

# **Exploring the Relationship between Word-Association and Learners' Lexical Development**

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Follow task 123 outlined on page 152 of McCarthy (1990 *Vocabulary* OUP). You do not have to use students: anyone who has an L2 but has not been brought up as a bilingual will do. Use at least four subjects and test them on their L2 (or L3/ L4 etc.). Report your findings, giving the level(s) of subjects' L2 (L3, etc.) and including the prompt words and responses. Follow McCarthy's list of evaluation points, adding other points to this if you wish.

Approx. 4530 words

## **1.0 Introduction**

Learning or acquiring your first language was a *piece of cake*, right? So why then, is it so difficult for some people to learn a second language? For starters, many learners might be wondering why I referred to a dessert in the opening sentence of a paper concerning vocabulary. The point here is summed up neatly by McCarthy (1990):

No matter how well the student learns grammar, no matter how successfully the sounds of L2 are mastered, without words to express a wide range of meanings, communication in an L2 just cannot happen in any meaningful way (p. viii).

This paper, based on Task 123 of McCarthy's *Vocabulary* (ibid: 152), aims to explore the L2 mental lexicon. A simple word association test consisting of eight stimulus words was administered to both low-level and high-level Japanese EFL students as well as a group of native English speakers for comparative reasons. Half of the participants were presented with verbal prompts and the other half were presented with visual prompts. The following section will present the necessary background information on the mental lexicon and word association before moving on to the experiment.

## **2.0 The Mental Lexicon and Word Association**

### **2.1 The Mental Lexicon: What is it?**

The mental lexicon is "a person's mental store of words, their meaning and associations" (Richards and Schmidt, 2002: 327). The term itself is a metaphor, as *lexicon* is the Greek word for 'dictionary'. Scholars admit that little is actually known about the mental lexicon (Aitchison, 2003; Channell, 1988; McCarthy, 1990) and all attempts to define and describe it rely on more metaphors that produce incomplete models. McCarthy

(1990: 34) gives the following examples: The mental lexicon is like a dictionary, a thesaurus, an encyclopedia, a library, a computer and a net. Brown (2006: 37) offers a more modern metaphor, comparing it to the Internet and World Wide Web. Despite the obvious differences between the above metaphors, they all have the concepts of *input*, *storage* and *retrieval* in common. Of particular importance to this study is the complexity of *storage* in the mental lexicon, with current research findings dictating expansion to previous models:

...the total model for the place of any word in the lexicon will have to be three-dimensional, with phonological nets crossing orthographic ones and criss-crossing semantic and encyclopaedic [personal knowledge] nets (McCarthy, 1990: 41). The information in the mental lexicon, like a library or computer, is always being updated. New words are added, new connections to existing words are made and unused words may be forgotten. This is true for both native speakers and L2 learners (ibid: 42).

Research on the mental lexicon of native speakers (NS) and bilinguals is fairly well established but has neglected second language (L2) learners. This leaves the question of how the L2 mental lexicon is organized open and in need of further exploration. Another issue to consider is the relationship between the L1 and L2 mental lexicon. Research in this area has produced conflicting results with some studies pointing to separate word stores and others finding evidence to support a single one. However, the majority of studies show that there is a clear link between the L1 and L2 mental lexicons of individual speakers (Channell, 1988). Although previous studies had found no substantial evidence that the L1 and L2 mental lexicons are organized in the same way (ibid), newer research is demonstrating that they are in fact structurally similar (Wolter, 2001).

### **2.1.1 The Japanese Mental Lexicon**

Although, far beyond the scope of this paper, it is an interesting digression to note the research into the Japanese mental lexicon as all the L2 subjects in the current study are Japanese. The Japanese language has a complicated writing system that combines four scripts: logographic Chinese kanji characters, two syllabic scripts, Hiragana and Katakana, and more recently, the Latin alphabet, known as Romaji. Psycholinguists have long been interested in the structure of the Japanese mental lexicon due to this unique blending of scripts, especially the possibility of different modes of access when dealing with Kanji. Kess and Miyamoto (1999, cited in Matsunaga, 2001) have debunked the once common view that the right hemisphere of the brain dominated Kanji processing. Furthermore, it was traditionally believed that kanji bypassed phonemic recoding when accessing the mental lexicon since logographs represent words rather than sounds. It has since been found that it is not the script that determines the decoding route but the familiarity with the word. This is also true for English. Kess and Miyamoto conclude that the frequency of using different processing routes (phonologic vs. semantic) may vary according to language but their availability is universal (1997).

### **2.2 Exploring the Mental Lexicon**

Aitchison (2003) lists four main methods for researching the mental lexicon: 1) word searches (tip-of-the-tongue or TOT states) and slips of the tongue, 2) linguistics and linguistic corpora, 3) speech disorders and brain scans and 4) psycholinguistic experiments (p. 16-17). The method of investigation for the current study, a simple word

association test, is a psycholinguistic experiment and will be described in more detail below.

