T<=t) two-tail	0.18	
t Critical two-tail	2.05	

Table 8 Results of t-test

The t value 0.18 is greater than the significance threshold p-value=0.05(i.e. 0.18>0.05), therefore it is not statistically significant to evident the impact of aging on linguistic dominance.

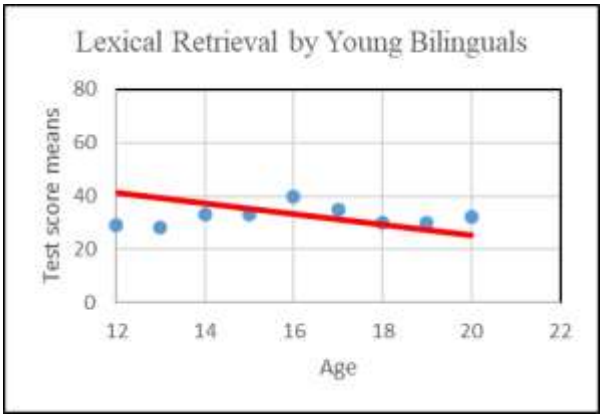

Figure 8a) Lexical retrieval by young bilinguals

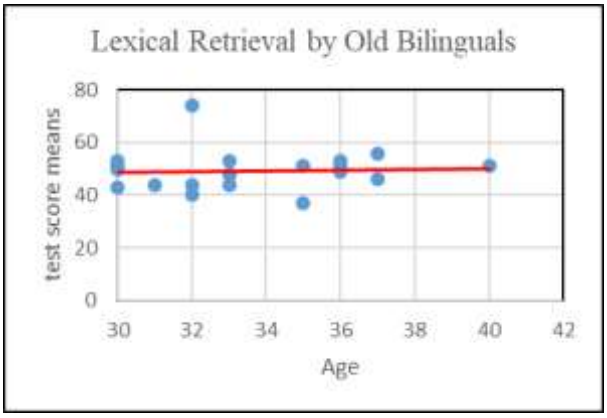

Figure 8b) Lexical retrieval by old bilinguals

Figures 8(a,b) show the impact of aging on lexical retrieval. Figure 8a) implies that with the increase in age in young bilinguals, lexical retrieval slows down. However,

Figure 8b) shows that for the old aged group lexical retrieval slightly increases with the increase in age.

4.5 Comparison based on Linguistic Dominance

To analyze the significance of the impact of linguistic dominance on lexical retrieval, linear regression model is employed. Two separate regression analysis are done, depending upon the following two cases:

1st Case: Urdu (L1) is dominant and its effect on English(L2) word retrieval

2nd Case: English (L2) is dominant and its impact on Urdu (L1) lexical retrieval

Since, the objective is to determine the impact of linguistic dominance on the lexical retrieval in the alternative non-dominant language. For the first case, the translation from Urdu to English and English fluency task is considered only, similarly, for the second case translation task from English to Urdu and Urdu fluency task are merely considered. The following table, therefore, shows the mean of scores gained by L1 dominant and L2 dominant in the relevant tasks.

Groups based on dominance	Urdu Dominant		English Dominant		Total Scores
	Translation	Fluency	Translation	Fluency	
	M		M		M
Retrieval in Urdu tasks	-	-	5.5	13.8	9.65
Retrieval in English task	8.15	20.85	-	-	14.5

Table 9 Lexical retrieval by Urdu & English dominant bilinguals

The scores of tests in Urdu-related tasks and English-related tasks are then compared with the mean of hours spent per day speaking English and Urdu language, respectively. The following table shows the mean of hours corresponding to the lexical retrieval.

Groups of Bilinguals	Time Spent (Hrs./day)		Test Scores	
	M	SD	M	SD
Urdu Dominant	15.4	1.04	9.65	6.08
English Dominant	15.5	1.23	14.5	5.12

Table 10 Duration and tests scores of Urdu & English dominant bilinguals

The regression analysis is done separately for two alternative cases, that is, first when Urdu (L1) is dominant and second when English(L2) is dominant. Following are the details of the outcomes yielded by regression analysis:

4.5.1 Impact of L1 dominance on lexical retrieval in L2

The comparison is done between the dominance (hrs./day) in Urdu (L1) and the test scores gained in English (L2) tasks, to determine the impact of the dominant language, L1 in this present case, on the alternative non-dominant language, which is English (L2) in this case. The regression analysis was done through Microsoft Excel. The following numbers are yielded:

	Coefficients	*t Stat*	*P value*
Intercept	15.55	0.74	0.47
Hrs./day by Urdu Dominants(x1)	0.88	0.64	0.53

Table 11 Regression analysis of Urdu dominant bilinguals

The above data on linear regression analysis is graphically presented below:

