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Organisation of Words in the Mental Lexicon: A Psycholinguistic Study

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Abstract: *This study investigated the organisation of words in the mental lexicon of grade 4 students. For this purpose, one hundred students in grade 4 were selected from the sample schools. This study employed a non-probability convenience sampling technique. The word association test was used to collect the data, which involved selecting 40 words from grade 4 English textbooks taught at three different private sector schools under three respective education systems. This study employed a quantitative method to collect the responses of sample students in a word association test. The data was analysed by using Fitzpatrick's (2007) model of classification of association response. The results showed that position-based association, which accounted for 56.95% of the total collected data dominated the distribution of the data; 17.95% of connections were meaning-based; whereas collocation associations were prevalent in position-based association test. The findings of the word association test showed that the participants' mental lexicon was impacted by their comprehension and use of the target term. The research concluded that in the participants' mental lexicon, the position-based association was the strongest lexical network. The findings implied that teaching vocabulary and its meanings were insufficient for expanding English language learners' mental lexicon. This study was helpful for English language teachers to teach English vocabulary based on a proper understanding of the organisation of the mental lexicon of English language learners.*

***Keywords*:** *collocation, coordination, mental lexicon, stimulus, vocabulary, word association test*

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Introduction

The mental area, where the process of learning, storing and accessing words takes place, is known as the mental lexicon. Lexical relation is a technique used in psycholinguistics to examine the organisation o f the mental model

network in the brain of individuals. The mental lexicon's intricate organizing structure enables the learners to retrieve the knowledge in several different ways. It is intriguing to wonder how our brain processes vocabulary. The mechanism of the mind that is capable of language appears to be extremely complicated. The area of psycholinguistics that is called mental lexicon is concerned with how words are organized in one's long-term memory (Carroll, 2000). A mental lexicon is like a person's mental storage of words, the meaning of the words and their association (Schmitt, 2000). The mental lexicon comprises not only how the words are kept in one's memory, but also how they are recalled throughout the act of writing (Rothman, 2009). The new words are retained in the long-term memory if there is a sufficient relationship between them and the previously learned terms (Carroll, 2000).

Even though Pranoto and Afrilita (2019) investigated the mental lexicon, it is an area, which is less exposed to research and examination, particularly with regards to English as a second language learning. If the representation of lexical elements and their retrieval mechanisms are not considered separately, research on the learning of second languages is insufficient (Pirhatini, 2020). According to psycholinguistics, the words in our mental lexicon are organized into a vast network that is determined by the characteristics of each word. Through their collocation and coordinates, and the words' semantic characteristics, the words must be strongly connected (Aitchison, 2012). Using links between the words, a conceptual network is formed, with each combination of words representing a context that the person is familiar with (Schmitt, 2000). The words are further joined to create weaker networks, which can be identified by their phonological or orthographic similarity. The mental lexicon's network resembles a massive, multidimensional spider web (Aitchison, 2012). Understanding the process of language acquisition and the relationship between the mental lexicon of the second language and cognitive ability depends on knowing how many words a normal language learner has

stored in his or her mental lexicon at a given age (Schmitt, 2000). According to certain lists and tables describing vocabulary, many 9 to 10-year-olds know at least 30,000 words (Radesky et al., 2016). Schmitt (2000) estimated that a 10-year-old has a total lexicon of 40,000 words. English language learners between the ages of 9 and 10 do not have a firm idea of the size of the mental lexicon. Language research today makes use of the Word Association Test, which was first employed by psycholinguists for psychoanalysis. A straightforward Word Association Test uses the approach of delivering a word or stimulus and asking the participants for the first thought that comes to mind. This response is studied for attributes that link it to the word or stimulus, and this is done as a result to gain a glimpse of the network structure of the mental lexicon. Understanding the mental lexicon, linkages and features that define the link between the words are made easier by researching the terms' close associations with the target word.

Statement of the Problem

Words must first be cognitively represented and arranged in a logical and accessible manner for someone to transform his or her abstract thoughts into actual words i.e., spoken or written form. English vocabulary is not taught in schools based on a proper understanding of the organisation of the mental lexicon of English language learners. The lack of mental vocabulary would make language production time-consuming and inaccurate in its representation of one's thoughts. If the words are not stored in an organized way in the mental lexicon, this condition affects the vocabulary learning of English language learners. The organisational patterns in the word association response cannot provide a general picture of English language learners' lexical networks if the words are not stored in an organized way in the mental lexicon. The responses of the English language learners in the word association test may be less stable and reveal low levels of association. The weak tendencies towards responses and

patterns are because of various factors such as English language learners' word knowledge related to the word or associations based on the forms of the words or simply misrepresentation/misinterpretation of the words.