### **2.2.1 Word Association**

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

### **2.3 Association Types**

The majority of word association literature focuses on the two main organizing principles of language: *syntagmatic* (chain) and *paradigmatic* (choice) relations. *Syntagmatic* associations are those that would be related by a phrase or syntactic structure.

*Paradigmatic* associations on the other hand, involve the other words that could replace the target word. Previous research has shown a tendency for native speakers to respond to word association stimuli paradigmatically and for non-native speakers to respond syntagmatically (Coulthard et al., 2000: 27; Meara, 1982). In addition to the paradigmatic/ syntagmatic distinction, word associations can be based solely on their phonological or orthographic relations. These responses, sometimes labeled *clang*

*responses*, are far less common and usually given by low-level language learners. Finally, some responses are related to one's personal knowledge about the word; these are referred to as *encyclopaedic responses*.

### **2.3.1 Paradigmatic Relations**

#### **Co-ordination**

Co-ordination (including antonymy) refers to words “on the same level of detail” e.g. ‘dog’ and ‘cat’. Co-ordination and antonymy can be further classified into *complementarity*, *gradable antonyms*, *converses* and *mutual incompatibles*. Previous word association research has shown co-ordination to be the most common type of response for native speakers (Aitchison, 2003: 86 cited in McCarthy, 1990: 39-40).

*Complementarity* occurs between words that exclude each other and cannot be graded such as ‘dead/alive’. *Gradable antonyms* on the other hand, have different degrees between two core opposites: ‘long’, ‘medium-length’, ‘shoulder-length’ and ‘short’. *Converses* are antonyms that reciprocate each other and have interdependent meanings such as ‘husband’ and ‘wife’. Finally, *mutual incompatibles* are co-ordinates or pseudo-antonyms that belong to the same semantic field (e.g. colour) and therefore exclude each other. If it's blue, it cannot also be red (Carter, 1998: 20-21; Coulthard et al., 2000: 25).

#### **Hyponymy and Hypernymy**

*Hyponymy* encompasses the hierarchical relationships of superordination (*hypernymy*) and subordination (*hyponymy*). ‘Pet’ is the hypernym of ‘dog’, which is in turn a

hyponym of 'pet'. 'Dog', 'cat', 'parakeet' and 'iguana' are referred to as *co-hyponyms* in this paradigm (Carter, 1998: 21; Coulthard et al., 2000: 26). *Co-hyponymy* is a form of *co-ordination*. Additionally, Hasan (1984, cited in Carter, 1998) coined the term *meronymy* to describe part-whole relationships where 'bedroom', 'bathroom' and 'kitchen' would be *co-meronyms* of the *hypernym* 'house'. Superordination is the third most common word association response for native speakers (Aitchison, 2003).

### **Synonymy**

If two words can be used interchangeably in all sentence contexts, they are *strict synonyms* (Jackson, 1988: 65-66). This is highly uncommon however; a more useful term is *loose synonymy* which is a relationship of similar meaning across many but not necessarily all contexts (Coulthard et al., 2000: 24). 'Tall' and 'high' are synonymous but not strict synonyms. We do not typically refer to a person as being really high (with reference to height). Aitchison (2003) found synonymy to be the fourth most common type of word association response for native speakers.

### **2.3.2 Syntagmatic Relations**

#### **Collocation**

Collocation (literally 'placing together') is the tendency for some words to regularly co-occur together. These co-occurrences are not random and can be either lexical or grammatical. Although *lexical collocation* does involve syntactic structure, the lexical items are responsible for the repeated pattern. *Grammatical collocation*, also referred to as *colligation*, depends on syntactic relationships such as prepositional choice, e.g.

‘buckle up’. *Restricted collocation* occurs when there are very few words that can co-occur with a specific word – ‘auburn’ is lexicogrammatically restricted as it can only be used to describe hair colour. Collocation is the second most common word association response for native speakers (Aitchison, 2003).

Computerized corpora such as the Bank of English have drastically changed the way in which collocation can be studied, making statistical analysis much easier. The word being investigated is labeled the *node* and the words that co-occur with it are its *collocates*. A *nine-word span*, the standard method for finding a node’s collocates, involves counting the words that occur within the four words preceding it and the four words following it. Statistically, collocations can be either strong (significant) or weak (insignificant). (Carter, 1998; Coulthard et al., 2000; Jackson, 1988; Sinclair, 1991).

### **Multi-Word Items**

*Multi-word item* is an umbrella term that refers to phrases or groups of words that function as single lexical items (Coulthard et al., 2000: 62) and can be thought of as “extreme cases of fixed collocations” (Moon, 1997: 43). For NS, the mental lexicon decodes multi-word items as ‘chunks’ (McCarthy, 1990: 44), whereas L2 learners, who often find idioms difficult, are most likely breaking them down and analyzing each word individually. The following table shows the major types of multi-word items found in English listed by Alexander (1984), which he refers to as *fixed expressions*.



