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On:

Exploring the Effect of Using Word Association Tests on English Foreign Language Learners' Mental Lexicon: A Case of Master Students of English at Biskra University

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Declaration

I hereby declare that this dissertation has been composed solely by me and that it has not been submitted, in a whole or in part, in any previous application for a degree. Except where states otherwise by reference or acknowledgement, the work is entirely my own.

Dedication

I thank Allah almighty for the strength and patience he has provided me to write this modest dissertation.

Every challenging work needs hard work as well as guidance of older especially those who were very close to my heart.

My humble effort, I dedicate this work to my sweet and loving

Father and Mother

Whose affection, love, encouragement and prayers of day and night made me able to get such success and honour

Along with all hard working and respected

Teachers

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Abstract

One of the major challenges foreign language learners face is how to know and retain a significant amount of vocabulary to their memory. In psycholinguistics, it is assumed that this knowledge, which exists in what is scientifically known as mental lexicon or mental dictionary, is quite important to language mastery. Therefore, this study aimed at exploring the effect of using word association tests on English foreign language learners' mental lexicon at Biskra University. The Hypothesis of the present study suggested that word association tests would have positive effect on EFL learners' mental lexicon. For this purpose, the quantitative approach was used to measure and analyse the data gathered in this study through learners' responses of a vocabulary test. After the analysis and interpretation of the data, the findings revealed that word association tests can help learners to improve their vocabulary competency in an easy and entertaining way. As the learners do not use word association tests inside the classroom; however, we recognise that words are meaningfully connected in the mental lexicon and should be taught accordingly. Consequently, the alternative hypothesis formulated in this research was confirmed.

Keywords: Word association test (WAT); mental lexicon; vocabulary test, EFL students.

List of Abbreviations

EFL: English Foreign Language

ESL: English Second Language

ESL: English Second Language

GE: General English

L2: Second Language

LMD: Licence Master Doctorate

NS: Native Speakers

PW: Prompt word

TOT: Tips of the tongue

WAN: Word association norms

WAT: Word association tests

WAT: Word association thesaurus

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Introduction

Everyone acknowledges that vocabulary learning is very crucial for foreign language learners. Without sufficient words to express a wide variety of meaning, communicating in a foreign language cannot happen in a meaningful way. Vocabulary has been described as "core component of all the language skills". This awareness on the importance of vocabulary knowledge among second language researchers necessitate in depth understanding of how the words of foreign language are learned, organized, stored, and retrieved by the learners. The mechanism responsible for handling this problem in the mind is traditionally called the mental lexicon. It is a mental system which contains all the information a person knows about words. There are roughly four main methods for investigating the mental lexicon: Word searches (tips-of-the-tongue and slips of tongue), linguistics and linguistic corpora, speech disorders and brain scans, and psycholinguistic experiments (Aitchison, 2003, p. 16-17). Word association test (WAT) is one form of psycholinguistic experiment employed to English foreign language learners at Biskra University in order to explore the lexical connections individuals hold in their mental lexicon. The WAT is popular because of its simplicity and ease of administration. Word associations are usually obtained through a simple stimulus response procedure, whereby the researcher provides a prompt word (PW) and the participant utters the first word that comes to the mind. There are different incarnations involving oral-oral, oral-written, and written-written stimulus-response methods. Some WATs ask subjects to reply with the first word they think of, while others require participants to provide as many words as they can within a given period of time (McCarthy, 1990). This study attempted to explore the effect of using word association tests on English foreign language learners' mental lexicon, a case of master students of English at Biskra University.

1. Statement of the Problem

Vocabulary learning is an essential part in foreign language learning; learning words is a very important aspect in learning a foreign language as languages are based on words. Vocabulary, as one of the knowledge areas in language, plays a great role for learners in acquiring a language (Cameron, 2001). It is almost impossible to learn a language without words; even communication between human beings is based on words (Walters, 2004). The first problem foreign language learners face is how to know a large amount of vocabulary and store it in their memory. In addition, they struggle to find the exact and appropriate words or lexical units to fulfil any communicative tasks such as asking questions during a lecture, describing simple situations or telling a story about themselves.

Psycholinguists have agreed that vocabulary knowledge resides in long-term memory of language users, and this kind of knowledge is stored and organised in a dictionary-like form, which is referred to as "the mental lexicon". Consequently, a set of different vocabulary tests were created to develop the mental lexicon of English foreign language learners among which the word association tests. This study intended to explore the effect of using word association tests on developing EFL learners' mental lexicon.

2. Significance of the Study

This study is significant as it tried to show the effect of using word association tests in learning English language vocabularies. This study attempted to call the use of WAT to improve vocabulary acquisition and to facilitate the role of teachers in making learners acquire the vocabulary knowledge in a motivated way; it also made learners more motivated and autonomous while using these tools. Finally, as the approach of WAT needs more research in Algeria, this study may motivate other researchers to carry on further studies on the same subject.

3. Aim of the Study

General aim: the purpose of this study is to determine whether using word association tests is effective in developing learners' vocabulary learning in EFL classes or not.

Objectives: Changing traditional methods used by EFL teachers into modern ones to increase the learning process.

- Finding new ways (enjoyable and entertaining tests) to develop learners' mental lexicon.
- Shedding light on how learning via word association tests can be useful for EFL learners, and promoting their motivation about learning vocabulary.

4. Research Questions

The research sought to answer the following research questions:

- What are the suitable vocabulary tests that can be utilised in EFL learning classrooms?
- To what extent can word association tests develop learners' mental lexicon?
- How do learners make mental links between words they have learnt?

5. Research Hypothesis

Based on the above research questions, we propose the following research hypothesis:

- We hypothesize that word association tests would have positive effect on EFL learners' mental lexicon.

6. Research Methodology

In order to obtain information from the subjects (students) and test the hypothesis formulated in the present study, the quantitative approach was used to explore the effects of the word association tests on English foreign language learners' mental lexicon.

7. Population and Sample

Forty master students of English from science of the language branch at Biskra University were chosen randomly from a total number of 286 students in order to conduct this study because vocabulary learning (storage and retrieval of words) plays an important role in their advanced level and ultimately answer the research questions and test the hypothesis.

8. Data Gathering Tools

The data gathering tool used to collect and analyse the data of the present study consists of a vocabulary test handed to the sample of the study (master students) to collect their responses.

9. Structure of the Dissertation

There are three chapters in this study. Chapter one provides the historical background of the mental lexicon, its definitions, its types, aspects of knowing a word, and teaching and learning vocabulary. Chapter two is devoted to the historical background of the word association test, its definitions, tools, criticism of scholars and its types. Chapter three is dedicated to the research methodology, analysis and interpretation of the results followed by the general conclusion and recommendations.

Chapter One

The mental Lexicon and Vocabulary Learning

Introduction

Knowing a vocabulary word means knowing many characteristics and dimensions of such a word. Psychologists have agreed that vocabulary knowledge resides in the long-term memory of language users. This kind of knowledge is stored, organised in a dictionary-like form, which is metaphorically referred to as "mental dictionary" or mental lexicon. However, this mental lexicon is not organised as a regular dictionary in alphabetical order, but rather as a network or web type. It refers to how words and their associative properties are stored in the human mind and in what way they are accessed. Moreover, studying vocabulary knowledge in relation to the mental lexicon does not include only the surface aspects of vocabulary items such as spelling, pronunciation and parts of speech, but it goes beyond these aspects to include the organization, storage and retention of words from the memory. Further, the traditional methods and approaches of teaching and learning vocabulary seem insufficient to handle the main purpose of learning vocabulary which is making language users, EFL learners in particular, learn and use their words correctly when they practice the language.

1.1 Historical Background

The mental lexicon is a tempting component that has an important role in EFL teaching and learning. It is considered as a crucial part in developing English language skills. (Bird cages, treasure-houses, attics and libraries). These are all suggestions which have been put forward for describing human memory (Marshall, 1977). Psycholinguists represent a persistent notion that human memory is as some kind of location, a concept that has endured for centuries.

The ancient Greek philosopher Plato attributes the Birdcage analogy to Socrates:

> Let us suppose that every mind contains a kind of large birdcage stocked with all kinds of birds, some in flocks, some in small groups, and some flying around alone...when we are babies, we must assume that this container is empty, and suppose that the birds stand for pieces of knowledge. Whenever a person acquires some piece of knowledge, he puts it into the enclosure... (Theatetus 197d-e)

The roman orator Cicero called memory "the treasure house of all things. A similar metaphor is put into the mouth of Sherlock Holmes by his inventor Conan Doyle: 'I consider that a man's brain originally is like a little empty attic and you have to stock it with such functions as you choose (Doyle, 1930/1980, p.21). The problem with birdcages, treasure house and attics is that their contents are somewhat complicated and difficult to put in order, so the most common representations of these places included the notion of a place whose contents could be easily arranged-above all, a library. For example, the German philosopher Kant, writing at the end of the eighteenth century, proposed that the content in one's memory should be divided into general headings as when we organize books in a library with different labels on the shelves (Quoted in Marshall, 1977, p. 479). The library is a repeated metaphor not only for memory in general but especially for the mental lexicon, where words are linked to books on the shelves.

However, libraries are not at the moment the main source of cerebral metaphors. There is a tendency to take over the dominant technology of the day, so that virtually all modern systems involving storing information or sending messages have turned to provide provocative metaphors. (Marshall, 1977).

Aitchison (1987) suggested that the mind was compared to a telephone exchange earlier in this century. Memory traces were related to laser holograms more recently, but machines are making the strongest persuasive analogies these days (Aitchison, 1987, p. 32).

Scholars have provided different metaphors of the mental lexicon and each one of them has his own view of it.

1.2 Definition of the Mental Lexicon

The mental lexicon plays an important role in storing and retrieving words. The idea of a mental lexicon was first proposed by Treisman (1960) who defined it as follows:

> A mental lexicon is normally defined as a repository of all the information a reader or a listener has attained about the words of his language. He suggested that in every speaker's mind there is a well-organised system of lexical representation, where each word's spelling (orthography), sound (phonology) and meaning (semantics) are assumed to be stored as unique entities. (p. 242-248)

The mental lexicon is a mental system that organises language in our minds. Richard and Schmidt (2002) suggested that it is a mental system which involves all the information a person knows about words. Such properties include the meaning of the word, its pronunciation and spelling, its relationship with other words, and the related information. However, McCarthy (1990) has linked the mental lexicon to a dictionary, a thesaurus, an encyclopaedia, a library, a computer or a network.

According to Wikipedia, the mental lexicon is described as a mental dictionary containing information about the context, pronunciation, syntactic characteristics of a word and so forth. The mental lexicon is a term used in linguistics and psycholinguistics to refer to the lexical, or word representations of individual speakers. Not all scientists however agree on the value of the mental lexicon as a scientific construct.

Richard and Schmidt state that “the mental lexicon is a person’s mental store of words, their meaning and associations” (Richards and Schmidt, 2002: 327). The term itself is a metaphor, as lexicon is the Greek word for ‘dictionary’. Scholars like Aichison, 2003; Channell, 1988; and McCarthy, 1990 admit that little is actually known about the mental lexicon and all attempts to define and describe it rely on more metaphors that produce incomplete models. On the other hand, Brown (2006) offers a more modern metaphor, comparing it to the Internet and World Wide Web. Despite the apparent variations between the above examples, they all have in common the concepts of input, storage, and retrieval. The nature of storage in the mental lexicon is of particular importance to this analysis, with current research results dictating expansion to previous designs. (p. 37)

1.3 Organisation of the Mental Lexicon

The mental lexicon is organised in many ways. Aitchison (2003) describes mental lexicon as the ‘mental dictionary’ that consists of all the words in a person's mind. It is in a state of constant growth where new words encountered are continuously entered and organized. Sokmen (1997) stances on lexico-semantic theory contend that "humans acquire words first and then, as the number of words increases, the mind is forced to set up systems which keep the words well-organized for retrieval" (p. 241).