Significance of the Study

This study is significant because it looks into how grade 4 English language learners organize words in their mental lexicon. This study is significant as it is helpful for English language teachers to teach English vocabulary based on a proper understanding of the organisation of the mental lexicon of English language learners. This study is significant in a way that it explores the mental lexicon of English language learners of grade 4 using word association test (WAT). This study is also significant in that it suggests diagnostic tests, such as word association tests that can be an important part of the curriculum because these tests would allow teachers to understand the various levels of word knowledge and the learners' reactions to lexical class disparities and rearrange the study materials as needed.

Objectives of the Study

1. To analyze meaning-based features in the mental lexicon of the English language learners at grade 4.
2. To analyze position-based features in the mental lexicon of the English language learners at grade 4.
3. To examine the lexical networks of English language learners characterized and influenced by the lexical class of the words.

Research Questions

1. How do English language learners of grade 4 make meaning-based associations when presented with single words?
2. How do grade 4 English language learners make position-based associations between words using a word association test?
3. How do lexical class words affect and characterize the lexical networks of grade 4 English language learners?

Delimitation of the Study

The present study is delimited as it investigates the organisation of words in the mental lexicon of English language learners of grade 4 by analysing position and meaning-based features. This study is delimited to English-medium schools in Rawalpindi, including Beacon House, Roots IVY, Roots International, Army Public School (APS) and The City School. This study is delimited to 100 participants of grade 4 at Beacon House, Roots IVY, Roots International, APS and The City School.

Literature Review

Language is a cognitive process by which one formulates ideas and concepts, which are then expressed through speech, written language or oral language. The ability to 'speak our minds' and the words that communicate thinking to one another's minds are at the core of communication (Roux, 2013). As a result, words serve as symbols or vehicles that enable people to communicate with one another. When the words are connected in a specific way, they constitute language, signifying that they maintain ties (Aitchison, 2003). Words are characterized by their relationship with other words (Roux, 2013). This means that explaining the meaning of words in terms of the network that exists between the various senses and sub-senses of words is often the best way to understand them. When encyclopaedic information is added to words, they become thoroughly recognized in the mental lexicon -- stylistic, associative, idiomatic, and cultural meanings all join together to establish a word's multidimensional nature (Carter, 1998). Vocabulary, according to psycholinguistics, is more complex and layered than a collection of words and their definitions **(**Kavitha & Kannan, 2016). The word *mental lexicon* comes from the field of psycholinguistics, which is concerned with the human brain's long-term memory for terminology (Xue, 2020). It is a complicated system with sophisticated psychological cognitive processes for learning and storing information. Beginning with two main principles or

classes of word association: paradigmatic (choice) and syntagmatic (chain), the interrelationship of words within a language can be examined (Coulthard, et al., 2001). The researchers chipping away at WATs assume that the reactions received by the students during the test uncover the mental nodes of semantic/phonological ties inside the mental lexicon of the students (Khan & Anjum 2023).

A syntagmatic relationship is a horizontal relationship that can be deciphered by looking at what comes before and after a given word. The group of word associations related to collocations belongs to syntagmatic associations (McCarthy, 1990). Syntagmatic associations are words that regularly collocate with the stimulus word; this is clear in *steel-bond, sell-short* and *red-rose* (Singleton, 1999). This is comparable to collocations, which work similarly. In the study of vocabulary, collocation is crucial; it is a marriage contract between words, and some words are more firmly married to each other than others (McCarthy, 1990). This indicates that some words are more naturally connected than others. Collocates are words that frequently appear with or near a target word, while collocations are resulting sequences or groups of words (Reppen & Simpson, 2019). Collocation is described by the colour 'blond'. Blond is almost always used to describe hair; it is not acceptable to use it to describe a car. As a result, 'blond' and 'hair' have links to each other, which implies they collocate (McCarthy, 1990). However, terms like 'knife' and 'fork' are associated, indicating that the objects are linked by their meaning (Post, 2007). Responses in collocational associations are dependent on the participants' interpretations of the target term (Rothman, 2009). Common collocations in languages are closely related to cultural concepts (Crystal, 1985). The term 'collocation' refers to a connection between two words that are most likely to appear together in context (Aitchison, 2003). Additional collocations that are impacted by culture also occur in real life.