<b>Types of fixed expressions</b>	<b>Examples</b>
<b>I Idioms</b>	
(i) irreversible binomials/ compound idioms	spick and span; dead drunk; red tape.
(ii) full idioms	run up (a bill); tear off (rush away); to smell a rat; to rain cats and dogs; to be in the doghouse.
(iii) semi-idioms	beefy-looking; dead drunk; a fat salary; the meeting kicks off at nine.
<b>II Proverbs</b>	A watched pot never boils.
<b>III Stock phrases</b>	When all is said and done; a recipe for disaster; unaccustomed as I am to...; a vicious circle.
<b>IV Catchphrases</b>	That's another fine mess you got me into; What do you think of it so far?; Are you sitting comfortably? Then I'll begin.
<b>V Allusions/ Quotations</b>	You've never had it so good; We are not amused; The lady's not for taking.
<b>VI Idiomatic similies</b>	As sober as a judge; as old as the hills; as daft as a brush.
<b>VII Discoursal expressions</b>	
(i) social formulae/ clichés	How do you do?; Long time, no see; bottoms up!
(ii) connectives; structuring devices	Mark my words; Once upon a time; Finally; to conclude.
(iii) conversational gambits	We'll now take questions from the floor; Guess what!; I wondered if I could have a word.
(iv) stylistic formulae	Further to my letter of 11 <sup>th</sup> inst.; My lords, ladies and gentlemen.
(v) stereotypes	We're just good friends; I thought you'd never ask; It's not what you think!

Table 1

Alexander, 1984: 3

### **Encyclopaedic Knowledge**

McCarthy (1990) briefly discusses *encyclopaedic* responses, which I would argue to be predominantly syntagmatic in nature. These responses are related to one's personal knowledge acquired over time concerning the target word that creates "a web-like set of associations" (p. 41). A native speaker would therefore have all of their encyclopaedic

knowledge linked together with associative words. If the structure of the L1 and L2 mental lexicons are organized in the same way, L2 learners would produce encyclopaedically based word associations less often as their L2 mental lexicon and encyclopaedic knowledge base would be much less developed.

### **2.3.3 Phonological and Orthographical Relations**

In addition to a semantically organized mental lexicon, there is evidence for phonetic and orthographic organization as well (ibid: 35). The *bathtub effect*, a term coined by Aitchison (2003), describes the tendency for people to remember the beginning and end of words more easily than the middle:

...as if the word were a person lying in a bathtub, with their head out of the water at one end and their feet out at the other. And, just as in a bathtub the head is further out of the water and more prominent than the feet, so the beginnings of words are, on average, better remembered than the ends (p. 138).

Words with similar uncommon spellings may also be linked or stored together, such as the silent 'k' in 'knife', 'know' and 'knight' (McCarthy, 1990: 35). Further evidence for a phonetically organized mental lexicon can be found in research on *malapropisms*, speech errors caused by related pronunciation rather than meaning, e.g. first→fast; finally→formally etc. (Fay and Cutler, 1977, cited in Channell, 1988: 87). Lower level learners and children are more inclined to produce phonetically based *clang* associations. This is likely due to their inability to make spontaneous collocational associations and sometimes from the subject mishearing the stimulus word (McCarthy, 1990; Meara, 1982; Wolter, 2001).

### 3.0 Research and Research Methods

#### 3.1 Overview and hypotheses

To gain a better understanding of the mental lexicon and lexical development of L2 learners, the word associations of higher- and lower-level learners were compared with those of native speakers. The experimental procedure followed Task 123 of McCarthy's *Vocabulary*:

- 1) Draw up a list of six to eight words to be used as stimuli in a simple word association test. Try to vary the test items, to include:
  - at least one grammar/function word (e.g. preposition, pronoun).
  - one or two items from the everyday physical environment (e.g. 'table', 'car').
  - a relatively uncommon or low-frequency word but one which your students will nonetheless know (this will depend upon the group's level: elementary-level students might require a word like 'drink', but an advanced group can probably cope with a word like 'surrender'; your own experience will tell you what is suitable).
  - a mix of word-classes (e.g. noun, adjective, verb).
- 2) Deliver the test to the class, asking them to write down the very first word that occurs to them when each item is heard.
- 3) Gather in the results and see if any patterns emerge from the responses.

(1990: 152)

The following three evaluation points are included in Task 123:

- 1) Does such a word-association test tell you anything about how your learners are making mental links between words they have learnt?
- 2) At lower levels, are phonological similarities playing an important role?
- 3) Do the results bear out the characteristic types of response discussed in 3.2?

(ibid)

Two more evaluation points were added in addition to McCarthy's:

- 4) Are there differences between the responses of low-level and high-level students?
- 5) Do spoken and written prompts elicit different responses?