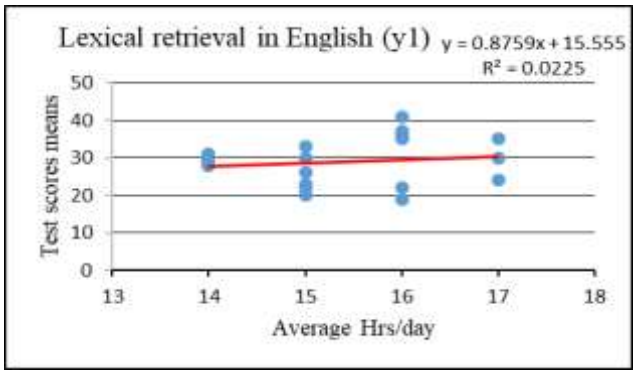

Figure 9) Regression analysis graph for Urdu dominant bilinguals

It is generated from table 11 above that the co-efficient β is 0.88, which implies that with the increase of 52 minutes and 48 seconds per day spend using Urdu would affect the lexical retrieval in English. Since the relation is positive, therefore the lexical retrieval will increase with the increase in time spent. However, table 11 also shows that the p-value is 0.53, which is greater than the significance threshold value, 0.05 (0.53>0.05). The results imply that the relation between two set variables, linguistic dominance and word recall, is not significant enough to show any relation between these two variables.

4.5.2 Impact of L2 dominance on L1 retrieval

For the 2nd case, the impact of linguistic dominance in English (L2) on the lexical retrieval in Urdu (L1), the linear regression model is used. The result of regression analysis produces the following statistics:

	Coefficients	*t Stat*	*P-value*
Intercept	27.97	1.87	0.08
Hrs./day by English Dominants(x2)	-0.56	0.58	0.57

Table 12 Regression analysis of English dominant bilinguals

The results of linear regression analysis yield the following graphical representation:

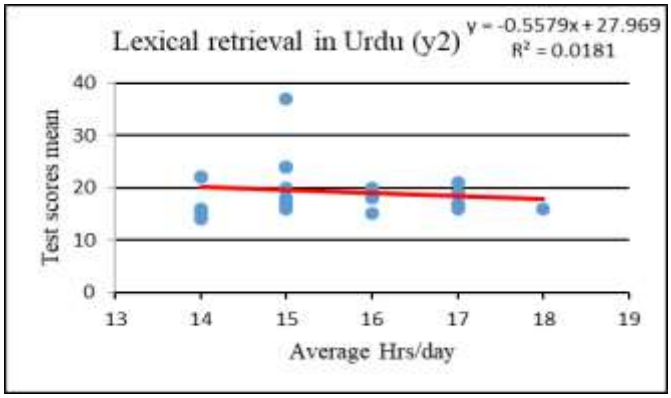

Figure 10 Regression analysis of English dominant bilinguals

According to the chart above, the coefficient is -0.56, implying that the increase of 33 minutes and 36 seconds using English per day, will result in decrease in the lexical retrieval in Urdu. Since the relationship is negative, lexical retrieval will slow downs as time spent speaking English increases. Table 12, reveals that the p-value is 0.57, which is more than the significance threshold, (0.57>0.05). The findings suggest that the relationship between two set factors, linguistic dominance and word recall, is not enough to provide the evidence to accept the null hypothesis.

4.6 Statistical Analysis of Age and Linguistic Dominance Impact on Lexical Retrieval

Additional analysis is done to examine the impact of aging and linguistic dominance, collectively, on lexical retrieval. For this purpose, four groups are formed:

Young-Urdu dominant bilinguals 1a), Old-Urdu dominant bilinguals 2A), Young-English dominant bilinguals 1b) and Old-English dominant bilinguals 2B). The statistical significance is determined between age, dominance and lexical retrieval in all four mentioned sub-groups. The multiple regression model is employed in which age and linguistic dominance are considered independent variables, and lexical retrieval or test scores as the dependent variable. The following section explains the outcomes of statistical analysis of all these sub-groups separately.

4.6.1 Effect of aging and linguistic dominance on Young-Urdu dominant bilinguals 1a)

Lexical retrieval in Urdu dominants within the age range of 12 to 20 years is examined through regression analysis and it produced the results as shown in the following table:

	Coefficients	*t Stat*	*P-value*
Intercept	-54.37	-0.62	0.55
Age of Young Bilinguals	2.24	2.30	0.05
Hours/day by Urdu Dominants(x1)	3.30	0.64	0.54

Table 13 Regression analysis of group 1a)

The predictors age has *p*-value that is equal to the significance level 0.05 ($p \leq 0.05$). This result indicates that age has relationships with lexical retrieval. However, time spent using L1 by young bilinguals has *p* value greater than the significance level of 0.05. Which indicates that there is not enough evidence to conclude that time is related to the response.

The diagrams below show the correlation between the age of young bilinguals and lexical retrieval in L2 (figure 11a) and between the L1 dominance and lexical retrieval in L2 (figure 11b).

