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Word associations of intermediate and advanced learners of English as a foreign language and of English native speakers: Probing into lexical network knowledge

Tesis para optar al grado de Magíster en Lingüística

Mención: Lengua Inglesa

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Santiago, Chile 2010

AGRADECIMIENTOS

A mi padre y mi novia.

A la señorita Alfonsina Doddis Jara, por su inestimable ayuda.

Y a todos aquellos que me alentaron en esta difícil tarea.

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1.0 INTRODUCTION

Learning a new language does not only include knowledge concerning syntax and phonology, it also includes knowledge about its vocabulary. Vocabulary is not a list of lexical items learnt by rote memorization and stored randomly in our mental dictionary. Some people might even think that words are stored in our minds in alphabetical order. It is not hard to see why. By opening a dictionary we are somehow led to perceive the mental store of lexical items in such a manner. The fact is that alphabetical order would render the mental lexicon inefficient. Searching and retrieving the desired words from the many thousands available would take considerable time, especially in face-to-face interaction.

The first attempts at trying to understand how it is that our mind integrates and organises vocabulary concentrated on the links between one particular word and another. These early studies contributed to later studies which have demonstrated the need to approach the study of the mental organisation of lexical items as some kind of web or network (Aitchison 2003). This approach is the one which best explains how words are stored and organised in our minds. According to this view, words are stored in groups held together by semantic links. So, for example, the word ‘day’ would be closely related to the words ‘night’, ‘awake’, and ‘light’. In addition, the network is not a rigid structure; it does not consist of fixed internal parts. On the contrary, it is in constant change, shifting internal links and creating new ones with frequency of use playing a fundamental role in the strengthening of links between words. Nowadays, this view is widely accepted amongst researchers in the field of psycholinguistics.

Early research on second language acquisition, heavily influenced by theoretical linguistics, concentrated on different aspects such as phonology, morphology and syntax (Meara 1984). Since 1980, though, research on vocabulary acquisition has gained a growing interest. This interest in vocabulary led to a concern for the study of the mental lexicon. The study of vocabulary acquisition also motivated researchers to the design and application of instruments to evaluate and probe the complex aspects of word knowledge. Many word tests have been constructed to explore the mental lexicon. These tests intend to reveal the structure of the mental lexicon of native speakers and L2 learners and to assess the type of lexical knowledge they possess. One of these tests, the Word Association Task is the most well known (Palermo 1971, Meara 1978, Wolter 2001). In this type of test, informants are asked to respond, under time constraints, to a list of prompt words. It is assumed that the answers given are those which the informants have the fastest access to. Responses are classified according to response types, for example, phonological, syntagmatic or paradigmatic associations. Some responses given by native speakers in productive word tests gain a 'canonical' status due to their frequency of occurrence as responses, for instance, 'butter' as a response to 'bread'. Other vocabulary knowledge tests include Read's (1993) receptive Word Associates format. The test assesses the quality of word knowledge by means of word associations. In the test, informants are asked to choose, from a set of eight words, four lexical items which are meaning-related to the stimulus word. The responses can have various relationships with the prompt word: paradigmatic, syntagmatic, or analytic (Greidanus et al. 2004). Research studies using the productive word tests have revealed that native speakers

produce a larger proportion of paradigmatic responses when compared to the responses given by a group of advanced learners and a group of beginners. Naturally, the L2 mental lexicon, due to less exposure to the target language, differs from the native speakers' mental lexicon in such aspects as size and structural properties. Studies using the Word Associates format, which is a receptive test, have revealed similar results; 'very advanced' learners identified a greater number of correct links than 'advanced' learners (Greidanus and Nienhuis 2001).

In this research study, the analysis of word associations produced by intermediate and advanced learners of English, and native speakers of English using a productive Word Association Task, and a receptive Word Connection Test will be performed. In the second section, the objectives, the method applied, as well as the informants, and the instruments used are presented. In addition, the theoretical descriptive framework and proposals put forward by various researchers are considered. In the third section, the results and the quantitative analysis are discussed. In the last section, some general conclusions are drawn from the evidence presented in the previous section. The most important findings are described and some implications for teaching purposes are discussed.

2.0 THE STUDY

2.1 OBJECTIVES

2.1.1 GENERAL OBJECTIVE

The general objective of this research study is to analyse and compare receptive and productive word associations produced by intermediate and advanced learners of English as a foreign language, and native speakers of English.

2.1.2 SPECIFIC OBJECTIVES

a. To analyse and classify productive word associations produced by learners of English at two levels of competence, intermediate and advanced levels.

b. To analyse and classify productive word associations produced by native speakers of English.

c. To analyse and classify receptive word associations produced by learners of English at two levels of competence, intermediate and advanced levels.

d. To analyse and classify receptive word associations produced by native speakers of English.

e. To identify quantitative similarities and differences between word associations produced by intermediate and advanced learners of English as a foreign language, and by native speakers of English.

f. To identify quantitative similarities and differences between stable and frequent responses provided by native speakers of English, i.e., prototypical or canonical responses, and intermediate and advanced learners of English as a foreign language.

2.2 RESEARCH QUESTIONS

The research question for this study is:

Are there any differences between the intermediate learners', the advanced learners' and the native speakers' receptive and productive word associations?

This research question can be understood in terms of the following:

1. Which type of productive word association (i.e., paradigmatic, syntagmatic, clang or other) shows the most significant frequency of occurrence within the intermediate and advanced learner groups, and the English native speaker group?
2. Which types of productive word association (i.e., paradigmatic, syntagmatic, clang or other) show significant differences, in terms of frequency of occurrence, between the two learner groups, and the English native speaker group?
3. Which type of paradigmatic word association (i.e., sameness, inclusion or opposition) has the highest frequency of occurrence within the intermediate and advanced learner groups, and the English native speaker group?
4. Which quantitative differences can be observed between receptive word associations produced by intermediate and advanced learner groups, and the English native speaker group?
5. Which group of subjects, i.e., intermediate and advanced learner groups, and the native speaker group, has the highest mean number of canonical responses, and what quantitative differences can be established between the three groups of subjects?

2.3 THEORETICAL AND DESCRIPTIVE FRAMEWORK OF THE STUDY

2.3.1 WORD LEARNING

Estimates on the number of words an average person knows have been made by various researchers. Pinker (1994) describes one such estimation performed by psychologists Nagy and Anderson. They estimated that on average a high school student who is a native speaker of English knows about 45,000 lexical items. This figure can easily increase to 60,000 if proper names, numbers, and other common words are considered, or even soar to a staggering six-digit number for higher education students. Other studies have also placed the number in the tens of thousands (Aitchison 2003).

A mental capacity of 60,000 words or more brings to mind just how fast words are learnt, and poses the questions of how and when we start learning them in order to store them in the mind. Aitchison (2003) states that children start acquiring their first words some time after their first birthday. In addition, she describes three tasks involved in the process, ‘labelling’, ‘packaging’, and ‘network building’. In the labelling task, also referred to as ‘mapping’, children learn that particular sounds can be used as names for particular objects or entities. For instance, a child that utters the word ‘cat’ is not able to recognise cats in general, but he is capable of visualising a whole situation built around a particular one, perhaps a picture of a black cat in a colouring book. Aitchison states that a child’s first words are mere ritual accompaniments to unanalysed situations, but this scenario gradually

changes as he learns to recognise and detach the words from whole situations to apply them as labels for specific objects.

The packaging task refers to the process by which things can be grouped together under one label. Applying labels correctly is the issue at this stage. For instance, in trying to classify objects, the child will make two kinds of mistakes, underextension and overextension. In the first type of mistake, the child will take time to realise that words often have wider applications. The word ‘cold’, for example, is generally used to describe a range of low temperatures, but it can also be employed to characterise a person who is not affectionate or friendly. Hence, the noun phrase ‘a cold person’ will seem like an odd construction to the child. In overextension, the child typically uses one label to mean other objects with shared features, for example, labelling a ‘sofa’ or a ‘stool’ as ‘chair’. The child will eventually learn to properly label objects, and events and phenomena which take place in the world.

The last task, network building, refers to the process by which words are related through sense relations. Aitchison (2003) states that understanding the full scope of a word implies understanding the relation it has with other lexical items. She also observes that network building is a slow process, but one which fosters quality and organisation of the mental lexicon. Consider again the example of ‘chair’. The child discovers how it relates to other objects through sense relations such as synonymy, ‘seat’; hyponymy, ‘furniture’; and even the extended sense of ‘chair’ as in ‘the chair of the committee’. The relations or semantic links between words will largely depend on word class, adjectives producing mainly synonymy, antonymy and gradation (Henriksen 1999).

In a second or foreign language, learners are faced with the same three tasks, although some differences can be observed. Henriksen (1999: 308) notes that "mature L2 learners do not experience the same mapping problems as young L1 learners who have to both develop concepts and learn to map words onto these concepts in the process of their cognitive development." Another noticeable difference is the learners' L1 lexical/conceptual knowledge, that is, knowledge or assumptions about the world such as human emotions (happiness, sadness), phenomena in the natural world (the rain falls, the sun shines), taboos, religious beliefs, etc, that will allow them to make good guesses about what might be possible in the L2 (Wolter 2006).

Learning vocabulary, thus, involves adding words (size or breadth of lexical knowledge) to the lexical store through the labelling and packaging tasks, and expanding the knowledge of the lexical items (depth of lexical knowledge) via network-building. Meara (1996a) states that breadth is the basic component in constructing the notion of lexical competence: the ability to recognise and use the words of a language in the way that a speaker of that language uses them. He adds that learners with big vocabularies are more proficient than learners with smaller ones. Breadth, however, will become less important as knowledge across different frequency bands increases. At this stage, organisation becomes vital in ensuring effective access to the growing mental lexicon. Likewise, Henriksen states that adding new words to this network is not the only important aspect in developing lexical competence, but, "it also includes the important process of developing our network knowledge through the process of creating links between

the lexical items found in the mental lexicon" (2008: 27). In fact, Haastrup and Henriksen (2000) assert that depth is at the heart of network building, and a major aspect of lexical competence.

Henriksen (1999), in an attempt to clarify issues, envisaged lexical competence as a construct of three dimensions: (a) a 'partial to precise knowledge' dimension, (b) a 'depth of knowledge' dimension, and (c) a 'receptive-productive dimension'. The first dimension refers to vocabulary knowledge as precise comprehension. This knowledge dimension basically correlates with vocabulary size. The second dimension refers to the learner's vocabulary knowledge in terms of quality. Aspects such as syntactic restrictions, paradigmatic (e.g., synonymy, antonymy) and syntagmatic relations (collocations) are part of this dimension. In order to describe a learner's depth of L2 lexical knowledge, researchers must make use of a combination of tests to tap different aspects of vocabulary knowledge. The receptive – productive dimension focuses on the learner's capacity to use words in comprehension and production. Henriksen states that much of the research done on L2 lexical acquisition and competence has concentrated on size. This has meant that L2 knowledge in relation to depth has been somewhat disregarded.

Henriksen (1999) stresses the importance of the relationship between the first two knowledge dimensions, depth and depth, and the acquisition of word meaning. She basically states that, whereas dimension 1 relates to the learner's word knowledge as a progression from simple word recognition to incorporating more subtle and finer shades of meaning, dimension 2 relates to the learner's word knowledge in terms of morphological, syntactic and collocational restrictions. This progression

from superficial to more accurate aspects of word knowledge is seen as an important factor for lexical development. This development is evident in the reorganization and restructuring of the mental lexicon as it passes through different transitional phases such as the phonological, syntactical and paradigmatic stages.

2.3.1.1 BREADTH AND DEPTH OF VOCABULARY KNOWLEDGE

Lexical knowledge, suggests Henriksen (2008), in terms of a large vocabulary plays a crucial role in communication. For example, studies have shown that breadth or size correlates with learners' reading abilities. Laufer (1997), as cited in Henriksen (2008), argues that a learner needs a vocabulary size of about 5000 words to communicate and achieve comprehension effortlessly. As extra words are added, and as the mental lexicon gets larger, a way of managing size of lexical knowledge is necessary. Thus, organising the words in a network that will provide efficient and fast access is required. Meara (2009) explains this by using a metaphor. Breadth and depth of lexical knowledge are exemplified by randomly placing dots or nodes on a graph. These nodes are then connected by lines or arcs. Each node represents a word, and each line, a link between two words. As a learner encounters a word across different contexts, knowledge of that particular word increases, and so do the links of that word with the rest. It can be stated, then, that depth of knowledge has increased. As additional links start to build up between the numerous words, more and shorter access routes are created, enabling the learner to achieve faster retrieval time. More links also have an impact on organisation, allowing efficient access to the lexical items and ensuring proper

language use. These links also make the expansion, restructuring, and strengthening of the network possible.

Meara (2009) argues that recent work on vocabulary acquisition has tended to make a broad distinction between both breadth and depth, focussing on each dimension separately. He points out that this distinction is a misleading one, since the addition of a new lexical item to the store has no implications for the rest of the lexicon, i.e., there is no intrinsic link between breadth and depth. Working with an integrating model, however, means that each extra word added to the mental lexicon will establish a new link and influence the rest of the network. The two diagrams below (Figure 1) exemplify this idea. The one on the left represents words as bars (breadth of lexical knowledge), while depth of knowledge is represented by the length of each bar. There is no link between the two. However, the diagram on the right represents words as little squares. As the links between words increase in number, so does the depth of vocabulary knowledge.

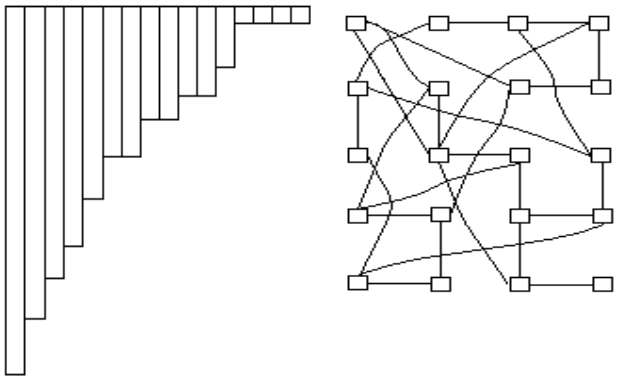


Figure 1. Two ways of conceptualising breadth and depth (Namei 2004: 371).

2.3.2 THE NETWORK METAPHOR

So far, it has been stated that breadth and depth of vocabulary knowledge are central components in attempting to characterise lexical competence. As vocabulary becomes more stable in terms of size, the organisation plays an important role in allowing the speakers fast and efficient access to the mental lexicon. A fundamental question arises from this last idea. What does the mental lexicon look like? Most researchers nowadays accept that words are stored on and arranged in a structure similar to a network, which resembles a spider-web. Henriksen (2008: 28) observes that even though the web metaphor has gained wide acceptance, not enough is known about its structure, hierarchy, and the complexity of the links between the elements in the mental lexicon. It is assumed that words are not suspended in isolation, but are linked with numerous others that share some semantic features. Every word which is added to the word store will occupy a place in this intricate and complex network.

