Macrothink Institute™

International Journal of Linguistics
ISSN 1948-5425
2023, Vol. 15, No. 6

Insights Into L1 and L2 Vocabulary Size Association: A Perspective From Elementary Pashto-English Sequential Bilinguals

Nighat Bibi

Department of English, Faculty of Modern Languages and Communication

Universiti Putra Malaysia

43400 UPM Serdang, Selangor Darul Ehsan, Malaysia

Mohamad Ateff Md Yusof (Corresponding author)

Department of English, Faculty of Modern Languages and Communication

Universiti Putra Malaysia

43400 UPM Serdang, Selangor Darul Ehsan, Malaysia

Tel: 60-3-9769-8726 E-mail: ateffyusof@upm.edu.my

Yap Ngee Thai

Department of English, Faculty of Modern Languages and Communication

Universiti Putra Malaysia

43400 UPM Serdang, Selangor Darul Ehsan, Malaysia

Ramiza Haji Darmi

Department of English, Faculty of Modern Languages and Communication

Universiti Putra Malaysia

43400 UPM Serdang, Selangor Darul Ehsan, Malaysia

Received: November 3, 2023 Accepted: December 8, 2023 Published: December 18, 2023

doi:10.5296/ijl.v15i6.21435 URL: https://doi.org/10.5296/ijl.v15i6.21435

Abstract

Vocabulary is a crucial predictive factor in the linguistic advancement of children whether monolingual or bilingual. The increasing number of bilingual individuals underscores the significance of accurately assessing vocabulary development among bilinguals at school. However, assessing the vocabulary of bilingual children is intricate due to their acquisition of words across two languages. Determining the most suitable metric for comprehensively measuring their vocabulary, especially in comparison to monolingual counterparts, remains an ongoing endeavor. This correlational descriptive study aims to examine the vocabulary knowledge of sequential bilingual children and evaluate the effectiveness of a conceptual scoring approach that incorporates the terms known in both their first and second languages. The sample consisted of bilingual(n=200) and monolingual (n=95) elementary school learners from Mardan district, Khyber Pakhtunkhwa, recruited through purposive and random sampling to ensure a balanced and unbiased outcome. The assessment procedure involved gauging each participant's passive and active vocabulary in English and Pashto, achieved through the utilization of tools such as X-Lex and the Category Generation Task. Data analysis carried out using SPSS version 25, revealed a substantial correlation between the vocabulary sizes of bilingual individuals across both their primary (L1) and secondary (L2) languages. The findings of the study may have far-reaching effects, providing significant novel perspectives on instructional practices and stimulating further investigation.

Keywords: Vocabulary size, Active, Passive, Sequential, Bilinguals, Pashto monolinguals

1. Introduction

The process of language acquisition plays a central role in the expansion of vocabulary, particularly in the context of early childhood development. Owning an extensive vocabulary is crucial for second language learners and greatly impacts their whole language proficiency. The significance of vocabulary knowledge in the process of language acquisition has been the subject of several studies (Cheng & Matthews, 2018; Janebi Enayat & Amirian, 2020; Qian & Lin, 2020; Sukying, 2018; Webb, 2019). Dong *et al.* (2020) assert the indispensable role of a robust vocabulary in children's language acquisition, underpinning their skills in comprehension and sentence generation. It comprises an essential component of linguistic proficiency. (Read, 2004; Schmitt, 2008; Abdullah, 2012; Alavi & Akbarian, 2012). In a similar vein, Richards, and Rodgers (2014) underscore that language learning and interactions are rooted in words and collocations, transcending the realm of grammar and other linguistic elements. Contemporary studies have also observed the significance of vocabulary in facilitating the development of speaking, writing, and communication abilities (Cakmak *et al.*, 2021; Wero *et al.*, 2021 & Luo *et al.*, 2021). Moreover, the significance of a robust vocabulary in achieving academic success cannot be overstated, as it exhibits proficiency and mastery. Conversely, a constrained vocabulary acts as a barrier to effective learning and language development.

Empirical studies have consistently indicated disparities between bilinguals and monolinguals concerning vocabulary size and the multifaceted understanding of vocabulary items (Verhallen & Schoonen, 1998; Meara, 2018). Verhallen and Schoonen's (1998) findings

revealed that bilinguals exhibit narrower conceptual interpretations compared to their monolingual counterparts. Similarly, bilingual individuals often demonstrate limited native word knowledge compared to monolinguals (Bialystok *et al.,* 2008). Addressing an ongoing debate, Topkaraoğlu and Dilman (2014) delve into the minimum vocabulary proficiency requisite for second-language learners to effectively communicate in the desired language. The extensive vocabulary, as revealed by Hatch and Brown's (1995) research, empowers individuals to articulate their thoughts and ideas with ease, reflecting heightened second-language proficiency.

Thus, a comprehensive exploration is imperative to comprehend the impact of bilingualism on vocabulary size across both primary and secondary languages. This research endeavor addresses this discrepancy by conducting a comparative analysis of vocabularies between Pashto-English bilinguals and monolingual Pashto speakers.

1.1 Research Problem

Vocabulary constitutes a pivotal facet of proficiency in both the first language (L1) and the second language (L2) competence (Daller *et al.*, 2007). The strength of one's vocabulary underpins not only reading and writing abilities but also influences overall language proficiency (Alderson, 2000; Qian, 2002; Joshi, 2005; Martin-Chang & Gould, 2008). This intricate relationship beckons for in-depth exploration, particularly concerning the interplay between linguistic capabilities in L1 and L2 for bilingual individuals (Cummins, 1979, 1980).

The prior studies concentrated on the association between other aspects of language efficiency, including syntax, morphology, phonology, and pragmatics (Kuo *et al.*, 2016; Verhoeven, 1994). For instance, a recent investigation conducted has explored the variations among learners in terms of working memory (Ansarin & Khabbazi, 2021; Lee & Lee, 2021). Likewise, Zhang and Roberts (2021) and Marecka *et al.* (2020) investigated the connection between children's phonemic awareness and verbal memory. Thus, a notable gap exists in the contemporary literature regarding the correlation between the vocabulary sizes (L1 & L2) of bilinguals and their comparison to monolinguals.

1.2 Classification of Vocabulary

Vocabulary, as a multifaceted construct, encompasses two primary dimensions: size and depth (Schmitt, 2014). Vocabulary size entails a straightforward and unidimensional count of words (Milton, 2009). In contrast, the depth of vocabulary delves into lexical intricacies such as word meanings, semantic associations, colloquial expressions, and syntactic patterns (Bardakçı, 2016). A pivotal distinction within vocabulary knowledge is the division between passive and active vocabulary (Zhou, 2010). Passive vocabulary pertains to the ability to recognize the form of a word (Laufer *et al.*, 2004) and to correlate it with an equivalent word in the learner's native language (Webb, 2009). Conversely, active vocabulary encompasses both the recognition and production of words in one's native language (Laufer *et al.*, 2004; Webb, 2009; Maskor & Baharudin, 2016). Within active vocabulary, Laufer (1998) identifies two subcategories: controlled and free. Controlled active vocabulary enables immediate and precise word usage, while free active knowledge involves employing a word without specific

cues, as seen in spontaneous speech. However, these interpretations have confined active and passive vocabulary knowledge to matters of form and meaning.