The fourth point was added in order to perform a direct analysis between the two groups in the study: Group 1) beginner and elementary students and Group 2) intermediate and advanced students. The fifth evaluation point was added in response to Brown (2006), who noted that written and spoken prompts might produce different responses and that problems due to homophony (e.g. *in/inn*) would likely be significantly reduced with written prompts (p. 28).

Based on previous word-association research, the following trends would be expected in the current study:

- The NS responses will be predominantly paradigmatic and the L2 learners will mostly respond syntagmatically (Coulthard et al., 2000: 27; Meara, 1982).
- The majority of NS responses will involve co-ordination followed by collocation, superordination and synonymy (Aitchison, 2003).
- The lower level learners may produce more *clang* responses based on phonological similarities (Aitchison, 2003; McCarthy, 1990).

Aitchison's word association results need to be viewed with caution however, since they are based on responses to nouns and adjectives only: 'butterfly', 'hungry', 'red' and 'salt'.

Wolter (2001) challenges the view that there is a shift from predominantly syntagmatic responses to predominantly paradigmatic responses in lexical development. He argues

that most word association tests rely on common, high frequency words as prompts, such as those on the Kent-Rosanoff list and therefore limit models of the mental lexicon based on these words. When using low frequency words, the responses of NS, L2 learners and NS children all produce similar responses (p. 5). As some of the prompt words in the current study would be considered low frequency words, Wolter's hypotheses will also be considered when evaluating the results.

### **3.2 Methodology**

When administering her word association test, Wright (2001: 7) used the word 'quiz' rather than 'test' to discourage subjects from searching for the 'right' answer. Brown (2006) used the less stress-inducing word 'task' to further reinforce this point. Following this line of thought I introduced my word association test as a word association 'activity'; the visual prompt test and questionnaire were simply labeled 'Word Association'.

The word association test was administered visually to half of the subjects and verbally to the other half. The visual prompt test consisted of nine strips of paper stapled together to form a small booklet. The first strip included the directions and a space for the participants' names with a single prompt word on the eight remaining strips. The prompts were put on individual strips to avoid interference (see Appendix A). Six of the native speaking participants were contacted by email and received the test as an attachment. The prompt words were spaced so that the participant had to scroll down after each response, again to avoid interference with the other prompt words.

When administering the verbal prompt test, the participants were asked to write the first word or words (to include multi-word item responses) that they thought of after hearing each prompt word. The verbal test was administered over the telephone with two native speaking subjects and followed the same procedure as the face-to-face test.

All participants completed a post-test questionnaire in which they provided reasons for their responses (see Appendix B). This was used to analyze uncommon responses and to aid classification. In the classroom settings, we had a follow-up discussion on learning new vocabulary where I explained the purpose of the activity and suggested a method for studying and retaining vocabulary (see 4.0).

### 3.3 Participants

A total of 75 subjects participated in the study: 51 Japanese students, seven Japanese coworkers and managers, nine NS coworkers, four NS friends and four family members.

The participants were divided into six groups:

<b>Group (English level and test format: visual/verbal)</b>	<b>Number of subjects</b>
Beginner/elementary-visual (L-VIS)	20
Beginner/elementary-verbal (L-VER)	22
Intermediate/advanced-visual (H-VIS)	9
Intermediate/advanced-verbal (H-VER)	8
Native speaker-visual (N-VIS)	8
Native speaker-verbal (N-VER)	8

Table 2

### 3.4 Choosing the prompts

Meara (1982) blames the lack of adequate L2 mental lexicon models on the minimal consideration given to stimulus words. This type of research produces results that merely describe the types of responses that L2 learners produce (p. 32). Although the types of stimulus in the current study adhere to the specifications set by McCarthy's (1990) Task 123, I attempted to choose stimulus words that would be considered both high and low frequency in order to investigate Wolter's (2001) hypotheses discussed above. In addition, I specifically chose some words that could possibly prompt encyclopaedic responses with certain participants to investigate the strength of encyclopaedic associations. The following table lists the prompt words and the reasons for choosing them:

<b>Stimulus word</b>	<b>Reason for choosing stimulus</b>
1) under	A slightly less frequent preposition taught in the EFL classroom compared to 'in' 'on' 'at' etc...
2) book	A very high frequency noun that even low level learners would be expected to have strong associations with in their mental lexicon.
3) bike	High frequency but can refer to both 'bicycle' and 'motorbike'; noun and verb; mountain biking is my hobby and I was interested in the possibility of encyclopaedic responses referring to this.
4) ouch	A very low frequency word in the EFL setting; interjections rarely or never used as word association stimuli.
5) surf	A relatively low frequency verb that can refer to the sport or the colloquial 'surf the internet'.
6) cold	A high frequency adjective for both native speakers and L2 learners.
7) fast	A high frequency word that is both an adjective and an adverb.
8) tsunami	A borrowed word from the subjects' native language (Japanese) which is rare in word association research; a very strong word that may prompt encyclopaedic responses from both Japanese and my friends and family (my wife and I experienced the Asian tsunami first hand in Thailand).