The fact that a great amount of words can be accessed in an effective and fast way is striking evidence that our mental lexicon is complex and richly structured. Unlike book dictionaries, where words are rigidly stored in alphabetical order, the mental dictionary is much more flexible. This flexibility is evident in slips of the tongue. For instance, a talk-show host, while praising Condoleeza Rice, uttered an embarrassing but accidental remark, “She's got the patent resumé of somebody that has serious skills. She loves football. She's African-American, which would be kind of a big coon. A big coon!!! Oh my God. I am totally, totally, totally, sorry for that. I didn't mean that. That was just a slip of the tongue”

(http://www.foxnews.com/story/0,2933,188830,00.html). He later had to excuse himself by saying that what he had really meant to say was ‘boon’. Other examples include embarrassing statements such as, “Today Lesbian forces invaded...no, sorry, that should be Lebanese” (http://www.rinkworks.com/said/news.shtml). Such unfortunate mistakes reveal that words are not arranged by spelling. If they were so, the speakers in making the mistakes cited above would have chosen a word in terms of its alphabetical order. It has been suggested that slips of the tongue may result from ‘slips of the brain’ as it tries to organise linguistic messages (Yule 1996).

Various network models have been proposed to account for the organisation of the mental lexicon. The two best-known proposals are the ‘hierarchical network model’ and the ‘spreading network model’. The first one can be illustrated as an upside-down tree or a pyramid, where words are arranged from universal to particular characteristics. For example, the concept ‘furniture’ would occupy a high rank. A ‘sofa’, because it is an example of sitting furniture, would occupy a lower hierarchy, and every word which denotes a seat will occupy a rank depending on its commonality or prototypical use. The activation of words is realised from top to bottom. In turn, the spreading network model sees concepts organised as a metaphorical electrical circuit. Words are interconnected with numerous others depending on their degree of association. As one word is activated, others which share semantic features will also get activated, while those which do not will simply fade away. This model is similar to Aitchison’s cob-web theory (2003), which states that words are linked on the basis of features such as semantics, spelling,

frequency of use, etc. The two models, though, explicate how words are organised in a first language. Some of the implications of these models need to be re-shaped when dealing with two languages. One of the issues which is immediately raised when considering a bilingual learner is whether he has two mental lexicons for words in the first and second language, or only one lexicon which stores both L1 and L2 entries. Although this is not the concern of this research, the development of a model which accounts for the storage of words in two languages is necessary for research into the bilingual mental lexicon.

2.3.2.1 BILINGUAL NETWORK MODELS

Based on proposals put forward by Kroll and de Groot (1997) and Kroll and Tokowicz (2005), Henriksen (2008) postulates that the representation of the mental lexical is a multi-layered structure with three levels of lexical knowledge (Figure 2). Lexical links are established in our semantic memory between and across the different knowledge components. These components are (a) conceptual knowledge, (b) intra-lexical knowledge, and (c) meta-semantic knowledge, and the links between these in our representational system are of three types. Level I contains our knowledge of the world or conceptual knowledge derived from experience. This type of link is established between the conceptual knowledge elements which are then organised into schema knowledge. The links are created through the co-occurrence of objects, actions and events in the world as well as in our private experience. For example, the concept ‘moon’ co-occurs with the concept ‘night’, and the concept ‘moonlight’, with a romantic setting (Henriksen 2008). Other conceptual links will be established depending on our encyclopaedic

knowledge, for instance, ‘moon’ and ‘werewolves’ and ‘witches’, etc. Level II describes our mental inventory of lexical entries, including syntactic and semantic characteristics. It also includes information concerning formal features of words such as phonemic and graphic forms, word class, and morphology. Level III contains meta-semantic knowledge of the lexical entries, that is, knowledge concerning specific aspects of words. For example, the words ‘sun’ and ‘planet’ are paradigmatically related to ‘moon’; the words ’shine’ and ‘full’ are syntagmatically related; and ‘round’ and ‘yellow’ are analytically related. Some of the links established across the knowledge components are more stable and prototypical, i.e., canonical and others, less common and more context-dependent. It is assumed that different word association tests and time restrictions may affect the links informants are able to activate, thus this variables may affect the production of different response types.

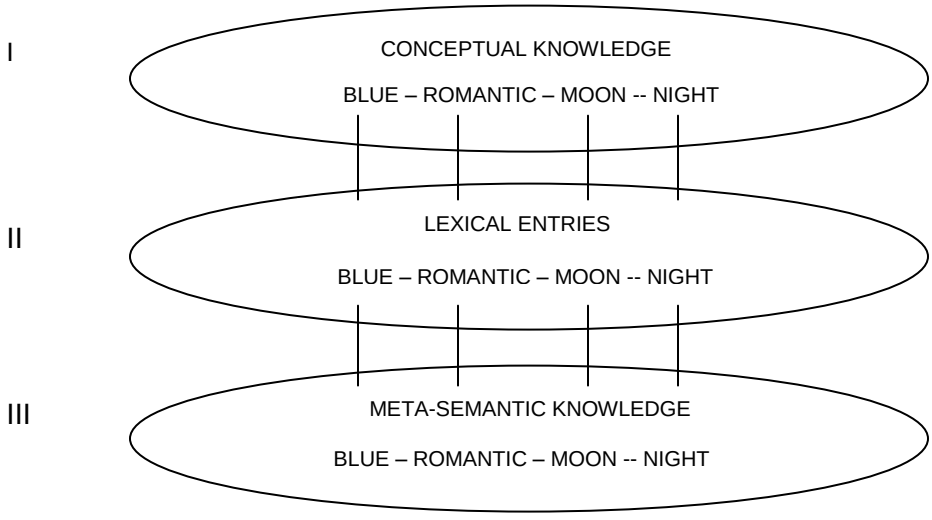


Figure 2. Links between and within the three levels of lexical representation (Henriksen 2008: 29).

The use of word tests to delve into the L2 mental lexicon and investigate the differences and similarities between the second or foreign language and the native speaker's lexicon has made it necessary to explicate the relations of the links between the knowledge elements across two or more languages. Thus, levels I and III are both perceived as language-neutral. The conceptual or encyclopaedic knowledge we have of the world is shared and most of it is probably cross-cultural. Meta-semantic knowledge especially of semantic word relations is quite likely to be universally shared. In turn, level II is perceived as being language-specific. Information relevant to formal aspects such as form or grammatical features are language-specific, unless the languages in question have some degree of overlap, in which case they will share some features.

2.3.3 PROBING THE NETWORK

Aitchison (2003) explains that the first attempts at describing the structure of the mental lexicon came from results of word association tests. These instruments consist of a list of common words which are read out to a subject, who, in turn, responds to each prompt word with the first word that comes to his mind. For instance, 'nail' is a usual response to 'hammer'. Other common responses include 'boy' to 'girl', 'black' to 'white', and 'butter' to 'bread'. These responses are quite stable and predictable since they make a pair. However, other words have a wider variety of responses, such as 'moon'. In this case, 'star', 'sun', and 'night' are the three most common responses in L1. Other experiments have studied the links of one particular word and its commonest responses. For example, the word

‘butterfly’ produces ‘moth’, ‘insect’, ‘wing(s)’, ‘bird’, ‘fly’, ‘yellow’, ‘net’, ‘pretty’, ‘flower(s)’, and ‘bug’ (Aitchison 2003). These different replies can be categorised under four main associations: coordination, collocation, superordination, and synonymy, respectively. Coordination is the commonest response. Words which cluster together on the basis of the same level of detail, such as ‘salt’ and ‘pepper’, ‘sugar’ and ‘salt’ are coordinates. Words which go together in a group of only two members like ‘day, night’, ‘left, right’, or common antonyms ‘hot, cold’, are also examples of coordinates. Collocation is also a common response. Words of different classes, but which usually go together like ‘bright red’, ‘cold hands’, ‘salt water’, are said to be collocates. In turn, superordination is a less common type of response. It refers to a term which serves as a cover or umbrella term for another, such as ‘insect’ for ‘butterfly’ or ‘animal’ for ‘dog’. The least common of the four associations is synonymy. It is not common to find a near synonym of a word, for example, ‘starving’ for ‘hungry’. These associations can perhaps reveal that some links may be more important and more permanent than others. The associations can be visualised as stemming out like branches, while multiple connections are established among the different words. The links between the lexical items are constantly being established as they occur across different contexts and as new words are added to the lexical store. The result is an interconnected structure resembling a spider web. The assumption behind this is that the greater the number of interconnections, the denser the web, and the better the quality of the vocabulary.

Different tests have been designed to investigate the lexical network. Some tests have been designed to measure learners' vocabulary in terms of size or breadth of lexical knowledge. Some of these include word recognition tasks with simple yes/no answers. Other tasks require that test takers translate a number of words from the L2 into their L1, or that they look for the right option in a multiple-choice task (Henriksen 1999). All these tests measure informants' vocabulary in terms of the number of words they know. As stated above, in the initial stages of L2 vocabulary learning, the number of words a learner is able to incorporate into his mental inventory will be crucial for the development of the L2. Later, organisation will play a much more defining role in L2 proficiency. In turn, various tests have been developed to measure the dimension of depth of lexical knowledge. One of the best known tests is the Word Association Task. It is a very simple test to apply, and it requires very little time on the part of the test takers. This will be described in detail in the Data Elicitation Instruments section (See Data Elicitation Instruments, Section 2.4.2). Other tests include Read's Word Associates. It differs from the first test in that the former is productive and the latter is receptive.

Word association tests have been used in research for some time. They were originally used in psychoanalysis with people suffering from schizophrenia, dementia or some kind of psychological disturbance. The test consisted of a list of words which were shown to patients one at a time. The basic assumption was that the responses provided by the patients would reveal information about their subconscious. Although word association tests had been established as a tool for clinical use, and also for L1 and some L2 research, Meara's paper titled 'Word

associations in a foreign language' (1983) was a major breakthrough in L2 vocabulary research. His work differed from previous research in that he addressed the questions that have steered much of the recent work done on word associations today, i.e., what does a second language learner's mental lexicon look like, and how different is it from the mental lexicon of a native speaker of the target language?

The basic word association task is usually administered in a pen-paper format. Words may be read out from a list one at a time, whereas other techniques include computer-based tests or the projection of words on a screen. Test takers are asked to write down the first word that comes to their minds upon hearing the prompt word. They are usually told not to worry about spelling, but that they should take as little time as possible in supplying a response. The assumption is that a restriction on time will activate those words which have the strongest link with the prompt word.

As mentioned above, word tests are employed by researchers to probe the mental lexicon and investigate the network knowledge of L1 and L2 informants. The responses to these elicitation tools are analysed and classified on the basis of response categories. Wolter (2001) presents four categories: paradigmatic, syntagmatic, clang-other, and no-response. He defines the paradigmatic category as a response belonging to the same word class as the prompt word, for example, 'cat' as a response to 'dog'. Responses that show a clear relationship (e.g. human → error) with the prompt word, or words which are used to make a longer noun phrase (e.g. discovery → channel) are classified as syntagmatic. A syntagmatic

response is classified on the basis of the following premises. Firstly, for a response to be classified as syntagmatic, it should have some kind of semantic or syntactic relation to the prompt word, and secondly, it should be a response that shows a sequential or an affective relation to the prompt word, such as ‘orchestra’ as a response to ‘conductor’. Clang responses only resemble the prompt word phonologically and have no semantic relation of any kind. When a participant cannot supply a response because he does not know the word or simply because no word comes to his mind, a ‘no-response’ category is assigned.

Some research studies that have used the productive Word Association Task have revealed that native speakers produce a larger proportion of paradigmatic responses when compared to the responses given by a group of advanced learners and a group of beginner learners (Wolter 2001). Other studies which have compared the responses of schoolchildren of different ages showed that, as age increases, there is a tendency for the responses to shift from clang responses (responses which have no semantic connection to the words and only resemble them phonologically) to semantic-related responses. Linguistic explanations accounting for this shift in response types assume that lexical or cognitive development is responsible for this change. The results of the research studies carried out on native speakers have set the standards and competence levels L2 learners should aim at. Naturally, the L2 mental lexicon, due to less exposure to the target language, differs from the native speakers’ mental lexicon in such aspects as size and structural properties.

Another test used to investigate the mental lexicon is Read's Word Associates Test (http://www.lextutor.ca/tests/associates/). It differs from the productive Word Association Task described above in that it is a receptive test. In the test, informants are asked to choose, from a set of eight words, four potentially meaning-related lexical items to the stimulus word. The relations between the words are either paradigmatic, syntagmatic or analytic (Greidanus et al. 2004). The number of correct links the learner is able to identify is an indication of the learner's level of network knowledge and lexical quality. The test can be administered through a paper-pencil format, but it is also available in a computer-based format in Read's webpage. Since there is no time restriction imposed, test takers can take as much time as needed to complete the test. Studies using the Word Associates Test have revealed that 'very advanced' learners identify a greater number of correct links than 'advanced' learners (Greidanus and Nienhuis 2001). These studies have also shown that depth of word knowledge grows more slowly than breadth.

An additional category will be used in the analysis of the responses supplied to the productive word test by the two learner groups and the native group. Canonical responses are those most frequently supplied by native speakers. For instance, Henriksen (2008) states that 'hot' is a very frequent response given to the prompt word 'cold'; likewise, 'butter' as a response to 'bread'. Meara (1983) observes that 60 to 70 percent of adult native speakers of English will provide a response of 'woman' to the prompt word 'man'. Similar response frequency is observed with words such as 'black' and 'hard'. They produce the responses 'white' to 'black', and

‘soft’ to ‘hard’ approximately the same proportion of times. These more stable responses are considered to “… play a central role in the structuring of the mental lexicon, perhaps functioning as bridges or pointers between different parts of the lexical net” (Henriksen 2008: 34). Therefore, in the present research study, it has been deemed important to analyse the number of canonical responses supplied by the two groups of learners and the group of native speakers, based on the assumption that there is a tendency for responses to stabilise as proficiency increases.

2.3.4 TAXONOMY OF THE WORD ASSOCIATIONS FOR THE ANALYSIS OF THE PRODUCTIVE WORD ASSOCIATION TASK

In the present study, responses elicited by means of a productive Word Association Task have been classified into the following five categories: paradigmatic, syntagmatic, clang, other, and no response. This taxonomy applied to the results of the productive Word Association Task was elaborated by the researcher based on proposals made by the following authors: Wolter (2001), Fitzpatrick (2007), and Meara (2009).

1) Paradigmatic: Paradigmatic relations (Figure 3) are those based on sameness, opposition and inclusion (Jaszczolt 2002). Considering the example cited above, the word ‘knowledge’ can be substituted by the word ‘understanding’ through the paradigmatic relation of sameness.

Sameness: The relation of sameness is called synonymy. Synonyms are words which have the same meaning but different pronunciation, for example ‘boy’ - ‘lad’, ‘truck’ - ‘long’, ‘police officer’ - ‘cop’. Context is essential in determining the degree of synonymy of two words; for example, ‘strong’ and ‘powerful’ (Jaszczolt 2002) can both be used to qualify the noun ‘argument’, but ‘powerful tea’ is a less likely construction than ‘strong tea’.