According to Henriksen (1999), vocabulary knowledge can be classified into three primary domains: (a) a provisional dimension based on grasping word meanings, (b) a comprehensive dimension involving word interconnectedness and association, and (c) a responsive dimension reflecting the learners' proficiency and ease of accessing word knowledge. Nation (2022) widens the perspective by defining vocabulary knowledge as an array of components including form (phonetics, punctuation, word parts), meaning (form/meaning relationships, contextual understanding, familiarity), and usage (grammatical function, idiomatic expressions, usage restrictions). These aspects can be acquired through passive and active means. To explore the intricate relationship between passive and active vocabulary, a multidimensional framework for vocabulary knowledge becomes essential. Consequently, active vocabulary knowledge extends to recognizing words in both written and spoken forms, while passive vocabulary knowledge pertains to word comprehension in listening and reading contexts.

1.3 Relationship Between Active and Passive Vocabulary Knowledge

Researchers commonly agree on classifying vocabulary based on its use in two categories: active and passive manner (Laufer, 1998; Laufer & Paribakht, 1998; Nation, 2001; Schmitt, 2014; Maskor et al., 2016). According to Zhou (2010), it is commonly believed that passive knowledge is acquired first and then can be used actively after deliberate study. Vocabulary knowledge should be seen as a continuum, with words progressing from passive to active position. Typically, learners in this continuum have a larger passive vocabulary size compared to their active vocabulary size (Laufer & Paribakht, 1998; Fan, 2000; Webb, 2008).

The classification of vocabulary knowledge into active and passive modes is widely recognized in the literature (Schmitt, 2014). However, the assumptions surrounding proficiency in these two modes encompass several nuances that necessitate comprehensive exploration within a broader context. Research scientists' perspectives gain credibility through such holistic analyses. The ability to understand the pronunciation of words in written text may precede precise spelling, just as comprehension of written language might precede the production of coherent written responses. The aptitude to grasp a word's meaning is intrinsically linked to the ability to express it accurately in writing, showcasing a robust command over both vocabulary and grammar. Such distinction between passive and active vocabulary proficiency is crucial, as it underscores the practical application of acquired vocabulary in effective communication.

Webb (2013) postulates that passive studying alone doesn't inherently alter the meaning of a word. The outcomes of active vocabulary acquisition owe their existence to both passive and active forms of knowledge. These two facets share a symbiotic relationship that works in tandem to amplify a learner's language skills and foster overall vocabulary development. In this dynamic interplay between passive and active vocabulary, the ultimate objective remains the practical incorporation of learned vocabulary into meaningful communication.

This demonstrates the significance of vocabulary for language proficiency since mastering passive and active vocabulary encompasses each of the four linguistic skills—speaking, writing, listening, and reading. Consequently, vocabulary size is associated with academic progress as well as achievements in reading, writing, and general linguistic competency (Laufer et al., 2004).

1.4 Relationship Between First and Second Language Proficiency in Bilinguals

Understanding the interplay between the two languages spoken by a bilingual is an intricate process. Hamers and Blanc (2000) found that languages are interconnected and mutually beneficial. One common theory about this concept is the interdependence hypothesis developed by Cummins (1981, 1991, 2000). The theory highlights the advantages of having a strong foundation in L1 when learning L2 and proposes a relationship between the two languages. Cummins (2008) draws attention to the significance of preserving the L1 to promote beneficial bilingual growth and mitigate potential negative consequences of excessive L2 exposure. The hypothesis suggests that two languages can evolve and coexist based on a shared foundation of linguistic skills, which can be optimized through advanced proficiency in L1 and adequate exposure to L2. This shared linguistic foundation allows for the accessibility of abstract concepts, pragmatics, metalinguistics, and phonological insight in both linguistic domains (Cummins, 2008).

Existing research underscores a notable and meaningful correlation between bilingual individuals' competence in their primary and secondary languages, particularly within the realm of their mental lexicon. Cummins (1991) has lent robust support to this notion through a plethora of studies. The cumulative findings propose a robust and reciprocal connection between bilinguals' literacy skills and their lexical aptitude across both languages. Two plausible explanations underpin this relationship: cognitive transfer from the first language (L1) to the second language (L2) and the interplay of L1 knowledge in shaping L2 lexical comprehension. Wolter (2006) advances the perspective that bilinguals tend to await the acquisition of lexical knowledge in L2, even when introduced to L2 lexical items. Crucially, L2 lexical knowledge is inherently influenced by the foundation laid by the learner's L1 knowledge, thereby facilitating seamless word associations and connections in the second language.

Previous research contends that children can adeptly acquire a second language while concurrently nurturing and enhancing their first language (McLaughlin, 1986; Umbel *et al.*, 1992). Cummins (1980, 1991) introduces the Common Underlying Proficiency (CUP) theory, positing that bolstering one language within bilingual individuals can potentially yield benefits for their proficiency in the other language (Cummins & Swain, 1986). A profound interrelation exists between the scale of bilinguals' mental lexicons and the cultivation of their conceptual knowledge in their primary language. This phenomenon, in turn, acts as a facilitator in their acquisition of vocabulary within their second language. Collier's (1989) investigation sheds light on elementary school children who embark on learning their second language (L2) between the ages of 3 and 5, engaging in sequential bilingualism. His findings indicate that the continuity of developing their first language (L1) acts as a protective factor

against potential risks in language acquisition. Notably, correlational research underscores a progression from weaker to stronger relationships between vocabulary sizes in bilinguals' L1 and L2.

Masrai and Milton's (2015) research reveals a significant and positive correlation between proficiency levels in L1 (Arabic) and L2 (English) among intermediate and high school students, yielding correlation coefficients of .64 and .82, respectively. The study also uncovers a substantial correlation coefficient (r = 0.62, p<.001) between the academic performance of preschool-aged children in English and Arabic (Masrai & Milton,2015). Additionally, Daller and Ongun (2018) ascertained a significant correlation coefficient of (r =.61) in a study involving Turkish-English bilinguals. Grøver et al. (2018) researched the effects of L2 teacher-led group talk and peer-play talk on L2 vocabulary acquisition in preschool contexts (5-year-olds) with varying degrees of vocabulary skills in L1. The statistical analysis revealed a significant positive correlation between the passive vocabulary of participants in Turkish and Norwegian. The data showed no relationship between teacher-led talk exposure and children's L2 vocabulary at age five. However, a positive relationship was observed between their age-five vocabulary and talk exposure in peer play. These collective findings establish a direct and substantial link between the expansion of a learner's vocabulary in their primary language and their adeptness in their second language.

2. Objectives

1. To explore the correlation between passive and active vocabulary sizes (L1 & L2) of bilinguals

2. To evaluate the relative advantages and disadvantages of bilinguals' comprehensive conceptual lexicon in comparison to monolinguals.

3. Methodology

3.1 Research Design

The current study was conducted using a quantitative approach and aims to provide a descriptive-explanatory analysis to investigate the association between vocabulary sizes (L1 & L2) of bilinguals and monolinguals (L1).

3.2 Participants and Setting

The research is centered in the Mardan district of Khyber Pakhtunkhwa, a region chosen for its suitability and relevance in representing the Pashtun community. The participants in this study comprise young primary sequential bilingual individuals along with age-matched Pashto monolinguals, each falling within the age range of 10 to 12 years. Specifically, the monolingual Pashto group consists of 48 boys and 47 girls, with a mean age of 10.89 years. In parallel, the bilinguals encompass 105 males and 95 females within the age bracket of 10 to 12, with a mean age of 11.14 years (refer to Table 1).