Table 3

### 3.5 Results

#### 3.5.1 Classification of results

In total, 556 responses were collected for the eight stimulus words, with six instances of low-level students being unable to provide a response. All of the responses were first classified into paradigmatic, syntagmatic and phonological associations; the paradigmatic responses were further classified into co-ordination, hyponymy/ hypernymy and synonymy. The frequency of obvious encyclopaedic responses was also recorded. This initial classification is shown in Figure 1 below (a more detailed table can be found in Appendix C).

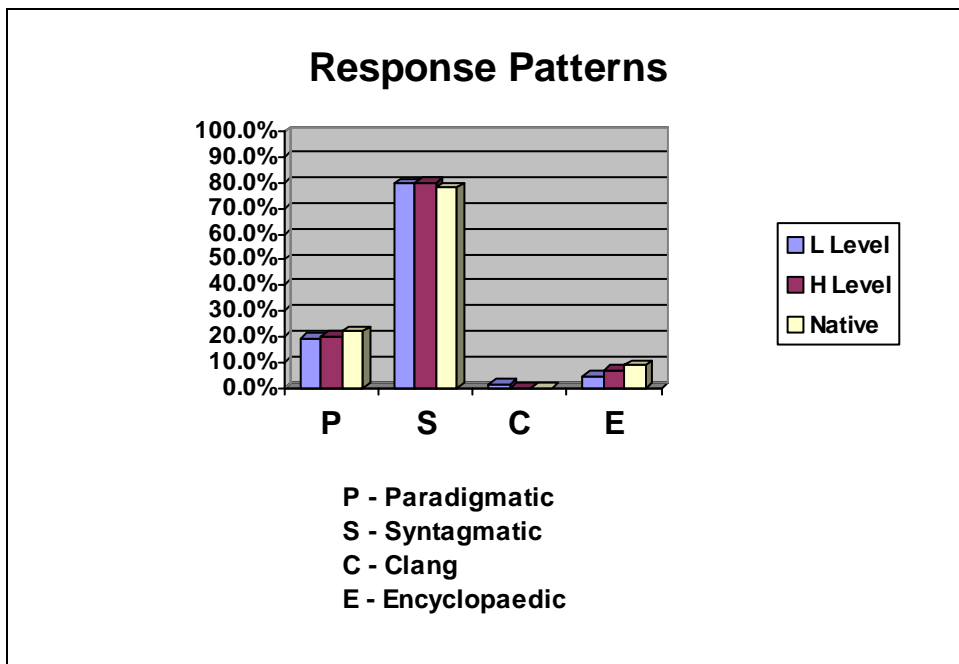


Figure 1

Classifying the responses was time consuming and problematic since many responses could be classified as either paradigmatic or syntagmatic depending on the thought process of the participant. For example, some subjects responded to the prompt 'book'



with 'story'. This can be paradigmatic: It was a good *book*./ It was a good *story*. Or it can be syntagmatic/ collocational as in 'storybook'. Meara (1982) makes a similar statement:

Personally, I have always found that this [paradigmatic/ syntagmatic] distinction is very difficult to work in practice, especially when you cannot refer back to the testee for elucidation, but this difficulty is not generally commented on in the literature (p. 30).

The post-test questionnaire proved to be invaluable for the classification process but not fool proof, as some participants did not give enough information. 'Story' was classified as paradigmatic as one respondent stated that he reads books to his daughter at bedtime.

### **3.5.2 Exploring the mental lexicon of the L2 learner**

*Does such a word-association test tell you anything about how your learners are making mental links between words they have learnt?*

To say that the mental lexicon is complex and highly organized would be an understatement. With that in mind, it is important to realize that our knowledge of it is limited and all representative models are speculative and metaphorical. The word association test is simple and easy to administer, but this simplicity is also its downfall. While it cannot provide a true reflection of the workings of the mental lexicon, it does allow us to briefly peek inside. As a language teacher, the results are very informative as to how students make mental links with their L2 vocabulary. 79.8% of all the L2 learners' responses were syntagmatic, 19.3% were paradigmatic and 0.9% were phonologically based. The breakdown of paradigmatic responses into co-ordination, hypernymy/ hyponymy and synonymy was 13.9%, 3.0% and 2.4% respectively. Additionally, 5.2% of the student responses were found to be encyclopaedic in nature. Nearly all types of word association were represented in the students' responses, which have obvious implications for teaching vocabulary in the EFL classroom. This will be discussed further in 4.0.