Opposition: Words opposite in meaning are antonyms. Palmer (1981) states that antonymy is a natural feature of languages, and that there are different kinds of antonyms:

a) Complementary opposition. These are pairs of antonyms where one of the members stands in a dichotomous relation to the other and vice versa, as in the following examples, ‘dead’ – ‘alive’, ‘male’ – ‘female’, etc. The truth of one implies the falsity of the other.

b) Gradable opposition. In gradable pairs, the inapplicability of one of the members does not imply the applicability of the other. Furthermore, these pairs such as ‘long’ - ‘short’, ‘cold’ – ‘hot’, or ‘narrow’ – ‘wide’ can be graded by adding -er or more. So for example, if something is not ‘cold’, it does not necessarily mean that it is ‘hot’. The terms ‘hot’ and ‘cold’ both sit at the ends of a continuum with other terms denoting temperatures in between,

such as ‘warm’ and ‘cool’. Also, these antonyms can be understood in terms of degree, for instance, ‘today is colder / hotter than yesterday’.

c) Relational opposition. Antonyms such as ‘buy’ – ‘sell’, ‘husband’ – ‘wife’, ‘above’ – ‘below’ (Jaszczolt 2002) are relational opposites, that is, the relation that holds between them is reversed. If a man is a ‘husband’, then he has a ‘wife’. Likewise, if someone ‘sells’, then someone else ‘buys’.

Inclusion: The relationship based on inclusion implies that the meaning of a specific term can be included into the meaning of a more general term. For instance, the meaning of ‘rose’ in (1) can be included in the meaning of ‘flower’ in (2), but not the other way around.

(1) I bought a rose.

(2) I bought a flower.

The lexical relations described above are of two types. Firstly, the specific term ‘rose’ is a hyponym of flower, and secondly, ‘flower’ is a superordinate or hypernym of ‘rose’. Words that sit at the same level of meaning are said to be co-hyponyms or sisters, as would be the case between ‘rose’ and ‘tulip’. Another instance of inclusion can be exemplified between the terms ‘bird’ and ‘robin’. In this case, ‘bird’ is the general term or hypernym, while ‘robin’ is the specific term or hyponym (Jaszczolt 2002). Another type of

relation based on inclusion is meronymy. Here, a term is related to another through a whole-part relation, as the one present in ‘hand’ – ‘nail’, or ‘house’ – ‘chimney’.

2) Syntagmatic: Words in a syntagmatic relation (Figure 3) are those that fall into a collocational structure with other words, for instance, ‘deep knowledge’. Here the word ‘deep’ is in a syntagmatic relation with the word ‘knowledge’. In her categorisation of lexical relations, Fitzpatrick (2009) defines syntagmatic as position-based associations. A response to a prompt word will has been classified as syntagmatic if one of the following provisos is observed:

   a) y follows x directly: ‘immigration’ → ‘politics’
   b) y precedes x directly: ‘association’ → ‘life’
   c) y follows x but with other content word(s) between them:
      ‘specific’ [learning] ‘disability’

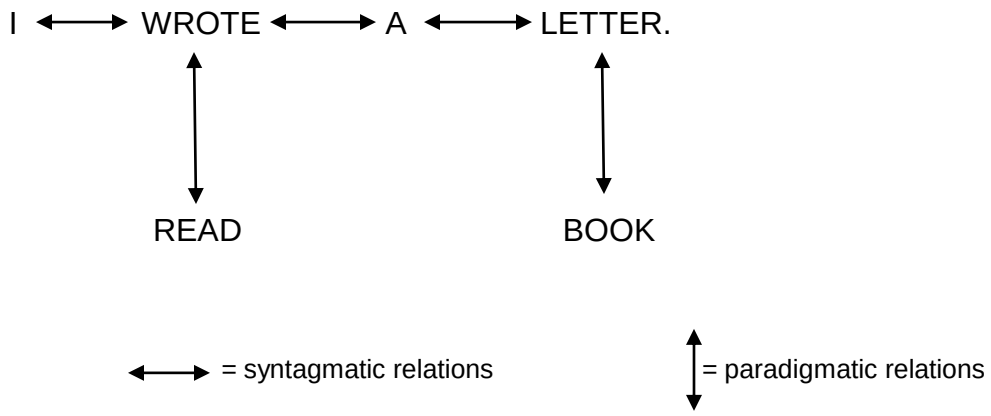


Figure 3. Syntagmatic and paradigmatic relations (Namei 2004: 371).

3) Clang: This type of response is heavily influenced by the form of the prompt word, rather than by its meaning. Some examples include rhyming responses such as ‘bite’ as a response to ‘light’, unchanged consonants as in ‘him’ as a response to ‘hum’, assonance responses such as ‘light’ as a response to ‘late’, and unchanged initial as the ‘g’ in ‘go’ as a response to ‘goat’ (Meara 2009). In addition, a response that is simply a different form of the prompt word, for example ‘children’ as a response to ‘child’, has been classified as clang.

4) Other: Responses that bear no obvious relation to the prompt word are classified as ‘other’. Such responses, e.g. ‘ruler’ as a response to ‘blood’, only have a meaningful relationship in the mind of the participant.

5) No response: The ‘no response’ classification has been assigned in the case of participants being unable to provide responses to the prompt words.

2.4 METHOD

2.4.1 SUBJECTS

A number of 24 informants participated in the study: 8 intermediate and 8 advanced learners of English, and 8 native speakers of English. The two learner groups are students of the English Teaching Programme at a higher education institution in the city of Los Angeles, Chile. Although the test was administered to all students in each level (14 and 20 students at the intermediate and advanced level, respectively) only those that had passed a mock language exam the previous year, The First Certificate of English (FCE) for intermediate students and Certificate of Advanced English (CAE) for advanced students, were chosen as informants. Both FCE and CAE are language exams prepared by Cambridge ESOL, a not-for-profit Department of the University of Cambridge, for nonnative speakers of English. Recently, some higher education institutions in Chile have implemented the application of one or more of these language tests in their academic syllabuses to assess the level of competence in English achieved by their students at various stages of the learning process.

The native speakers that participated in this study are all educated adults from different professional backgrounds. Because some of them were not present in Chile at the time of the data collection, a PowerPoint presentation was elaborated and sent via e-mail. Originally, 10 participants had taken both word tests, but 2 of them did not send the tests back. Therefore, each group of informants was constituted by 8 participants.

2.4.2 DATA ELICITATION INSTRUMENTS

In the present study, two word knowledge elicitation tools were used to collect the data: a productive Word Association Task, and a receptive Word Connection Test. While the first investigates the informants' ability to produce words that are related in a number of ways to the stimulus words, the second taps into the links the informants are capable of establishing between the different lexical items.

2.4.2.1 PRODUCTIVE WORD ASSOCIATION TASK

The Word Association Task is a productive test. It requires that the informants produce, verbally or written, a response to a prompt or stimulus word. Wolter (2001) states that there are different ways to go about collecting the data: the aural-oral method, the aural-written method and the written-written method. In this case, the aural-written method was used since it allows greater control of the testing conditions. Additionally, it was felt that the aural-written method could better access the connections of the items in the mental lexicon since it allows the researcher to control the time span between prompts and responses. The test used in this study contains a number of 48 prompt words, consisting of 24 adjectives and 24 concrete nouns, from a representative range of semantic topics (Henriksen 2008: 41, Meara 2009: 17). The nouns and adjectives were presented alternately, and countable nouns were denoted by placing an indefinite pronoun in front of them (Table 1). It has been suggested by researchers (Henriksen 2008, Fitzpatrick 2006) that a test should include an equal number of items belonging to

the same word class since it has been observed that word class has an influence on the type of association subjects may produce.

Nouns	Adjectives
a moon, a child, a fruit, a house, a woman,	cold, beautiful, afraid, hungry, slow
a chair, a hand, bread, a head, a spider,	sweet, dark, deep, soft, short, quiet
a river, a lion, an eagle, an ocean, a soldier,	bitter, yellow, long, high, hard, blue
butter, a window, a sheep, a bed, a stomach	thirsty, white, black, red, sour, heavy
cheese, a mountain, a doctor, a foot	green

Table 1. Stimulus words included in the Word Association Task (Henriksen 2008: 41).

2.4.2.2 RECEPTIVE WORD CONNECTION TEST

In 1993, Read developed a receptive version of the Word Association Task called the Word Associates Test. This test was seminal in research into depth of lexical knowledge. The test described above consists of 40 prompt words, each followed by eight other words, four of which are semantically related to the prompt words. The subjects have to establish which four words are correctly related to the prompt word. In the following example (Figure 4), the correct associations are ‘film’, ‘publishing’, ‘revise’ and ‘text’.

Edit	arithmetic	film	pole	publishing
	revise	risk	surface	text

Figure 4. Read’s receptive version of the Word Connection Task (1993, in Greidanus et al. 2004: 221).

Schoonen and Verhallen (1998, in Greidanus and Nienhuis 2001) designed their own test based on Read's Word Associates Test. Their test consists of six words that are placed around a target word of which three have a strong relationship to the target word and the other three, a looser relationship. In the example below (Figure 5) the target word is 'banana', and the correct links are 'fruit', 'skin' and 'curved'. The other three words are possible relations but in a contextualised setting.

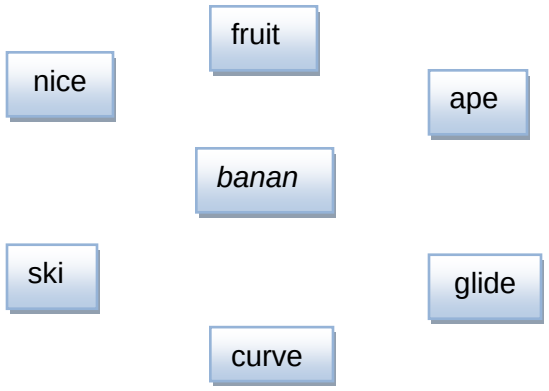


Figure 5. Schoonen and Verhallen's version of Read's Associates Test (1998, in Greidanus and Nienhuis 2001: 568).

In the present study, a modified version of Read's Word Associates Test designed by Henriksen (2008) was used, the Word Connection Test (Figure 6). It contains 24 prompt words, 12 nouns and 12 adjectives (see Appendix B). Each prompt word has 10 possible associations, but only 5 are the most frequent according to a native speaker norming list. A norming list refers to the commonest responses supplied by native speakers of English to word association tests. The other 5 lexical items are semantically related, but are infrequent responses. Test takers are

asked to establish 5 strong connections out of the 10 lexical items. In the example below, according to the data available in the norming list, ‘snow’, ‘frost’, ‘winter’, ‘hot’, and ‘ice’ are the five strongest links to the prompt word ‘cold’.

COLD:	war ☐	water ☐	frost ☐	hand ☐	hot ☐
	warm ☐	snow ☐	pain ☐	winter☐	ice☐

Figure 6. Word Connection Test sample (Henriksen 2008: 42).

2.4.3 DATA COLLECTION PROCEDURE

2.4.3.1 PRODUCTIVE WORD ASSOCIATION TASK

This test was applied, by the researcher, to the three groups of participants in three different sessions, one for each group. After handing out the test, the participants were asked to read the following instructions:

> The following test is a word test. You will hear several words and you will be asked to respond with the first word that comes to mind upon hearing the word. There are no right or wrong answers, so try not to take a long time considering your response.

In addition, before the test was applied, an example was provided on the whiteboard, and participants were encouraged to ask questions in case of any doubts. The prompt words were then read aloud one at a time, allowing the informants enough time to respond, approximately 7 seconds before the next word

was read out. A pilot test applied by the researcher to a different group of learners of similar level of competence in English revealed that between 5 to 7 seconds was enough time to elicit a response from the subjects.

The learners' responses to each prompt word were written down on an answer sheet provided for this purpose (see Appendix A). The test takers were also provided with blank sheets of paper and asked to cover their answers to each prompt word so as to avoid chaining, i.e. influence from the previous response. Additionally, a PowerPoint presentation was prepared for the native participants that could not take the test in situ.

2.4.3.2 RECEPTIVE WORD CONNECTION TEST

The Word Connection Test (see Appendix B) is a pen-paper activity. The tests were handed out to the participants by the researcher, and they were asked to read the following instructions before taking the test:

> Decide which of the words in the group has either a strong (S) or weak (W) link with each stimulus word. Write your answers between the square brackets. If you are not sure of a probable link, write N. You must find no more and no less than five strong links. There is no time limit.

Furthermore, two examples were written on the whiteboard, and time for additional questions was provided. As stated in the instructions, the participants were not given time restrictions to do the test. On average, the test took each group of subjects 40 minutes.

2.5 DATA PROCESSING

2.5.1 PRODUCTIVE WORD ASSOCIATION TASK

The following steps were taken to process the data:

1. Digitisation of the responses to the productive Word Association Task supplied by the two groups of learners and the group of native speakers (see Appendix C for sample).

2. Classification of responses into the five categories of the taxonomy, according to their relation to the prompt word: paradigmatic, syntagmatic, clang, other, and no response. Each response type was assigned a letter: paradigmatic (P), syntagmatic (S), clang (C), other (O), and no response (NR).

3. Classification of paradigmatic responses according to their semantic relation to the prompt word: sameness, opposition, and inclusion.

4. Classification of opposition into: complementary opposition, gradable opposition, and relational opposition.

5. Classification of inclusion into: hyponymy, hypernymy, co-hyponymy, and meronymy.

6. Classification of responses to the receptive word connection task using the norming data provided by Professor Henriksen.

7. Statistical analysis of the associations established by the intermediate learners of English as a foreign language in the productive word test using one-way ANOVA, and Tukey's post-hoc test.

8. Statistical analysis of the associations established by the advanced learners of English as a foreign language in the productive word test using one-way ANOVA, and Tukey's post-hoc test.

9. Statistical analysis of the associations established by native speakers of English in the productive word test using one-way ANOVA, and Tukey's post-hoc test.

10. Comparison between the associations established by the intermediate and advanced learners of English as a foreign language, and native speakers of English using two-way ANOVA, and Bonferroni post-hoc test.

2.5.2 RECEPTIVE WORD CONNECTION TEST

The following steps were taken to process the results of this test:

1. Categorisation of ‘strong’ connections produced by the intermediate learners of English, using the norming data kindly provided by Professor Henriksen.

2. Categorisation of ‘strong’ connections provided by the advanced learners of English, using the norming data.

3. Categorisation of ‘strong’ connections provided by the native speakers of English, using the norming data.

4. Statistical analysis of the number of ‘strong’ connections established by the intermediate learners of English in the receptive Word Connection Test using one-way ANOVA, and Tukey’s post-hoc test.

5. Statistical analysis of the number of ‘strong’ connections established by the advanced learners of English in the receptive Word Connection Test using one-way ANOVA, and Tukey’s post-hoc test.

6. Statistical analysis of the number of ‘strong’ connections established by the native speakers of English in the receptive Word Connection Test using one-way ANOVA, and Tukey’s post-hoc test.

2.5.3 CANONICAL RESPONSES

Canonical responses were elicited by means of the application of the productive Word Association Task. The analysis of these responses was performed on the basis of the responses present in The Edinburgh Associative Thesaurus available in the net. The Edinburgh Associative Thesaurus is a set of word association norms showing the counts of word associations as collected from native speakers of English. The classification decided upon was based on the proportion of times the responses to each prompt word occurred. So, for instance, the prompt word ‘house’ produces a number of 42 responses supplied by 100 informants who were native speakers of English (Table 2), of which one response, ‘home’ makes up for 28% of the total. Other responses to the prompt word ‘house’ do not exceed more than 10%. Furthermore, because canonical responses can either be syntagmatic or paradigmatic, it was decided that the analysis would be performed separately from the rest of the analysis. (See Appendix C, in which there is a sample of responses in which the symbol (#) is used to identify canonical responses).