3.3 Data Collection Settings

The study is conducted across two distinct settings: educational institutions and participants'

homes. To ensure comprehensive data collection, visits were made to three elementary schools in the Mardan district, where English serves as the primary language of instruction starting from Grade 1. Simultaneously, volunteers who were solely proficient in Pashto were recruited through social networks, embracing their common language background.

Table 1. Mean ages and genders of the participants' groups

Groups	N	Mean Age	Boys	Girls
Pashto-English Bilinguals	200	11.14	105	95
Pashto Monolinguals	95	10.89	48	47
Total	295	-	153	142

3.4 Instruments and Assessments

Each participant underwent an individual assessment utilizing the provided evaluation tools.

3.4.1 X-Lex

X-Lex (Meara & Milton, 2003) serves as a tool to assess the passive vocabulary encompassing the most frequent 5000 English words. This assessment comprises vocabulary spanning diverse frequency levels and is commonly employed in research on second language (L2) vocabulary acquisition. The test comprises 100 authentic English words and 20 fictitious words, demanding a yes/no response. The incorporation of fictitious words aims to mitigate any potential guessing by participants. X-Lex is effective with young students because it does not drain their motivation or take up too much time (10-15 min) and energy. The presence of decontextualized words in the test indicates that it is not affected by the linguistic or cultural context of the test takers.

3.4.2 Category Generation Task

Category Generation Task encourages participants to generate a comprehensive list of words in a specific category (e.g., professions) within a given time framework. The format of the category creation task has the potential to provide an estimate of active vocabulary size that can be compared to measure passive vocabulary size (Roghani & Milton, 2017). Broad semantic categories like animals and fruits, are often used in semantic fluency studies (Lonie *et al.*, 2009; Zemla *et al.*, 2020). Cognitive, neuropsychiatric, and linguistic researchers frequently use such categories to elicit large verbal output (Izura *et al.*, 2005). McKinney (2016) used this method earlier to measure vocabulary size among bilingual speakers. This study has one minute allotted to each of the following categories: fruits, animals, colors, and professions.

3.4.3 Pashto X-Lex

Incorporating monolingual and bilingual dictionaries is integral to language learning (Harmer, 2015). Accordingly, the Pashto passive vocabulary size assessment used in the current study

draws from a Pashto monolingual dictionary, structured on the X-Lex template (Meara & Milton, 2003). Pashto X-Lex is formulated based on Thornbury's taxonomy (2006), which involves randomly selecting words using a dictionary, such as every tenth word on every tenth page, and aggregating them for assessment. The evaluation also encompasses a set of 100 real and 20 fabricated words specifically designed to align phonologically with Pashto, yet deliberately constructed to discourage any form of guessing. The scoring method adheres to the procedure described in Meara and Milton's (2003) X-Lex to maintain consistency between the two assessments for subsequent analysis.

3.5 Data Collection

The study took place upon receiving a letter of ethical approval from the Research Ethics Committee Involving Human Subjects (JKEUPM) of the University Putra Malaysia. The guidelines for the study encompass the requirements of obtaining informed consent from the schools, parents, and participants individually in addition to maintaining confidentiality throughout the research process (Fleet & Harcourt, 2018). Both active and passive tests were independently conducted on school premises following the instructions in both languages spoken by participants within the assigned time limits. The passive vocabulary size test (X-Lex) in both languages was administered using pen and paper whereas active vocabulary size tests (L1 & L2) were audio recorded with a Galaxy M02 and transcribed for subsequent analysis. All participants adhered to a predefined word order (colors, fruits, animals & profession) for the active vocabulary size test. Active vocabulary size assessments assessed each participant independently, compared to the mutually exclusive assessment for passive vocabulary size. To mitigate priming effects, the tests were conducted two weeks apart. A chocolate bar and an emblem were presented to participants as a token of appreciation upon completion of tasks.

3.6 Data Analysis

After completing the assessments, initial results were entered into SPSS 25.0 for descriptive statistical analysis. To ensure confidentiality, participants' feedback was anonymized using numerical identifiers. The relationship between the passive and active vocabularies of bilinguals was investigated using Pearson correlation methods. An independent t-test was conducted to discern variations in vocabulary size between bilingual and monolingual children. Scoring involved attributing 50 points to correctly identified legitimate English terms and deducting 250 points for erroneously identified non-words. Participants correctly identifying all real and fictitious terms received a final score of 0. All responses, including errors and repetitions, were meticulously transcribed for the active vocabulary size test. The maximum word count for each category was calculated after removing errors and invalid words.

4. Results

4.1 Correlation Between L1 and L2 Passive Vocabulary Size

Data were collected from a sample of 200 bilingual (Pashto-English) individuals in Pakistan, aged between 9 and 12, utilizing the English and Pashto passive vocabulary size tests. The

findings of the passive vocabulary tests for bilingual children in both Pashto and English are displayed in Table 2. The table provides a comprehensive overview of descriptive statistics alongside the correlation observed between the scores of the two languages.

Table 2. Descriptive statistics for passive vocabulary size in Pashto and English (max score=5000)

Measures	N	Min	Max	Mean	St. Dev
English passive test	200	3200	4600	3990.50	291.306
Pashto passive test	200	3250	4450	3872.00	214.291

The minimum scores for Pashto and English exhibited a close resemblance, standing at 3200 and 3250, respectively. However, the maximum score for English (4600) surpassed that of Pashto (4450). In terms of mean scores, the passive vocabulary assessments yielded 3872.00 for Pashto and 3990.50 for English, with the latter slightly surpassing the former. Correspondingly, the standard deviation score for English (291.306) exceeded that of Pashto (214.291). Visualized in Figure 1, the correlation coefficient between the passive vocabulary size of bilinguals in their first language (Pashto) and second language (English) is depicted.

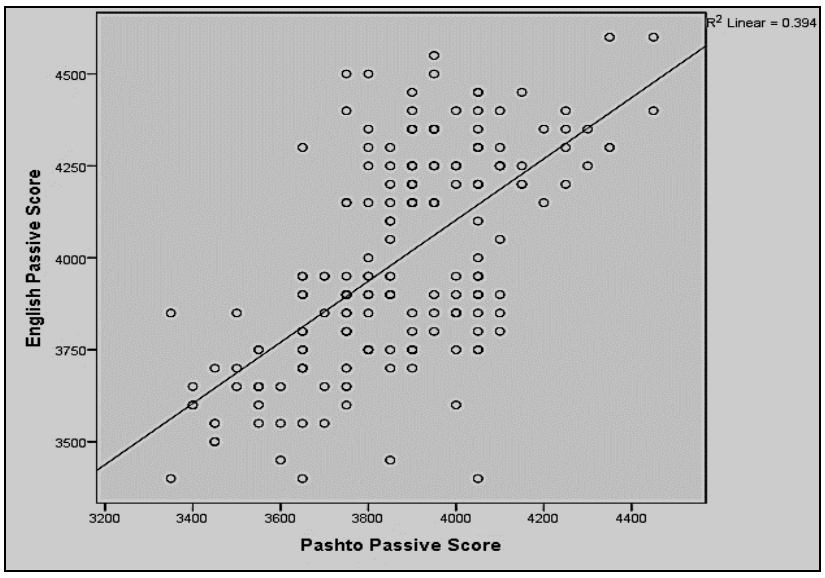

Figure 1. Correlation between Pashto and English Passive Vocabulary Scores

Figure 1 illustrates a robust positive correlation between the passive vocabulary size scores in Pashto and English (r = .630, p < .001). For the category generation task, a closely matched group of participants engaged in sub-tests encompassing fruits, colors, professions, and animals. The assessment's internal consistency was assessed through Cronbach's alpha coefficient, resulting in values of .649 for Pashto and .715 for English. These coefficients denote satisfactory reliability and measurement consistency. The assessment is exclusively designed to appraise the active vocabulary knowledge for each language, thereby maintaining a unidimensional focus. Table 3 displays descriptive statistics for bilinguals' active vocabulary size scores (L1 & L2).