McCarthy (1990) provides a visual explanation of these systems by presenting a model that depicts the organization of words in a web-like formation. In this formation, words make connections to each other based on semantic relations or the world knowledge a person has obtained through his or her experiences. His model also addresses the complexities attached to word storage by including connections to phonological, orthographical, word class and syntactic properties of words. What results is a multi-

dimensional 'web of words' models with numerous links criss-crossing one another (Wilks & Meara, 2002).

For L2 learners, their lexicons may appear barren with few connections at first. Words that are unknown have no connections of any kind to the learners' lexicon, whereas those that are well-known have many (Meara, 1997). New connections are created as learners acquire new words and the web expands. Sokmen (1997) argues that learners access their background knowledge when they encounter a new word. Also, he claims the following: (learners) connect the new word with already known words, the link is created, and learning takes place. In the process of deciding how the new word fits in, i.e. how it is similar to or different from words they already know, information about the word becomes more organized (p. 241). These connections can be further explored through word association tests whereby association patterns produced by EFL learners may provide insight on the organization of the mental lexicon.

1.4 Exploring the Mental Lexicon

The mental lexicon can be explored as Aitchison (2003) lists four main methods for researching the mental lexicon: 1) word searches (tip-of-the-tongue or TOT states) and slips of the tongue, 2) linguistics and linguistic corpora, 3) speech disorders and brain scans and 4) psycholinguistic experiments (p. 16-17). The method of investigation for the current study, a simple word association test, is a psycholinguistic experiment and will be described in more detail below.

1.5 Language Production

In this section the focus is on the word processing itself. How individual content words are generated. According to Carrol (2008):

> Language production is a fundamentally more difficult subject to study than comprehension, because although speech is observable, the ideas that lead to production are more elusive. Researchers have responded to this dilemma by using convergent measures. Some investigators have made detailed and systematic analyses of naturally occurring errors of production, and others have given speakers under laboratory conditions, more or less specific instructions on what to produce. (p. 193).

Levelt (1989) adds, "Language production is logically divided into three major steps: deciding what to express (conceptualization), determining how to express it (formulation), and expressing it (articulation)". To understand how people communicate, psycholinguistic studies of language development have focused primarily on the formulation of single, isolated utterances. A phrase consists of one or more words spoken together under a single domestic or expressive contour.

1.5.1 Generating Words

The process which is called generating words, termed conceptualization or message planning, is traditionally considered pre-linguistic and language neutral .The next major stage is formulation, which in turn is divided into a word selection stage and a sound processing stage. That is, a speaker decides upon an intention or some content to express (e.g., a desired outcome or an observation) and encodes the situational constraints on how the content may be expressed (e.g., polite or informal speech, monolingual or mixing languages. Griffin and Ferreira (2006) state that generating a word begins with specifying its semantic and pragmatic properties. The simplest meaningful utterance consists of a single word. **(**Griffin and Ferreira, 2006)

Sound processing, in contrast, involves constructing the phonological form of a selected word by retrieving its individual sounds and organizing them into stressed and unstressed syllables (phonological encoding) and then specifying the motor programs to realize those syllables (phonetic encoding)(Griffin and Ferreira, 2006). The relevant word representation is often called a lemma, lexical entry, lexical representation, or simply a word, and it marks the presence of a word in a speaker's vocabulary that is capable of expressing particular semantic and pragmatic content within a particular syntactic context. Deciding which word to use involves selecting a word in one's vocabulary based on its correspondence to semantic and pragmatic specifications. The final process is articulation, that is, the execution of motor programs to pronounce the sounds of a word. **(**Griffin and Ferreira, 2006)

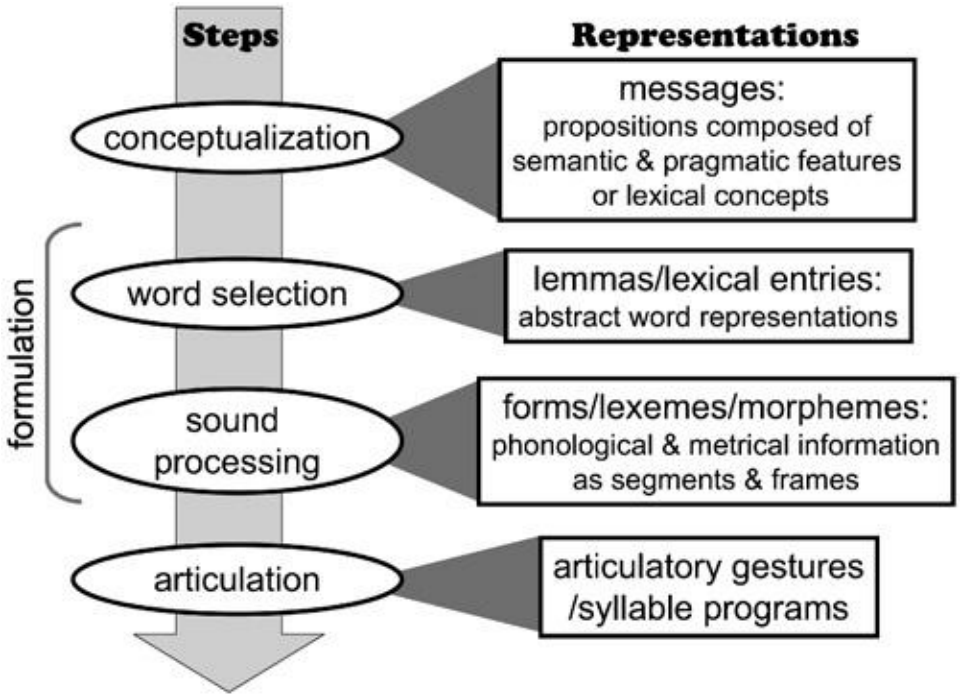

Figure 1.1: Major Steps and Representations in Language Production.

1.5.2 Selecting a Content Word

Studies of isolated word production have focused primarily on nouns (e.g., person, place, or thing) with some studies of verbs (i.e., action words and predicates), ignoring other grammatical classes of content words that are less often spoken alone. In one-word

utterances, the properties of word production processes appear similar for nouns and verbs (e.g, Mackay, Connor, Albert, & Obler, 2002; Vigliocco, Vinson, Damian, & Levelt, 2002). There is no reason to suspect that other types of content words are prepared differently in single word production.

1.5.2.1 The Intention to Produce a Word Activates a Family of Meaning-Related Words

Speech error analyses suggest that the most common error in word selection occurs when a speaker substitutes a semantically related word for the intended one, such as calling a van bus (Dell et al., 1997). A related type of speech error is a blend in which two words that could sensibly fill a particular slot in an utterance are spliced together to form an unintended string of sounds, such as behavior and deportment emerging as behortment (Wells, 1951/1973). How meaning is represented in models of word production, leads to two major theoretical positions (Bierwisch & Schreuder, 1992; Katz & Fodor, 1963). Decompositional views portray the primitives of semantic representation as being entities that are smaller than the words. Put another, a word is a composite of features e.g., the meaning of bird might include HAS WINGS, HAS FEATHERS, SINGS SONGS, and the like (e.g., Cree & McRae,2003; Vigliocco, Vinson, Lewis, & Garrett, 2004).

According to non-decompositional views, the representational bases of words and their meanings bear a one-to-one relationship, so that the word bird is fed by an atomic meaning representation of BIRD, the word airplane is fed by an atomic meaning representation for AIRPLANE, and so forth. These atomic meaning representations are often called lexical concepts. Within such account, the activation of a family of words which are similar in meaning is not as straightforward as it is with decompositional accounts. Specific claims as to how multiple meanings become activated have been presented by Roelofs (1992) and Levelt et al. (1999).

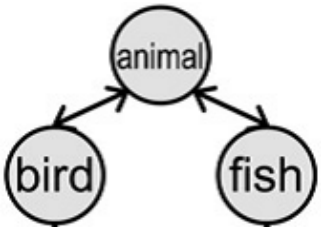

Figure .1.2: Semantic Network of the Word Animal

The idea is that activating the concept BIRD activates the concept FISH because BIRD will be connected within a semantic network to the concept ANIMAL (through what is sometimes called an “is-a” link), which will then spread activation to FISH. The concept FISH can then activates the word fish.

1.6 Vocabulary Learning and Teaching

The importance of vocabulary is to be inside and outside the walls of classrooms. Outside classrooms, people use the language to socialize and communicate all the time. In classrooms, learners have to learn a sufficient amount of vocabulary to succeed in their process of learning. Rodriguez and Sadoski (2000) figure out that vocabulary acquisition is essential for successful second language (L2) and foreign language use and plays an important role in speaking and writing complete texts. Either in English as a second language (ESL) or English as a foreign language (EFL), learning vocabulary has a vital role in all language skills (i.e. listening, reading, speaking, and writing) (Nation, 2011, cited in Alqahtani, 2015 p. 22).

Vocabulary learning has become unfashionable; "the arcane mysteries of grammar acquisition" have captivated the imagination of psychologists and linguists. (Bruner, 1975, p. 65). The popular view seems to be that syntax, rather than the lexicon, is complex and interesting, as is humorously illustrated by quotations such as the following: "In the beginning was the word. But by the time the second word was added, there was trouble. For with it came syntax, the thing that tripped up so many people" (Simon 1981, p. 111).

Meara (1980) states, there are at least three strong arguments for attention to lexical learning. Once learners are past the initial stages of acquiring the second language, they identify the acquisition of vocabulary as their greatest single problem area (Meara 1980, p. 221). Whether first, second or foreign languages are learnt by children or adults, no language learning can take place without the acquisition of lexis.

Second, some studies suggest that mother tongue speakers grade lexical errors of foreign language learners as more serious and disruptive than phonological or grammatical errors (Politzer 1978; Johansson 1978). Third, in a study of lexis in interlanguage, lexical errors were shown to outnumber grammatical errors by three or four to one (Meara 1984).

Studies in language acquisition do not devote as much careful attention to vocabulary as to phonology or grammar. Research in this field has been described as 'unsystematic' (Meara 1980, p. 221). In studies of learners' inter language; the focus tends to fall on the acquisition of morphological endings.

1.7 The Needs of Adult Foreign Language Learners

A survey of available materials for courses in English for Academic Purposes (Laufer 1985, p. 1) reveal that Less attention is given to vocabulary training than to discourse-cohering devices and to reading strategies. The collection of new vocabulary items and the practice both seemed inadequate. Where vocabulary check lists are provided at the end of reading texts, or lexicons are provided as reference materials, they are merely listed in alphabetical order. This practice ignores modern insights into cognitive processes relevant to lexical acquisition.

Laufer (1985, p. 1) contends that the assumption is made that vocabulary is either familiar or, if unknown, does not have to be explicitly taught. She also suggests that much

vocabulary learning can and should be done as part of the reading process. The above-mentioned assumption goes against reports estimating the second language vocabulary level of learners at the end of secondary school at between 500 (Davies, Glendenning & McLean 1984) and 3 000 words (Israel: Ministry of Education, reported in Laufer 1985). These figures do not even approximate the 5 000 - 10 000 vocabulary range considered necessary for the reading of academic literature (Hulstijn & Hazenberg 1993) and are very far from a moderate native speaker's reading vocabulary of about 50 000 words (Nuttall 1982). When these figures are considered, one begins to understand the frustration of adult learners in the field of vocabulary acquisition.