Associations	Mean Proportion
1. Home	28%
2. Garden	8%
3. Door	6%
4. Boat	4%
5. Chimney	4%
6. Roof	4%

Table 2. Sample of associations elicited by ‘house’ (The Edinburgh Associative Thesaurus).

The following steps were taken in the analysis of the canonical responses:

1. Categorisation of canonical responses using the Edinburgh Associative Thesaurus.

2. Classification of the responses supplied by the intermediate learners of English into the canonical category.

3. Classification of the responses supplied by the advanced learners of English into the canonical category.

4. Classification of the responses supplied by the native speakers of English into the canonical category.

5. Statistical analysis of the number of canonical associations established by the intermediate learners of English in the productive Word Association Task using one-way ANOVA, and Tukey's post-hoc test.

6. Statistical analysis of the number of canonical associations established by the advanced learners of English in the productive Word Association Task using one-way ANOVA, and Tukey's post-hoc test.

7. Statistical analysis of the number of canonical associations by the native speakers of English in the productive Word Association Task using one-way ANOVA, and Tukey's post-hoc test.

3.0 DISCUSSION OF RESULTS

3.1 RESULTS FROM THE PRODUCTIVE WORD ASSOCIATION TASK

3.1.1 WITHIN GROUP ANALYSIS

This section will specifically answer research question 1:

Which type of productive word association (i.e., paradigmatic, syntagmatic, clang or other) shows the most significant frequency of occurrence within the intermediate and advanced learner groups, and the English native speaker group?

The objective of this subsection is, therefore, to put forward any differences in the response patterns within the three groups of participants. To determine whether there were statistical differences, the data were analysed using one-way ANOVA with Tukey's post hoc test. Since an analysis of variance (ANOVA) identifies differences in means, but does not reveal which means are different, a post-hoc test was necessary. Graphs and tables were also elaborated to visually represent the distribution of the responses for each category.

3.1.1.1 INTERMEDIATE LEARNERS

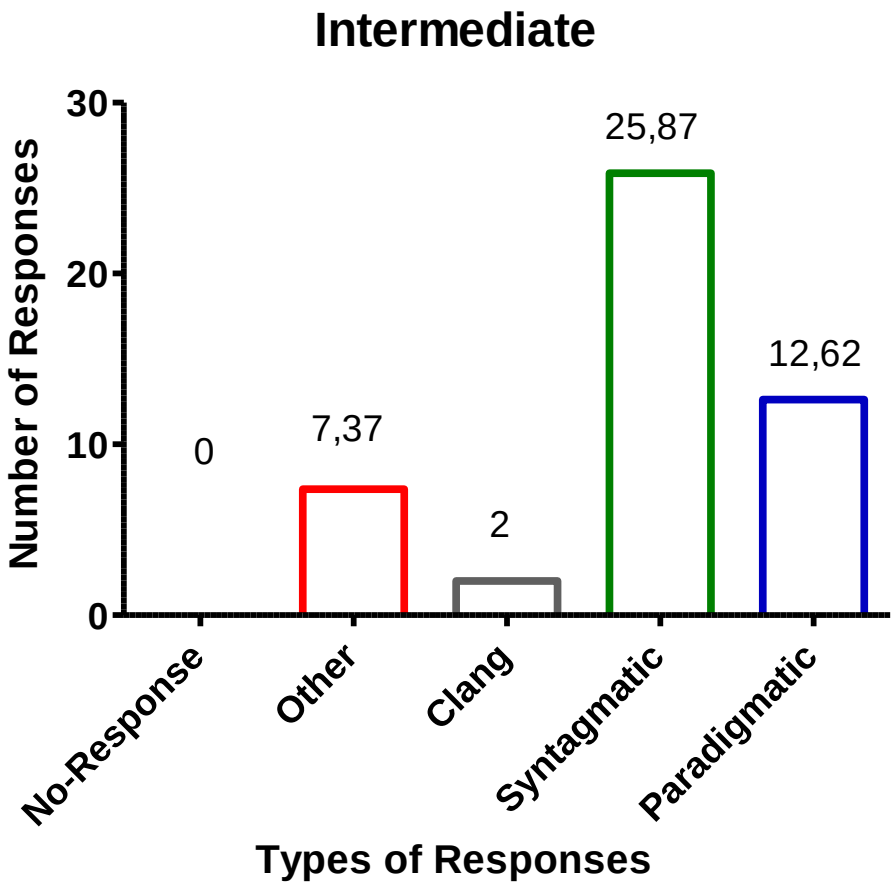
Statistically significant differences ($p < 0.0001$) were found among the responses provided by nonnative speakers belonging to the intermediate level of competence. Tukey's post hoc test identified differences among four of the five response categories: other, clang, syntagmatic and paradigmatic (Table 3). There are no occurrences of the no response category, as participants provided answers for all prompt words.

Response Types	q value = 3.85
Other vs. Syntagmatic	7.959
Clang vs. Syntagmatic	10.27
Clang vs. Paradigmatic	4.571
Syntagmatic vs. Paradigmatic	5.701

Table 3. Statistically significant differences as identified by Tukey's post hoc between response types by intermediate learners.

The response patterns coincide with observations reported by the research literature: responses will progress from predominantly form-related to semantically-related associations. Students at the intermediate level produced a very low number of clang responses, an important number of paradigmatic associations, and an even higher number of syntagmatic associations (Graph 1). Although the high number of syntagmatic associations may not be surprising, as students at this stage of learning will have achieved a certain amount of lexical knowledge that accounts for the form-semantic shift, what astounds, considering the high frequency of the prompt words, is the high mean number of other responses. At this point, it is useful to remember that the participants' responses that bore no relation to the prompt words were classified as other responses. For instance, six of the eight subjects produced unrelated responses; two subjects provided the highest number of ambiguous associations, 13 (27%) and 26 (54%) out of 48 in total, e.g., 'fruit' → 'dog'; 'hungry' → 'spotlight'. The same subjects also produced the lowest number of syntagmatic responses, 13 and 17 respectively (well below

the mean $\bar{x}$ = 25.87). This could possibly be attributed to the procedure adopted for collecting the data, the aural-written method. This method requires that the subjects respond to acoustic stimuli, the underlying idea being that this channel accesses the lexical connections available in the mind easily. It is likely, though, that the subjects individualised above could not properly access the links described in level II (See Bilingual Network Models, Section 2.3.2.1), maybe due to the anxiety produced by the time limit imposed, approximately 7 seconds between each word.



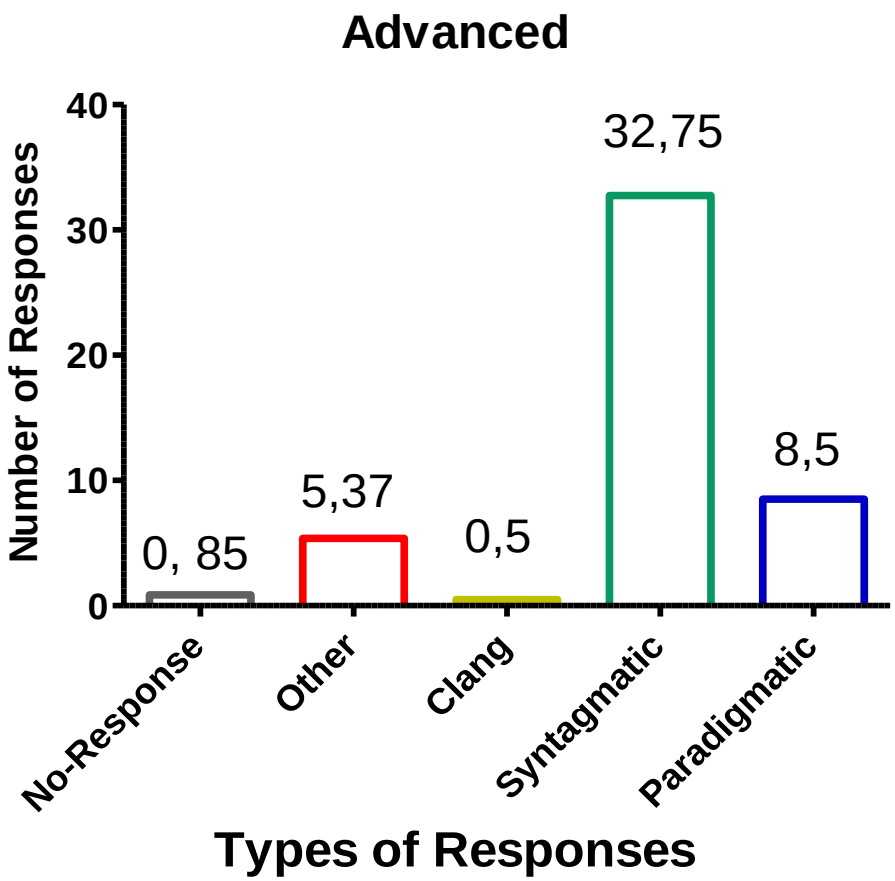
Graph 1. Mean number of responses produced by the intermediate learner group.

3.1.1.2 ADVANCED LEARNERS

The analysis of the data produced by the group of advanced learners also showed statistically significant differences ($p < 0.0001$), and Tukey's post hoc identified differences in all response categories (Table 4).

Response Types	q value = 3.85
1. No response vs. Other	5.028
2. No response vs. Syntagmatic	35.62
3. No Response vs. Paradigmatic	8.520
4. Other vs. Clang	5.447
5. Other vs. Syntagmatic	30.59
6. Clang vs. Syntagmatic	36.04
7. Clang vs. Paradigmatic	8.939
8. Syntagmatic vs. Paradigmatic	27.10

Table 4. Statistically significant differences as identified by Tukey's post hoc between response types by advanced learners.



Graph 2. Mean number of responses produced by the advanced learner group.

Meara's early work on L1 vocabulary acquisition using word association data revealed some important findings, and led to some very useful insights into the nature of the mental lexicon of L2 learners (Meara 2009, Fitzpatrick 2009). One of the findings of particular interest to this subsection is a developmental shift in response types. Meara observes that as children grow older, their responses gradually shift from syntagmatic to paradigmatic associations. Likewise, Aitchison (2003) states that as children get older, the more likely they are to produce adult-like responses. This progression was also observed in studies with learners; as

proficiency increased, so did the number of paradigmatic associations. However, in the present study, an analysis of the advanced group's response patterns clearly shows a marked preponderance of syntagmatic responses ($\bar{x}$ = 32.75; see Graph 2 above). In fact, the mean difference between syntagmatic and paradigmatic associations is one of the largest ($\bar{x}$ = 27.10). The tendency towards syntagmatic associations observed here could be explained on the basis of the methodologies involved in the teaching of vocabulary. The trend in school and university texts is to present lists of vocabulary as chunks or collocations. These chunks allow learners to produce language which is more natural, and easier to handle. This last notion is supported by Fitzpatrick (2009). She states that collocations maximise efficiency by reducing cognitive load. Another explanation for the greater number of syntagmatic associations could be explained in terms of proposals about the late syntagmatic development stage. Entwisle (1966, in Nissen and Henriksen 2006) observed that late syntagmatic associations were present in the associations produced by adults, and described them as "enlargements in meaning due to a more flexible and richer interpretation of a concept" (p. 390).

Another interesting fact is that 3 of the 8 subjects could not provide associations to some of the prompt words. Thus, 2 subjects did not provide responses to three prompt words, while 1 subject left one prompt word unanswered; in total, seven 'no responses' are registered. It is interesting to note that 1 of the subjects that could not provide associations to three of the forty-eight prompt words also has the highest number of responses classified under the 'other' category, and he provided two of the four 'clang' responses. Moreover, the same subject has the lowest

number of responses for syntagmatic and paradigmatic responses, twenty-eight and five, respectively, well under the mean. Bearing in mind that the test we are dealing with is a productive one, this poor performance could be explained on the basis of the development from receptive to productive knowledge, one of the dimensions of lexical competence, as described by Henriksen (1999) (See Word Learning, Section 2.3.1). She observes that a limited number of words that are receptive will become productive. However, she clarifies that this trait of word knowledge should not be viewed as a dichotomy, but as a continuum. Learners, then, must not only master words in terms of their input specifications necessary for comprehension, but also in terms of production. Henriksen (1999) hypothesizes that knowledge of a lexical item along the first two knowledge dimensions, partial to precise knowledge and depth of knowledge, adds to a word's meaning representation. Moreover, how well a word is known also has an impact on the word in terms of the links it is able to establish with other items in the mental lexicon. It has also been observed that meaning representation is a crucial factor for a word to become productive.

3.1.1.3 NATIVE SPEAKERS

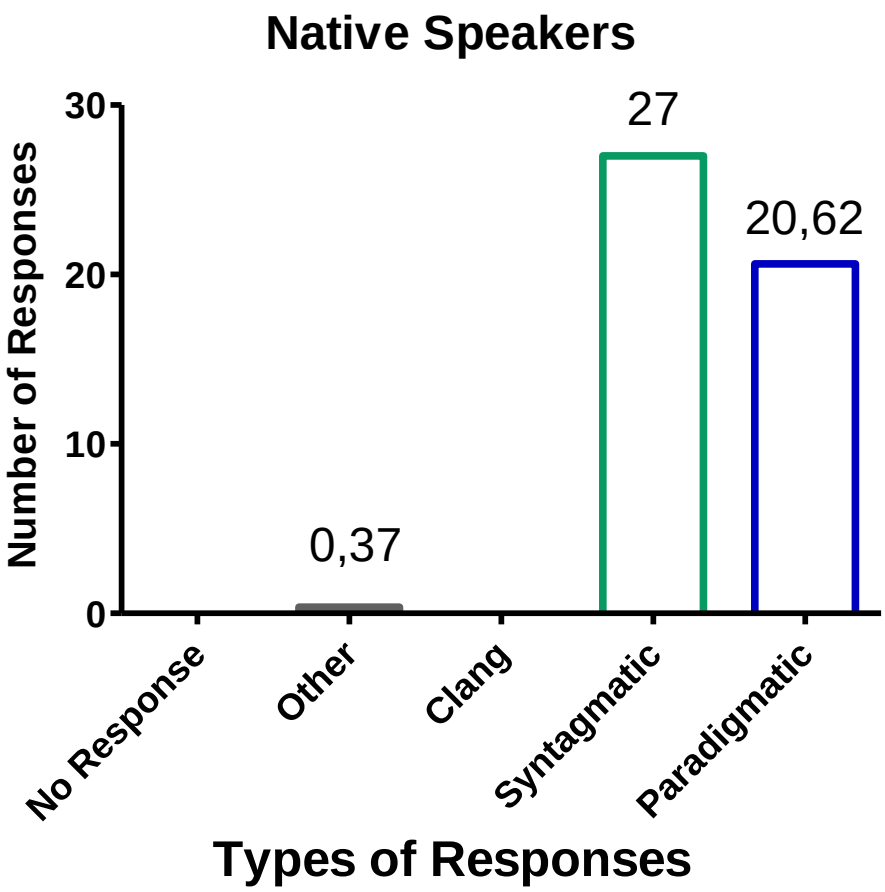
The analysis of the data produced by the native speaker group showed statistically significant differences ($p < 0.0001$). The post hoc analysis revealed significant differences between the 'other' and the syntagmatic categories, and between the 'other' and the paradigmatic categories (Table 5). There were no responses

registered under the 'no response' and the 'clang' categories, and only three responses were classified under the category of 'other'.