Table 3. Descriptive statistics for active vocabulary size scores in Pashto and English

Measures	N	Min	Max	Mean	St. Dev
Active English	200	75	85	80.51	2.275
Active Pashto	200	74	85	79.77	2.085

Table 3 demonstrates an insignificant difference in the minimum scores obtained in the active Pashto and English tests, ranging from 74 and 75, respectively. Furthermore, the mean results for Pashto and English, which average 79.77 and 80.51, show a significant degree of similarity in comparison to the passive test. Likewise, a moderate positive correlation emerges between the active vocabulary assessments for Pashto and English languages (r = .433, p < .001), taking age into account. This relationship is visually depicted in Figure 2.

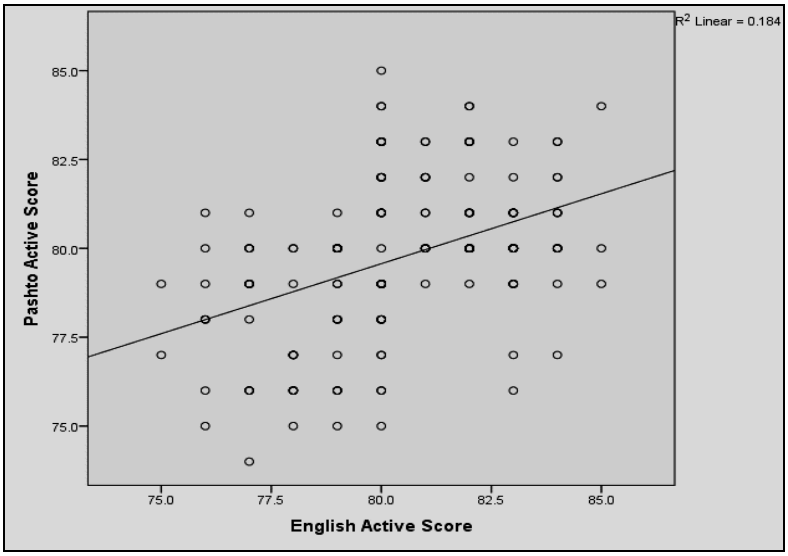

Figure 2. Scatter plot for the relationship between bilinguals' active vocabulary scores (L1 & L2)

A statistical analysis revealed a significant positive correlation between the scores of passive and active vocabulary sizes in bilinguals, for both languages. Notably, the correlation coefficient for passive vocabulary size stands at r = .630 (p < .001), whereas for active vocabulary size, it reaches r = .433 (p < .001) significance. The observed strong correlation suggests that bilingual youngsters who possess a substantial passive vocabulary in Pashto are also likely to possess a comparably broad passive vocabulary in English. The results underscore the presence of a significant correlation between the vocabulary sizes of Pashto-English bilinguals across their first and second languages, encompassing both passive and active vocabulary domains.

The correlations observed between the passive and active vocabulary sizes among bilingual children in their respective first and second languages are not only statistically significant but

also conceptually meaningful. Specifically, for Pashto, the correlation between passive and active vocabulary size is noteworthy (n = 200, r = .548, p < .001), while for English, it exhibits even stronger associations (n = 200, r = .666, p < .001). These findings harmonize with prior expectations. The proportion of variation explained by Passive Pashto in Active Pashto amounts to 30% (R2 = .30), leaving 70% for Active Pashto. Similarly, Passive English elucidates 44% of the variability in Active English, as reflected by an R2 value of .443. This observed variation could stem from diverse factors, such as fluctuations in active test outcomes or the potential influence of group characteristics on passive test results.

4.2 Comparing Vocabulary Size of Bilinguals and Monolinguals

Table 4 offers a comparative analysis of the passive vocabulary sizes among Pashto-English bilinguals and Pashto monolingual speakers, utilizing the Pashto X-Lex framework. It also provides an overview of group statistical data, showcasing average values for both bilinguals and monolingual speakers. Furthermore, Figure 3 visually presents the findings of bilingual and monolingual participants in their respective native languages, as evaluated through an independent sample t-test.

Table 4. Comparison of L1 passive vocabulary size between monolinguals and bilinguals

Respondents	**N**	**Mean**	**Std. Dev**	**Std. Error**
Pashto-English bilinguals	200	3872.00	214.291	15.153
Pashto monolinguals	95	3879.47	287.181	29.464

The analysis conducted through an independent sample t-test reveals a marginal discrepancy, with monolinguals displaying slightly higher scores (M = 3879.47, SD = 287.18) in comparison to bilinguals (M = 3872.00, SD = 214.291). The outcomes of the t-test [t (145.490) = -0.226, p = 0.822, 95% CI (-72.95, 58.00)] underscore the absence of a statistically significant distinction between the two groups, as the p-value surpasses the predetermined alpha level of 0.05. Table 3 presents a comparison of the passive vocabulary scores between bilingual individuals who have proficiency in both Pashto and English (n = 200) languages and individuals who only speak Pashto (n = 95).

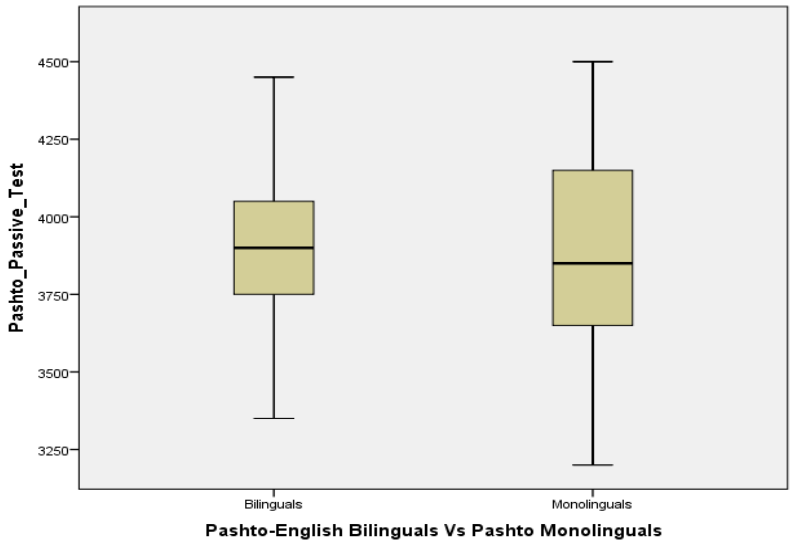

Figure 3. Passive vocabulary scores between Pashto/English bilinguals and Pashto monolinguals

4.3 Active Vocabulary Size(L1) scores Between Bilinguals and Monolinguals

To ascertain the disparity in active vocabulary scores within the Pashto language between bilinguals and monolinguals, a t-test was employed. The findings disclose that bilingual children exhibit slightly higher active vocabulary sizes in Pashto when compared to monolinguals (t = 3.981, df = 157.867, p < .001). It's important to note that the assumption of equal variances still needs to be met for accurate interpretation. The results underscore the superior performance of Pashto-English bilinguals (n = 200) in the active vocabulary size test in Pashto, in contrast to their Pashto monolingual counterparts. Conversely, Pashto monolinguals surpassed Pashto-English bilinguals in the passive test, as depicted in Table 5.