The language learners plight becomes even more severe when one tries to explain what "knowing a word" entails. Clear comprehension of a word means knowledge of the denotative, associative and thematic categories of meaning, as well as its underlying form and the derivations that can be derived from them (Leech, 1981, p.9-24). Knowledge of a term often requires restrictions on the register such as temporal, geographical and social variability. However, a more sophisticated use of language requires knowledge of idiomatic and metaphorical usage, where interpretation involves more than knowledge of the constituent words ' individual meanings.

1.8 Explicit Vocabulary Teaching - Or Not?

Vocabulary tends to occur in the classroom regardless of the activity chosen and beyond any deliberate design on the teacher's part. Therefore, vocabulary teaching is not ignored in terms of quantity but rather in terms of quality: learners are confronted with a large number of vocabulary items that are not introduced and analyzed in a scientifically justified manner. Gairns and Redman (1986) remark that a "vast amount of teaching time is consumed by explanation and definition; classroom blackboards are often littered with masses of new

lexical items, and students compile vocabulary word-lists that they rarely have the opportunity to practise". It is unclear whether these incidental vocabulary items are actually the most appropriate and suitable ones for the learners.

One reason often used against clear vocabulary instruction is that individual words are not as important as the whole context of the sentence. Therefore, it is expected that learners either infer the meaning of unknown terms from the context or disregard the words they do not know, and derive the general meaning from what they can understand.

However, if learners are below the "threshold level" of target language competence, that is, if they have not yet mastered elementary grammar and do not possess a basic vocabulary of at least 5 000 words, these strategies cannot be applied satisfactorily (Cziko 1980). As a requirement for understanding a complex academic piece of writing and for correct lexical guessing, learners should have more than basic target language skills at their fingertips.

Focusing on the argument contained in a text also presupposes that “the text does not contain more than about five per cent of unknown words” (Johns 1980), which could severely hamper comprehension. “Lexical guessing cannot be successfully practised when the clues themselves are contained in words that are unknown to the learners, as is often the case in academic texts” (Bensoussan & Laufer 1984). Looking up in the dictionary on all unfamiliar terms is not only time-consuming but also irritating.

Laufer (1981) declares that:

> Some teachers do not consider explicit vocabulary teaching necessary, since they believe that new vocabulary can be adequately learnt through exposure to extensive reading. However, comparative research on intensive and extensive reading methods

indicates that intensive reading coupled with much vocabulary practice is more effective for vocabulary acquisition than extensive reading only.

Although extensive reading is necessary for the acquisition of vocabulary it seems to be inadequate on its own. Hence, its function is to form an additional complement to intensive reading in the classroom.

1.9 Cognitive Psychology and Language Awareness Studies

The field of cognitive psychology has provided applied linguistics with important insights into the nature of human learning and has shed light on the active processes involved in all language learning settings, in the initial as well as in the advanced stages of learning. Cognitive psychologists such as Ausubel (1968) Have pointed out the importance of meaningful as opposed to rote learning for the retention of information in long-term memory. The first prerequisite for meaningful learning is that learners should have a meaningful learning set - that is, a disposition to relate the new information to what they already know. Another prerequisite is that the learning task has to be potentially meaningful to the learners - that is, relatable to the learners' structure of knowledge. (Brown 1987, p. 65-70).

Recent research on cognitive psychology in language learning has focused on helping learners become conscious, understand and develop their own learning processes through the development and implementation of new learning strategies (C.F. O'Malley & Chamot 1990; Rubin & Thompson 1982; Ellis & Sinclair 1989; Weinstein & Underwood 1985; Jones et al. 1987; Hosenfeld et al. 1981). Instructional materials built from this point of view match in on the learner's side with the push towards a greater awareness of language.

1.10 The Role of Memory in Learning a Language

Language is a means of communication; in this case people use language as a tool for communicating ideas and interpreting the message. Human beings often interact with each other using language. According to Shazia (2014), "there are two kinds of languages that humans can learn in their life, the first language (L1) and the second language (L2). The first language is called the mother tongue, and the second is learned in a formal school." Memory is one of the variables that can be used to assess a student's ability to learn foreign language. Long-term memory (working memory) has three important roles in learning language, language processing, namely language comprehension, language development, and vocabulary acquisition.

1.11 Language Comprehension

In language comprehension, working memory provides the temporary storage space for the information before it is sent on in a recorded form to the long-term memory. When comprehending the interlocutor's messages, a person must do more than retrieve the meanings of the individual words. Moreover a person must determine the relations among the word meaning, based on the syntactic structure of the sentence.

According to the famous psycholinguist, George Miller, when people hear someone speaking they can recall five to nine chunks of information in short period of time. These chunks of information must be at first reordered into analysis unit before they are held in working memory. In this case, when we learn language we try to remember a chunk of the words that is being uttered by our teacher or native speaker. These words are stored in our long-term memory. Then, we try to not only to retrieve the meaning of the individual words but also to determine the relations among the word meanings, based on the syntactic structure of the sentence. In learning a new language this process may become long. (Miller)

1.12 Language Production

Working memory is, in language production, the place where the pronunciations of the words are placed in linear order on the basis of the syntactic and semantic relationships in the intended utterance before the construction of the motor program which produces the speech. If we try to say something or generate the foreign language utterance, that sound must be provided in working memory, certain sound must be presented in working memory so that we will not make error in speech. (Shazia, 2014)

1.13 Vocabulary Acquisition

Acquiring a new vocabulary is not an easy task therefore it requires different techniques. “Working memory has a limited capacity in learning the new vocabulary which is called the' phonological loop' in which phonological content is processed, kept in sequence, and rehearsed. Neuropsychological studies have provided strong evidence that the phonological loop plays a critical role in the development of vocabularies.” (Shazia, 2014)

1.14 The Concept of Mental Lexicon

The concept of the ‘mental lexicon’ was first introduced by Oldfield (1966) who suggestes, “the existence of a ‘mental dictionary’ in which information about word meaning is retrieved.” It is now suggested that the ‘dictionary’ should be regarded not only as a repertory of word meanings but as a three-fold lexicon comprising syntactic, semantic and word-form (phonological/orthographical) features (e.g., Jackendoff, 2002).

However, there are distinct models regarding the organization of the lexicon. In the influential model of Levelt (1992) “lexical access occurs serially along two stages: first, the selection of semantic and syntactic representations (lemma level) and, second, the selection of its phonological/orthographic content (lexeme level).”

Caramazza and Miozzo (1997) propose an alternative model according to which "semantic, syntactic and word-form features can be accessed independently. One argument for the latter model is provided by the « word-on-the-tip-of-the tongue » phenomenon demonstrating that access to semantic and syntactic information is independent from phonological or orthographic information" (Caramazza and Miozzo, 1997).

Conclusion

This research sought to investigate the nature of the EFL students' mental lexicon. The research proposed that EFL learners should be educated specifically on how to use cognitive techniques such as memorization and retention to improve their lexical skills, which constitute a central part of their overall competence and to discover the lexical units learners make when learning vocabulary.

Chapter Two

Word Association Tests

Introduction

Learning a language needs complicated learning processes, storing and accessing words inside the mind in the mental house referred to as the mental lexicon. The vocabulary is a figure of speech for the mind's dynamic structure of organization that allows learners to access information in a range of ways. Understanding the mental lexicon organizational structure has nevertheless to be processed through strategies, among them the word association method. Learning a language might occur at numerous stages of an individual's physical and mental development, unresolved questions typically exist regarding how language learners form the mental connections inside their mental lexicon. This chapter find investigates how foreign English learners create mental links between words.

2.1 Historical Background

Word association tests was initially used as a psychological tool to study the subconscious mind, and more recently used by psycholinguists to explore the mental lexicon. It was first developed by Sir Francis Galton and later refined by Wilhelm Wundt near the end of the nineteenth century (Stevens, 1994). There are different variations in word association tests but the underlying principle remains the same: stimulus words are presented to the subject (either verbally or in written form) who is asked to answer with the first word or words that come to mind. The resulting word association is thought to mirror the way the words are processed and related in the mental lexicon.

Word association proof appears to demonstrate that in spite of the various words chosen as responses to stimulation words on word association tests, the ways in which people opt for words follows consistent patterns. This consistency is obvious for both L1 and L2. Whereas it seems clear that word association tests are ready to indicate that words are

organized into semantically connected families inside the mind such tests should not be all over to mirror the retrieval process (McCarthy, 1990, p.39).

Studies on the linguistic organization of the L2 lexicon have created four inconclusive results on patterns of organization are the foremost predominant. Maera (1984, cited in Swan, 1997, p.174) states that while L2 lexicons involve networks of associations, the second-language associative links could also be less firmly created than that of the L1 links. However, different analysis studies (Wolter, 2001) have argued that the lexical development inside the mental lexicon of the L1 and L2 is more structurally similar.

2.2 Definition of Word Association Tests

Word association is one of the major subjects studied in linguistics, psychology and psycholinguistics. Sinopalinkova (2003) states that the term association is used in psycholinguistics to refers to the connection or relation between ideas, concepts, or words, which exist in the human mind and manifest in the following way: An appearance of one entity entails the appearance of the other in the mind.

Miller (1996) suggests that "Word associations show the familiarity effect: responses are faster to familiar words and if a word has been presented before, it takes a shorter time to respond to that word." Moreover, according to Kess (1992), context is an important factor in giving responses: if subjects must respond quickly, clang responses are common, if there is no time limitation more idiosyncratic responses occur.

Word Association Test, which was invented by F. Galton, is a technique in order to test associations people make and it was widely used in psychology by psychiatrists such as Jung, Kent and Rosanoff. Kent & Rosanoff's study (2017) was the first large scale study which was carried out in English with 1,000 men and women. They used 100 probe words

and read one word at a time to a person who was to give the first word that came into his/her mind. After analysing the data, they claimed that there was uniformity in the organization of associations and people shared stable networks of connections among words.

Word associations are created by participants who are asked the first word (response) that comes to their mind when presented with a word (stimulus). For example, given the stimulus book to the students, they might answer 'read or page'. According to Bahar and Hansell (2000),

> Word association test is one of the commonest and oldest methods for investigating cognitive structure and has been used by several researchers. The underlying assumption in a word association test is that the order of the response retrieval from long-term memory reflects at least a significant part of the structure within and between concepts. In a word association test, the degree of overlap of response hierarchies is a measure of the semantic proximity of the stimulus words. (2000)

Word association test is a famous strategy in which researchers study the mental networks the human mind. Memory can affect the responses of the test. Also, the types of words in word association test can reflect and vary the types of responses.

2.3 Word Association Types

Word association tests have different types. According to Sinopalinkova (2003), the simplest experimental technique to reveal the association mechanism is a free association test (FAT). In FATs, a list of words (stimuli) is presented to subjects (either writing or orally), which are asked to respond with the first word that comes into their mind (responses), and FAT gives the broadest information on the way knowledge is structured in the human mind. The results of FAT series carried out with several hundred stimuli and a few thousand

subjects, reported in a form of tables, was given the name word association norms (WAN). Word association thesaurus (WAT) is a more developed form of WAN because it includes several thousands of stimuli. (2003)

Another scholar adds a different study about word association tests (WAT) .Wolter's (2002) study revealed that word associations in a foreign language are not clearly linked to proficiency. However, Read (1993) carried out a study with university students of English and tested their knowledge of "academic" words. Read's test consisted of a target word followed by eight other words, four of which are semantically related to the target word, and four of which are not. Read's test aimed to assess receptive word knowledge and knowledge about the meaning of a word, the words with which it is associated, and the collocations in which it occurs. Read (1993) distinguished two types of associations on the basis of "preliminary drafting of items": Paradigmatic ("The two words are synonyms or at least similar in meaning, perhaps with one being more general than the other"; and syntagmatic "The two words are collocates that often occur together in a sentence"). (p.359)

One of the most striking results of word association studies was summarized by Read (1993) as follows:

> One of the basic findings is that native speakers have remarkably stable patterns of word association, which can be taken to reflect the sophisticated lexical and semantic networks that they have developed through their acquisition of the language. On the other hand, second language learners produce associations that are much more diverse and unstable; often their responses are based on purely phonological, rather than semantic, links with the stimulus words. (p.358)

As we can notice that native speakers' patterns are totally different from second and foreign language learners' patterns.