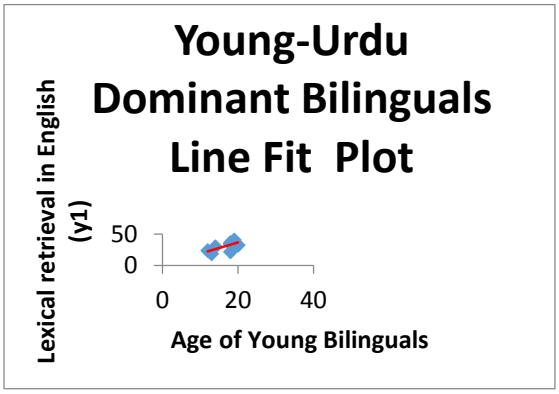

Figure 11a) Regression analysis between age and lexical retrieval of group 1a)

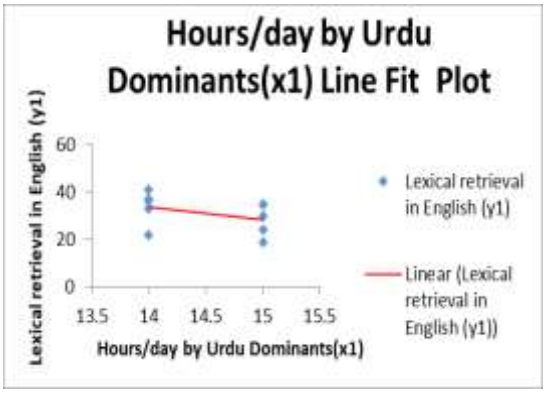

Figure 11b) Regression analysis between Hrs./day and lexical retrieval of group 1a)

The coefficient for age, β is 2.24, estimates that the mean of L2 lexical retrieval increases by 2.24 units for each one-unit increase in age, while the other terms in the model are held constant.

Similarly, the coefficient of duration spent (Hrs./day), β 3.30, indicates that the mean of L2 lexical retrieval increases by the increase of 3 hours and 18 minutes in time spent speaking Urdu.

4.6.2 Effect of aging and linguistic dominance on Old-Urdu dominant bilinguals 2A)

The regression analysis of the lexical retrieval in the non-dominant language, English, by the old-aged Urdu dominant bilinguals produced the following statistics:

	Coefficients	t Stat	P-value
Intercept	148.79	3.32	0.01
Age of Old Bilinguals	-1.16	-2.16	0.07
Hours/day by Urdu Dominants(x1)	-5.24	-2.63	0.03

Table 14 Regression analysis of group 2A)

The predictor of time duration has a *p*-value, 0.03, which is less than the significance level of 0.05 ($p<0.05$). This result indicates that there exists a significant relation between linguistic dominance (Hrs./day) and lexical retrieval. However, the age of Urdu-dominant bilinguals has *a p value* of 0.07. This value is greater than the significance level of 0.05. Which indicates that there is no enough evidence to conclude that old age is related to the response in non-dominant L2.

The diagrams below show the correlation between the age of old bilinguals and lexical retrieval in L2 (figure 12a) and between the L1 dominance and lexical retrieval in L2 (figure 12b).

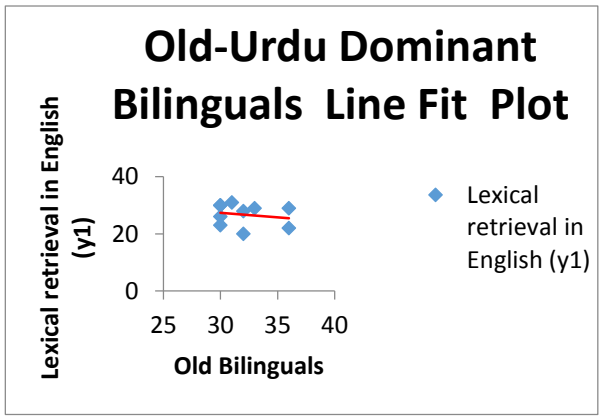

Figure 12a) Regression analysis between age and lexical retrieval of group 2A)

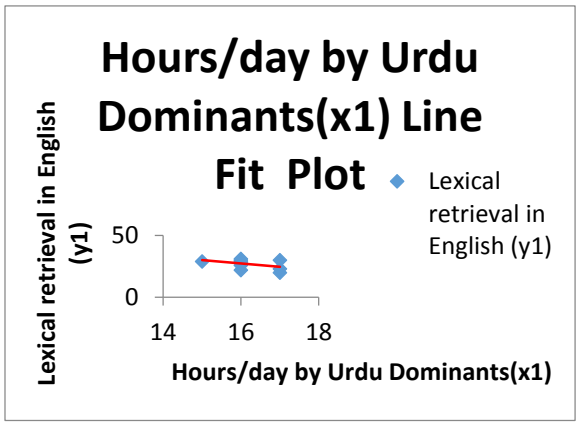

Figure 12b) Regression analysis between Hrs./day and lexical retrieval of group 2A)

The coefficient for time estimates that the mean of L2 lexical retrieval decreases by 5.24 units for each one-unit increase in time, while the other terms in the model are held constant.

The above diagram 11a) shows that, since the β is -1.16, with the decrease of 1.16 in age, lexical retrieval increases. Similarly, the coefficient of duration spent (Hrs./day), β -5.24, depicts that the mean of L2 lexical retrieval increases by the decrease of 5 hours, 14 minutes, and 24 seconds per unit.