Table 5. Active vocabulary size scores between bilinguals and monolinguals

Respondents	N	Mean	S. Dev	Std. Error
Bilinguals	200	79.77	2.085	.147
Monolinguals	95	78.59	2.507	.257

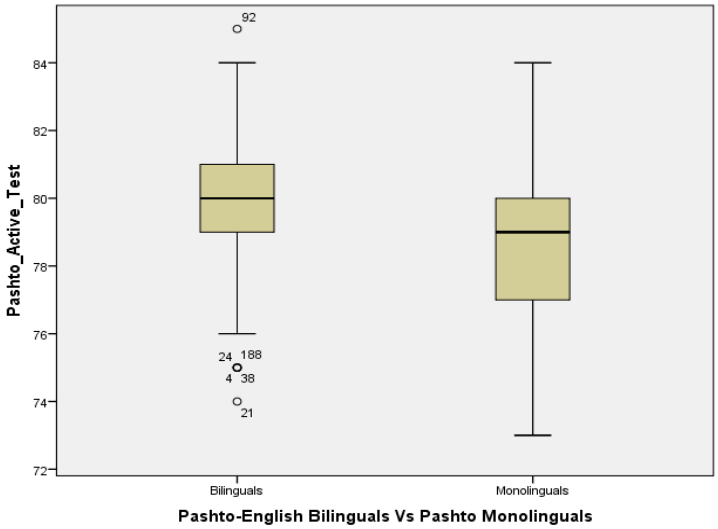

Figure 4. Active vocabulary size (L1) scores between bilinguals and monolinguals

The analysis further evaluates the vocabulary size scores of Pashto-English bilinguals and Pashto monolinguals, specifically focusing on passive and active vocabulary. The vocabulary size scores of both groups were compared using an independent sample t-test. The study's findings indicate that bilinguals manifest a more robust active vocabulary in comparison to monolinguals. However, the latter exhibits a heightened proficiency in passive vocabulary. This differentiation in terms of vocabulary size among bilinguals aligns with the anticipated active vocabulary size trends in Pashto. Notably, this analysis systematically compares the vocabulary scores of both monolinguals and bilinguals, considering their cumulative conceptual vocabulary within their respective first languages.

It's essential to clarify that this analysis primarily evaluates the active vocabulary of bilinguals for an overarching conceptual vocabulary assessment. Nonetheless, future research avenues could potentially encompass individual language constructs. This approach, however, necessitates a comprehensive and documented evaluation specifically designed for passive vocabulary size assessment across diverse languages. Similarly, this study conducts a comparative analysis between the total conceptual vocabulary scores of bilinguals and the active vocabulary scores of monolinguals. The statistical insights for total conceptual vocabulary are presented in Table 6.

Table 6. Comparison of total conceptual vocabulary size scores between bilingual and monolingual individuals

Respondents	**N**	**Mean**	**St. Dev**
Pashto-English bilinguals	200	78.73	3.676
Pashto monolinguals	95	78.59	2.507

Overall, bilinguals scored relatively better (M = 78.73, SD = 3.676) than monolinguals (M =

78.59, *SD* = 2.507), as depicted in Figure 5.

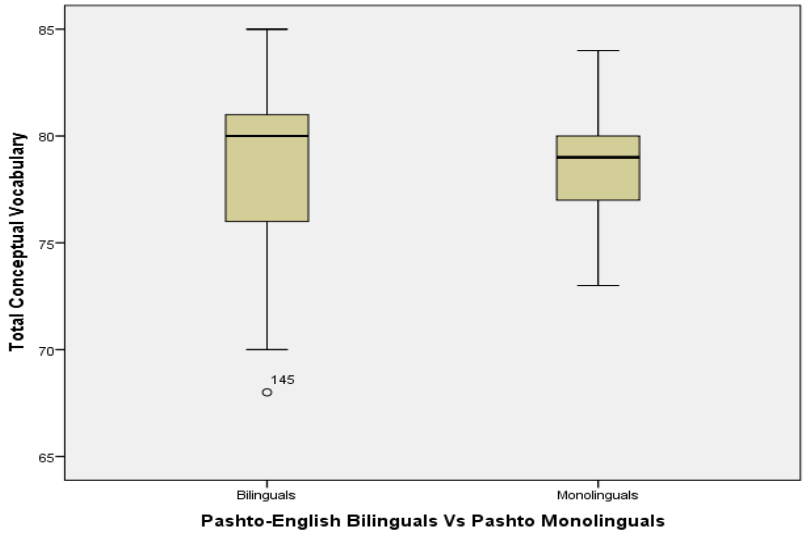

Figure 5. Total conceptual vocabulary comparison between bilinguals and monolinguals

The analysis highlights an intriguing pattern in the scores of bilingual individuals, which exhibit greater variability on an individual level. However, when considering proficiency levels across groups, the distinctions between bilinguals and monolinguals are not substantial. The TCV evaluation does not exhibit a vocabulary disparity effect, when compared to monolinguals (t = 257.265, p = .701, 95% *CI* = -0.580 to 0.861), aligning with the observation that there is a minimal disparity between bilingual and monolingual individuals in terms of their respective passive and active vocabulary size scores in their primary language.

5. Discussion

5.1 Relationship Between Pashto and English Vocabulary

This study's findings underscore a positive and robust correlation between the size of Pashto and English vocabularies, providing substantive evidence for the initial research objective. The simultaneous development of vocabulary in both the first and second languages is evident, even though the growth of the second language may appear somewhat delayed due to English being the primary language of instruction and learning for the participants. Remarkably, bilingual individuals exhibiting a strong command of Pashto also exhibit an expansive range of vocabulary in both passive and active English. This observation accentuates the significant correlation between the passive and active vocabulary sizes of bilinguals across both languages. Such findings lend support to the interdependence hypothesis proposed by Cummins (1979, 1984), highlighting the pivotal role of proficiency in the first language as a foundation for proficiency in the second language. Cummins' Common Underlying Proficiency (CUP) theory (Cummins, 1980) finds empirical backing in this study, suggesting that bilinguals can effectively transfer knowledge between their first and second languages due to shared foundational skills. The study not only adds essential insights to

empirical research on vocabulary size relationships in multilingual contexts but also highlights the interwoven nature of language development.

5.2 Comparing Vocabulary Sizes in Bilinguals and Monolinguals

The analysis of vocabulary sizes among bilinguals and monolinguals provides support to prior findings (Bialystok, 2017; Gunnerud *et al.*, 2020; Carroll *et al.*, 2017) that often point to bilinguals having slightly smaller vocabularies compared to their monolingual counterparts. Bilinguals often utilize their pre-existing knowledge from both their primary and secondary languages when evaluating vocabulary size independently in each language. This interpretation is consistent with the observed current pattern. Bilinguals may outperform monolinguals on tests because they have a more complex comprehension of word meanings. For instance, they might recall a word more easily in their second language, even if they struggle to pronounce or remember it in their first language. This condition may result in a decline in their overall vocabulary score, as opposed to monolinguals, who are not subjected to such a hypothetical position. Monolinguals, relying on a more limited lexical pool, tend to utilize familiar words more extensively.