Response Types	q value = 4.10
Other vs. Syntagmatic	12.55
Other vs. Paradigmatic	9.576

Table 5. Statistically significant differences as identified by Tukey's post test between the response types by native speakers.

Additionally, there were no statistical differences identified between the syntagmatic and paradigmatic responses. However, in terms of number of responses (Graph 3), the native speaker group produced a greater quantity of syntagmatic associations (27). As mentioned above, various researchers (e.g., Henriksen 2008, Meara 2009, Nissen and Henriksen 2006) have observed that there is a tendency to shift back to syntagmatic associations, especially in very advanced learners and adult native speakers. This fact could explain the difference in number between native speakers' syntagmatic and paradigmatic responses, considering that the subjects that participated in this study are educated adult speakers.



Graph 3. Mean number of responses produced by the native speaker group.

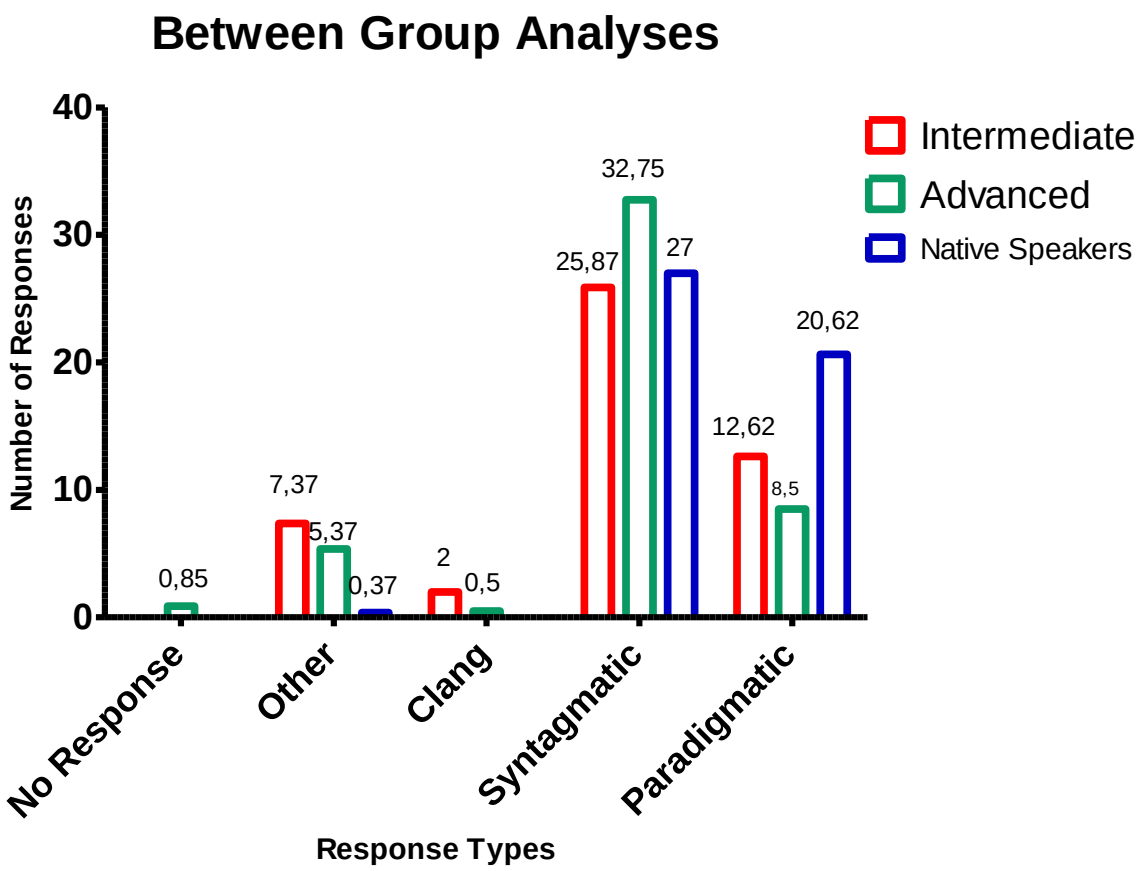
3.1.2 BETWEEN GROUP ANALYSES

This sub-section deals with results that will answer research question 2:

Which types of productive word association (i.e., paradigmatic, syntagmatic, clang or other) show significant differences, in terms of frequency of occurrence, between the two learner groups, and the English native speaker group?

The analyses of the results of the three groups were performed using two-way ANOVA, and the Bonferroni post hoc test. The analyses revealed that there are statistically significant differences across the three groups ($p < 0.0001$). The Bonferroni post hoc test also identified differences in the responses provided by the two groups of learners and the group of native speakers.

Graph 4 below represents the differences in number of responses, and the types of responses produced by the three groups of participants. Some very interesting observations can be made. As proficiency increased, the number of clang associations decreased for the two learner groups. It has been stated that the mental lexicon of advanced learners is mainly meaning driven. In addition, due to the high frequency of the words, only semantically related responses were expected: syntagmatic or paradigmatic. Nonetheless, a very small proportion of the links in the learners' mental lexicon are still phonological (intermediate, 4.16%; advanced, 1.04%). Additionally, concerning the responses provided by the advanced learners, a relatively small number of subjects could provide neither form-related nor semantically related responses (no response, 1.77%). Moreover, the three groups gave responses which were difficult to classify, resulting in 15.35% of unclassifiable responses for the intermediate learners, 11.18% for the advanced learners, and 0.77% for the native speakers. As competence reaches higher levels, there are fewer 'other' responses



Graph 4. Analyses of the associations produced by the intermediate and advanced learners of English, and the native speakers.

Researchers have observed that as the knowledge of individual words increases, the organisation of the mental lexicon favours semantically-related links. This is evident in the mean proportion of semantically-related responses, i.e., syntagmatic and paradigmatic, provided by the two groups of learners and the group of native speakers: intermediate, 80.19%; advanced, 85.93%; native speakers, 99.2%. A more detailed analysis of these semantic responses reveals that both learner groups have a tendency towards syntagmatic associations. However, a higher number of paradigmatic links was expected as the result of the

progression from the intermediate to the advanced level. This could be interpreted as a late syntagmatic development or stage as both learner groups provided a high number of syntagmatic associations. In fact, the intermediate group produced a mean number of 25.87 (53.89%) syntagmatic associations, twice the number of the paradigmatic associations, 12.62 (26.29%). Likewise, the advanced group of learners also produced a very high mean number of syntagmatic associations, 32.75 (68.22%). This figure is almost four times as much as the paradigmatic associations, 8.5 (17.70%). Furthermore, in terms of descriptive statistics, the Bonferroni post hoc test identified significant differences between the syntagmatic and the paradigmatic associations for both learner groups (Table 6). These results are similar to those of previous studies. In a study of a group of nonnative speakers and a group of native speakers, Wolter (2001) used his own version of the Word Association Test, which incorporated lexical items of various frequencies. Results revealed that the L2 mental lexicon is principally organised in terms of syntagmatic associations for words which are well known. He observed, counter to what other models of the L2 mental lexicon had proposed, that a syntagmatically-dominated L2 mental lexicon is by no means functionally inferior. In fact, he states that the nonnative participants in his study managed to use their vocabulary quite effectively, “...a task that requires a high rate of mental processing” (p. 61). There were, however, no statistical differences identified between the syntagmatic and the paradigmatic associations produced by the native group ($p > 0.05$). This last fact is interesting as research (e.g., Meara 2009) has provided ample evidence that supports the idea that native speakers favour paradigmatic associations, especially when dealing with high frequency words. Graph (4) shows that the mean number

of syntagmatic associations (27) is higher than the paradigmatic associations (20.62).

Syntagmatic vs. Paradigmatic	t value = 2.306
Intermediate	4.965
Advanced	9.088

Table 6. Significant values for the syntagmatic and the paradigmatic associations produced by the intermediate and advanced learners.

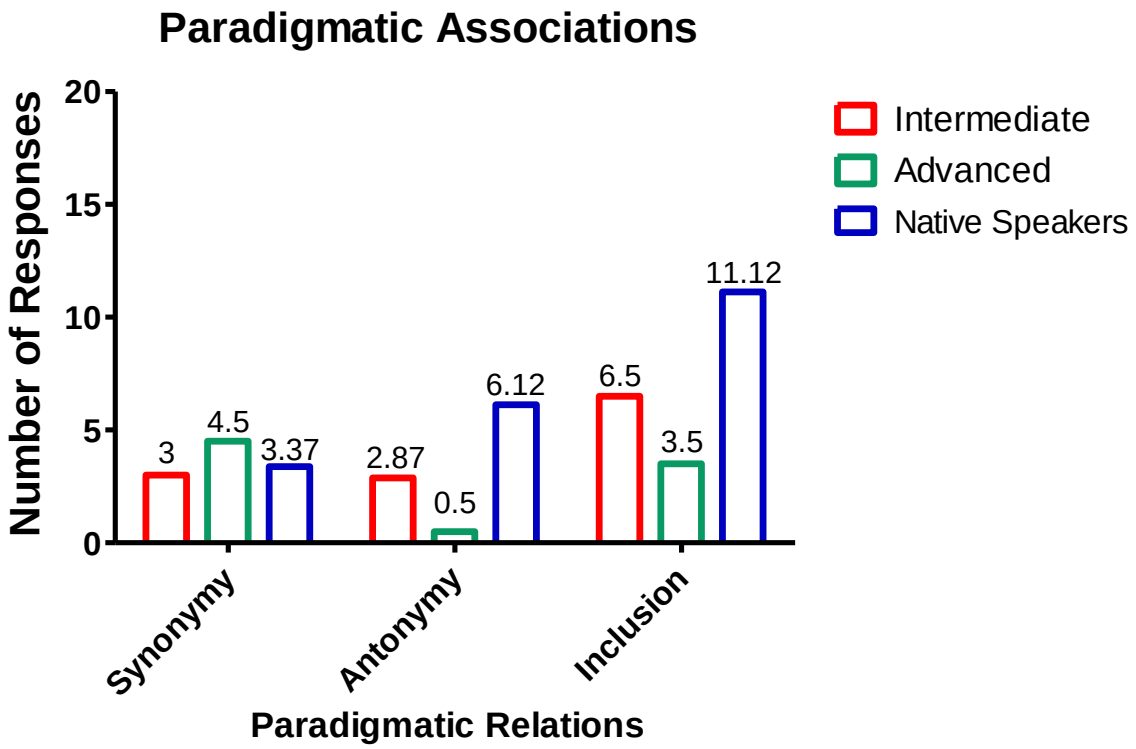
3.1.3 PARADIGMATIC ASSOCIATIONS

This section will specifically answer research question 3:

Which type of paradigmatic word association (i.e., sameness, inclusion or opposition) has the highest frequency of occurrence within the intermediate and advanced learner groups, and the English native speaker group?

In this section, an analysis of the different types of paradigmatic associations --sameness, inclusion, and opposition -- presented by the three groups of participants will be presented. The analysis was carried out using two-way ANOVA with Bonferroni post hoc test. Graph 5 represents the paradigmatic lexical relations produced by the three groups of subjects and the mean number of each subcategory within the paradigmatic relation. Furthermore, it was deemed important to subdivide, with the aim of obtaining a finer analysis, some of the categories into classes. So, for instance, the paradigmatic relation of antonymy was analysed in terms of its types: complementaries, gradable antonyms and

relational antonyms (see Taxonomy, Section 2.3.4). Table 7 shows the statistically significant differences as identified by the Bonferroni post test. In addition, Graph 6 represents the mean number of responses for all paradigmatic lexical relations, including the antonymy and inclusion types.

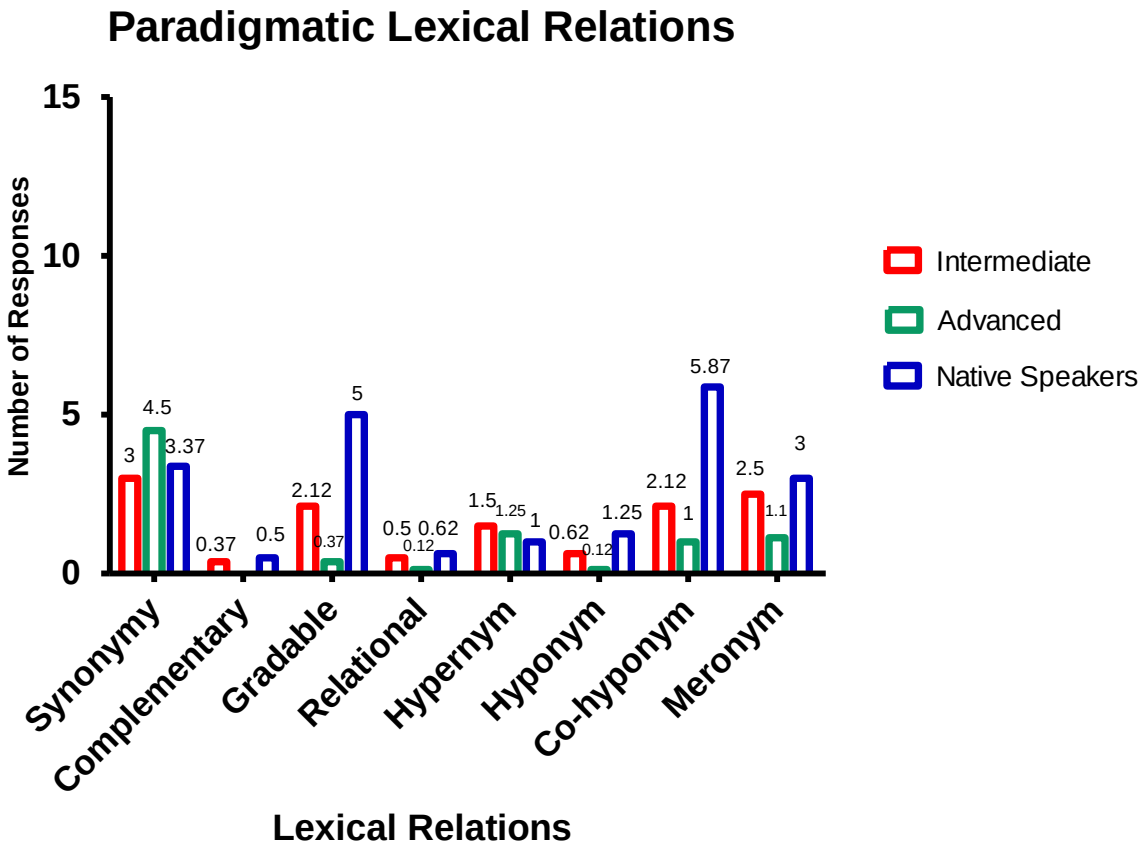


Graph 5. Mean number of paradigmatic associations.