As Schmitt (1998) affirms that the elicitation of word associations is a relatively simple procedure, traditionally subjects are given a stimulus word and asked to produce the first response which comes to their mind. According to him, the use of word associations holds a great deal of promise in the areas of L2 vocabulary research and measurement. He further claims that word association procedures can be used as an alternative way to test vocabulary.

Therefore, for Kess (1992), an association theory looks for latent relationships, the covert links that words have with other words, images and thoughts. For Kess, word association system is like a spider web in which words in the mental network are related to other words. He divided word associations into 3 types:

2.3.1 Members of the Same Part of Speech Class

Paradigmatic responses are words that belong to the same word and which fall in the same syntactic category such as synonyms or antonyms such as thin-skinny, black-white. However, syntagmatic responses are textual relation that can be analysed by looking at words that appear before or after the stimulus word and which fall into other categories such as dig/hole).

2.3.2 Phonological or Clang Responses (Sister/Blister, yellow/fellow)

Moreover, Miller (1996) reports that associative responses of adults can be investigated by using four types of semantic relations which were found to be salient in the lexical organization of most speakers of English: Superordinate, coordinate and subordinate terms, attributive terms, part-whole relations, and functional terms.

The majority of word association literature focuses on the two main organizing principles of language: syntagmatic (chain) and paradigmatic (choice) relations. According to Coulthard et al (2000) and Meara (1982), “syntagmatic associations are those that would be

related by a phrase or syntactic structure. Paradigmatic associations on the other hand, involve the other words that could replace the target word." For them, previous research has shown a tendency for native speakers to respond to word association stimuli paradigmatically and for non-native speakers to respond syntagmatically. In addition to the paradigmatic/ syntagmatic distinction, word associations can be based solely on their phonological or orthographic relations. These responses, sometimes labelled clang responses, are far less common and usually given by low-level language learners. (Coulthard et al., 2000 p.27; Meara, 1982), Some responses are related to one's personal knowledge about the word; and they can vary from syntagmatic to paradigmatic responses.

2.4 Paradigmatic Relations

Paradigmatic relation refers to words that belong to the same word class. There are three types of paradigmatic relations:

2.4.1 Co-ordination

Co-ordination (including antonymy) refers to words "on the same level of detail" or same category e.g. 'dog' and 'cat'. Co-ordination and antonymy can be further classified into complementarity, gradable antonyms, converses and mutual incompatibles. Previous word association research has shown co-ordination to be the most common type of response for native speakers (Aitchison, 2003 p. 86, as cited in McCarthy, 1990 p. 39-40). For that reason, such responses occur frequently.

Complementarity occurs between words that exclude each other and cannot be graded such as 'dead/alive'. Gradable antonyms on the other hand, have different degrees between two core opposites: 'long', 'medium-length', 'shoulder-length' and 'short'. Converses are antonyms that reciprocate each other and have interdependent meanings such as 'husband'

and ‘wife’. Finally, mutual incompatibles are co-ordinates or pseudo antonyms that belong to the same semantic field (e.g. colour) and therefore exclude each other. If it’s blue, it cannot also be red (Carter, 1998 p.20-21; Coulthard et al., 2000 p. 25). Antonyms are fast responses, students read the stimulus word and respond quickly with an antonym of the given word.

2.4.2 Hyponymy and Hypernymy

Hyponymy encompasses the hierarchical relationships of superordination (hypernymy) and subordination (hyponymy). ‘Pet’ is the hypernym of ‘dog’, which is in turn a hyponym of ‘pet’. ‘Dog’, ‘cat’, ‘parakeet’ and ‘iguana’ are referred to as co-hyponyms in this paradigm (Carter, 1998 p.21; Coulthard et al., 2000 p.26). Co-hyponymy is a form of co-ordination. Additionally, Hasan (1984, as cited in Carter, 1998) coined the term meronymy to describe part-whole relationships where ‘bedroom’, ‘bathroom’ and ‘kitchen’ would be co-meronyms of the hypernym ‘house’. Superordination is the third most common word association response for native speakers (Aitchison, 2003). The relation between the part of an object and the whole object can be formed in a web like system in the mind every part is linked to the other semantically and physically. when retrieving such words the mind draw some images about the whole object and the missing part of the object.

2.4.3 Synonymy

Synonyms are two different words which share the same meaning. According to Jackson (1988) “If two words can be used interchangeably in all sentence contexts, they are strict synonyms. “(p. 65-66). This is highly uncommon however; a more useful term is loose synonymy which is a relationship of similar meaning across many but not necessarily all contexts (Coulthard et al., 2000 p. 24). ‘Tall’ and ‘high’ are synonymous but not strict synonyms. We do not typically refer to a person as being really high (with reference to height). Aitchison (2003) found synonymy to be the fourth most common

type of word association response for native speakers. Synonyms are less frequent than antonyms because the mind tends to organise opposites more than similar meaning words.

2.5 Syntagmatic Relations

Syntagmatic relation is a textual relation between words that can be analysed by looking at words before or after the target word. There are two types of syntagmatic relations:

2.5.1 Collocation

Collocation (literally 'placing together') is the tendency for some words to regularly co-occur together. These co-occurrences are not random and can be either lexical or grammatical. Although lexical collocation does involve syntactic structure, the lexical items are responsible for the repeated pattern. Grammatical collocation, also referred to as colligation, depends on syntactic relationships such as prepositional choice, e.g. 'buckle up'. Restricted collocation occurs when there are very few words that can co-occur with a specific word – 'auburn' is lexico-grammatically restricted as it can only be used to describe hair colour. Collocation is the second most common word association response for native speakers (Aitchison, 2003). Collocations are linked to one another like a spider web. When the mind observe the stimulus word it collocates the right response immediately.

Computerized corpora such as the Bank of English have drastically changed the way in which collocation can be studied, making statistical analysis much easier. The word being investigated is labelled the node and the words that co-occur with it are its collocates. A nine-word span, the standard method for finding a node's collocates, involves counting the words that occur within the four words preceding it and the four words following it. Statistically, collocations can be either strong (significant) or weak

(insignificant). (Carter, 1998; Coulthard et al., 2000; Jackson, 1988; Sinclair, 1991). The human mind is organised systematically therefore it collocates words together easily.

2.5.2 Multi-Word Items

Multi-word item is an umbrella term that refers to phrases or groups of words that function as single lexical items (Coulthard et al., 2000 p.62) and can be thought of as "extreme cases of fixed collocations" (Moon, 1997 p.43). For NS, the mental lexicon decodes multi-word items as 'chunks' (McCarthy, 1990 p. 44), whereas L2 learners, who often find idioms difficult, are most likely breaking them down and analyzing each word individually. Logically when our mind encounters chunks or group of words we directly think about a specific word response, following the systematic organisation from general to specific just like a puzzle.

2.6 Importance of Word Association Tests

Word association tests are very important in assessing EFL learners' language proficiency level. As Wolter (2002) states: "Devising a word association test (WAT) as a means of assessing proficiency in a foreign language has always had something of an inherent appeal to it". For him, when developing a WAT, it should be kept in mind that WAT would be relatively quick and easy both to administer and to score, be a nice complement to other methods of assessing learner performance and tend to suggest that there may be something of a connection between psycholinguistic knowledge and more general proficiency in a foreign language. In respect to this last point, he affirms that the underlying argument is that we would expect learners of higher proficiency to have more highly developed semantic networks in the L2 mental lexicon. However, his study with a group of language learners and native speakers did not support his views since he could not find any evidence that word associations in a foreign language are linked to proficiency.

2.7 Classifying Word Association Tests

In the classification of word associations, various researchers applied different classification systems that have some specific characteristics. According to Richards (1991), "The responses to free association tests give much information about the psychological structuring of vocabulary in an individual and offer a way of investigating the syntactic and semantic relationships among words". It means that when learners develop lexical associations their mental lexicon is building a kind of semantic and syntactic relations between words.

2.8 Investigating Word Association Tests

Word association tests are a procedure for investigating how word meanings are stored in memory. In a word association test, the researcher presents a series of words to individual respondents. For every word, participants are taught to reply with the primary word (i.e., associate) that comes to mind. Sigmund Freud (1892) believed that such responses provided clues to people's personalities, what they are, and their feelings (free association). Cognitive psychologists, however, use this procedure to analyze how linguistic data is stored in memory. Studies have demonstrated that word associations are nearly always supported a word's meaning, as against its physical properties. As an example, a typical response to the word "knife" can be "fork" or maybe "spoon", but not "wife or life".

Over the years, psychologists have collected word association norms that describe the relative frequencies with that numerous responses are given to totally different words. These frequencies are then used as a measure of the associative strength between the words. If a large sample of individuals offer the word "doctor" as a response to the word "nurse", this share is employed as an index of the associative affiliation between "doctor" and "nurse". In

a different way of determining the strength of an association is to live what proportion time it takes to provide a response in an exceedingly word association test. High frequency associates also are those with the quickest reaction times.

By scrutiny children's word associations to those of adults; we are able to learn one thing concerning how word meanings are acquired. 5 year-olds are seemingly to reply to the word “long” with a response like “grass” indicating that words are organized in their memory in line with real world things and private experience. By age 10, the foremost common response is brief, thereby revealing a growing awareness of linguistic relations and grammatical categories.

2.9 Characteristics of Word Association Tests

Word association tests can be very beneficial for EFL learners. As Henning (1973) declares, “learners might benefit from synonym and antonym games and exercises, paired-associate compositions in which lists of related words are given the learner from which he is to prepare written or oral compositions”. Through these types of exercises, the language learner will begin to recognize not only a larger inventory of lexical items encountered, but be able to identify the acoustic and semantic families from which they come, and thus more efficiently progress in language proficiency.

2.10 Word Association Tests and Foreign Language Teaching

Teacher has been using traditional methods of teaching for a long time. As Bahar, Johnstone and Sutcliffe (1999) report, teachers can use the word association test before a teaching session, to elicit the prior concepts in students’ minds, as well as after the teaching session, and the two results can be compared to see the changes in students’ learning. They add that the teacher can also encourage students to compare their own responses with those of other students, in order to show them that there is more than one way of seeing things, and

they can recognize that learning is individual and involves individual construction of meaning. This comparison of the responses may lead to a discussion which can broaden their understanding. They further claim that word association tests can be used as an educational tool for ‘seeing inside students’ heads’, both individually and as a group.

Abdullah (1993) advises the teachers to adopt activities that will help reinforce and recycle vocabulary to facilitate automatic lexical access; to help students organize information or words according to concepts or topics. He suggests that activities in the classroom should help learners build up new networks or maintain, refine, and expand existing networks. Suggested activities are:

1. Narrow reading activities

2. Word prediction (predicting vocabulary from a given topic)

3. Word prediction (predicting topic from given vocabulary)

4. The odd man out

5. Vocabulary map

2.11 Related Studies

A good description of the learner’ vocabularies provided by Meara (1983) in which she describes learners' vocabularies as one in a state of flux and not fixed where the semantic links between words in the learner's mental lexicon are weak leading to less homogenous responses. In a study involving Swedish and Finnish ESL learners, however, it was found that the learners' responses became more paradigmatic as their proficiency improved (Soderman, 1993). These findings were replicated in a recent study by Zareva and Wolter (2012) who

concluded that "there are no significant differences in the lexico-semantic pattern of NSs and L2 learners of advanced proficiency" (p. 59).According to Wolter (2001),

> Most explanations for this syntagmatic-paradigmatic shift in word association found in L2 learners point to lexical or cognitive development. He also suggests that as words become more familiar and "better integrated into the mental lexicon, the phonological connections lose their predominance and other more powerful ... semantic connections become stronger" (pp. 60-61).