Paradigmatic relationships are frequently found between terms of the

same word class, and they are sometimes referred to as 'vertical' relationships since grammatically related words can be used to substitute for one another in a sentence (McCarthy, 1990). Words that tend to cluster together on the same degree of detail, known as *coordinate*s, are involved in coordination (Aitchison, 2003). Coordination is determined by the connection of 'salt and pepper', and other instances of coordinates include 'cashew and walnut'. Antonyms are also included in coordination. Some opposing words simply have two parts: left and right. However, some parts of opposites have multiple conceivable oppositions. In that situation, two opposites, such as 'hot and cold', can be coordinated (Aitchison, 2012). The term *antonym* is used when looking at oppositions further. An antonym is a term with the opposite meaning. Super-ordination, also known as *hyponymy*, is a hierarchical relationship of inclusion that is established by the creation and structuring of taxonomies (Carter, 1998; Shahzad, 2022). A robin can be classified as a bird in general. In terms of *hyponymy*, super-ordination is explained. A superordinate may cause words within its category to be triggered, such as 'pear' for 'fruit' (Rothman, 2009). These words are referred to as subordinate. This term can be applied to any word in a subordinate group. Different people have different viewpoints on what a word relationship must resemble to be considered a superordinate link (McCarthy, 1990). Carter (1998) categorized *meronymy* as part of his section on super-ordination. Meronymy is handled as a type of super-ordination since the whole-part relationship can be viewed as a hierarchical system (Rothman, 2009, Shahzad, 2022). Synonyms are words that signify the same thing, such as 'worried' and 'anxious'. However, because it is uncommon for two terms to signify the same thing, the term *synonym* is applied to a broader context (Aitchison, 2003). As a result, even though the latter meaning is stronger than the former, words like 'hungry' and 'starve' are considered synonyms. In

reality, there are no absolute synonyms; a synonym always has a small variance in meaning from its counterpart. This is not to say that synonyms cannot be interchanged; it only means that substituting a synonym slightly changes the meaning in a context (Carter, 1998). It is difficult to define similarity, and selecting which words go together is a never-ending process (Murphy, 2003). As a result, many terms can be considered synonyms in a suitable situation. Words that are associated given phonological connections in the mental lexicon are called clang (Xiang & Nam, 2022). In recent studies, the early 20th-century technique has largely been employed to examine the mental lexicon of English language learners (Fitzpatrick, 2007). One technique for investigating the way words are organized in our minds is the word association test (Rothman, 2009). The word association test can be used to infer information about the formal (grammatical and lexical) relationships between words, a person's internal (psycholinguistic) knowledge, and the sociolinguistic context (Roux, 2013). The word association test is a technique for identifying respondents' automatic response to a specific word (Schmitt, 2000). It is considered that the automatically presented word has the closest mental association with the incentive term among the respondents. Multiple Word Association Tests (WATs) produce chain responses or second and third responses that associate with one another rather than stimulus. Contrarily, response Word Association Tests (WATs) are better at detecting a respondent's first (and strongest) association with a stimulus word (Cremer et al., 2011). The L2 mental lexicon of Korean EFL students was studied by Lu and Lim (2019). The goal of the study was to look at the elements that influence Korean EFL students' mental lexicon word association type. The researchers also looked at the size of the learners' vocabulary to determine if it had any bearing on the types of word associations. A total of 40 Korean EFL students made up the study's sample. The participants in this study were 23 females and 17 males. This study was

conducted using an experimental research design. The lexical decision task assumes reaction time and accuracy when responding to word association. In this study, the model of McCarthy's (1990) word association served as a theoretical framework. Learners' vocabulary size and their word association task were both used in a correlation study. The findings revealed that the amount of a Korean EFL learner's vocabulary had a strong relationship with their ability to identify paradigmatic and phonological associations. El-Dakhs (2017) researched the effect of language exposure and word characteristics on Arab EFL learners' word association. The researcher looked into the structure of word connections among Arab EFL students and compared it to native English speakers. The researcher looked at how increased language exposure and word features affected learners' association patterns. The study's sample included 45 native English speakers and 421 Arab English learners at a Saudi university. Multiple replies were used in the word association test. As a theoretical framework, Fitzpatrick's model (2007) was used. The study's findings revealed that language exposure and word characteristics have a strong influence on learners' associations, and they supported a developmental approach to the second language lexicon in which increased language exposure and word knowledge enhanced mental word connectivity and increased native-like similarity with most paradigmatic associations.