	Intermediate vs. Native S.	Advanced vs. Native S.
Synonym	not significant	not significant
Complementary	not significant	not significant
Gradable	3.396 ($p < 0.01$)	5.463 ($p < 0.001$)
Relational	not significant	not significant
Hypernym	not significant	not significant
Hyponym	not significant	not significant
Co-hyponym	4.430 ($p < 0.001$)	5.758 ($p < 0.001$)
Meronym	not significant	not significant

Table 7. Summary of statistically significant differences between the two learner groups and native speakers.

Graph 6 shows that all groups produced a high number of responses classified under the inclusion category ($p > 0.0003$): intermediate, 6.5; advanced, 3.5; and native speakers, 11.12. The category in second place in terms of number of responses is synonymy. The rest of the responses produced were classified under the category of antonymy. In terms of a descriptive analysis, there are no statistical differences observed between synonymy and antonymy ($p < 0.05$).



Graph 6. Mean number of lexical relations.

A detailed analysis of the paradigmatic lexical relations categorised in this study (Graph 6) shows that both the intermediate and the advanced group favoured

synonymy, while the native group favoured co-hyponymy. In terms of lowest scores, the intermediate group got only 0.37 for complementary antonymy. The advanced group produced its lowest scores for both relational antonymy (0.12) and hyponymy (0.12). Additionally, the advanced learners produced no responses for complementary antonymy. The native speaker group also obtained the lowest responses for complementary antonymy. Table 7 presents a summary of the responses with significant differences. For instance, there were differences identified between the intermediate group and the native group for both gradable antonymy and co-hyponymy. Likewise, there were differences identified between the advanced group and the native group for the same two lexical relations.

An interesting observation that can be made regarding the types of paradigmatic lexical relations favoured by the three groups of participants is that the total mean number for ‘inclusion’ is 21.12, which is greater than the total mean number for both synonymy and antonymy, 10.87 and 9.49, respectively. The wide gap between inclusion, and synonymy and antonymy could possibly be due to the participants’ categorisation of lexical items. Cognitive theories (Harnad 2005) point to the fact that the mind categorises concepts on the basis of prototypes. So, for instance, there are many ways of categorising a particular object. A chair, then, may be a more representative instance of sitting furniture than a stool. Likewise, a table could be a more representative item of furniture than a chair. Context and sensory capacity are very important when categorising ‘things’, our experience telling us what ‘things’ or objects are usually found together, or expected to be found together.

3.2 RESULTS FROM THE RECEPTIVE WORD CONNECTION TEST

This section will specifically answer research question 4:

Which quantitative differences can be observed between receptive word associations produced by intermediate and advanced learner groups, and the English native speaker group?

This section will present an analysis of the number of correct associational links that the three groups of subjects were able to provide in the Word Connection Test. This test is the receptive version of Read's Word Associates Test, and it differs from it in that the participants have to relate a number of words to a specific stimulus word (See Receptive Word Connection Task, Section 2.4.2.2). The assumption that underlies the Word Connection Test is that it is possible to tap the subjects' network knowledge at levels I and III, as considered in the model adopted by Henriksen (2008). Level I contains our knowledge of the world, and level III contains meta-semantic knowledge. In a recent publication, Meara (2009) describes a study in which L2 learners and native speakers were asked to decide the number of links that could be established between two unrelated lexical items (for instance, 'oven …veil'). Meara's assumption was that L2 participants would produce fewer links than native speakers. His findings showed that L2 subjects produce fewer links than native speakers, revealing a much denser mental lexicon for the latter.

The Word Connection Test used in the present study consists of 24 prompt words, and each prompt word contains 10 possible associations. Each subject, as stated

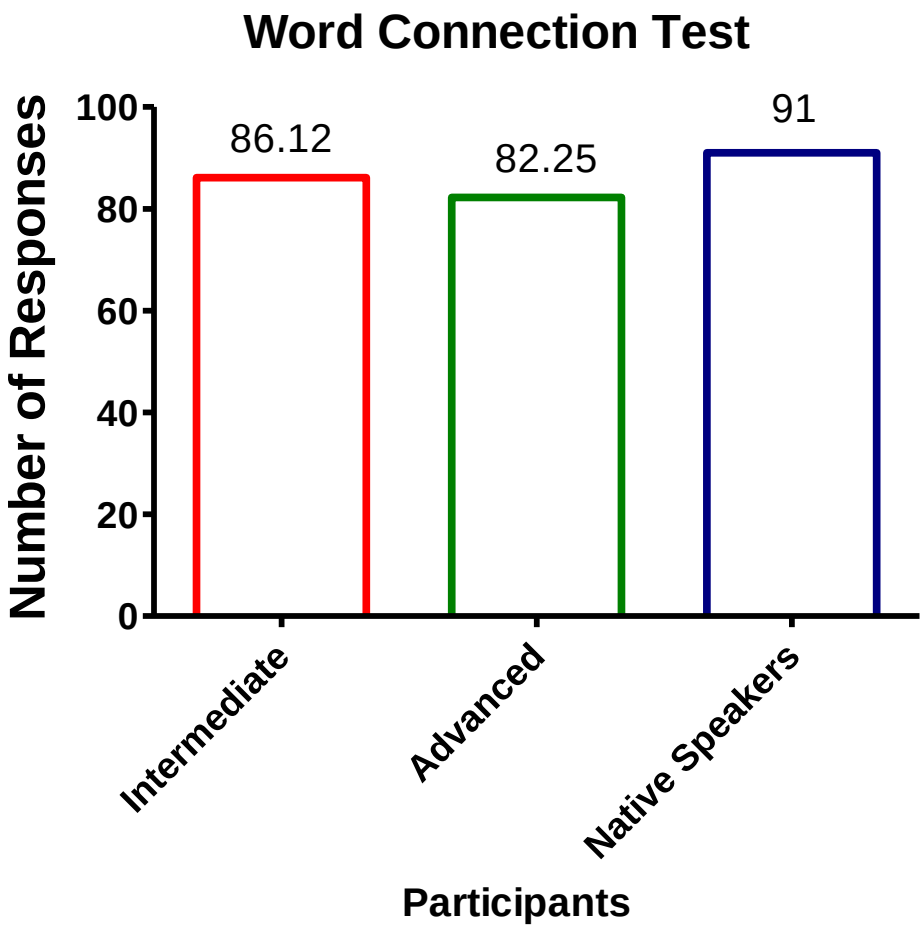
in the instructions, had to decide which were the 5 strongest connections to each prompt word. The tests were then compared to the native speaker norming data (see Appendix E). One point was awarded on the basis of each 'correct' associational link identified by the test takers, the highest possible score being 126 points. The expectation is that this test would force test takers to consider the relative relatedness of the options given to each prompt word, revealing their current status of network knowledge at the receptive level.

One-way ANOVA revealed that there are no statistically significant differences between any of the three groups ($p = 0.0626$). Table 8 summarises the critical values for *q* between the two learner groups and the native speaker group.

Tukey's Multiple Comparison Test	q value = 8.25
Intermediate vs. Advanced	1.574
Intermediate vs. Native Speakers	1.980
Advanced vs. Native Speakers	3.554

Table 8. Bonferroni post hoc for the Word Connection Test.

Although there were no statistical differences identified in the Word Connection Test, the native speakers produced a higher mean number of strong connections (91) than the two learner groups (intermediate, 86.12; advanced, 82.25) (See Graph 7). In turn, the group of intermediate learners produced a higher number of strong connections than the advanced learners. However, it was assumed that the opposite would occur due to the different competence levels. A detailed analysis of the advanced group shows that 6 of the 8 subjects are under the overall mean (86.45), whereas only 3 subjects of the intermediate group are under it.



Graph 7. Number of responses in the Word Connection Test.

One possible explanation is that the advanced group is simply less proficient than the intermediate learner group. Retrospective data revealed that some of the students in the advanced group had failed the Certificate of Advanced English exam once, and that some had interrupted their studies for a semester due to personal reasons. Additionally, some of the teachers had resigned half way through the semester due to administrative problems; all this affecting the overall performance of the group.

3.3 CANONICAL RESPONSES

This section will specifically answer research question 5:

Which group of subjects, i.e., intermediate and advanced learner groups, and the native speaker group, has the highest mean number of canonical responses, and what quantitative differences can be established between the three groups of subjects?

The main objective of this section is to analyse the number of canonical responses produced by the two learner groups and the group of native speakers. It is assumed that the number of canonical responses that each group of learners is capable of producing will shed light on their current status of lexical knowledge, and that a sustained increase would suggest that lexical links gain stability with development in proficiency. Furthermore, the canonical associations that the native speaker group is able to establish will serve as a benchmark against which the learners' results will be compared. It must be made clear that there is no taxonomy for canonical responses. Therefore, the criterion used for deciding on these responses was to consider the most frequent responses found in the Edinburgh Associative Thesaurus as canonical associations.

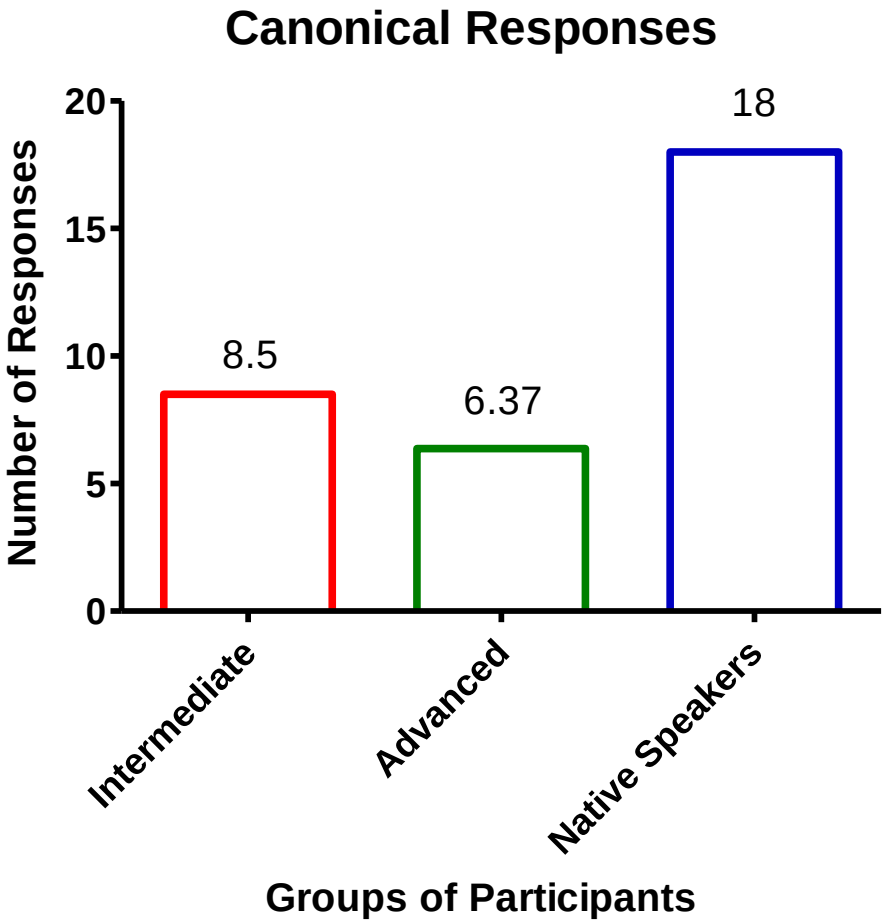
Meara (1983) observed that native speakers' responses to word association tasks were significantly stable. In fact, he stated that if a group of native speakers took the same test twice, it would be very unlikely that the second test would produce responses that differed largely from the ones produced in the first test. This

observation leads to the notion that native speakers' links in the mental lexicon are stable, and that word retrieval is realised through fairly fixed routes. On the contrary, studies on learners' response stability have revealed that the L2 mental lexicon is less stable. For instance, Hughes (1981, as cited in Meara 1983) found that responses produced by learners in terms of stability differed considerably from group to group, suggesting that an increase in response stability is expected as a result of proficiency level. Henriksen (2008) also analysed learners' responses to word association tasks. Her study revealed differences in three learner groups, advanced learners producing a higher number of stable responses than less competent learners.

In the present study, the number of canonical responses produced by the three groups were analysed using one-way ANOVA, and Tukey's post hoc test. The results were charted on a bar graph to show the mean number of canonical responses produced by each group (see Graph 8). The intermediate learner group scored a mean number of 8.5 responses, while the advanced scored 6.37. The native speaker group scored the highest mean number of responses, 18. One-way ANOVA revealed significant differences (p□ 0.0003). Furthermore, Tukey's post hoc identified differences between the intermediate learner group and the native speaker group, and between the advanced learner group and the native speaker group (Table 9). However, there were no statistical differences observed between the intermediate and the advanced learner groups (q=1.994).

Groups	q value = 2.95
Intermediate v/s Native Speakers	5.339
Advanced v/s Native Speakers	6.533

Table 9. Significant statistical differences as identified by Tukey's post-hoc.



Graph 8. Mean number of canonical responses produced by the two learner groups and the native speakers.

Concerning the learner groups, the results obtained indicate that there is no progress in the number of canonical responses from the intermediate to the advanced levels. An analysis based on the statistical differences shows that the

mean number of responses produced by the native speakers is well over the mean of the three groups, 10.95. Both learner groups, nonetheless, are under the mean. These findings lead to assume that learners' lexical links could be influenced by L1 conceptual knowledge. Kroll and De Groot's Lexical/Conceptual Feature Model (1997) includes three levels of representation, a lexical feature level, which contains information regarding the form of words, and a conceptual feature level, which contains information regarding aspects of meaning. Between these two levels, they postulate a lemma level containing semantic and syntactic information which is specific for each language. It could quite possibly be that learners did not produce the same number of idiosyncratic associations as native speakers, due to their L1 conceptual knowledge. It must be considered that learners' mapping process is aided by their L1, and the paths which are built in their mental lexicon are heavily influenced by it. Meara (2009) states that the idea of starting a new L2 network from scratch is very unlikely as it would render the whole learning process inefficient, suggesting that L1 conceptual knowledge may in fact have a bearing on the type of association a learner is able to establish. This would explain why, in the present research study, learners obtained responses which were neither idiosyncratic nor infrequent, that is, their L2 mental lexicon is modeled by their L1. For instance, in the word association norms available in the Edinburgh Association Thesaurus, 'moon' has a total of 45 responses, of which 'sun' and 'shine' are considered canonical, while the other 43 responses are common, but not sufficient enough to be viewed as canonical. The two learner groups did produce responses which were classified as canonical, but they also produced a great number of responses which, although common enough, could not be classified as canonical.