However, some recent studies have yielded findings that contradict the research supporting the syntagmatic-paradigmatic shift (Billiris, 2011; Fitzpatrick, 2007; Higginbotham, 2010; Nissen & Henriksen, 2006). For example, Billiris (2011) finds that both low and high level adult Korean EFL learners made a greater number of syntagmatic responses than paradigmatic responses.

In addition, the low-level learners had a higher percentage of paradigmatic responses than the high-level learners. In all these studies, when less frequent words were used as prompts, many of the NS subjects produced syntagmatic responses. Fitzpatrick and Izura (2011) contend that it may not be prudent to assume that "the processes of lexical acquisition, storage, and retrieval in a L2 will follow the same patterns, stages, and ultimate attainment as those in a L1" (p. 374). Thus, this discrepancy in the results may appear to indicate that further investigation is needed in understanding the development of the mental lexicon.

Russ (n.d) in the same vein of studies (using the old paradigm) finds that although no definitive conclusion can be made, it appears that L2 learners tend to organize the mental lexicon much like L1 speakers do. He argues that according to his studies word

class is an important feature of lexical organization. Moreover, personal experiences and phonological systematizing also appear to play a role in lexical linkage.

2.12 Criticism of Word Association Tests

Despite the insights into the mental lexicon that WATs has provided, it may not be always suitable to consider WATs as the primary tool for such research. The lack of consensus and standards in WAT methodology (prompt word selection and response classification) in the field appears to impair the robustness of WATs leading to contradictory findings.

Fitzpatrick (2007) reports that interest in word association has fallen after Kruse, Pankhurst and Sharwood (1987) completed a detailed study that contradicted the assumptions of earlier studies. Kruse et al. (1987) conclude that "word association tests do not show much promise for the specific role created for them in L2 research" (p. 153).

Another critique of WATs is that results can be easily influenced by context and a subject's state of mind. For instance, in this present study, one test was conducted in a restaurant with a NS subject where the prompt word 'eat' elicited the response 'now'. It is possible that this response may have been influenced by the environment and his physical condition at that particular time.

As Aitchison (2003) would contend, "if a word's association can be changed so easily by context, then, it is possibly wrong to assume that we can ever lay down fixed and detailed pathways linking words in the mental lexicon" (p. 85). However, recent studies in word association have continued the use of WATs but with alternative methodologies, for example analyzing data by using an individual profiling approach (Fitzpatrick, 2007; Fitzpatrick & Izura, 2011; Higginbotham, 2010). These researchers believe that learners are not

homogenous in their response behaviour and should be considered as individuals as opposed to attempting to group them.

Fitzpatrick (2007) found that when viewed as individuals, learners showed consistent responses between their L1 and L2 profiles. Furthermore, Fitzpatrick (2009) reports that L2 users of a language generally make similar kinds of associations as they do in their L1 as proficiency increase.

More recently, another methodology employed by Fitzpatrick and Izura (2011) measures the response times of subjects in WATs. In their study of native Spanish speakers, their findings suggest that, in terms of category reaction time differences, "word association reaction time data might inform understanding of storage and activation in the bilingual lexicon" (p. 395). With further exploration in these approaches, perhaps a greater consensus can be reached in the understanding of the mental lexicon.

Conclusion

Learning a language might occur at numerous stages of an individual's physical and mental development. Memorizing and retrieving words is very difficult process when learning a new language. Word association test is the right tool to figure out how our minds store and retrieve new words in the mental lexicon. It appears that L2 learners tend to organize the mental lexicon much like L1 speakers do. The results can be easily influenced by context and a subject's state of mind.

Chapter Three

Data Analysis and Interpretation of the Results

Introduction

The current study aims to explore the effect of Word Association Tests (WATs) on English foreign language learners' mental lexicon in improving EFL learners' vocabulary; this chapter presents the analysis and interpretation of the results. First, it starts with a theoretical background on the research methodology underlying the study. Then, it attempts to describe the rational of each data collected method and the adopted strategy that are used to test the hypotheses under investigation. After that, it provides the discussion of the finding including answers to the research questions, and testing the hypotheses which were suggested in the general introduction. Finally, the chapter ends up with limitations and pedagogical recommendation.

3.1 Research Methodology

The issue under investigation entails a careful paradigm that encounters the ambition and the depth of the current study, which seeks to explore the effect of word association tests on EFL learners' mental lexicon. Therefore, the researchers opted to quantify the gathered data. The quantitative method is devoted to measure and analyse the data gathered in this study. First, a student's word association test aims was used to gather numerical and quantitative data in order to answer the first two research questions which state "1- What are the suitable vocabulary tests that can be utilized in EFL learning classrooms?, 2- To what extent can word association tests develop learners' mental lexicon?", While a content analysis procedure answers the last research question of this study which state "3- How do learners make mental links between words they have learnt?". As such, this study quantitatively measures the data collected by mean of students' vocabulary test.

3.2 Participants

This study was conducted with master students of English at Biskra University. Conducting the test was difficult because of Corona virus. Thus, we made an online test and shared it in a Facebook group (UMKB Master Students) and we asked them to answer it. Forty (40) students answered the vocabulary test. The selection of this sample was based on the fact that Master students do not have an official vocabulary course and it was expected that the participants would rely on other sources such as their digital devices to learn vocabulary through conducting such tests.

3.3 Description of the Word Association Test

The test was administrated to master students of English in order to obtain their responses about the first word that comes to their minds. It was shared on Facebook group, and 40 students answered in two days only. It consists of ten (10) stimulus words (see appendix 01). The stimulus words varied from different types of vocabularies and varied responses were submitted by the students.

3.4 Analysis and Interpretation of the Results

The students were requested to answer the test by writing the first word that comes to their mind. The Google drive form (online test) helped us to show the statistical analysis of the quantitative data of the students' test. The results were reported as follows:

3.4.1 Choice of Test Words

Word of the test were carefully chosen to gain a better understanding of the mental lexicon and lexical development of foreign language learners. The experimental procedure followed Task 123 of McCarthy's vocabulary (1990):

1. Draw up a list of ten words to be used as stimuli in a simple word association test. Trying to vary the test items, to include:
   - At least one grammar/function word (e.g. Preposition, pronoun).
   - One or two items from the everyday physical environment (e.g. Table, car).
   - A relatively uncommon or low-frequency word but one which the students will nonetheless know.
   - A mix of word-classes (e.g. Noun, adjective, verb).
2. Deliver the test to the students, asking them to write down the very first word that occurs to them when reading the stimulus word.
3. Gather in the results and see if any patterns emerge from the responses.(1990, p.152)

3.5 Results

The test was published on a facebook group and 40 students responded on it by providing the first word that comes to their mind. Making a variety of mental connections to develop a valuable response to the stimulus word was the student's job. Through the test we notice that different responses were given.

3.5.1 Word Association Test Results

In the following process we are showing the students' responses on the word association test, the frequency and the percentage of their responses. Accordingly we decided to list the results in the following tables:

Prompt Words	Responses	Frequency	Percent
1.Under (Preposition)	Table	10	25%
	Below	6	15%
	Understand	7	17.5%
	Ground	4	10%
	Down	2	5%
	Above	3	7.5%
	Line	5	12.5%
	Pressure	3	7.5%

Table.3.1: Item One Responses "Under"

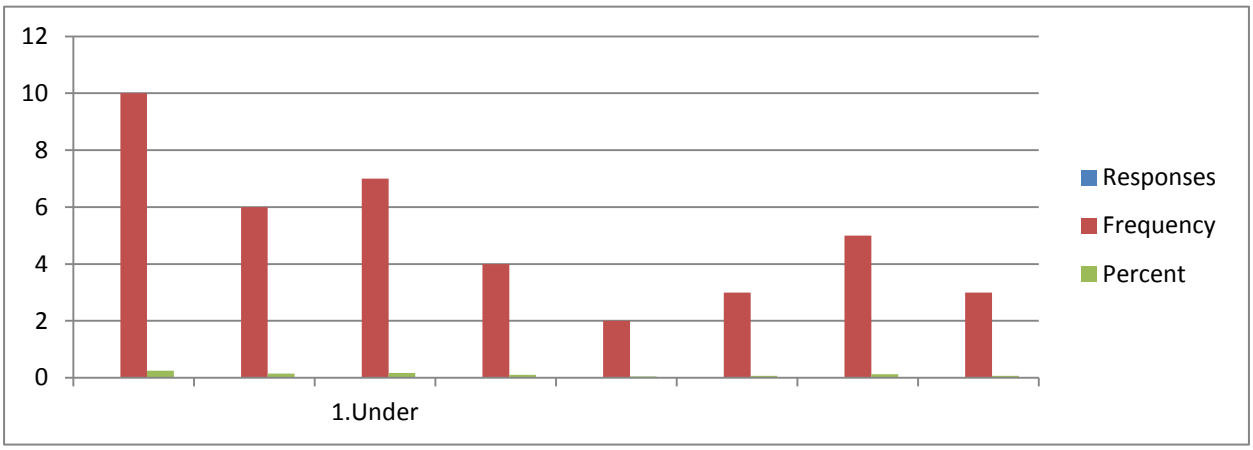

Figure.3.3: Classification of Item One Responses "Under"

From the output shown above, we know that there are different responses for the preposition (Under) ten responses "Table" noun phrase (25%), six responses "Below" preposition/adverb(15%), seven responses "Understand" verb (17.5%), four responses "Ground" noun/verb (10%), two responses "Down" adverb/preposition (5%), three responses "Above" preposition/adverb (7.5%), five responses "Line" noun/verb (12.5%), three responses "Pressure" noun/verb (7.5%).

Prompt Words	Responses	Frequency	Percent
2.Book (Noun)	Reading/read	7	17.5%
	Culture	5	12.5%
	Knowledge	4	10%
	Library	3	7.5%
	Shelf	4	10%
	Education	6	15%
	Author	5	12.5%
	Pages	6	15%

Table.3.2: Item Two Responses "Book"

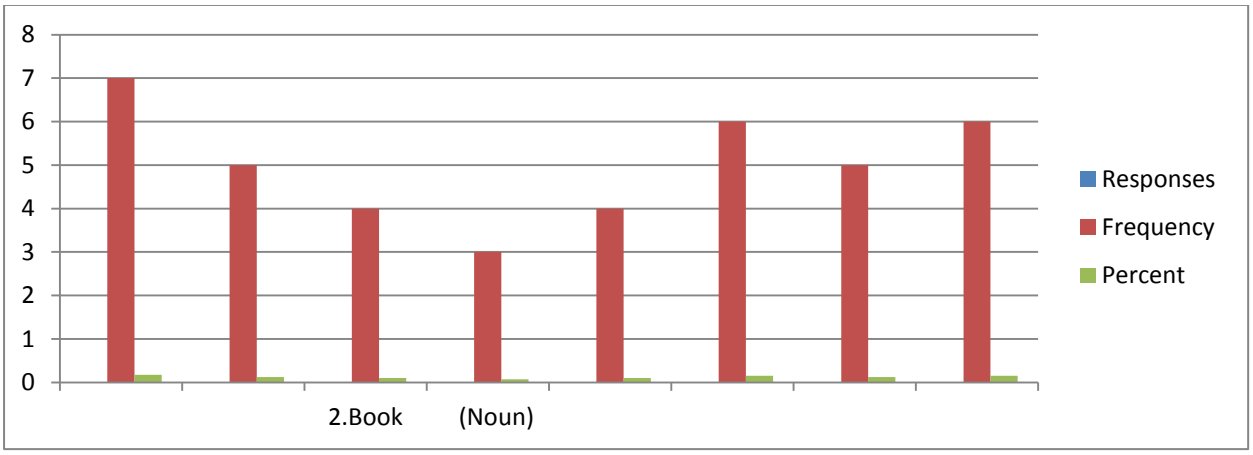

Figure.3.4: Classification of Item Two Responses "Book"

From the output shown above, we know that there are different responses for the noun (Book) seven responses “Reading/read” gerund/verb (17.5%), five responses “Culture” noun/verb(12.5%), four responses “Knowledge” noun (10%), three responses “Library” noun(7.5%), four responses “Shelf” noun (10%), six responses “Education” noun(15%), five responses “Author” noun/verb (12.5%), six responses “Pages” noun/verb (15%).