The studies discussed above represented that WATs were employed to explore the mental lexicon, and there were not any that catered for the organisation of words in the mental lexicon by analysing position-based and meaning-based associations. The purpose of this study was to investigate the organisation of words in the mental lexicon of English language learners by analysing the position-based and meaning-based features. The learning and acquisition of English as a second language had an important place in the language learning process. The study of the acquisition

and learning of English as a second language and exploring the mental lexicon of grade 4 students is rare and requires eminent research in this vicinity.

Research Methodology

Exploratory-descriptive research method has been used in this study. This exploratory-descriptive study uses a quantitative research approach. The students were selected from grade four of private schools in Rawalpindi, i.e. Beacon House, Roots IVY, Roots International, The City School and APS.

Research Design

The sample size of the study was 100 students. Twenty students from each school were chosen to participate in the word association test. This study has employed a non-probability convenience sampling technique. In this study, with the aid of a non-probability convenience sampling strategy, the researchers selected the sample by locating conveniently available students.

Instrumentation

The word association test was used to collect the data, which involved selecting 40 words from grade 4 English textbooks taught at Beacon House, Roots IVY, Roots International, The City School, and APS (Appendix A). In the word association test (WAT), the students were asked to write down the first word that came to their mind after reading each of the stimulus words.

Data Analysis Procedures

The results of the word association test were given in terms of the percentage of responses and the actual number of responses. To make things clearer, the proportion was not rounded off. The responses in each category have been shown in figures, tables and graphs.

Theoretical Framework

Fitzpatrick (2007) attributes the paucity of decisive knowledge about learners' mental lexicon to the clang-paradigmatic-syntagmatic classification system's inadequacy to capture the mental lexicon's specific details (Roux, 2013). In this study, the responses of the students in the word association test were analysed by using Fitzpatrick's (2007) model of 'classification of association response'. Four categories of

Fitzpatrick's (2007) model of 'classification of association response' were made.

1. Meaning-based associations: Words that can be substituted for one another in the sentence: synonyms, antonyms, lexical sets, super-ordinates (hyponymy) (meronymy i.e. whole part relation), coordinates, and conceptually related words.
2. Position-based associations: Determined by syntactic and collocational characteristics: Words that appear one after the other in the sentence.
3. Form-based associations: relationships between words based on their forms, words with changed suffixes, similarities in their orthographic (related to the letters) and phonetic structure (related to the sound).
4. Erratic association: It appears that there is no link between the cue and the reaction, or that there is no response at all.

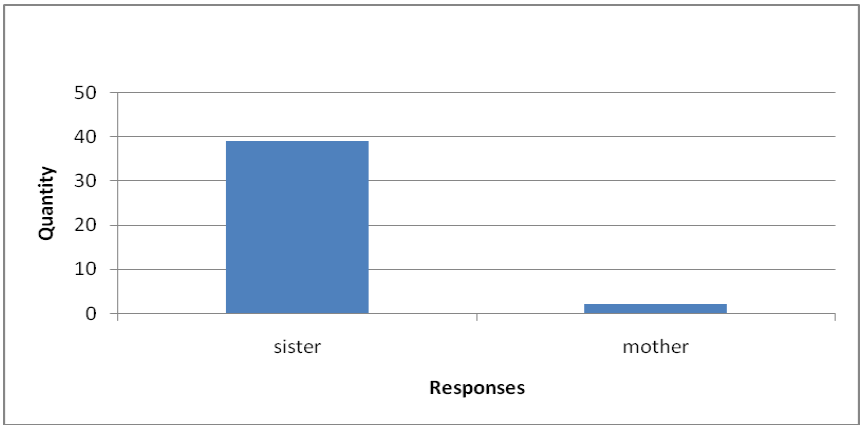
Findings

As grammatically related words can be substituted for one another in a sentence, meaning-based interactions are frequently seen between lexical items belonging to the same word class. These relationships are sometimes referred to as ‘vertical’ relationships.

The word 'brother' was presented to the participants in this word association test. Naturally, the usual pair for this word is 'sister'. This coordination pair is an illustration of complementarity; the antonyms are the opposite because they have no degree (Carter, 1998; Shahzad, 2022). For instance, being a sister precludes a person's ability to be a brother. Figure 1 displays coordinated responses with the stimulus 'brother'.