4.0 CONCLUSIONS

The objective of the present study was to describe and compare the results of word association tasks across two learner groups and a group of native speakers and to relate them to their lexical network knowledge. To achieve these aims, two word association tests usually applied in L2 lexical acquisition research were used to collect the data, the productive Word Association Task and the receptive Word Connection Test. The assumption for the first test, the Word Association task, was that a shift from form-related (phonologically alike) to semantically-related associations (syntagmatic-paradigmatic) would be indicative of a 'native-speaker-like' mental lexicon. Research studies in the L1, especially the ones carried out by Meara (2009), suggest that children favour phonological or form-related associations in word tests. This gradually changes as children get older (Aitchison 2003). At the age of seven, approximately, their associations are predominantly syntagmatic, and at adulthood, paradigmatic. Studies on L2 word associations reveal a similar pattern: as proficiency increases, the form-semantic shift becomes evident. However, the type of semantic relations which nonnative speakers favour is a matter of debate. For instance, the results of a study performed by Wolter (2001) using a productive word test with different word frequencies suggest that nonnative speakers favour syntagmatic associations for words which are well known, whereas native speakers favour paradigmatic associations. The results in the present research study tally with the ones obtained in the aforementioned study, as far as nonnative speakers are concerned. The results show that both the intermediate and the advanced learners favoured

syntagmatic associations, the latter producing the highest mean number. An interesting fact is that the native speakers did not favour paradigmatic associations over syntagmatic ones, as reported in the literature. In this respect, it must be stated that studies have also shown that there is a tendency for advanced learners and adults to shift back to syntagmatic associations, or what Entwisle (1966) calls, 'late syntagmatic' associations. A different study (Namei 2004) that tested 100 Persian-Swedish bilingual subjects using a productive word association test revealed that high levels of syntagmatic and paradigmatic associations were produced by both L1 and L2 subjects. What is even more striking is the fact that clang associations were also found among the responses of very advanced L1 and L2 speakers. A similar case can be drawn here. Both learner groups produced clang responses. The intermediate group produced the highest number of clang associations with 16 responses in total, and the advanced group produced 4.

The findings of a study performed by Fitzpatrick (2007) suggest that the form-semantic shift is not reliable as L1 and L2 subjects tend to produce response patterns that vary quite drastically. She (2007: 327) states that subjects' responses to word associations, "…cannot reliably be traced back to their maturity or whether they are operating in the L1 or L2; despite the fact that the subjects in this study were all adult native speakers, their response preferences varied greatly." Similar results can be observed in a research study carried out by Wolter (2006). One of the conclusions that he draws from the results is that paradigmatic associations are not indicative of a higher level of development and of organisation of the mental lexicon. In fact, he observes that building syntagmatic connections seems to be a

harder task since it demands a constant restructuring of learners' lexical network as new items are added. Providing paradigmatic connections does not put such a burden on learners. In fact, he states that paradigmatic connections can be established in the learner's network quite easily through his already existent L1 lexical/conceptual network.

The response patterns produced by the two groups of learners in this study cannot be held as support for a syntagmatic-paradigmatic shift along the lines of proficiency. The number of associations and the patterns that they established cannot be seen as signs of development and higher capacity for lexical organisation. Both learner groups' preference for syntagmatic associations can be explained on the basis of the bilingual network model adopted here (Henriksen 2008). This model postulates that lexical representation is organized as a multi-layered structure with three levels of lexical knowledge. It is assumed that because of time limits imposed, productive word tests tap into the second level. The nature of the information found at this level comprises a word's, "phonemic and graphic form, word class and morphology, syntactical and pragmatic restrictions, and semantic specifications" (Henriksen 2008). Furthermore, the data is perceived as being language specific, unless the L1 and the L2 are from the same language family. In this case, learners' L1 and natives' L1 are from different language families. Consequently, any new word incorporated into the learners' L2 mental lexicon will require specific information concerning its phonological and grammatical functions, and particularly, its semantic restrictions. Observations made by Henriksen (1999) suggest that thorough knowledge of a single lexical

item will determine how productive it will be. The author also states that the types of associations learners are able to establish also depend on the transition from general to defining features of individual items. This could also explain why learners at the beginner level favour form-related associations, this aspect being the one that they encounter first. A word's semantic restrictions would be situated at a more developed stage of learning, when the use of words in speech and writing become essential. At this phase, syntagmatic relations are established as responses to the need for proper language use. It seems, though, that paradigmatic relations occur somewhat automatically as lexical sense relations (synonymy, antonymy, and inclusion) are seen as not being language specific, but most probably universally shared.

An analysis of why native speakers produced a greater number of syntagmatic associations is not very clear though. A possible reason is the high frequency of the words used. It is believed that most of the lexical items in the productive Word Association Task, as confirmed by the results, are syntagmatically biased, i.e., words which fall into a syntagm. For instance, native speakers produced 'water' three times, and 'blue' twice as a response to the prompt word 'deep'. The other responses were 'pond', 'pool' and 'swallow', all considered syntagmatic. Likewise, the nonnative speakers also produced a high number of syntagmatic responses for the same prompt word. The intermediate group produced 5, and the advanced group produced 6. Another example is 'spider'. It elicited 8 syntagmatic associations from the native speakers, and 6 and 7 syntagmatic associations from the intermediate and the advanced learners, respectively. Another possible reason

for this trend observed across all three groups is the word class chosen as prompt words; equal number of nouns and adjectives were used. Nissen and Henriksen (2006) observed that word class has an influence on the types of word associations which subjects are able to establish. For instance, adjectives are characterized in terms of what they modify –a noun– resulting in a higher number of syntagmatic associations. It could also be stated that the syntagmatic associations established are, in fact, late syntagmatic, as mentioned earlier. An analysis of the paradigmatic lexical relations produced by both groups of nonnative speakers and the group of native speakers revealed that inclusion was the most frequent relation. Within inclusion, other types of lexical relations were also made, hypernyms, hyponyms, co-hyponyms or coordinates, and meronyms. Of these four, co-hyponyms were produced the most. Nissen and Henriksen state that co-hyponyms are at a basic level of meaning, that is, “speakers can give the most substantial information about a word with the least cognitive effort” (2006: 403). Both synonymy and antonymy came second and third in place, respectively. However, there were no statistical differences identified between the two.

The results obtained from the receptive Word Connection Test do not show significant statistical differences across the three groups. It was expected, though, that the intermediate learners would produce fewer stronger connections than the advanced group. It is thought that because of the receptive nature of the Word Connection Test, and with time for reflection, the vocabulary knowledge accessed is found both in levels I and III of the mental lexicon model used here. The information in each of the two levels is considered language neutral. Probably

much of the conceptual knowledge in level II is universal; the fact that the ‘moon’ is considered by some to have astrological influence in our lives is cross-culturally shared. The same can be said for the meta-linguistic knowledge contained in level III. It is believed that the information regarding specific paradigmatic relations and the various syntagmatic associations that can hold between different words; for instance, ‘white’ plus ‘snow’, ‘white’ plus ‘cloud’, etc, are universal features (Murphy 2003). It is estimated that the responses provided by the two groups of nonnative speakers and the native speakers group did not differ greatly, due to the universal characteristics of the concepts and ideas that underlie some words. In other words, the knowledge that was activated was similar for all subjects.

In trying to relate the two word association tests applied in this study, and the current state of vocabulary knowledge of the two learner groups and that evidenced by the nonnative speakers, it can be concluded that the results obtained are conflicting and do not reveal any clear development in terms of the syntagmatic-paradigmatic shift described in vocabulary studies. The efficiency of a word association test in accurately determining the lexical links at a certain moment of lexical development may be questioned. Firstly, subjects’ progress along the semantic shift and development of lexical knowledge were not manifest in the word association tests. Secondly, the responses produced by the native speakers did not differ greatly as the ones produced by the nonnative speakers. It could be argued that the responses supplied by the learner subjects reveal a less developed mental lexicon, but the statistical analysis did not identify important differences between the responses supplied by the nonnative speakers and those

supplied by the native speakers. Likewise, the receptive Word Connection Test did not reveal any concluding differences about the actual stage of lexical development of the nonnative speakers.

The results of the canonical responses show that both groups of learners, intermediate and advanced, produced a relatively small number of canonical associations, 8.5 and 6.37, respectively, versus the native speaker group, which produced a total mean number of 18 canonical responses. It is suggested that canonical responses reflect well-established routes through which native speakers have access to their mental lexicon. It was expected that there would be a marked increase in the number of idiosyncratic responses that the two learner groups were able to produce. However, the fact that both learner groups did not establish a significant number of canonical associations does not mean that their lexical links are of a poorer quality. It could simply mean that learners have fewer links established in their mental lexicon, and they make use of the ones available at their current stage of lexical knowledge. This correlates with the relevant research findings (Meara 2009, Wolter 2001, Henriksen 2008) that learners' links in the L2 are fewer in number when compared to those in the L1.

The theoretical and descriptive framework used in the present study is based on proposals made by various researchers that have studied L1 and L2 lexical acquisition and are also interested in probing into the mental lexicon. These different approaches to the acquisition of lexis have allowed the present study to be comprehensive and updated, in terms of considering both research previously

done and also recent findings in the field. Concerning the taxonomy (See Section 2.3.4), it was useful and pertinent in the analysis of the responses provided by both the learner groups and the group of native speakers. Previous problems encountered by researchers during the categorisation process were considered before collecting the data in an attempt to prevent complications in the data analysis. However, there still persist some drawbacks, especially with responses which are ambiguous. To solve this problem, many authors (e.g., Fitzpatrick 2006, Henriksen 2008) have proposed the use of follow-up tests in the form of an interview to elucidate doubts concerning the responses produced by the participants. In this study, it was not possible to have a follow-up test due to time limitations. With regard to the instruments used, the words included in both tests were all high-frequency items. This fact could have influenced the number of syntagmatic responses that the participants were able to produce. Another point to consider in the WAT test format is the administration procedure. It is done sequentially, possibly affecting the responses which the participants produced. Meara (2009), in an attempt to avoid chaining due to the sequential order in which the lexical items are presented, has recently devised a computerised word test in which participants are asked to click on words which they think are related in any order.

Concerning future studies, the use of follow-up tests could allow a more adequate identification of participants' word associations. Besides, in order to make the results of the present study generalisable, a larger number of participants is needed, both L1 and L2 subjects. Moreover, continued research on lexical

knowledge is of great importance to the study of second language acquisition, and learning and teaching of a foreign language. It is essential that learners benefit from activities that present vocabulary in a systematic manner through authentic texts. Additionally, the use of vocabulary in different contexts should help learners develop their mental lexicon in terms of breadth and also depth.

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APPENDIX A: Productive Word Association Task

INSTRUCTIONS: The following task is a word association test. You will hear several words, one at a time, and you will be asked to respond with the first word that comes into your mind upon hearing the word. Write one word on each gap. There are no right or wrong answers, so try not to take a long time in considering your response. Don't worry about spelling mistakes.

1. a moon _____
2. cold _____
3. a child _____
4. beautiful _____
5. a fruit _____
6. afraid _____
7. a house _____
8. hungry _____
9. a woman _____
10. slow _____
11. a chair _____
12. sweet _____
13. a hand _____
14. dark _____
15. bread _____
16. deep _____
17. a head _____
18. soft _____
19. a spider _____
20. short _____
21. a river _____
22. quiet _____
23. an lion _____
24. bitter _____

25. an eagle _____
26. yellow _____
27. an ocean _____
28. long _____
29. a soldier _____
30. high _____
31. butter _____
32. hard _____
33. a window _____
34. blue _____
35. a sheep _____
36. thirsty _____
37. a bed _____
38. white _____
39. a stomach _____
40. black _____
41. cheese _____
42. red _____
43. a mountain _____
44. sour _____
45. a doctor _____
46. heavy _____
47. a foot _____
48. green _____

APPENDIX B: Receptive Word Connection Test

INSTRUCTIONS: Decide which of the words in the group has either a strong (S) or weak (W) link with each stimulus word. Write your answers between the square brackets. If you are not sure of a probable link, write N. You must find no more and no less than five strong links. There is no time limit.

MOON:

morning [ ] sky [ ] clouds [ ] space [ ] light [ ]

sun [ ] circle [ ] stars[ ] night [ ] telescope [ ]

COLD:

war [ ] water [ ] frost[ ] hand[ ] hot [ ]

warm [ ] snow [ ] pain [ ] winter [ ] ice [ ]

CHILD:

baby [ ] person [ ] human [ ] small [ ] twin [ ]

mother[ ] family[ ] boy[ ] adult [ ] sleepy [ ]

BEAUTIFUL:

looks [ ] lovely [ ] face[ ] morning [ ] fine [ ]

pretty [ ] girl[ ] ugly[ ] attractive [ ] woman [ ]

FRUIT:

apple [ ] walnut[ ] vegetable[ ] sour [ ] fly [ ]

tomato [ ] healthy[ ] tree[ ] monkey [ ] orange[ ]

AFRAID:

brave [ ] ghost[ ] dark[ ] nervous[ ] dream[ ]

scared [ ] fear[ ] shake[ ] frightened[ ] unhappy [ ]

HOUSE:

city [ ] garden[ ] park[ ] stone[ ] door[ ]

home [ ] fireplace [ ] large[ ] garage[ ] roof [ ]

HUNGRY:

baby [ ] feeling [ ] eat[ ] stomach[ ] food [ ]

table[ ] full[ ] thirsty [ ] need [ ] taste[ ]

WOMAN:

beautiful[ ] lady[ ] child[ ] person [ ] breast[ ]

man[ ] blonde[ ] girl[ ] female[ ] teacher [ ]

SLOW:

car[ ] speedy[ ] clock[ ] quick[ ] late[ ]

snail[ ] drive[ ] still[ ] fast[ ] train[ ]

CHAIR:

leather[ ] round[ ] legs[ ] seat[ ] study[ ]

piano[ ] sit[ ] soft[ ] room [ ] table[ ]

SWEET:

bitter[ ] music[ ] candy[ ] sour[ ] food[ ]

spice[ ] lips [ ] sugar[ ] potato[ ] dream[ ]

HAND:

arm[ ] cream[ ] thumb[ ] move[ ] finger[ ]

person[ ] foot[ ] nail[ ] glove[ ] shake[ ]

DARK:

black [ ] room [ ] clouds[ ] sea[ ] colour [ ]

sleep[ ] light[ ] window[ ] night[ ] white[ ]

BREAD:

butter[ ] food[ ] cheese[ ] cut[ ] eat[ ]

rice[ ] dry[ ] water[ ] lunch[ ] white[ ]

DEEP:

afraid[ ] high[ ] bed[ ] sea[ ] chair[ ]

pool[ ] dark [ ] shallow[ ] red[ ] water[ ]

HEAD:

back[ ] intelligence[ ] body[ ] move[ ] foot[ ]

neck[ ] glasses[ ] cranium[ ] hair[ ] shoulders[ ]

SOFT:

bed[ ] light[ ] body[ ] loud[ ] butter[ ]

pillow[ ] cat[ ] hand[ ] hard[ ] soap[ ]

SPIDER:

fly[ ] jump[ ] small[ ] insect[ ] beetle[ ]

web[ ] legs[ ] mouse[ ] butterfly[ ] black[ ]

SHORT:

distance[ ] man[ ] fat[ ] small [ ] fingers[ ]

tall[ ] heavy[ ] tiny[ ] long[ ] walk[ ]

RIVER:

boat[ ] grass[ ] water[ ] woods[ ] deep[ ]

rock[ ] lake[ ] stream[ ] land[ ] side[ ]