### 3.5.3 Are phonological similarities playing an important role at lower levels?

*At lower levels, are phonological similarities playing an important role?*

Phonologically based responses were very uncommon, even with the lowest level students. There were only four such responses in total (see table 4), numbers one to three were in the L-VER group and number four was in the L-VIS group. The first three phonological responses are not actual clang responses in that they didn't relate phonologically to the stimulus word. Instead the participants misheard the stimulus word and produced a typical response to the phonologically related misheard prompt. The fourth response was difficult to classify since the student gave a valid syntagmatically-based reason for the response: It was my last day teaching that particular class and the student wrote, "Today is [the teacher's] last class". The rhyme could be just a coincidence if she was referring to the time passing quickly. On the other hand, there could have been an instant clang association that she was able to find an explanation for. Numbers one and three are examples of the *bathtub effect* operating at the input level.

<u>Prompt</u>	<u>Response</u>	<u>Reason</u>
1) fast	page	Heard 'first'.
2) surf	plane	Thought 'surface'.
3) cold	TV	Heard 'cord'.
4) fast	last	Today is [the teacher's] last day.

Table 4

### 3.5.4 Are the results characteristic of the responses discussed by McCarthy?

*Do the results bear out the characteristic types of response discussed in 3.2?*

There is a general consensus in the literature concerning word association of a tendency for NS to respond paradigmatically and for non-native speakers and children to respond syntagmatically (Carter, 1998; Coulthard et al., 2000; Deese, 1965; Meara, 1982). The results of the current study do not fully support these findings. The majority of the responses were syntagmatic for both groups of L2 learners and the NS (see Figure 1). However, the NS group produced slightly more paradigmatic responses than the higher and lower level students (21.9% / 19.9% / 19.1% respectively).

McCarthy (1990), summarizing Aitchison (1987) reports that co-ordination is the most common word association response for native speakers, followed by collocation, superordination (hypernymy/ hyponymy) and synonymy. Figure 2 shows that the present study did not replicate these findings; the majority of responses were collocational for all three groups (see Appendix C for more detail).

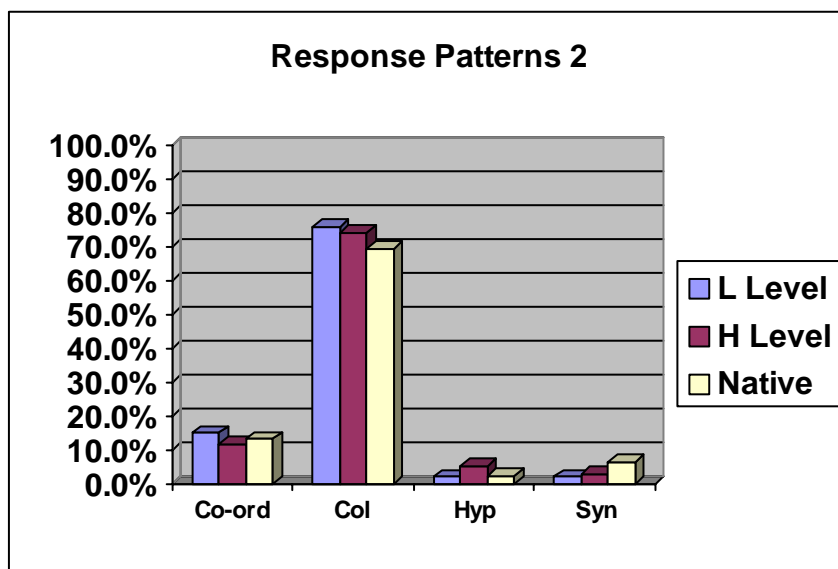


Figure 2

The Bank of English (BOE) Collocation option was utilized to check the collocation strength of the syntagmatic results. Each of the prompt words was entered as the node within a nine-word span using the whole corpus and t-score. Many of the responses of both the L2 learners and the NS were not found to be collocates within the corpus, which suggests weak or uncommon collocation. The results of this analysis are shown in Appendix E.

The NS responses were much more similar to the L2 learners' than would be expected based on past research. This was likely caused by the choice of prompt words in the current study. As previously mentioned, the word association results found in Aitchison (2003) are based on common nouns and adjectives only, whereas the prompts in the current study are more heterogeneous and some of them, such as 'ouch' and 'tsunami' are low-frequency words in the BOE. Table 6 below summarizes the results for the individual prompts, which are more in line with the views of Wolter:

In the few cases in which lower frequency words have been used as prompt words, the pattern of responses has been quite different, resulting in what could be classified as a substantial number of 'childlike' or even 'nonnativelike' responses (Postman, 1970; Stolz & Tiffany, 1972, cited in Wolter, 2001: 42).