Figure 1

Co-ordinational Responses Given to Stimulus 'Brother'



Note. This stimulus includes all the co-ordinational responses

Figure 1 shows that in this word association test, 39% of respondents responded 'sister' when given the stimulus 'brother'. In response to the stimulus 'brother', two participants responded 'mother'. The majority of answers that agreed with the stimulus were provided by these responses. When it came to the stimulus 'brother', these participants' mental vocabulary exhibited a comparatively high co-ordinational relationship. The entire test consisted of twenty-seven stimuli: the majority of which led to connections based on coordination. It was obvious that these stimuli were not as effective as those of the stimuli that primarily triggered collocation.

Lexical relations of inclusion in hyponymy include terminology like superordinate terms and subordinate terms. 'Table', 'apple', 'green', 'red', 'butterfly', 'potatoes', 'cat', and 'cold' were the stimuli in this test that genuinely had an obvious super- ordinate, bringing a cluster of subordinates together. The obvious super-ordinates were, of course, 'furniture', 'fruit', 'colour', 'insect', 'vegetable', 'animal' and 'winter' in that order. Eleven participants responded 'fruit' to 'apple' and one 'furniture' to 'table'. To the colour 'green', nine students responded 'colour'. Five students wrote 'colour' with the stimulus

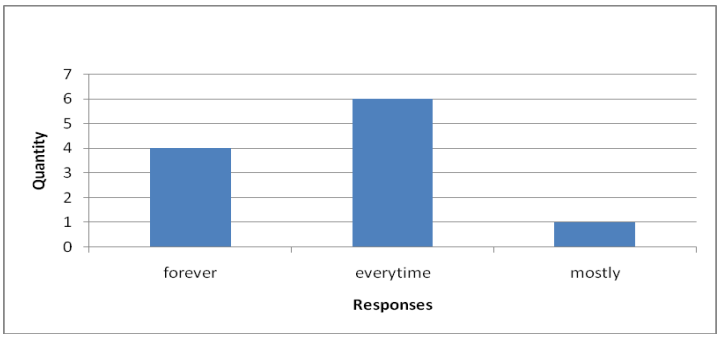
'red'. Eight students wrote 'insect' with 'butterfly, six 'vegetable' with 'potatoes', three 'family' and one 'human' with 'brother', and ten 'animal' with 'cat', three 'winter' with 'cold', and three respondents wrote 'winter' with 'snow'. Within a classification scheme, each of these responses demonstrated superior order. Therefore, there was a great chance to look at second language learners' propensity for super-ordinative association.

In this word association test, the participants' connections between a superordinate and its subordinates were not very strong, or at least, their connections could not be compared to other kinds of connections. Super-ordination, therefore, was the most crucial technique for these students to keep their recall of English vocabulary. In the end, only eleven stimuli primarily achieved linkages based on super-ordination.

Although it is rare for two terms to mean the same thing, the term "synonym" refers to a wider context. As a result, this word association test produced few synonyms. Two students were exceptions as they connected the word 'worried' to the word 'sad'. This synonymy illustration is not the best from this test. Figure 2 shows synonym responses of the stimulus 'always' in the word association test.

Figure 2

Synonym Responses Given to Stimulus 'Always'



Note. The stimulus includes all the synonym responses

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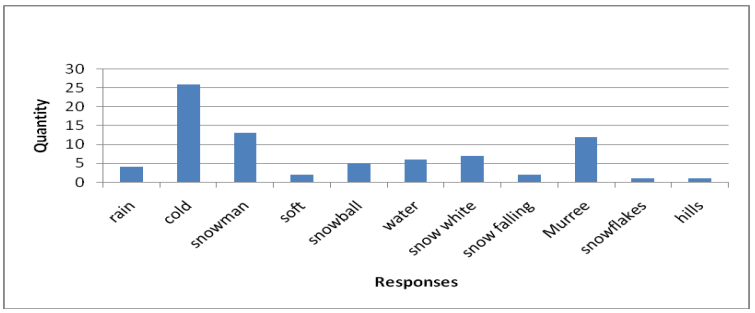
Figure 2 shows that eleven respondents consistently responded with the word 'always' in response to the stimuli. This indicates that the synonymy was not the most typical response to the word 'always'. Six participants responded 'every time' with the stimulus 'always'. This indicates that the most typical reaction to 'always' was the synonymy 'every time'. Seven other students, however, responded with different synonyms for the stimulus 'always'. Four participants responded 'forever' with 'always'. One participant wrote 'mostly' with 'always'. The participants' intention to assign 'always' a synonym, was evident from these linkages. It indicates that these second language learners are significantly less likely to provide synonyms during the word association test. The discussion of the number of synonyms provided by the participants in this word association test reveals that there are not many of them. There were a total of twelve stimuli, the majority of which led to the production of synonyms.