Prompt Words	Responses	Frequency	Percent
3.Study (verb)	Hard	6	15%
	Research	4	10%
	School	7	17.5%
	Degree	3	7.5%
	Success	3	7.5%
	Students	6	15%
	Learn	3	7.5%
	Teacher	8	20%

Table. 3.3: Item Three Responses "Study"

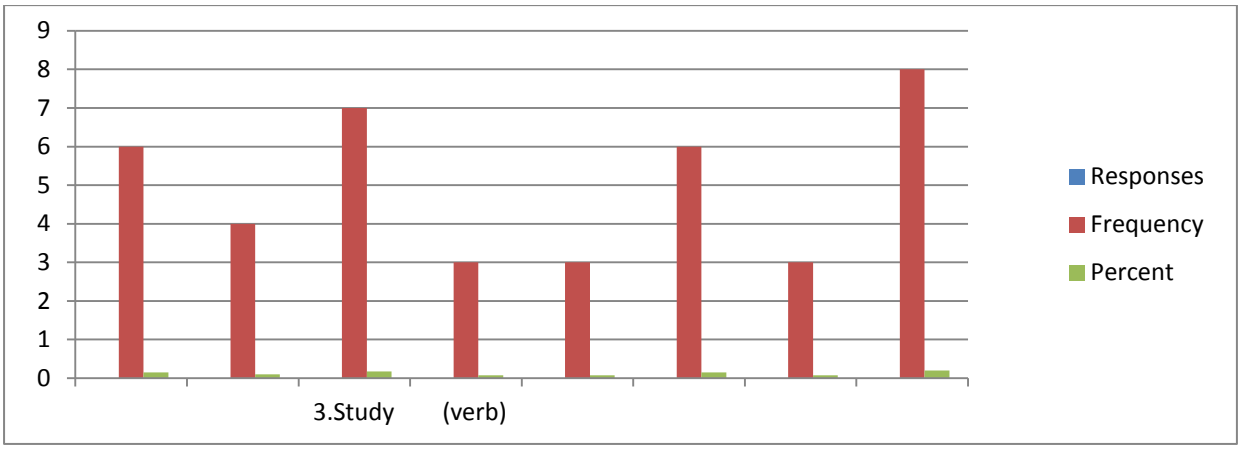

Figure. 3.3: Classification of Item Three Responses "Study"

From the output shown above, we know that there are different responses for the verb (Study) six responses "Hard" Adjective/Adverb(15%), four responses "Research" noun (10%), seven responses "School" noun/verb (17.5%), three responses "Degree" noun (7.5%), three responses "Success" noun (7.5%), six responses "Students" noun (15%), three responses "Learn" verb (7.5%), eight responses "Teacher" noun (20%).

Prompt Words	Responses	Frequency	Percent
4.Internet (Noun)	Social media	7	17.5%
	Web	3	7.5%
	Technology	6	15%
	Network	4	10%
	Search	3	7.5%
	Information	2	5%
	Connection	8	20%
	Google	7	17.5%

Table. 3. 4: Item Four Responses "Internet"

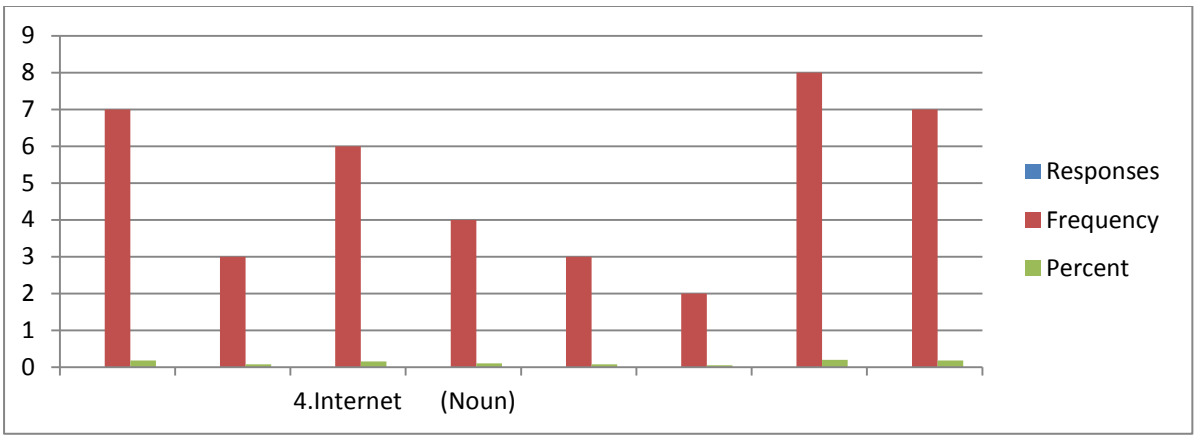

Figure. 3. 5: Classification of Item Four Responses "Internet"

From the output shown above, we know that there are different responses for the noun (Internet) seven responses “Social Media” noun (17.5%), three responses “Web” noun (7.5%), six responses “Technology” noun (15%), four responses “Network” noun (10%), three responses “Search” noun (7.5%), two responses “information” noun (5%), eight responses “connection” noun (20%), seven responses “Google” verb (17.5%).

Prompt Words	Responses	Frequency	Percent
5.Note (noun)	Remark	4	10%
	Book	9	22.5%
	Idea	3	7.5%
	Reminder	4	10%
	Pen	1	2.5%
	Note taking	6	15%
	Memory	7	17.5%
	write	6	15%

Table.3.5: Item Five Responses "Note"

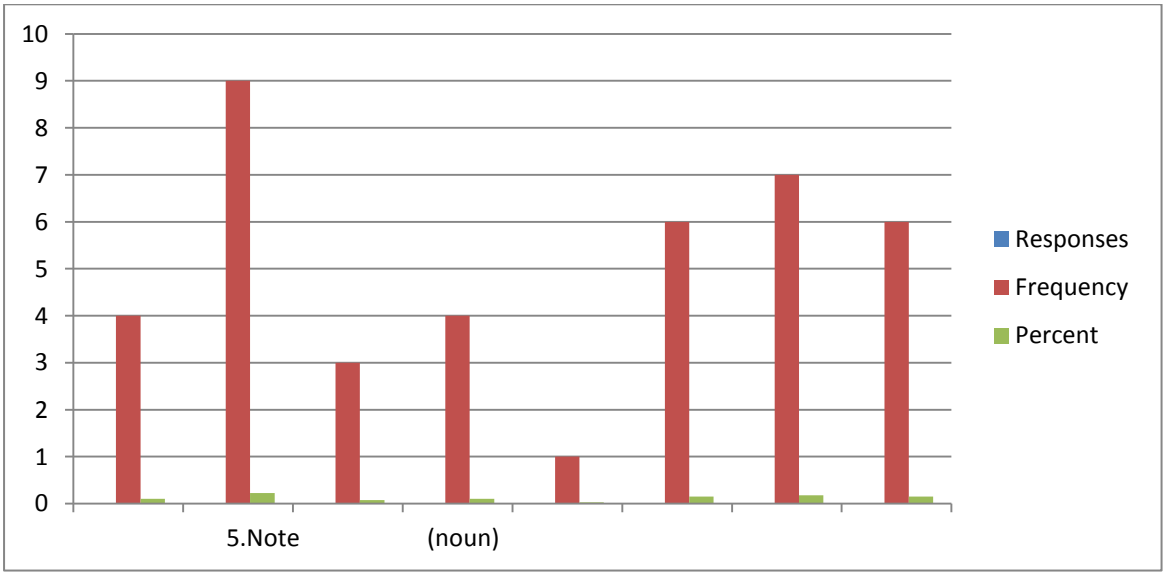

Figure.3.6: Classification of Item Five Responses "Note"

From the output shown above, we know that there are different responses for the noun (Note) four responses "Remark" noun/verb (10%), nine responses "Book" noun/verb (22.5%), three responses "Idea" noun (7.5%), four responses "Reminder" noun (10%), one response "Pen" noun/verb (2.5%), six responses "Note taking" noun/adjective (15%), seven responses "Memory" noun (17.5%), six responses "Write" Verb (15%).

Prompt Words	Responses	Frequency	Percent
6.Interesting (Adjective)	Important	4	10%
	Topic	5	12.5%
	Music	6	15%
	Nice	5	12.5%
	Astonishing	1	2.5%
	Entertaining	4	10%
	Exciting	5	12.5%
	Attractive	6	15%
	Awesome	4	10%

Table. 3.6: Item Six Responses "Interesting"

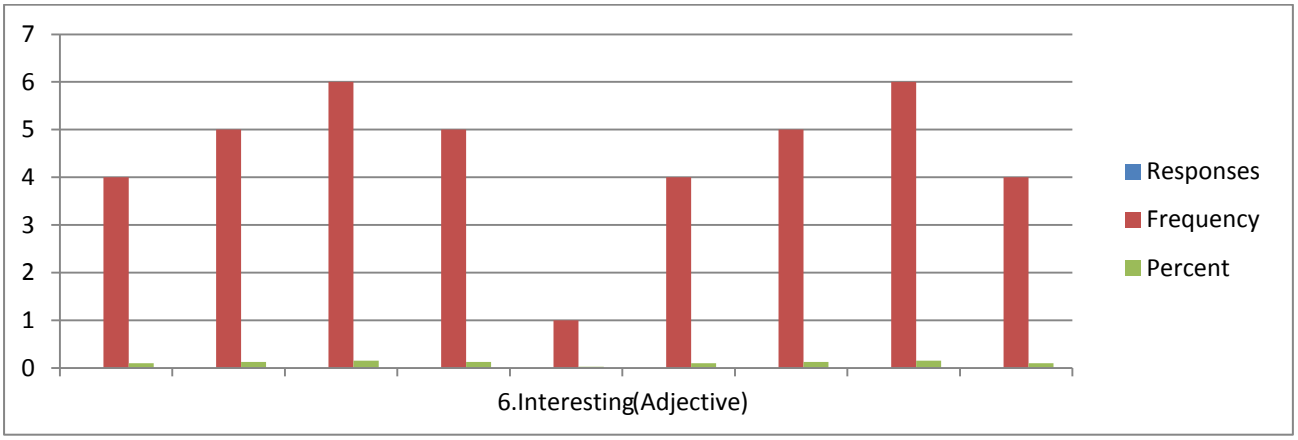

Figure.3.7: Classification of Item Six Responses "Interesting"

From the output shown above, we know that there are different responses for the adjective (Interesting) four responses "Important" adjective (10%), five responses "Topic" noun (12.5%), six responses "Music" noun (15%), five responses "Nice" noun (12.5%), one response "Astonishing" adjective (2.5%), four responses "Entertaining" verb/adjective (10%), five responses "Exciting" adjective (12.5%), six responses "Attractive" adjective (15%), four responses "Awesome" adjective (10%).