4.6.3 Effect of aging and linguistic dominance on Young-English dominant bilinguals 1b)

To analyze the statistical significance between the ages time spent, and lexical retrieval among the young English-dominant bilinguals, a multiple regression model is

utilized. This group consists of 12 to 20 bilinguals and their lexical retrieval in Urdu is examined. The outcomes of statistical analysis are shown in the following table:

	Coefficients	t Stat	P-value
Intercept	6.86	0.38	0.72
Age of Young Bilinguals	0.20	0.36	0.73
Hours/day-Eng Dominant(x2)	0.49	0.58	0.58

Table 15 Regression analysis of group 1b)

The predictors age and duration have *p*-values, of 0.73 and 0.58 respectively, which is greater than the significance level of 0.05 (p>0.05), hence, the model is statistically insignificant to evident any impact of aging and dominance on lexical retrieval in Urdu.

The diagrams below show the correlation between the age of young bilinguals and lexical retrieval in L1 (figure a) and between the L2 dominance and lexical retrieval in L1 (figure b).

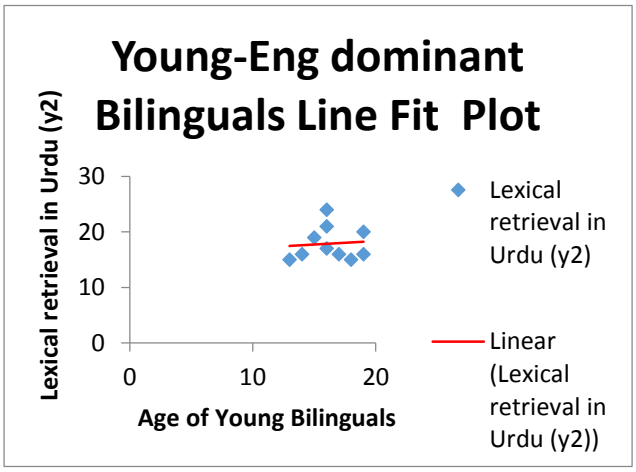

Figure 13a) Regression analysis between age and lexical retrieval of group 1b)

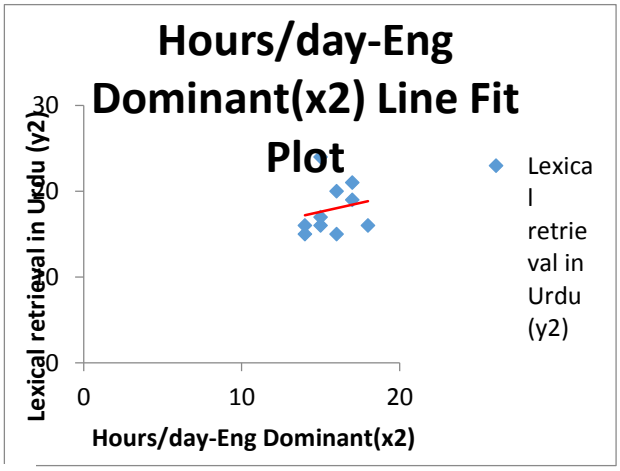

Figure 13b) Regression analysis between Hrs./day and lexical retrieval of group 1b)

The coefficient of age, β=0.20 indicates that with the every increase of 0.20 in age, lexical retrieval increase, which means both are directly proportional. Similarly, coefficient of duration, β= 0.49. depicts that with the increase of every 30 minutes (approx.) in time per day spent speaking English by English-dominant bilinguals increases lexical retrieval in L1. The relationship, hence, between time and lexical retrieval is directly proportional.

4.6.4 Effect of aging and linguistic dominance on Old-English dominant bilinguals 2B)

To study the impact of age and linguistic dominance, collectively, on lexical retrieval in non-dominant language, the old aged English dominant bilinguals are analyzed. The statistical tool, regression analysis is used and it formulated the following results, as shown in the table:

	Coefficients	*t Stat*	*P-value*
Intercept	108.97	2.97	0.02
Age of Old Bilinguals	-1.72	-2.41	0.05
Hours/day-Eng Dominant(x2)	-1.82	-1.17	0.28

Table 14 Regression analysis of group 2B)

The table above shows that *p* value of age,0.05, is equal to the significance threshold, (p=0.05) which implies that there is a significant relation between old-aged English dominant bilinguals and their lexical retrieval in non-dominant Urdu. Therefore, there is enough evidence present to conclude lexical retrieval in non-dominant Urdu, is influenced in the case when bilinguals are old and are dominant in L2, English.

However, the *p* value of duration or time is 0.28, which is greater than the significance level ($p>0.05$). Therefore, it is concluded there is not enough proof to establish the relation between the lexical retrieval in L1, and the time old bilinguals spent speaking in their dominant language, L2 in this case.

The diagrams below show the correlation between the age of young bilinguals and lexical retrieval in L1 (figure 14a) and between the L2 dominance and lexical retrieval in L1 (figure 14b).