Even though the students might not be able to use the same terms that are presented with the same stimulus, the majority of pupils have provided collocational linkages. The stimulus 'snow' serves as another illustration of how the participants in this word association test tended to combine words of various types. *Collocation* is the term used to describe all associations made with the word 'snow'. Figure 3 shows each of these collocations.

Figure 3

Collocational Responses Given to Stimulus 'Snow'



Note. Stimulus ‘snow’ includes all the collocational responses

Figure 3 shows that some of the collocations used may be simpler than others. Nevertheless, the conclusion must be drawn that they are all collocational word associations when all of them are taken into account in terms of what collocation means. Words that are more likely than just by chance to appear in the same context as the stimulus are referred to as collocations (Reppen & Simpson, 2019). As a result, when considering associations with the stimulus 'snow', even those that initially seem improbable, become more likely. Consider the word 'rain' as an example. It might not initially appear reasonable that 'snow' and 'rain' would be related in this context. However, it happens frequently because it is a sort of precipitation that can happen in particular meteorological circumstances, notably during harsh winters. This is because it can snow and rain at the same time. In this word association test when two students associate the words 'rain' and 'snow', it becomes obvious how each student's unique and personal interpretation of the target word affects his/her mental lexicon. They linked 'cold' with 'snow' because when it is cold, the moisture in the air absorbs all of the heat in the atmosphere, causing the temperature to drop. Because people experience cold in the snow, this collocation shows that the student has a personal understanding of the target word. Thirteen students responded 'snowman' with the stimulus word 'snow'. The phrase 'snowman' being used with the word 'snow' demonstrates that the learner understands the target word on a personal level. This is because snowman is often created by youngsters as models of people made of snow. Two students responded 'snow' with 'ball' in the word association test. A 'snowball' is an object made of snow that is spherical in shape and is often formed by scooping snow with the hands and compacting it into a ball. Games like 'snowball' combat frequently involve the usage of snowballs. The physical activity known as a 'snowball' battle involves throwing snowballs at opponents to strike them. People tend to

play this hobby more frequently during the winter when there is enough snow, which is why, based on their own experiences and perceptions of the target term, they associate 'ball' with 'snow'. Seven students wrote 'snow-white' with 'snow'. A Disney character like 'snow-white' might not seem like it would go well along with the word 'snow', but this collocation shows that students' mental lexicon is influenced by their unique interpretation of the target word. Twelve students responded 'Murree' with the stimulus 'snow'. The term 'Murree' being used with the word 'snow' shows that the student has a personal grasp of the target word. This is because Murree is well-known for its snowfall in Pakistan, and many visitors travel there in the winter to experience it. The total collocational replies supplied to 'snow' were seventy-nine, or 79%, when both commonly used collocations and the less frequently used ones were included.

The learners' experiences and perceptions shape their evolving mental lexicon (Aitchison, 2003). Some of the responses to the word association test suggested that a term in the mental lexicon can continue to develop and establish a new network with new words, unique to a given person. Eleven students responded 'sonic' and seven 'Usain Bolt' with the stimulus 'fast'. Sonic is a video game that features a fast, speed-based platform. The fastest runner in the world is 'Usain Bolt'. However, the respondent develops a new network for the term 'fast' as a result of the use of the words 'sonic' and 'Usain Bolt'. When given the stimulus 'Jealous', nine students wrote 'Olivia Rodrigo' while six wrote 'Jack and jealous'. 'Olivia Rodrigo' is a singer most known for her song 'Jealousy', and 'Jack and Jealous' is a music collection featuring a wide range of tracks. Common collocations in languages are closely related to cultural concepts (Post, 2007). The term 'collocation' refers to a connection between two words that are most likely to appear together in context (Atchison, 2003). This collocation serves as an example of how songs and singers can add new associations to the mental vocabulary. Fourteen students responded 'Ali Zafar'

and ten 'Pasoori song' with the stimulus 'sing'. In Pakistan, Ali Zafar is a well-known singer, and the Pasoori song has become incredibly popular recently. This relationship relates to the environment and cultural elements; in Pakistan, fans of Ali Zafar's music enjoy his singing, and the Pasoori song is currently one of the most popular songs among the younger generation.

Finally, it is clear from the data that there are countless associations based on collocation. Overall, the significant majority of twenty-six stimuli (out of forty) were the primary triggers of collocation. The smallest number of collocations a stimulus can have and yet be dominant over other word associations is thirty collocations, or 30%, given to the word ‘brother’. The stimulus ‘butterfly’, which was discussed in detail above, elicited the largest percentage of collocation replies (83%) with 83 responses.