Prompt Words	Responses	Frequency	Percent
7.Cold (Adjective)	Winter	9	22.5%
	Weather	7	17.5%
	Ice	5	12.5%
	Hot	5	12.5%
	Freezing/frozen	3	7.5%
	Juice	1	2.5%
	Russia	2	5%
	Warm	8	20%

Table. 3.7: Item Seven Responses "Cold"

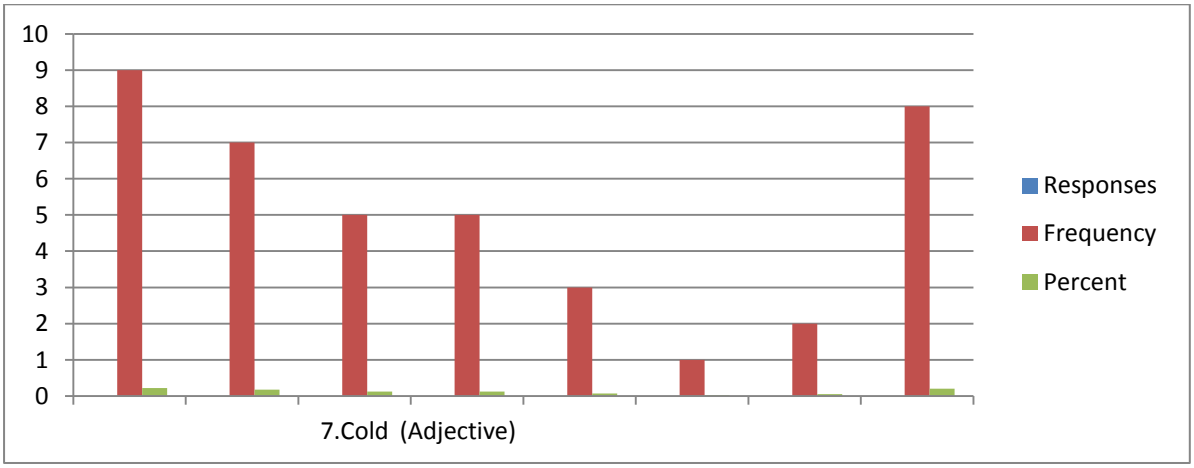

Figure. 3.8: Classification of Item Seven Responses "Cold"

From the output shown above, we know that there are different responses for the adjective (Cold) nine responses "Winter" noun (22.5%), seven responses "Weather" noun/verb (17.5%), five responses "Ice" noun (12.5%), five responses "Hot" adjective (12.5%), three responses "Freezing/ Frozen" adjective/verb (7.5%), one response "Juice" noun (2.5%), two responses "Russia" noun (5%), eight responses "Warm" adjective/verb (20%).

Prompt Words	Responses	Frequency	Percent
8.Corona (noun)	Virus	18	45%
	Death	4	10%
	Disease	3	7.5%
	Quarantine	6	15%
	Covid-19	2	5%
	China	4	10%
	Flu	2	5%
	Epidemic	1	2.5%

Table. 3.8: Item Eight Responses "Corona"

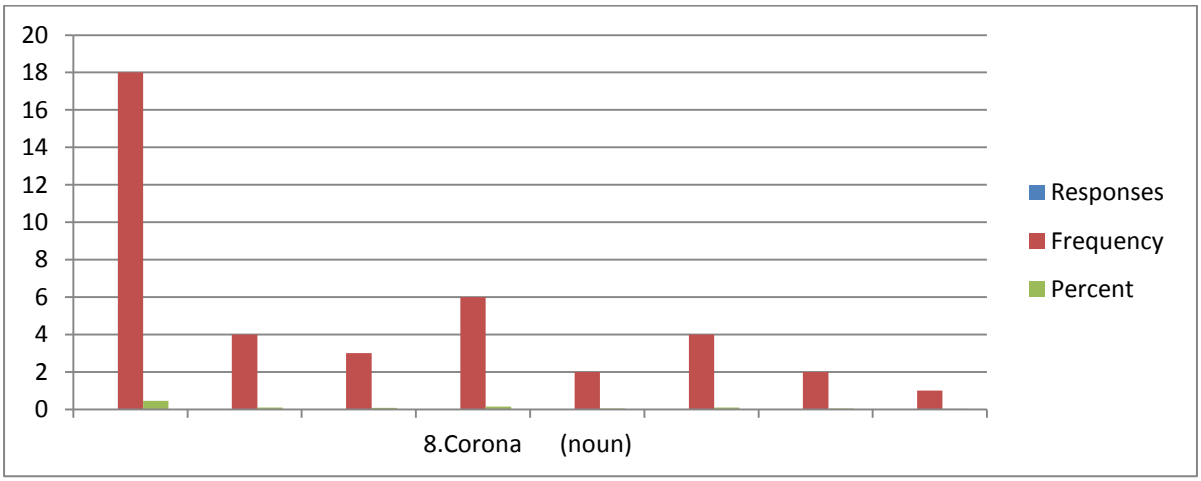

Figure. 3.9: Classification of Item Eight Responses "Corona"

From the output shown above, we know that there are different responses for the noun (Corona) eighteen responses "Virus" noun (45%), four responses "Death" noun (10%), three responses "Disease" noun (7.5%), six responses "Quarantine" noun (15%), two responses "Covid-19" noun (5%), four responses "China" noun (10%), two responses "Flu" noun (5%), one response "Epidemic" noun (2.5%).

Prompt Words	Responses	Frequency	Percent
9.Always (Adverb)	Usually	4	10%
	Never	6	15%
	All the time	3	7.5%
	Everyday	7	17.5%
	Habit	9	22.5%
	More often	8	20%
	Happy	1	2.5%
	Any how	2	5%

Table. 3.9: Item Nine Responses "Always"

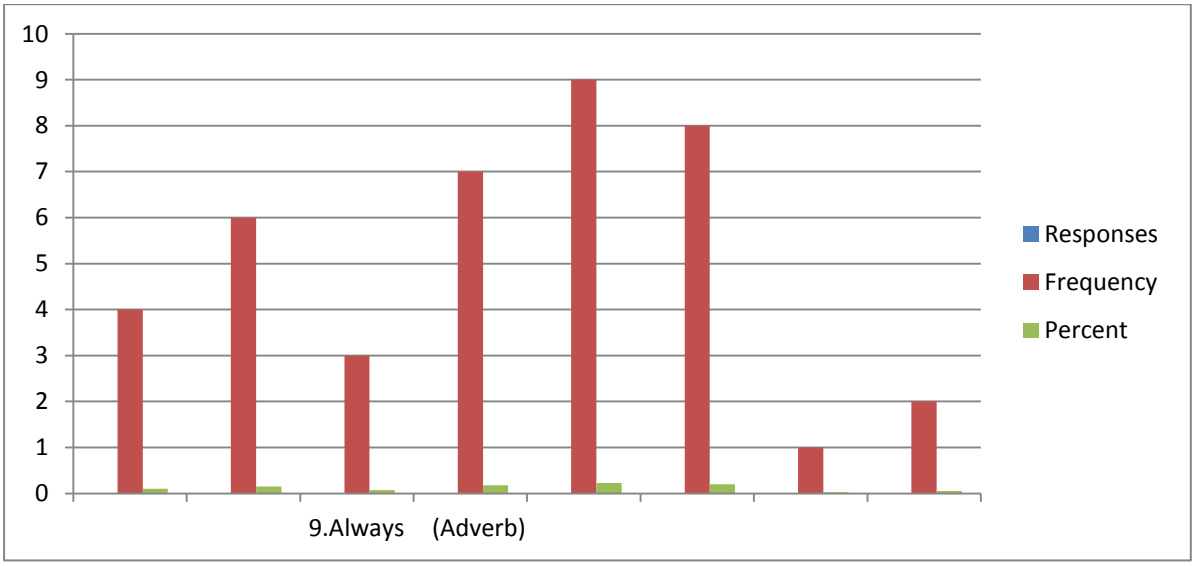

Figure.3.10: Classification of Item Nine Responses "Always"

From the output shown above, we know that there are different responses for the adverb (Always) four responses "Usually" adverb (10%), six responses "Never" adverb (15%), three responses "All the time" phrase (7.5%), seven responses "Everyday" adverb (17.5%), nine responses "Habit" noun (22.5%), eight responses "More often" noun/adverb (20%), one response "Happy" Adjective (2.5%), two responses "Any how" adverb (5%).

Prompt Words	Responses	Frequency	Percent
10.Ouch (Interjection)	Pain	17	42.5%
	Hurt	7	17.5%
	Painful	4	10%
	Hurting	3	7.5%
	Interjection	1	2.5%
	Cough	1	2.5%
	Silence	1	2.5%
	Ah!	6	15%

Table.3. 10: Item Ten Responses "Ouch"

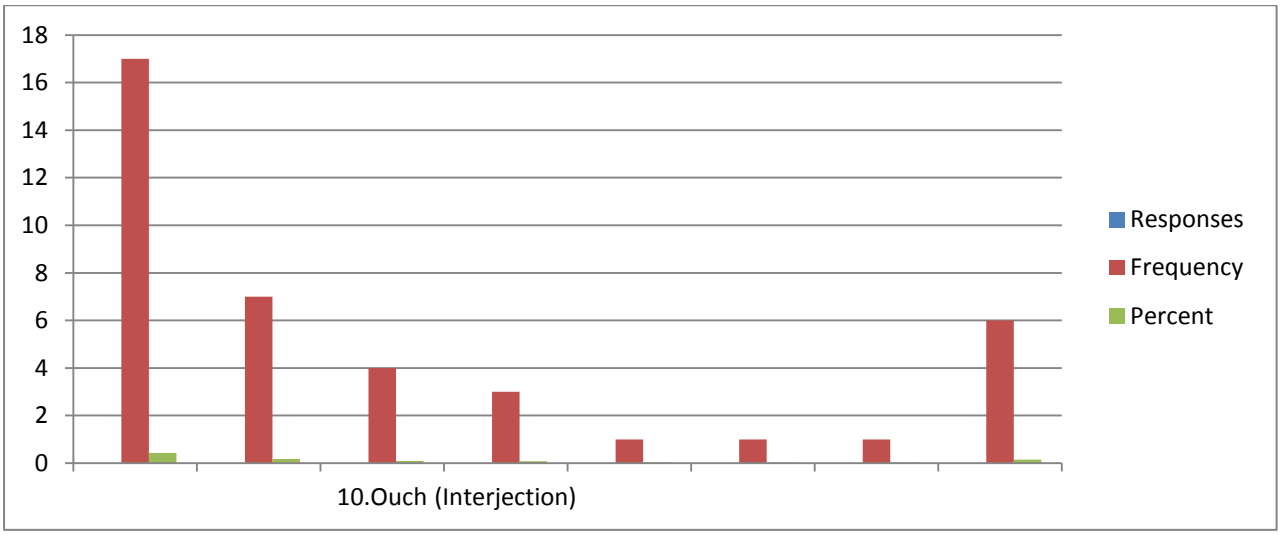

Figure.3.11: Classification of Item Ten Responses "Ouch"

From the output shown above, we know that there are different responses for the interjection (Ouch) seventeen responses "Pain" noun (42.5%), seven responses "Hurt" verb/noun (17.5%), four responses "Painful" adjective (10%), three responses "Hurting" Verb (7.5%), one response "interjection" noun (2.5%), one response "Cough" noun/verb (2.5%), one response "Silence" noun (2.5%), Six responses "Ah!" interjection (15%).