Prompt	Part of Speech	Freq. in BOE	Trends
under	preposition	266261	Syntagmatic responses most prominent across all groups although paradigmatic responses significantly higher with NS than L2 learners.
book	noun/ verb	115658	Lower-level students responded with highest percentage of paradigmatic results. Processed as a verb only 2 times (2.7%): 'book a hotel'.
bike	noun/ verb	9978	Lower-level students responded with highest percentage of paradigmatic results. No occurrences where processed as a verb.
ouch	interjection	427	Responses of L2 learners and NS nearly identical with exception of single paradigmatic response (goddamit) by NS.
fast	adjective/ adverb	43464	Interpreted as an adjective 82.2% and as an adverb 17.8%. NS produced far more paradigmatic responses to 'fast' than the L2 learners.
surf	verb	4460	Majority of responses across all groups syntagmatic. However, very few paradigmatic responses available for 'surf'.
cold	adjective/ noun	44371	NS produced more paradigmatic results than L2 learners. Processed as noun 3 times (4.0%).
tsunami	noun	450	Higher-level L2 learners produced the most paradigmatic responses (52.9%), followed by lower level L2 learners (40.5%) and NS (31.2%).

Table 6

In their continuous response word association research, Piper and Leicester (1980, cited in Wolter, 2001) report that NS produced more paradigmatic responses than ESL learners for verbs and adjectives but found almost no difference between the two groups for nouns. The results for 'fast' and 'cold' reflect these findings while the nouns 'book', 'bike' and 'tsunami' do not: the L2 learners produced more paradigmatic responses. The reasons for these unusual results are not exactly clear.

Encyclopaedic responses were the most frequent with 'tsunami' (21.3%) and 'bike' (12.0%). Seven of the 16 native-speaker responses were directly related to the Asian Tsunami. My wife and I were in southern Thailand when the tsunami struck and very luckily survived. We were unable to contact our families to tell them we were safe for about 36 hours. This of course was very traumatic for my family and close friends who made up the native speaking group. The most evident encyclopaedic response came from my sister who responded with 'my brother'. The remaining encyclopaedic responses for 'tsunami' came from the L2 learners who associated the word with a Japanese pop group who have a song entitled 'Tsunami'. Eight of the nine encyclopaedic responses for 'bike' were related to me as well as all my friends and students know that I am an avid mountain biker. Very few references to encyclopaedic knowledge were found in the literature while these results show that they can be a significant factor in word association, especially for words with strong emotional ties.

### **3.5.5 Are their differences between higher and lower level students?**

The difference in responses between the higher and lower level L2 learners was minimal. The higher-level students responded paradigmatically 19.9% of the time compared to 19.1% for the lower-level students. When the results are broken down for the individual words as shown in Table 6 it is evident that the results vary according to the word and word class more than the level of the students' English (see Appendix D for more detail).

### **3.5.6 Do the results vary according to spoken or written prompts?**

The only significant difference between the spoken prompt and written prompt groups was that the L-VER group produced clang responses based on mishearing the prompt, which of course was not a problem for the participants who read the prompts.

### **3.5.7 Discussion of Results**

The following points should be taken into consideration while attempting to make sense of the mixed results, especially those discussed in 3.5.4:

- There is no standardized method of classifying word association results. Wolter (2001) classified all derived forms as clang responses whereas the BOE lists derived forms as collocation e.g. surf → surfer; surfing. I followed this method for my classification.
- Several studies have reported that Japanese adults tend to respond syntagmatically both in English and Japanese. Koreans were also found to respond this way (Yoneoka, 2001).
- The *idiom principle*, the importance of multi-word items and collocation (Sinclair, 1987b, cited in Coulthard et al., 2000), is likely affecting results: the verb 'surf' has few paradigmatic choices; several participants responded to 'book' with 'worm' etc.

## **4.0 Implications for teaching**

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

It seems evident then that simply telling students the meaning of new words is not enough to fully incorporate them into the mental lexicon. After the students completed the word association task and questionnaire, I led a discussion on learning new words and explained the purpose of the research. Agreeing with McCarthy's (1990) point that technical linguistic terms such as 'antonymy', 'polysemy' and 'collocation' are likely not useful to the language learner (p. 19), I elicited from the students in their own words the types of connections they observed in their responses. Following this discussion, I suggested that students keep a 'vocabulary journal' in which they could write new words and all of the connections that they can think: part of speech; spelling, syllables and stress; words with similar meanings; opposites; categories the words belong to; words that usually connect to the word and personal experiences etc. I explained that by writing down all of these connections, they would be assisting their mental lexicon in building stronger links between words which in turn would help them remember the new vocabulary.

## **5.0 Conclusion**

The purpose of this paper was to gain insight into the lexical development of the second language learner. While the results of the word association test did not replicate the findings of Aitchison (2003) as discussed by McCarthy (1990) they clearly demonstrate that the mental lexicon of both the L2 learner and the native speaker is highly organized and cross-referenced on many levels. Wolter's (2001) theory that low frequency words elicit similar responses from both L2 learners and native speakers is supported. Encyclopaedic knowledge is also highly influential for certain words, which by its very



nature will vary from person to person. The overall results seem to suggest that attempting to categorize and predict word association results based on word class and participant language level is insufficient; the specific nature of individual words likely has a stronger effect. Overall, the only definite conclusion that I can make is that we have a long way to go before we fully understand the complexities of the mental lexicon.