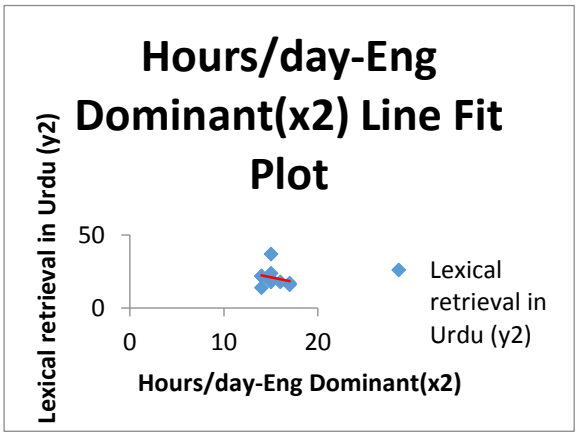

Figure 14a) Regression analysis between age and lexical retrieval of group 2B)

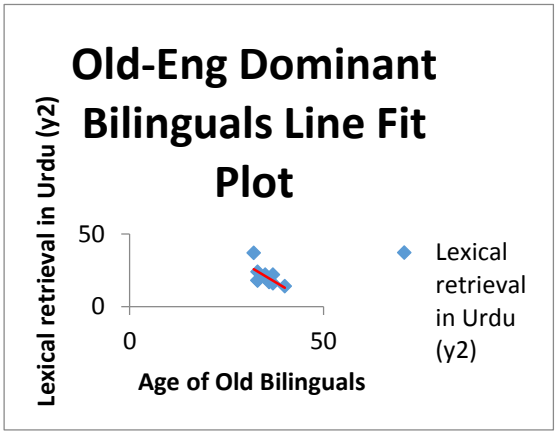

Figure 14b) Regression analysis between Hrs./day and lexical retrieval of group 2B)

The coefficient of both, age and durations, shows indirect relation between them and lexical retrieval. The coefficient value for is -1.72, which means that with the increase of 1.72 in age, the lexical retrieval decreases. β for duration (Hrs./day) is -1.82, it implies that with the increase of 1.82 time, there is decrease in lexical retrieval per unit.

4.7 FINDINGS AND DISCUSSION

This chapter builds on the data analysis done in the previous chapter. It attempts to state the findings considering the set hypothesis. The second part of the chapter consists of detailed discussions of these findings while highlighting the contributions they make to the existing literature.

4.7.1 Findings on Effect of Aging on Lexical Retrieval

The 1st hypothesis of this study is:

Hypothesis 1 (H1): With aging, lexical retrieval becomes slower.

Null Hypothesis (H0): Aging does not affect lexical retrieval.

To find if with aging lexical retrieval becomes slower or not, the results of two different age groups, while keeping the linguistic dominance constant, are compared. The comparison is done between the young-aged group and the old-aged group. Such

comparative analysis of the tasks performed by these groups yielded the following results.

Lexical retrieval is calculated by summing up the scores of all four psycholinguistic tasks: Translation from Urdu to English, Translation from English to Urdu, Urdu Fluency Task and English Fluency Task. Young and aged bilinguals are compared on the basis of the test scores they gained in all these tests. The comparison between their test results shows the impact of aging on lexical retrieval.

The analysis of the results of all the tasks of both age groups, young and old, yielded the illustration as shown in *figure 6*.

The graph explicitly shows that old bilingual outperformed the young-aged bilinguals, in all the word recalling tasks collectively.

The results promote that with aging lexical retrieval becomes frequent and stronger. Young-aged bilinguals have to fight more for word selection competition, as compared to old-aged bilinguals. This rejects the declaration given by the weaker link hypothesis that with the passage of time the connection between concepts and their linguistic expression becomes weak due to the availability of more than one word, or name for almost every idea.

However, the results of the t-test show that this effect of aging on lexical retrieval is not statistically significant. Since the value of p, obtained after running the t-test is 1.80. This p-value is greater than the significance threshold (α=0.05). Therefore, there was not a significant difference in lexical retrieval of young and age group.

4.7.2 Discussion on the findings of hypothesis 1

The results of this study contrast with what has been proposed by Alwin and McCammon (2001) and Verhaeghen (2003). Depending on the result of their research, it was claimed by them that semantic systems improve with age. Therefore, older people are supposed to have a larger vocabulary, superior word knowledge, and the ability to construct longer and more complex sentences than younger adults (Kemper & Sumner, 2001). This study, on the contrary, reveals that there is no such difference in the semantic system of young and aged bilinguals.

Moreover, studies by Rossi and Diaz (2016) suggested that the factor of age highly influences language performance, although if bilinguals have equal proficiency in both languages. These results suggest that aging can play an important role in a bilingual's languages differentially. However, this present study negates that there is

any aging impact on bilingual's language. The results may vary between the studies by Rossi (ibid) and this current research because of proficiency level of bilinguals, since the sample of this present study includes bilinguals with mixed level of proficiency, ranging from being limited to native-like proficient.

Moreover, the RHM developed by Kroll and Stewart (1994) supports the claim generated from the current study that aging has no effect on lexical retrieval. Bilinguals, according to RHM, generate a strong relationship between the words of L2 and their translation counterparts in their first/native language (L1) while learning or acquiring a second language, but less connection with the common conceptual store. This is because as learners mature, they live and converse in their L1, which causes them to access concepts in their L1 and strengthens the relationship between their lexical memory in L1 and their concept recall. Then, when they begin learning an L2, they have no concepts to begin with because they are unfamiliar with the culture. As a result, access to the meaning of the word in the L2 is obtained by stimulating its counterpart in the L1 and recovering its semantic meaning. However, with the passage of time, L2 lexical elements become directly related with conceptual storage, the need for L1-facilitated recall of word meaning reduces.