5.3 Total Conceptual Vocabulary Evaluation

The analysis of total conceptual vocabulary exclusively employs the active vocabulary of bilinguals, combining scores from both Pashto and English. Intriguingly, this analysis reveals no significant disparity between the two groups in either language. As can be seen in the table above, there is no statistically significant difference between the average scores of Pashto/English bilinguals (78.73) and Pashto monolinguals (78.59). These findings align with earlier research, suggesting that considering total conceptual vocabulary leads to the conclusion that bilingual children do not experience any potential disadvantages compared to monolingual peers (Umbel *et al.*, 1992; Pearson *et al.*, 1993; Bedore *et al.*, 2012). The study demonstrates that accurately assessing bilinguals' conceptual vocabulary provides a comprehensive overview of their overall vocabulary capacity. These results further endorse Cummins' CUP theory, emphasizing the symbiotic growth of vocabulary across languages and reinforcing the idea that concepts nurtured in one language inevitably flourish in the other. These findings represent a significant contribution, as the exploration of total conceptual vocabulary in the context of Pashto-English bilingual speakers has been previously an unexplored domain.

6. Conclusion

This study discovered a correlation between Pashto and English vocabulary size, offering statistical support for the first objective. As English is the major language of instruction and learning for children, second language growth may appear to be delayed, yet vocabulary development in first and second languages proceeds simultaneously. Individuals who are bilingual and fluent in Pashto also have a wide vocabulary in English. The data shows a strong correlation between bilinguals' passive and active vocabulary in their first and second languages. These results support the interdependence theory, which argues that a person's proficiency in a second language depends on the skill in their first language. The current

investigation supports Cummins' Common Underlying Proficiency (CUP) theory, which claims that bilinguals may transfer knowledge from their first to their second language and vice versa because of a shared basis (Cummins, 1980). The study reveals significant findings contributing to empirical research on the relationship between vocabulary size in first and second languages.

The present study also aligns with previous research and recent investigations demonstrating that bilingual individuals frequently exhibit smaller vocabulary sizes compared to their monolingual counterparts. When their vocabulary sizes are measured independently in each language, bilingual individuals make use of the knowledge they already have in either their first or second language. The interpretation mentioned earlier is potentially backed up by the current study's findings. For example, they may not be able to pronounce or remember a word in their first language but can recall it in their second language. Consequently, their vocabulary is reduced, resulting in an overall lower score on the test in contrast, monolinguals are not affected by such a situation. The total conceptual vocabulary analysis was conducted solely using the active vocabulary of bilinguals. The active vocabulary scores in Pashto and English were combined by tallying the bilinguals' active vocabulary scores in each language. resulting in insignificant differences.

This study has successfully provided compelling statistical evidence for the positive relationship between the size of Pashto and English vocabularies, substantiating the simultaneous growth of vocabulary in both languages. Bilingual individuals exhibiting proficiency in Pashto also demonstrate a remarkable breadth of vocabulary in both passive and active English. These findings lend substantial support to the interdependence hypothesis and Cummins' Common Underlying Proficiency theory. Furthermore, the analysis aligns with previous research regarding the disparities between bilingual and monolingual vocabulary sizes. Collectively, this study makes a significant contribution to our comprehension of vocabulary development in Pashto-English bilingual individuals. The current study's results are significant because total conceptual vocabulary in the context of Pashto-English bilingual speakers has never been the subject of research before. The present study concludes that the extent of vocabulary knowledge in one's first language may have an impact on the extent of vocabulary knowledge in their second language. It is recommended that this finding be considered in the design and implementation of vocabulary instruction and acquisition strategies.

7. Research Implications and Importance

The implications of this study are far-reaching, as it uncovers a moderate correlation between the active and passive vocabulary sizes (L1 & L2) of bilinguals. The findings are consistent with the observations made by Daller and Ongun (2018), who reported a similar correlation (r =.61) among Turkish-English bilingual children. These outcomes underscore the interrelated nature of vocabulary development across languages and emphasize that growth in the first-language lexicon plays a pivotal role in shaping second-language lexical skills. The notion of "conceptual vocabulary" serves as a framework to describe the interconnectedness between first and second languages, as articulated by Daller and Ongun (2018).

However, care must be taken when interpreting the holistic performance of bilingual individuals in this study. The varying standard deviations across multiple bilingual assessments, including conceptual vocabulary, indicate that some bilingual participants scored lower than their monolingual counterparts. As this study focused on middle-class bilinguals in a specific context, generalizing these findings to other bilingual contexts must be approached with care. These findings underscore the complexity of bilingualism, necessitating that any research encompassing bilingual populations, whether in vocabulary, cognitive abilities, or executive control, consider the intricate interplay of the first language within the socio-cultural and familial context. The implications of our analyses extend to educational practices and governmental policies. Policies that encourage the use of a community's primary language at home may not necessarily yield long-term benefits for bilingual children. Future research employing the X-Lex assessment across different schools within the Mardan district has the potential to provide additional insights into the association between bilinguals' passive and active vocabulary. Additionally, the study suggests the need for conducting gender-focused inquiries and evaluations of linguistic competency among English as a Second Language (ESL) learners in Pakistan.

Further avenues of research include the development of a comprehensive vocabulary assessment program for schools in Pakistan, to be integrated into entry tests and individual interviews. By leveraging linguistic insights into the significance of vocabulary in language acquisition, the study results warrant the incorporation of vocabulary-focused curricula in primary education. The study's findings also have immediate pedagogical implications, advocating for ESL educators to incorporate vocabulary enrichment exercises into their teaching strategies to reinforce students' lexical proficiency.

Acknowledgment: All authors contributed equally to the study's conception and design.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

ORCID ID: https://orcid.org/0000-0002-0973-2887

References

Abdullah, N. A. (2012). Quantifying academic readiness: ESL undergraduates' mastery of English vocabulary. *In 2012 IEEE Symposium on Humanities, Science, and Engineering Research*, pp. 449-454. https://doi.org/10.1109/SHUSER.2012.6268877

Alavi, S. M., & Akbarian, I. H. (2012). The role of vocabulary size in predicting performance on TOEFL reading item types. *System*, *40*(3), 376-385. https://doi.org/10.1016/j.system.2012.07.002

Alderson, J. C. (2000). *Assessing reading.* Cambridge University Press. https://doi.org/10.1017/CBO9780511732935

Alderson, J. C. (2005). *Diagnosing foreign language proficiency: The interface between learning and assessment.* A&C Black.