Combining the word associations means to emphasize the key results regarding word associations that have emerged from the outcome of the word association test. Table 1 shows the percentage of each type of association in the word association test. The percentage of each type of word association type is calculated in position-based associations and meaning-based associations

Table 1

Percentage of Word Associations

Words	%	%
Nouns	62.6	20.8
Adjectives	55.1	29.7
Verbs	71	4.5
Adverbs	39.1	16.8

Note. In the word association test, percentages of nouns, adjectives, verbs, and adverbs are calculated.

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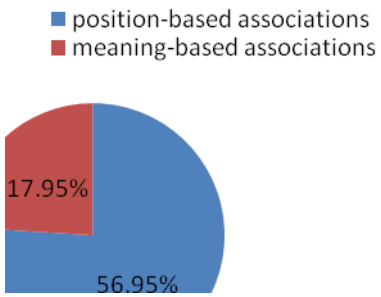
It can be seen in Table 1 that in the category of position-based association, nouns received 626 responses or 62.6%; adjectives received 551 responses or 55.1%; verbs received 710 responses or 71%, and adverbs received 391 responses or 39.1%. In position-based associations, collocation relationships were common. Adverbs received 168 responses or 16.8% of the total, while verbs received 45 responses, or 4.5%, and nouns received 208 responses, or 20.8% of the total in the category of meaning-based association. In meaning-based associations' coordination, super-ordination and synonyms were dominant. Adjectives received 247 coordination responses at 24.7%, 17 super-ordination responses at 1.7%, and 33 synonyms responses at 3.3%. Nouns received 27 coordination responses with 2.7%, 76 super-ordination responses with 7.6%, and 5 synonyms responses with 0.5%. Adverbs received 113 coordination responses with 11.3%, and 55 synonyms responses with 5.5%. Verbs received 45 coordination responses with 4.5%. Word associations division across the entire test is seen in the following figure.

Figure 4

Word Associations Division Across the Entire Test



Note. Word associations are divided in the word association test.

Figure 4 shows that just 17.95% of relationships are meaning-based. The distribution of the data was dominated by position- based association, which accounted for 56.95% of the total gathered data.

A few form-based connections have been generated and the majority of them were based on rhyme, such as 'table-cable', 'cat-fat', 'finger-zinger', 'spend-depend', 'jump-bump', 'sing-wing', 'play-clay', 'look-cook', 'late-plate', and 'soon-moon'. The result of the study showed that nouns 2.8%, verbs 2.2%, adjectives 1.5%, and adverbs 1.8% were form-based associations. That made up exactly 2.75% of the total form-based associations which 100 students from the 40 stimuli created collectively. That indicated that these participants had weak connections between phonological structures. However, 'weak' is a gradable word, and this simply indicates that the connections appeared weak in comparison to position-based and meaning-based relationships. This does not suggest that the language learning of these people was underdeveloped but was well advanced. It showed that nouns activated 13.8%, verbs 22.3%, adjectives 13.7%, and adverbs 42.3% were erratic associations. That made up exactly 23.25% of the total erratic associations which 100 students from the 40 stimuli created collectively. It indicates that respondents misunderstood some of the stimuli in erratic associations and made incorrect associations. Some of the pupils left the response blank having failed to respond to the stimulus word. It seemed that respondents intentionally or unintentionally left the response blank because they were unable to provide an answer to it.

This section discussed whether or not word associations had changed as a result of the stimuli about *word class*. Each word class' outcome was derived based on which *word class* received the majority of the stimuli within that particular *word class*. There were ten stimuli which belonged to nouns: ‘table’, ‘brother’, ‘butterfly’, ‘policeman’, ‘potatoes’, ‘cat’, ‘apple’, ‘salt’, ‘snow’ and ‘finger’. A large number of the nouns had word

associations that were mostly nouns, verbs and adjectives. These nouns, verbs and adjectives were all collocational linkages with their corresponding nouns. Co-ordinations and super-ordinations that were provided for the nouns *word class* were all nouns. There were ten stimuli which belonged to adjectives -- 'green', 'small', 'red', 'fast', 'sad', 'jealous', 'happy', 'cold', 'hard' and 'sleepy'. The majority of the adjectives had word associations that were primarily adjectives. In actuality, a large number of adjectives contributed to the development of the adjective word class. Coordination and synonym responses which were given to adjectives word class were counted as adjectives. The majority of nouns were thus activated by these ten adjectives. Ten verbs in all were included in this test. These ten verbs were: 'send', 'jump', 'look', 'sing', 'eat', 'live', 'sit', 'drive', 'play' and 'smell'. The individuals primarily used nouns in response to the verb stimuli, which was the general pattern. Word connections based on nouns significantly outperform these verbs.