3.5.2 Detailed Description of the Results

The current study has shown different types of responses. Some students tend to respond with syntagmatic associations and others respond with paradigmatic associations. The data were analysed according to Kess's classification with one modification. In the second type (members of the same taxonomy) 'coordinates' was added as the third type. All responses were counted and ranked according to their frequencies. As there is a large body of data, the most frequent responses, which were thought to be significant, were taken into consideration in classifying the data. The response types in each level were classified separately in order to get information about the students in each level, and then the response types were compared.

3.2.5.1 Syntagmatic and Paradigmatic Associations

a. The Syntagmatic Association*:* is a textual relation that can be analysed by looking at words that appear before or after the stimulus word. Ex: solar (stimulus) → sunset/ sunrise(syntagmatic association).

a.1 Collocations: is the commonly emerging words or called as word network (Aichison,1994). Collocations have a particular pattern based grammatical and lexical. Ex: "Beautiful" is collocated with "female", "girl". While the word "handsome" is collocated with "male".

a.2 Encyclopaedic Relation: McCarthy (1990) adds this classication of meaning relation; a knowledge of words in relation to referents or specific contexts in the real world. Ex: My husband → Love.

b. The Paradigmatic Association: refers to words that belong to the same word class as the stimulus and can substitute. Ex: Eat (stimulus) → Cooking/Buying (paradigmatic association).

b.1 Coordination Relation: are word relations that belong to the same word class. Ex: Cat → Dog (Animals). (Carroll, 2008, p.106). Aitchison (2003) mentions that this relation is the most common relation produced by native speakers. (p.80)

b.2 Taxonomy: is a super ordinate relation to its subordinate in a hierarchy. Ex: Sparrows → Pigeons (are hyponym of birds).

b.3 Meronymy: is the relationship between the part of an object and the whole object. Ex: Car → machine/ Table leg → Table.

b.4 Synonymy: is a word relation that has same meaning. Although there are no absolute synonyms. Ex: Famous → well-known.

b.5 Antonym Relationships: is a relation that shows contrasting relationships. Ex: Young → Old.

b.6 Phonological Relation or Clang: is a semantic relation based on sound or orthographically similar. Ex: First → Fast / Final → Formal.

C. Syntagmatic and Paradigmatic associations

Most EFL learners produced paradigmatic associations (54 responses) 66.66% and the rest produced syntagmatic associations (27 responses) 33.33%. Most of the responses were nouns (55 responses). And the rest of the responses varied between adjectives (13 responses), verbs (4 responses), adverbs (6 responses), prepositions (2 responses) and exclamation (1 response).The reasons for these unusual results are not exactly clear.

When we look at the results generally, it is seen that the students used a variety of responses which were more or less similar. A total of 40 responses were gathered in the study. Of these 40 responses, the most frequent and significant responses were taken into account and these responses were classified. The number of responses in each category was as follows:

Types of Associations	Frequency	Percentage
1. Syntagmatic association	27	33.33%
a. Collocations	18	22.22%
b. Encyclopaedic	9	11.11%
2. Paradigmatic association	54	66.66%
a. Coordination relations	22	27.16%
b. Taxonomy	12	14.81%
c. Meronymy	6	7.40%
d. Synonymy	10	12.34%
e. Antonym	3	3.70%
f. Phonological or clang	1	1.23%

Table.3. 11: Types of Associations

It is observed that the paradigmatic associations are the most frequent responses (54 responses); we notice that the coordination relations were mostly used (22 responses), taxonomy (12 responses) and synonymy (10 responses) were almost equally used, as for meronymy (6 responses), antonym (3 responses), and phonological/ clang (one response). However, another finding is that the syntagmatic associations were less frequent than the paradigmatic ones (27 responses); In terms of the syntagmatic responses, the frequency of the responses is divided into two categories. Collocations are more frequent with a number of (18

responses), as for encyclopaedic responses the number is (9 responses). Since the words in the test were nouns, adjectives, verb, adverb, preposition and interjection.

3.5.2.2 Detailed Interpretation of the Results

Nouns elicit nouns such as library for the word book. Adjectives elicit nouns such as winter or adjectives such as hot and warm for the word cold. Prepositions elicit adverbs such as below and above or verbs such as understand and underline for the word under. Verbs elicit nouns such as success and school, adjectives such as hard, and verbs such as learn for the word study. Adverbs elicit adverbs such as never and usually, adjectives such as happy, or nouns such as habit for the word always. Interjections elicit nouns such as pain, adjectives such as painful, and verbs such as hurt for the word ouch. Khairi (1993) states that good readers "store" their knowledge of vocabulary in semantically related networks; the activation of a word in a network will automatically "activate" other related words, which will then aid comprehension.

The results obtained in this study suggest that the students gave responses to word association test using words which rank highly in their lives and which reflect their psychological state. It can be said that proficiency in English might affect word associations and competent speakers can make generalizations about the occurrence of a word and can find associated words easily. Students have connected the words in their minds more easily by establishing a mental network of associations in order to have an appropriate response.

3.5 Implications for Foreign Language Learning/Teaching

The results of the word association test show just how highly organized the mental lexicon is. This has important implications for language teaching: words are meaningfully connected in the mental lexicon and should therefore be taught in a similar way. Wolter's (2001) Depth of Individual Word Knowledge Model states that semantic links become

stronger and overtake phonetic links as the understanding of individual words increases. It seems evident then that simply telling students the meaning of new words is not enough to fully incorporate them into the mental lexicon.

Considering that vocabulary teaching has not received much emphasis as grammar, listening, reading and writing skills in foreign language learning. Instead, it has been taught as part of reading syllabus. Since vocabulary is crucial in learning a language, it cannot be ignored. Language learners who have the basic knowledge of vocabulary can make associations of the words such as knowing different meanings associated with the word, semantic value of the word and underlying form of the words. The students who can associate the words with each other can expand their vocabulary and choose the right word for the right context. As Richards (1991) claims "stored words come to mind according to associative bonds and learning may be facilitated when such bonds are established".

In first language acquisition and second language acquisition situations, it might be easier for people to remember and associate the words with each other since first or second language is used and heard every time. However, in foreign language learning situation, the learners are exposed to foreign language only in classroom settings. Thus, establishing associative bonds might be difficult for them because a word may be linked to different words by using different associative networks. If they are provided with the knowledge of associating words with each other, learners can choose the right words for the right context. Foreign language teaching programs might be designed to expand vocabulary by employing activities and exercises of direct vocabulary teaching. As Henning (1973) states,

> Learners might benefit from synonym and antonym games and exercises, paired-associate compositions in which lists of related words are given the learner from which he is to prepare written or oral compositions. Through

> these types of exercises, the language learner will begin to recognize not only a larger inventory of lexical items encountered, but be able to identify the acoustic and semantic families from which they come, and thus more efficiently progress in language proficiency. (1973)

As Bahar, Johnstone and Sutcliffe (1999) state teachers can use the word association test before a teaching session, to elicit the prior concepts in students' minds, as well as after the teaching session, and the two results can be compared to see the changes in students' learning. The teacher can also encourage students to compare their own responses with those of other students, in order to show them that there is more than one way of seeing things, and they can recognize that learning is individual and involves individual construction of meaning. This comparison of the responses may lead to a discussion which can broaden their understanding. They further claim that word association tests can be used as an educational tool for 'seeing inside students' heads', both individually and as a group.

Conclusion

One of the reasons people are interested in the field of foreign language learning is to improve pedagogy. Hence, the findings of this study seem to have some obvious implication for teaching vocabulary. The most important message this research conveys to language teachers and material developers is that words are meaningfully connected in the mental lexicon and should be taught accordingly.

General Conclusion

The current dissertation explored the effects of Word Association Tests (WAT) as a new approach in improving EFL learners' mental lexicon. Accordingly, the dissertation aimed to change traditional vocabulary learning techniques used by EFL teachers into modern ones to increase the learning process by finding new techniques (enjoyable tests) to develop learners' mental lexicon. Additionally, this work sought to examine the status of vocabulary in the academic institutions. For these reasons, the present study investigated the effectiveness of WAT in vocabulary as an instruction to be implemented in our department.

First of all, it is essential to review the related literature which was presented in the first two chapters. The first chapter provided an analysis about the mental lexicon; stating its historical background, its definitions, its importance, its kinds. Meanwhile, the second chapter dealt with word association tests (WAT) as an emerging vocabulary learning technique that supports the use of word association tests as educational tools. The chapter contains the basic concepts and definitions according to many scholars, historical background, definitions, types, tools, benefits and challenges. The chapter then tackled the various previous studies and researches that investigated and explored the use of WAT in teaching and learning vocabulary.

Furthermore, in order to test the research hypothesis, the research overall method consisted of students' test and content analysis. We collected relevant data on the subject to make appropriate inferences to future recommendations. The students' online test was posted in a facebook group in order to gather responses and to know the effect of the test on students' mental lexicon. Additionally, content analysis approach was used in order to analyse the gathered data. Most of the results confirm that the use of WAT as a learning technique develop EFL learners' mental lexicon and proved that it is a successful technique

to be applied in the classrooms. As a final point, the dissertation provided some pedagogical recommendations and remarks for the future.

Limitations and Suggestions for Further Research

This study was limited to 40 master students. Therefore, we cannot make generalizations. It would be better if more subjects from different levels were used in the study. This study might also be carried out by children and adults of different age groups. 10 stimulus words were used in this study. In a further study, this number can be increased. Sex differences were not taken into account in this study but in another research word association of males and females can be investigated.

The subjects were asked to write the first word that came to their minds. Instead, they could have been asked to produce two or three responses and this format would have been differentiating between learners at elementary and advanced levels of proficiency. As Schmitt (1998) states, asking for multiple responses gives the subjects additional chances to supply these more typical associations, and thus may well be a fairer measure. Providing multiple typical responses would supply a more convincing illustration that the stimulus word is incorporated into subject's lexicon in a way similar to a native speaker.

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Appendices

Appendix 01: Students' Test

Word Association Test

Please write down the first word that you think of after reading each of the following stimulus words:

*Required

Always *

Your answer

Cold *

Your answer

Note *

Your answer

Corona *

Your answer

Study *

Your answer

Book *

Your answer

Internet *

Your answer

Interesting *

Your answer

Ouch *

Your answer

Under *

Your answer

الملخص

أحد التحديات الرئيسية التي يواجهها متعلمي اللغة الإنجليزية كلغة أجنبية هو كيفية معرفة والاحتفاظ بكمية كبيرة من المفردات في ذاكرتهم. في علم اللغة النفسي يُفترض أن هذه المعرفة الموجودة في ما يعرف علميًا باسم المعجم العقلي أو القاموس العقلي مهمة جدًا لإتقان اللغة. لذلك هدفت هذه الدراسة إلى استكشاف تأثير استخدام اختبارات ارتباط الكلمات على المعجم العقلي لمتعلمي اللغة الإنجليزية الأجنبية في جامعة بسكرة. اقترحت فرضية الدراسة الحالية أن اختبارات ارتباط الكلمات سيكون لها تأثير إيجابي على المعجم العقلي لمتعلمي اللغة الإنجليزية كلغة أجنبية. لهذا الغرض تم استخدام النهج الكمي لقياس وتحليل البيانات التي تم جمعها في هذه الدراسة من خلال استجابات المتعلمين لاختبار المفردات. بعد تحليل البيانات وتفسيرها كشفت النتائج أن اختبارات ارتباط الكلمات يمكن أن تساعد المتعلمين على تحسين كفاءتهم في المفردات بطريقة سهلة ومسلية. نظرًا لأن المتعلمين لا يستخدمون اختبارات ربط الكلمات داخل الفصل الدراسي؛ ومع ذلك فإننا ندرك أن الكلمات مرتبطة بشكل مفيد في المعجم العقلي ويجب تدريسها وفقًا لذلك. وبالتالي تم تأكيد الفرضية البديلة التي تمت صياغتها في هذا البحث.