This therefore claims that over the time L2 retrieval become directly linked to the conceptual storage just like the links which were already present between L1 and conceptual storage, it can be conclude that process of lexical retrieval becomes stable for bilinguals as they grow, therefore there is no significant impact of aging on lexical retrieval. Lexical retrieval in aged bilinguals is as same as within the young bilinguals who can retrieve in their L2 without much struggle as claimed by Johnson and Newport's (1989) research. According to them, an assumed CP in SLA indicated that native-like competency in L2 was unattainable after the age of seven, a finding aligned with the maturational theory of language acquisition.

4.7.3 Findings on Effect of Linguistic Dominance on Lexical Retrieval

The second hypothesis set for this very research is:

Hypothesis 2 (H2): Linguistic dominance in one language affects lexical selection and retrieval in the other non-dominant language.

Null Hypothesis (H0): Linguistic dominance in one language does not affect lexical selection and retrieval in the other non-dominant language.

Two cases, depending on the independent variable, are analyzed separately:

1st Case: If there is an effect of L1 dominance on the lexical retrieval in non-dominant L2

2ND Case: If there is an effect of L2 dominance on the lexical retrieval in non-dominant L1.

To test 1st case hypothesis, the results of all English retrieval related tasks (Translation from Urdu to English and English fluency task) performed by Urdu-dominant bilinguals are examined. Similarly, to test hypothesis 2nd case, the results of all Urdu retrieval related tasks (Translation form English to Urdu and Urdu fluency task) are examined. The comparison between the results of Urdu and English dominant yielded the impact of linguistic dominance on the non-dominant language, English and Urdu respectively.

The results from the tasks produced the graphical representation presented in *figure 7*. The graph shows that Urdu dominant bilinguals outperformed English dominant bilinguals in both, translation and fluency, tasks. Therefore, it is implied that the lexical retrieval in English (L2), by Urdu dominant bilinguals is less affected as compared to the lexical retrieval in Urdu, by English dominant bilinguals.

If bilinguals are dominant in L2, they are likely to struggle to retrieve in their non-dominant L1. However, if bilinguals are L1 dominant they do not have to struggle to retrieve in their non-dominant L2.

Moreover, the means of the tasks' results are statistically analyzed. The Linear regression model is used for both cases of hypothesis 2.

For the 1st case:

The results of linear regression analysis show that the impact of L1 dominance on lexical retrieval in L2 is not statistically significant. Since the value of p, obtained because of a regression model is 0.53. This p-value is much greater than the significance threshold, which is α=0,05, and 0.53>0.05. Therefore, the sample is not evident enough to reject the null hypothesis. Hence, the null hypothesis is accepted that if a bilingual is dominant in L1, his/her lexical retrieval in L2 is not affected.

For 2nd Case:

To determine the statistical significance of the impact of L2 dominance on lexical retrieval in L1, the linear regression model is used. The p-value yielded through the regression model, which is p=0.57, is greater than the significance threshold, 0.57>0.05. It implies that the impact of L2 dominance on the lexical retrieval in non-

dominant L1, is statistically not significant. This impact is therefore not evident enough to reject the null hypothesis. As a result, the alternative hypothesis is rejected, and it is found out that the linguistic dominance in L2 has no effect on lexical retrieval in non-dominant L1.

Therefore, null hypothesis 2 is accepted, the linguistic dominance in one language does not affect the lexical retrieval in alternative non-dominant language.

4.7.4 Discussion on the findings of hypothesis 2

The findings of present study suggest that adopting or using non-native language (L2 in the present case) does not impact language processing in native language (L1).

Gollan et al., (2008, 2011) presented the weaker linkages hypothesis to account for the "disadvantages" found in bilingual speakers' performance during lexical access to their native language as opposed to monolingual speakers. The weaker linkages theory postulates that there exists shortcoming in bilingualism due to the presence of two distinct terms for nearly all provided notions for each language. This causes bilinguals to employ each word less frequently than monolingual speakers. Due to less frequent use, the associations between the semantic and phonological structures of words in bilinguals' two languages are incapacitated than in monolinguals' one language. However, the findings of this study reveal that less use of one language over the other language does not have any impact on the links between semantic and graphological structures of words.

Chapter 5

CONCLUSION AND RECOMMENDATIONS

This study attempts to find the impact of aging and linguistic dominance on the lexical retrieval by bilinguals. This research is based on Grosjean's (2010) exhaustive definition of bilingualism which states that bilinguals are ones that acquire and utilize more than one languages or dialects in daily routine. They are considered as individuals, according to Grosjean, whose linguistic ability in both languages fluctuates in relation to a particular domain. Moreover, the research is conducted based on frequency lag, according to which bilinguals' slower lexical retrieval is a result of their less frequent usage of words from both languages, which ultimately leads to weaker linkages between concepts and words (Gollan et al., 2008). This study employs this theory while comparing bilinguals based on their age and the linguistic dominance in either of their two languages.