Ansarin, A. A., & Khabbazi, S. K. (2021). Task-induced involvement load and working memory: Effects on active and passive vocabulary knowledge of EFL learners in a multimedia learning environment. *Eurasian Journal of Applied Linguistics, 7*(1), 277-302. https://doi.org/10.32601/ejal.911288

Bardakçi, M. (2016). Breadth and depth of vocabulary knowledge and their effects on l2 vocabulary profiles. *English Language Teaching*, *9*(4), 239-250. https://doi.org/10.5539/elt.v9n4p239

Bedore, L. M., Peña, E. D., Summers, C. L., Boerger, K. M., Resendiz, M. D., Greene, K., ... Gillam, R. B. (2012). The measure matters language dominance profiles across measures in Spanish–English bilingual children. *Bilingualism: Language and Cognition*, *15*(3), 616-629. https://doi.org/10.1017/S1366728912000090

Bialystok, E. (2017). The bilingual adaptation: How minds accommodate experience. *Psychological Bulletin*, *143*(3), 233. https://doi.org/10.1037/bul0000099

Bialystok, E., & Martin, M. M. (2004). Attention and inhibition in bilingual children: Evidence from the dimensional change card sort task. *Developmental Science, 7*(3), 325-339. https://doi.org/10.1111/j.1467-7687.2004.00351.x

Bialystok, E., Craik, F., & Luk, G. (2008). Cognitive control and lexical access in younger and older bilinguals. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *34*(4), 859-873. https://doi.org/10.1037/0278-7393.34.4.859

Bialystok, E., Feng, X. (2009). Language proficiency and executive control in proactive interference: Evidence from monolingual and bilingual children and adults. *Brain and Language*, *109*(2-3), 93-100. https://doi.org/10.1016/j.bandl.2008.09.001

Bialystok, E., Luk, G., Peets, K. F., & Yang, S. (2010). Receptive vocabulary differences in monolingual and bilingual children. *Bilingualism: Language and Cognition*, *13*(4), 525-531. https://doi.org/10.1017/S1366728909990423

Çakmak, C. T., & Ali, M. E. R. Ç. (2021). Turkish EFL learners' lexical competence and performance. *Journal of Language and Linguistic Studies*, *17*(2), 946-964. https://doi.org/10.17263/jlls.904092

Carroll, S. E. (2017). Exposure and input in bilingual development. *Bilingualism: Language and Cognition*, *20*(1), 3-16. https://doi.org/10.1017/S1366728915000863

Collier, V. P. (1989). How long? A synthesis of research on academic achievement in a second language. *TESOL Quarterly*, *23*(3), 509-531. https://doi.org/10.2307/3586923

Cummins, J. (1980). The construct of language proficiency in bilingual education. *Current Issues in Bilingual Education, 3*(80), 81-103.

Cummins, J. (1984). Bilingualism and Special Education: *Issues in Assessment and Pedagogy*, *10*(2), 267-269.

Cummins, J. (1991). Conversational and academic language proficiency in bilingual contexts.

AILA Review, *8*(91), 75-89.

Cummins, J. (2000). *Language, power, and pedagogy: Bilingual children in the crossfire* (Vol. 23). Multilingual matters. https://doi.org/10.21832/9781853596773

Cummins, J. (2008). Teaching for transfer: Challenging the two solitudes assumption in bilingual education. *Encyclopedia of language and education*, *5*, 65-75. https://doi.org/10.1007/978-0-387-30424-3_116

Cummins, J., & Swain, M. (1986). *Bilingualism in Education: Aspects of Theory.* Research and Policy. London: Longman.

Daller, H., Milton, J., & Treffers-Daller, J. (Eds.). (2007). *Modeling and assessing vocabulary knowledge*: (Vol. 10). Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511667268

Daller, M., & Ongun, Z. (2018). The threshold hypothesis revisited: Bilingual lexical knowledge and non-verbal IQ development. *International Journal of Bilingualism*, *22*(6), 675-694. https://doi.org/10.1177/1367006917690835

Dong, Y., Tang, Y., Chow, B. W. Y., Wang, W., & Dong, W. Y. (2020). Contribution of vocabulary knowledge to reading comprehension among Chinese students: *A Meta-analysis Frontiers in Psychology*, *11*, 1-15. https://doi.org/10.3389/fpsyg.2020.525369

Fan, M. (2000). How big is the gap and how to narrow it? An investigation into the active and passive vocabulary knowledge of L2 learners. *Relc Journal*, *31*(2), 105-119. https://doi.org/10.1177/003368820003100205

Fleet, A., & Harcourt, D. (2018). (Co)-researching with children. *International handbook of early childhood education*, 165-201. https://doi.org/10.1007/978-94-024-0927-7_7

Grøver, V., Lawrence, J., & Rydland, V. (2018). Bilingual preschool children's second-language vocabulary development: The role of first-language vocabulary skills and second-language talk input. *International Journal of Bilingualism*, *22*(2), 234-250. https://doi.org/10.1177/1367006916666389

Gunnerud, H. L., Ten Braak, D., Reikerås, E. K. L., Donolato, E., & Melby-Lervåg, M. (2020). Is bilingualism related to a cognitive advantage in children? A systematic review and meta-analysis. *Psychological Bulletin*, *146*(12), 1059. https://doi.org/10.1037/bul0000301

Hamers, J. F., & Blanc, M. (2000). *Bilinguality and bilingualism.* Cambridge University Press. https://doi.org/10.1017/CBO9780511605796

Harmer, J. (2015). *The practice of English language teaching* (5th ed.). Harlow, UK: Pearson Longman.

Hatch, E., & Brown, C. (1995). *Vocabulary, semantics, and language education.* Cambridge University Press, p. 40.

Henriksen, B. (1999). Three dimensions of vocabulary development. *Studies in Second*

Language Acquisition, *21*(2), 303-317. https://doi.org/10.1017/S0272263199002089

Izura, C., Hernández-MuÑoz, N., & Ellis, A. W. (2005). Category norms for 500 Spanish words in five semantic categories. *Behavior Research Methods*, *37*(3), 385-397. https://doi.org/10.3758/BF03192708

Janebi Enayat, M., & Amirian, S. M. R. (2020). The relationship between vocabulary size and depth for Iranian EFL learners at different language proficiency levels. *Iranian Journal of Language Teaching Research*, *8*(2), 97-114.

Kuo, L. J., Uchikoshi, Y., Kim, T. J., & Yang, X. (2016). Bilingualism and phonological awareness: Re-examining theories of cross-language transfer and structural sensitivity. *Contemporary Educational Psychology*, *46*, 1-9. https://doi.org/10.1016/j.cedpsych.2016.03.002

Laufer, B. (1998). The development of passive and active vocabulary in a second language: Same or different? *Applied Linguistics*, *19*(2), 255-271. https://doi.org/10.1093/applin/19.2.255

Laufer, B., & Paribakht, T. S. (1998). The relationship between passive and active vocabularies: Effects of language learning context. *Language learning*, *48*(3), 365-391. https://doi.org/10.1111/0023-8333.00046

Laufer, B., Elder, C., Hill, K., & Congdon, P. (2004). Size and strength: Do we need both to measure vocabulary knowledge? *Language Testing*, *21*(2), 202-226. https://doi.org/10.1191/0265532204lt277oa

Lee, O. H., & Lee, S. K. (2021). Effects of task-induced involvement load and working memory on Korean high school students second language vocabulary learning. *Language Research*, *57*(1), 143-165. https://doi.org/10.30961/lr.2021.57.1.143

Lonie, J. A., Herrmann, L. L., Tierney, K. M., Donaghey, C., O'Carroll, R., Lee, A., & Ebmeier, K. P. (2009). Lexical and semantic fluency discrepancy scores in an MCI and early Alzheimer's disease. *Journal of Neuropsychology*, *3*(1), 79-92. https://doi.org/10.1348/174866408X289935

Luo, Y., Song, H., Wan, L., & Zhang, X. (2021). The effect of vocabulary depth and breadth on English listening comprehension can depend on how comprehension is measured. *Frontiers in Psychology*, *22*, 1-11. https://doi.org/10.3389/fpsyg.2021.657573

Malatesha Joshi, R. (2005). Vocabulary: A critical component of comprehension. *Reading and Writing Quarterly*, *21*(3), 209-219. https://doi.org/10.1080/10573560590949278