The fact that the majority of nouns were generated in response to the verb stimulus suggests that participants were more likely to associate with the collocations. In response to the verb stimulus, some verbs and adverbs were produced, indicating that participants were more likely to identify these verbs and adverbs with collocations. Ten adverbs were provided as stimuli: 'always', 'joyfully', 'immediately', 'beautifully', 'suddenly', 'late', 'sometimes', 'slowly', 'soon' and 'carefully'. Co-ordinations and synonyms that were provided for the adverbs word class were mostly adverbs.

Discussion

The results of the present study highlighted the dominance of position-based responses for grade 4 students at Beacon House, Roots IVY, Roots International, The City School and APS. This came from Roux's (2013) findings that position-based responses dominate word association tests for second language learners. A significant distinction was noticed that Roux (2013) essentially designated advanced

learners, whereas, in the present study, the participants were grade 4 students. The dominance of position-based responses for English as second language learners came to the opposite of the normal conviction that second language learners' mental lexicon is structurally different than first language learners' mental lexicon. The total percentage of meaning-based and position-based were different for grade 4 students; 17.95% were meaning-based associations and 56.95% were position-based associations. These findings also confirmed earlier results that meaning-based associations and position-based associations were extremely influential in second language learners' mental lexicon (Roux, 2013). Coordinations, superordinations and synonyms were quite few in the responses of all the students of grade 4. In the word association test, the participants' connections between a superordinate and its subordinates were not very strong, or at least, their connections could not be compared to other kinds of connections. This came in line with El-Dakhs' (2017) findings that super-ordination and synonyms often seemed to be the most crucial technique for these students to keep their recall of English vocabulary. The result of the study showed the strong influence of word class on the word associations of grade 4 students. The responses of grade 4 students to the overall pattern of noun and verb stimuli were nouns and formed position-based associations. This came from Rothman's (2009) findings on the participants' responses to the overall pattern of noun and verb stimuli, i.e., they were nouns, which suggested that participants made position-based (collocation) links when exposed to nouns.

Conclusion

The result of the study showed that some respondents made meaning-based associations; as a result, just 17.95% of relationships were meaning-based. Adverbs received 16.8%; verbs received 4.5%, and nouns received 20.8% responses in the category of meaning-based association. In general, these participants' mental lexicons were

structured in a way that made meaning-based linkages less likely to occur. In the word association test, a few superordination, co-ordinations and synonyms were found. Further, it was found that the majority of replies mostly elicited collocational associations. Nouns received 62.6%; adjectives received 55.1%; verbs received 71%, and adverbs received 39.1% responses in the category of position-based association. Position-based associations frequently use collocation associations. The significance of position-based connections produced by this test, which accounted for a significant portion of all word associations as collocation, is 56.95%. The result showed that collocational relationships were superior. The findings suggested that the student's knowledge and prior exposure to the target word can have an impact on their mental lexicon. The results of the word association test showed that common collocations in the word association test are closely related to social and cultural concepts. Having analysed the data, the connections appear weak in form-based associations. The outcome demonstrated that respondents created inaccurate associations and misinterpreted some of the cues in erratic associations. Moreover, the participants' responses to the overall pattern of noun and verb stimuli tended to be nouns, which suggested that participants typically form position-based (collocation) links when exposed to nouns. In this test, nouns were mostly produced by all word classes. According to the test's findings, most respondents assigned word classes to create collocations. Consequently, coordination, super-ordination and synonym linkages were quite less frequent.

Implications for the Teachers

The study’s findings imply that teaching vocabulary and its meanings is insufficient for expanding English language learners’ mental lexicon. This study is helpful for English language teachers to teach English vocabulary based on a proper understanding of the organisation of the mental lexicon of English language learners. Pedagogical implications from this insight highlight

the significance of language activities and instruction. It has been demonstrated that vocabulary and grammar are not distinct concepts. Reading for comprehension, word generation games, cloze test procedures, word generation games and word puzzle tools, and crosswords all focus on making it easier to understand, remember and produce lexical items. Additionally, this may assist teachers in developing and broadening the students' mental lexicon.

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