This research is constructed on the claim that as processing in L1 is examined and studied through TOT and other linguistic errors, similarly errors in L2 determine the processing in it. Here, lexical errors were defined narrowly as a replacement of an intended required target word with the non-targeted word (Ecke, 2001).Further, the inherent abilities of bilinguals were tested through the dimensions of dominance as suggested by Birdsong.

Friesen et al. (2015) worked on Verbal Fluency (VF) as it is one of the widely accepted techniques for measuring lexical retrieval ability by various psychologists and psycholinguistics. (Shao et al., 2014) worked on two frequently used types of VF tasks, which are; Semantic fluency and Phonemic fluency task. A similar technique is employed for data collection to analyze the linguistic abilities of bilinguals, however, instead of Phonemic, Written Semantic fluency task was used since it was a written test.

The purpose of the study lies in testing the following hypotheses:

Hypothesis 1 (H_1): With aging, lexical retrieval becomes slower.

Null Hypothesis (H_0): Aging does not affect lexical retrieval.

Hypothesis 2 (H_2): Linguistic dominance in one language affects lexical selection and retrieval in the other language.

Null Hypothesis (H_0): Linguistic dominance in one language does not affect lexical selection and retrieval in the other language.

Clearly the findings of the study prove that there is no effect of aging on the lexical recall. The study also found that there is no significant impact of one dominant language on the lexical retrieval of the other non-dominant alternative language. However, different results can be obtained while considering the factor of short-term memory, reading time.

Moreover, the study nullified the weaker link hypothesis, hence it contributes in the body of knowledge by finding out that links between semantic and phonological representations are not affected by aging or the time one spent in speaking any specific language. Therefore, it is implied that bilingualism neither has positive nor negative impact on a person.

The above-mentioned findings provide new dimensions for examining the language processing in bilinguals in terms of their age and language dominance. This study tends to examine Urdu-English bilinguals in context of Pakistani society where Urdu is regarded as native language and English is regarded as non-native language. The results of the study will be beneficial for applied linguists working in the field of Second Language Acquisition (SLA), English Language Teaching (ELT) and bi/multilingualism. The lexical retrieval or other language processing skills of students can be assessed by the English language teachers regardless of students' age and language dominance or preference, since it is proved from this study that dominance or preference towards one language does not make any impact on non-dominant language. The students' performance, therefore, should only be assessed on other grounds such as teaching strategy of mentors, syllabus efficiency etc.

Moreover, studies on bilingualism and bilingual memory are the need of this age of technological advancements. This study hopes to contribute to the ongoing debates on the advantages or disadvantages of bi/multilingualism by claiming that language processing in bilinguals is not effected by aging and linguistic dominance, while keeping other factors such as proficiency and age of acquisition (AoA) constant; therefore, they are not at any disadvantage.

5.1 Recommendations for Further Research

This research can further be linked with other areas of linguistics, such as multilingualism, sociolinguistics and applied linguistics. Following are some recommendations for further research, which can be adopted by scholars interested in studying further complexity in bilingualism.

1. This study does not take into account the factors involved in acquiring a second language such as critical period hypothesis, or the way L2 is acquired, that is, whether it is acquired sequentially or simultaneously. Taking these factors into account can further contribute to research in psycholinguistics.
2. Moreover, this research provides the grounds for future research by incorporating a sociolinguistic approach. One can study the process of lexical retrieval in bilinguals by taking the bilinguals' educational background, financial status or family language background into account. Adding these approaches would enable the researcher to understand the complexity of lexical retrieval to some extent.
3. Furthermore, researchers can also compare the process of lexical retrieval among trilingual groups. This study takes only two languages, Urdu and English, under consideration. However, interested researchers can compare Urdu with other two regional languages of Pakistan, such as Punjabi, Saraiki, Pushto, Sindhi, etc. This point of view of approaching the study would be beneficial for understanding the process of lexical retrieval in terms of multilingualism and regional languages.
4. Depending on the sources and the time given, potential researchers can retest the findings of this study by varying the data collection methods. Since this study adopted Semantic Written Fluency Task and Translation Task for data collection, in future scholars can use different tests like picture-naming tasks, Boston Naming tasks and Eye-tracking tasks.
5. In order to study the impact of aging on lexical retrieval or any other language processing, researchers in future can study more age groups to better understand the trends. For instance, they can investigate the age groups 10 to 20, 20 to 30, 30 to 40 and from 40 to 50. This approach would be helpful to generalize the impact of aging on lexical retrieval.

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Appendix 1

My name is Khizra Aslam and I am currently pursuing MPhil in English Linguistics from NUML,Islamabad. For my MPhil thesis, I am working on language acquisition among Urdu and English bilinguals in Pakistan.

Below is a questionnaire that I have designed for data collection for my research. The questionnairewill be followed by fluency and translation tasks. This will take a total of up to 10 minutes (5-7 minutes for filling out the questionnaire and 3 minutes for fluency and translation tasks). Your responses will be kept anonymous and will be only used for the purpose of my research study.