Marecka, M., Fosker, T., Szewczyk, J., Kałamała, P., & Wodniecka, Z. (2020). An ear for language: sensitivity to fast amplitude rise times predicts novel vocabulary learning. *Studies in Second Language Acquisition*, *42*(5), 987-1014. https://doi.org/10.1017/S0272263120000157

Martin-Chang, S. L., & Gould, O. N. (2008). Revisiting print exposure: Exploring differential

links to vocabulary, comprehension and reading rate. *Journal of Research in Reading*, *31*(3), 273-284. https://doi.org/10.1111/j.1467-9817.2008.00371.x

Maskor, Z. M., & Baharudin, H. (2016). Receptive vocabulary, or productive vocabulary knowledge in writing skills, is essential. *International Journal of Academic Research in Business and Social Sciences*, *6*(11), 261-271. https://doi.org/10.6007/IJARBSS/v6-i11/2395

Masrai, A. (2018). The impact of preschool education on L1 vocabulary development and sequential bilingualism: The case of Arab school children. *International Journal of Applied Linguistics and English Literature*, *7*(4), 121-128. https://doi.org/10.7575/aiac.ijalel.v.7n.4p.121

Masrai, A., & Milton, J. (2015). An investigation of the relationship between L1 lexical translation equivalence and L2 vocabulary acquisition. *International Journal of English Linguistics*, *5*(2), 1-7. https://doi.org/10.5539/ijel.v5n2p1

McKinney, C. (2016). *Language and power in post-colonial schooling: Ideologies in Practice.* Routledge. https://doi.org/10.4324/9781315730646

McLaughlin, B. (1986). Multilingual education: Theory east and west. *Language and Education in Multilingual Settings*, 35-52.

Meara, P. (2018). Laying the foundations: A bibliometric analysis of L2 vocabulary research in 1982-1986. *Linguistics Beyond and Within*, *4*, 108-128. https://doi.org/10.31743/lingbaw.5669

Meara, P. M., & Milton, J. (2003). *X_Lex. The Swansea Vocabulary Levels Test.* Newbury: Express.

Milton, J. (2009). *Measuring second language vocabulary acquisition* (Vol. 45). Multilingual Matters. https://doi.org/10.21832/9781847692092

Nation, I. S. (2022). *Learning vocabulary in another language*. Cambridge University Press. https://doi.org/10.1017/9781009093873

Nation, I. S., & Nation, I. S. P. (2001). *Learning vocabulary in another language* (Vol. 10), 2-4. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139524759

Oller, D. K., & Pearson, B. Z. (2002). Assessing the effects of bilingualism: A background. *Applied Psycholinguistics*, *28*(2), 191-230. https://doi.org/10.1017/S0142716407070117

Pearson, B. Z., Fernández, S. C., & Oller, D. K. (1993). Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. *Language Learning*, *43*(1), 93-120. https://doi.org/10.1111/j.1467-1770.1993.tb00174.x

Qian, D. D. (2002). Investigating the relationship between vocabulary knowledge and academic reading performance: An assessment perspective. *Language Learning*, *52*(3), 513-536. https://doi.org/10.1111/1467-9922.00193

Qian, D. D., & Lin, L. H. F. (2020). The relationship between vocabulary knowledge and

language proficiency. In *The Routledge Handbook of Vocabulary Studies* (pp. 66-80). Taylor & Francis. https://doi.org/10.4324/9780429291586-5

Read, J. (2004). Vocabulary knowledge is defined—vocabulary in a second language: *Selection, Acquisition, and Testing*, *10*, 209. https://doi.org/10.1075/lllt.10.15rea

Read, J. (2011). *Assessing vocabulary.* Cambridge University Press.

Richards, J. C., & Rodgers, T. S. (2014). *Approaches and methods in language teaching.* Cambridge University Press. https://doi.org/10.1017/9781009024532

Roghani, S., & Milton, J. (2017). Using Category Generation Tasks to Estimate Productive Vocabulary Size in a Foreign Language. *TESOL International Journal*, *12*(1), 143-159.

Schmitt, N. (2008). Instructed second language vocabulary learning. *Language Teaching Research*, *12*(3), 329-363. https://doi.org/10.1177/1362168808089921

Schmitt, N. (2014). Size and depth of vocabulary knowledge: What the research shows. *Language Learning*, *64*(4), 913-951. https://doi.org/10.1111/lang.12077

Sukying, A. P. I. S. A. K. (2018). Investigating receptive and productive affix knowledge in EFL learners. *Explorations in second language vocabulary research*, 183-218.

Thornbury, S. (2006). *How to teach vocabulary.* Pearson Education India.

Topkaraoğlu, M., & Dilman, H. (2014). Effects of studying vocabulary enhancement activities on students' vocabulary production levels. *Procedia-Social and Behavioral Sciences*, *152*, 931-936. https://doi.org/10.1016/j.sbspro.2014.09.345

Umbel, V. M., Pearson, B. Z., Fernández, M. C., & Oller, D. K. (1992). Measuring bilingual children's receptive vocabularies. *Child Development*, *63*(4), 1012-1020. https://doi.org/10.2307/1131250

Verhallen, M., & Schoonen, R. (1998). Lexical knowledge in L1 and L2 of third and fifth graders. *Applied Linguistics*, *19*(4), 452-470. https://doi.org/10.1093/applin/19.4.452

Verhoeven, L. T. (1994). Transfer in bilingual development: The linguistic interdependence hypothesis revisited. *Language Learning*, *44*(3), 381-415. https://doi.org/10.1111/j.1467-1770.1994.tb01112.x

Webb, S. (2008). Receptive and productive vocabulary sizes of L2 learners. *Studies in Second Language Acquisition*, *30*(1), 79-95. https://doi.org/10.1017/S0272263108080042

Webb, S. (2009). The effects of receptive and productive learning of word pairs on vocabulary knowledge. *RELC Journal*, *40*(3), 360-376. https://doi.org/10.1177/0033688209343854

Webb, S. (2013). Depth of vocabulary knowledge. *The Encyclopedia of Applied Linguistics*, 346-354. https://doi.org/10.1002/9781405198431.wbeal1325

Webb, S. (Ed.). (2019). *The Routledge Handbook of Vocabulary Studies.* Routledge.

https://doi.org/10.4324/9780429291586

Wero, Y. T., Machmud, K., & Husain, N. (2021). The study on students' vocabulary size. *Jambura Journal of English Teaching and Literature*, *2*(1), 22-34. https://doi.org/10.37905/jetl.v2i1.10279

Wolter, B. (2006). Lexical network structures and L2 vocabulary acquisition: The role of L1 lexical/conceptual knowledge. *Applied Linguistics*, *27*(4), 741-747. https://doi.org/10.1093/applin/aml036

Zemla, J. C., Cao, K., Mueller, K. D., & Austerweil, J. L. (2020). SNAFU: The semantic network and fluency utility. *Behavior Research Methods*, *52*, 1681-1699. https://doi.org/10.3758/s13428-019-01343-w

Zhang, H., & Roberts, L. (2021). A comparison of pinyin-invented spelling and oddity test in measuring phonological awareness in L2 learners of Chinese. *Journal of Psycholinguistic Research*, *50*, 375-396. https://doi.org/10.1007/s10936-020-09700-z

Zhou, S. (2010). Comparing receptive and productive academic vocabulary knowledge of Chinese EFL learners. *Asian Social Science*, *6*(10), 1-14. https://doi.org/10.5539/ass.v6n10p14

Copyrights