QUIET:

hear[ ] man[ ] evening[ ] noise[ ] soft[ ]

scream[ ] house[ ] sleep[ ] loud[ ] stillness[ ]

LION:

animal[ ] meat[ ] cat[ ] roar[ ] giraffe[ ]

brown[ ] hungry[ ] tiger[ ] jungle[ ] wild[ ]

BITTER:

grapes[ ] sharp[ ] taste[ ] poison[ ] salt[ ]

sweet[ ] sour[ ] mild[ ] tea[ ] lemon[ ]

APPENDIX C – Responses to the Word Association Task (Sample)

1. A MOON

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. SUN	P (relational opp) #	1. LIGHT	S	1. NEW	S
2. SPACE	S	2. DARK	S	2. STARS	S
3. SUN	P (relational opp) #	3. SATELLITE	P (synonymy)	3. ECLIPSE	S
4. WATER	O	4. SPACE	S	4. NIGHT	S
5. SUN	P (relational opp) #	5. NIGHT	S	5. STAR	S
6. NIGHT	S	6. SHADOW	S	6. SUN	P (relation compl) #
7. TOOK	C	7. NIGHT	S	7. STAR	S
8. LOVE	S	8. NIGHT	S	8. MAN	S

Symbols: Paradigmatic: P; Syntactical: S; Clang: C; Other: O; No Response: NR; Canonical: #

Paradigmatic Relations: Synonymy: syn; Antonymy: relational opp; gradable opp; complementary opp; Hyponymy: hypon; Hypernym: hyper; Co-hyponym: co-hyp; Meronymy: meron

2. COLD

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. HOT	P (grad opp) #	1. WATER	S	1. ICE	S #
2. WINTER	S	2. ICE	S #	2. HOT	P (grad opp) #
3. HOT	P (gradable opp) #	3. WINTER	S	3. WINTER	S
4. FREEZE	P (gradable opp)	4. ICE	S #	4. ICE-CREAM	S
5. DISTANCE	S	5. ICE	S #	5. HOT	P (grad opp) #
6. BLUE	S	6. FEELING	S	6. HOT	P (grad opp) #
7. YES	O	7. FREEZE	P (grad opp)	7. HOT	P (grad opp) #
8. GLOVES	S	8. COFFEE	S	8. HOT	P (grad opp) #

Symbols: Paradigmatic: P; Syntactical: S; Clang: C; Other: O; No Response: NR; Canonical: #

Paradigmatic Relations: Synonymy: syn; Antonymy: relational opp; gradable opp; complementary opp; Hyponymy: hypon; Hypernym: hyper; Co-hyponym: co-hyp; Meronymy: meron

3. A CHILD

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. WOMAN	P (grad)	1. CHILDREN	C	1. SMALL	S
2. GAME	S	2. FUN	S	2. BOY	P (hypon)
3. BOY	P (hypon)	3. WEEP	S	3. MOTHER	P (rel opp)
4. KID	P (syn)	4. LITTLE	S	4. BABY	P (hypon)
5. NEVER	O	5. LITTLE	S	5. MOTHER	P (rel opp)
6. LITTLE	S	6. PLAYING	S	6. BOY	P (hypon)
7. MOTHER	P (relation opp)	7. BABY	P (hypon)	7. ADULT	P (grad opp) #
8. SCREAMS	S	8. MESS	S	8. GIRL	P (hypon)

Symbols: Paradigmatic: P; Syntactical: S; Clang: C; Other: O; No Response: NR; Canonical: #

Paradigmatic Relations: Synonymy: syn; Antonymy: relational opp; gradable opp; complementary opp; Hyponymy: hypon; Hypernym: hyper; Co-hyponym: co-hyp; Meronymy: meron

4. BEAUTIFUL

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. PRETTY	P (syn) #	1. FACE	S	1. PRETTY	P (syn) #
2. WOMEN	S	2. GORGEOUS	P (syn)	2. WOMAN	S
3. FLOWER	S	3. HER	O	3. WOMAN	S
4. AWESOME	O	4. WONDERFUL	P-(syn)	4. PRETTY	P (syn) #
5. SEA	S	5. WOMAN	S	5. UGLY	P (grad opp) #
6. FLOWER	S	6. PERFECTION	P (hyper)	6. UGLY	P (grad opp) #
7. ONLY	O	7. MUSIC	S	7. UGLY	P (grad opp) #
8. GIRL	S #	8. ME	O	8. UGLY	P (grad opp) #

Symbols: Paradigmatic: P; Syntactical: S; Clang: C; Other: O; No Response: NR; Canonical: #

Paradigmatic Relations: Synonymy: syn; Antonymy: relational opp; gradable opp; complementary opp; Hyponymy: hypon; Hypernym: hyper; Co-hyponym: co-hyp; Meronymy: meron

5. A FRUIT

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. BANANA	P (hypon)	1. VEGETABLE	P (hyper)	1. APPLE	P (hypon) #
2. TREE	S	2. JUICY	S	2. GRAPE	P (hypon)
3. DELICIOUS	S	3. DELICIOUS	S	3. BASKET	S
4. PINEAPPLE	P (hypon)	4. HEALTHY	S	4. STRAWBERRY	P (hypon)
5. DOG	O	5. SWEET	S	5. APPLE	P (hypon) #
6. APPLE	P (hypon) #	6. FLAVOUR	S	6. PEACH	P (hypon)
7. JUICE	S #	7. FRESH	S	7. VEGETABLE	P (hyper)
8. ORANGE	P (hypon)	8. HEALTHY	S	8. PEACHES	P (hypon)

Symbols: Paradigmatic: P; No Response: NR; Syntactical: S; Canonical: #; Clang: C; Other: O

Paradigmatic Relations: Synonymy: syn; Antonymy: relational opp; gradable opp; complementary opp; Hyponymy: hypon; Hypernym: hyper; Co-hyponym: co-hyp; Meronymy: meron

6. AFRAID

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. BRAVE	P (relation opp)	1. TERRIFIED	P (syn)	1. SCARED	P (syn)
2. NIGHT	S	2. DARKNESS	S	2. SCARED	P (syn)
3. FEAR	P (syn) #	3. SCARED	P (syn)	3. DARK	S
4. SCARED	P (syn)	4. FEAR	P (syn) #	4. FEARFUL	P (syn)
5. VICTIM	S	5. FEIR (fear)	P (syn) #	5. DARK	S
6. DARK	S	6. BAD	O	6. SCARED	P (syn)
7. TERROR	P (syn)	7. ANT	S	7. SCARED	P (syn)
8. BRAVE	P (relation opp)	8. SPIDERS	S	8. FEAR	P (syn) #

Symbols: Paradigmatic: P No Response: NR
Syntactical: S Canonical: #
Clang: C
Other: O

Paradigmatic Relations: Synonymy: syn Hyponymy: hypon
Antonymy: relational opp Hypernym: hyper
gradable opp Co-hyponym: co-hyp
complementary opp Meronymy: meron

7. A HOUSE

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. BACKYARD	P (meron)	1. BEAUTIFUL	S	1. DRIVEWAY	P (meron)
2. FLOOR	P (meron)	2. COSY	S	2. LAWN	P (meron)
3. FAMILY	S	3. LIFE	S	3. HOME	P (syn) #
4. HOME	P (syn) #	4. FAMILY	S	4. HOME	P (syn) #
5. STAR	O	5. MOTHER	S	5. FAMILY	S
6. HOME	P (syn) #	6. WARM	S	6. CASTLE	P (syn)
7. YARD	P (meron)	7. WARM	S	7. COTTAGE	P (syn)
8. YARD	P (meron)	8. FAMILY	S	8. HOME	P (syn) #

Symbols: Paradigmatic: P; Syntactical: S; Clang: C; Other: O; No Response: NR; Canonical: #

Paradigmatic Relations: Synonymy: syn; Antonymy: relational opp; gradable opp; complementary opp; Hyponymy: hypon; Hypernym: hyper; Co-hyponym: co-hyp; Meronymy: meron

8. HUNGRY

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. FOOD	S #	1. FOOD	S #	1. STARVING	P (syn)
2. HAMBURGER	S	2. DESIRE	P (syn)	2. KID	S
3. FOOD	S #	3. FOOD	S #	3. FOOD	S #
4. STARVING	P (syn)	4. BREAD	S	4. FOOD	S #
5. SPOTLIGHT	O	5. FOOD	S #	5. FOOD	S #
6. SANDWICH	S	6. (empty)	NR	6. EAT	S
7. PLEASE	O	7. MORNING	O	7. THIRSTY	P (rel opp) #
8. FOOD	S #	8. FOOD	S #	8. FOOD	S #

Symbols: Paradigmatic: P; Syntactical: S; Clang: C; Other: O; No Response: NR; Canonical: #

Paradigmatic Relations: Synonymy: syn; Antonymy: relational opp; gradable opp; complementary opp; Hyponymy: hypon; Hypernym: hyper; Co-hyponym: co-hyp; Meronymy: meron

9. A WOMAN

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. INDEPENDENT	S	1. FACE	S	1. BEAUTIFUL	S
2. DRESS	S	2. CLEVER	S	2. RED-HAIRED	S
3. BEAUTIFUL	S	3. BEAUTIFUL	S	3. BEAUTIFUL	S
4. GIRL	P (grad opp)	4. BEAUTY	S	4. FEMALE	P (meron)
5. PAIN	O	5. DRESS	S	5. DRESSES	S
6. LADY	P (syn)	6. WORK	O	6. MAN	P (compl opp) #
7. SO	O	7. CAPACITY	O	7. MAN	P (compl opp) #
8. PERFECT	S	8. FASHIONABLE	S	8. MAN	P (compl opp) #

Symbols: Paradigmatic: P
Syntactical: S
Clang: C
Other: O
No Response: NR
Canonical: #

Paradigmatic Relations: Synonymy: syn
Antonymy: relational opp
gradable opp
complementary opp
Hyponymy: hypon
Hypernym: hyper
Co-hyponym: co-hyp
Meronymy: meron

10. SLOW

NONNATIVE INTERMEDIATE		NONNATIVE ADVANCED		NATIVE	
1. TURTULE (turtle)	S	1. CAR	S	1. FAST	P (grad opp) #
2. TURTLE	S	2. RHYTHM	S	2. CAR	S
3. RACE	S	3. LIFE	S	3. FAST	P (grad opp) #
4. WAVES	S	4. MOVEMENT	S	4. TIME	S
5. AWAKE	O	5. CALM	S	5. TURTLE	S
6. STONE	C	6. PATIENCE	O	6. FAST	P (grad opp) #
7. CALM	S	7. MOVEMENT	S	7. FAST	P (grad opp) #
8. CAR	S	8. TURTLE	S	8. FAST	P (grad opp) #

Symbols: Paradigmatic: P
Syntactical: S
Clang: C
Other: O
No Response: NR
Canonical: #

Paradigmatic Relations: Synonymy: syn
Antonymy: relational opp
gradable opp
complementary opp
Hyponymy: hypon
Hypernym: hyper
Co-hyponym: co-hyp
Meronymy: meron

APPENDIX D: Responses to the Word Connection Test (Sample)

MOON:

morning [S] sky [S] clouds [W] space [W] light [W]

sun [S] circle [W] stars[S] night [S] telescope [W]

COLD:

war [S] water [S] frost[W] hand[W] hot [S]

warm [S] snow [W] pain [W] winter [S] ice [W]

CHILD:

baby [W] person [W] human [S] small [S] twin [W]

mother[S] family[W] boy[W] adult [S] sleepy [S]

BEAUTIFUL:

looks [W] lovely [W] face[S] morning [S] fine [W]

pretty [W] girl[S] ugly[S] attractive [W] woman [S]

FRUIT:

apple [S] walnut[W] vegetable[S] sour[W] fly [W]

tomato [S] healthy[S] tree[W] monkey [W] orange[S]

AFRAID:

brave[S] ghost[W] dark[S] nervous[W] dream[W]

scared [S] fear[S] shake[W] frightened[S] unhappy [W]

HOUSE:

city[W] garden[W] park[W] stone[S] door[W]

home[S] fireplace [W] large[S] garage[S] roof [S]

HUNGRY:

baby [S] feeling[W] eat[S] stomach[W] food [S]

table[W] full[S] thirsty [S] need [W] taste[W]

WOMAN:

beautiful[S] lady[S] child[W] person [W] breast[W]

man[S] blonde[W] girl[S] female[S] teacher [W]

SLOW:

car[S] speedy[W] clock[W] quick[S] late[W]

snail[S] drive[S] still[W] fast[S] train[W]

APPENDIX E: Word Connection Test Norming Data (Sample)

word	strong	weak	empty	total
MOON				
circle	40	70	1	W
sky	87	24		S
clouds	8	103		W
space	71	40		S
light	47	64		W
sun	77	34		S
morning	2	109		W
stars	110	11		S
night	107	4		S
telescope	5	95	1	W

MOON	
circle	weak
sky	strong
clouds	weak
space	strong
light	weak
sun	strong
morning	weak
stars	strong
night	strong
telescope	weak

word	strong	weak	empty	total
COLD				
war	21	90		W
warm	49	62		W
water	47	64		W
snow	80	31		S
frost	75	36		S
pain	4	106	1	W
hand	8	102	1	W
winter	100	11		S
hot	75	36		S
ice	96	15		S

COLD	
war	weak
warm	weak
water	weak
snow	strong
frost	strong
pain	weak
hand	weak
winter	strong
hot	strong
ice	strong

word	strong	weak	empty	total
CHILD				
baby	99	12		S
person	53	58		W
human	55	56		W
small	102	9		S
twin	9	102		W
mother	68	42	1	S
family	59	52		S
boy	48	63		W
adult	48	63		W
sleepy	14	97		W

CHILD	
baby	strong
person	weak
human	weak
small	strong
twin	weak
mother	strong
family	strong
boy	weak
adult	weak
sleepy	weak

word	strong	weak	empty	total
BEAUTIFUL				
looks	64	47		S
lovely	65	46		S
face	58	53		S
morning	22	87	2	W
fine	6	104	1	W
pretty	88	23		S
girl	45	66		W
ugly	58	53		S
attractive	91	20		S
woman	57	54		E

BEAUTIFUL	
looks	strong
lovely	strong
face	strong
morning	weak
fine	weak
pretty	strong
girl	weak
ugly	strong
attractive	strong
woman	strong

word	strong	weak	empty	total
FRUIT				
apple	111			S
walnut	4	106	1	W
vegetable	90	21		S
sour	6	105		W
fly	11	99	1	W
tomato	64	47		S
healthy	90	21		S
tree	66	45		S
monkey	3	107	1	W
orange	110	1		S

FRUIT	
apple	strong
walnut	weak
vegetable	strong
sour	weak
fly	weak
tomato	strong
healthy	strong
tree	strong
monkey	weak
orange	strong

word	strong	weak	empty	total
AFRAID				
brave	48	63		W
ghost	33	78		W
dark	69	42		S
nervous	56	55		E
dream	6	105		W
scared	108	3		S
fear	104	7		S
shake	15	96		W
frightened	105	6		S
unhappy	15	95	1	W

AFRAID	
brave	weak
ghost	weak
dark	strong
nervous	strong
dream	weak
scared	strong
fear	strong
shake	weak
frightened	strong
unhappy	weak