Consent Form

1. Name _____
2. I provide my consent to take part in the research study and understand the following:

- I voluntarily agree to participate in this research study.
- I understand that even if I agree to participate now, I can withdraw at anytime or refuse
- I have had the purpose and nature of the study explained to me in writingand I have had the opportunity to ask questions about the study.
- I understand that I will not benefit directly from participating in this research.
- I understand that all information I provide for this study will be treated confidentially.
- I understand that in any report on the results of this research my identitywill remain anonymous.
- I understand that if I inform the researcher that myself or someone else isat risk of harm they may have to report this to the relevant authorities - they willdiscuss this with me first but may be required to report with or without my permission.
- I understand that I am free to contact any of the people involved in theresearch to seek further clarification and information.

  Mark only one oval.

  ○ Consent given

  ○ Consent not given

Appendix 2

BILINGUALS' LANGUAGE BACKGROUND QUESTIONNAIRE

The questions below are grouped into several sections. Please read the instructions for each section and note that there are no "right" or "wrong" answers. Your answers will be confidential and used only for the purpose of this research project.

1. My age falls between
    - 12-20
    - 21-25
    - 30-35
    - 36-40
2. I identify my gender as
    - Male
    - Female
3. My first acquired language is:
    - Urdu
    - English
4. Mark only one oval.

    I speak Urdu more than 13 hours per day

    I speak English more than 13 hours per day

5. Highest level of educational attainment
    - Primary school
    - Secondary school
    - Professional training/diploma
    - Undergraduate degree
    - Masters
    - PhD
6. Current occupational status
    - Student
    - Employed
    - Self-employed
    - Unemployed
7. Which statement best describes you? Tick all that apply.
    - I am a native English speaker with proficient Urdu.

- I am a native Urdu speaker with proficient English.
- I am a native speaker of both Urdu and English.

8. Which language(s) did your parents tend to use when speaking to you during your childhood? *Mark only one oval.*

- English
- Urdu
- Both

ENGLISH LANGUAGE BACKGROUND

This section asks you about the amount of time you've spent in an English-speaking environment.

9. In total, how many months/years have you spent in a country where English is spoken? *Mark only one oval.*

- 0-6 months
- 6-12 months
- 5+ years
- 10+ years

URDU LANGUAGE BACKGROUND

This section asks you about the amount of time you've spent in Urdu speaking environment.

10. In total, how many months/years in total have you spent in a country where Urdu is spoken? *Mark only one oval.*

- 0-6 months
- 6-12 months
- 5+ years
- 10+ years

LANGUAGE PROFICIENCY, PREFERENCE AND USE

11. Rate your ENGLISH language proficiency *Mark only one oval.*

- Native-like proficiency
- Limited proficiency
- Neutral

12. Rate your URDU language proficiency. *Mark only one oval.*

- Native-like proficiency

- Limited proficiency
- Neutral

13. If you could choose freely which language to use most in your daily life, it would be : *Mark only one oval.*
    - English
    - Urdu

14. Which language do you prefer to speak, most of the time in a day: *Mark only one oval.*
    - English
    - Urdu

15. How often do you use URDU in your daily life right now with friends/family? *Mark only one oval.*
    - Always
    - Very Often
    - Never

16. How often do you use ENGLISH in your daily life right now with friends/family? *Mark only one oval.*
    - Always
    - Very Often
    - Never

17. How often do you listen to music/podcasts/radio in URDU? *Mark only one oval.*
    - Always
    - Very Often
    - Never

18. How often do you listen to music/podcasts/radio in ENGLISH? *Mark only one oval.*
    - Always
    - Very Often
    - Never

19. When you browse the internet, how often do you use URDU as your preferred language? *Mark only one oval.*
    - Always

- Very Often
- Never

20. When you browse the internet, how often do you use ENGLISH as your preferred language? *Mark only one oval.*
    - Always
    - Very Often
    - Never

Thankyou!

Thank you for taking the time to answer these questions about your language background, preferences, and use. I appreciate the time you took to respond to this survey!

Appendix 3

FLUENCY TEST

Write English words starting with the following letters, as many as you can: (30 seconds)

1.F

2.A

3.S

List the animals (including birds) in English, as many as you know: (30 seconds)

Write Urdu words starting with the following letters, as many as you can: (30 seconds)

ا

س

ف

List the animals (including birds) in Urdu, as many as you know: (30 seconds)

Appendix 4

TRANSLATION TASK

Please write Urdu equivalent for the following English words: (Time allotted: 30 seconds)

Words in English	Urdu Equivalent
1. Translation	
2. Planet	
3. Dustbin	
4. Zoo	
5. Rainbow	
6. Society	
7. Experience	
8. Flavor	
9.Hope	
10. Ring	

Please write English equivalent for the following Urdu words: (Time allotted: 30 seconds)

English Equivalent	اردو الفاظ
	ذائقہ
	خواہش
	ترتیب
	خدمت

درخواست	
قینچی	
مصالحه	
عجیب	
میز	
گزارش	