## Appendix A

Name: \_\_\_\_\_

### Word Association

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

**under**

\_\_\_\_\_

**book**

\_\_\_\_\_

**bike**

\_\_\_\_\_

**ouch**

\_\_\_\_\_

**fast**

\_\_\_\_\_

**surf**

\_\_\_\_\_

**cold**

\_\_\_\_\_

**tsunami**

\_\_\_\_\_

Appendix B

**Word Association Questionnaire**

Name: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: M / F

Native language: \_\_\_\_\_

2<sup>nd</sup> / 3<sup>rd</sup> languages: \_\_\_\_\_

Level of English: Beginner / Elementary / Intermediate / Advanced

**Please comment on how or why you chose your responses:**

**1) *under***

response: \_\_\_\_\_

reason: \_\_\_\_\_

**2) *book***

response: \_\_\_\_\_

reason: \_\_\_\_\_

**3) *bike***

response: \_\_\_\_\_

reason: \_\_\_\_\_

**4) *ouch***

response: \_\_\_\_\_

reason: \_\_\_\_\_

**5) *fast***

response: \_\_\_\_\_

reason: \_\_\_\_\_

**6) *surf***

response: \_\_\_\_\_

reason: \_\_\_\_\_

**7) *cold***

response: \_\_\_\_\_

reason: \_\_\_\_\_

**8) *tsunami***

response: \_\_\_\_\_

reason: \_\_\_\_\_

## Appendix C

### Overall Results

		<b>Beginner/ Elementary</b>	<b>Intermediate/ Advanced</b>	<b>Native</b>
<b>Number of Responses</b>		330	136	128
<b>Paradigmatic Responses</b>	<b>Frequency</b>	63	27	28
	<b>Percentage</b>	19.1%	19.9%	21.9%
<b>Co-ordination</b>	<b>Frequency</b>	49	16	17
	<b>Percentage</b>	14.8%	11.8%	13.3%
<b>Hyponymy/ Hypernymy</b>	<b>Frequency</b>	7	7	3
	<b>Percentage</b>	2.1%	5.1%	2.3%
<b>Synonymy</b>	<b>Frequency</b>	7	4	8
	<b>Percentage</b>	2.1%	2.9%	6.3%
<b>Syntagmatic Responses</b>	<b>Frequency</b>	263	109	100
	<b>Percentage</b>	79.7%	80.1%	78.1%
<b>Collocation</b>	<b>Frequency</b>	250	101	89
	<b>Percentage</b>	75.8%	74.3%	69.5%
<b>Clang Responses</b>	<b>Frequency</b>	4	0	0
	<b>Percentage</b>	1.2%	0%	0%
<b>Encyclopaedic Responses</b>	<b>Frequency</b>	14	9	11
	<b>Percentage</b>	4.5%	6.6%	8.6%

## Appendix D

### Individual Prompt Results

		Beginner/ Elementary			Intermediate/ Advanced			Native		
		P	S	C	P	S	C	P	S	C
<b>1) under</b>	Frequency	5	36	0	3	14	0	5	11	0
	Percentage	12.2%	87.8%	0%	17.6%	82.4%	0%	31.3%	68.7%	0%
<b>2) book</b>	Frequency	20	21	0	7	10	0	2	14	0
	Percentage	48.8%	51.2%	0%	41.2%	58.8%	0%	12.5%	87.5%	0%
<b>3) bike</b>	Frequency	13	29	0	3	14	0	4	12	0
	Percentage	31.0%	69.0%	0%	17.6%	82.4%	0%	25.0%	75.0%	0%
<b>4) ouch</b>	Frequency	0	39	0	0	17	0	1	15	0
	Percentage	0%	100%	0%	0%	100%	0%	6.2%	93.8%	0%
<b>5) fast</b>	Frequency	4	36	2	0	17	0	6	10	0
	Percentage	9.5%	85.7%	4.8%	0%	100%	0%	37.5%	62.5%	0%
<b>6) surf</b>	Frequency	2	38	1	1	16	0	0	16	0
	Percentage	4.9%	92.7%	2.4%	5.9%	94.1%	0%	0%	100%	0%
<b>7) cold</b>	Frequency	3	38	1	4	13	0	4	12	0
	Percentage	7.1%	90.5%	2.4%	23.5%	76.5%	0%	25.0%	75.0%	0%
<b>8) tsunami</b>	Frequency	17	25	0	9	8	0	5	11	0
	Percentage	40.5%	59.5%	0%	52.9%	47.1%	0%	31.2%	68.8%	0%

\*P = paradigmatic      S = syntagmatic      C = clang

## Appendix E

### BOE Collocation Results

<b>under</b>			
<b>Collocate</b>	<b>Frequency</b>	<b>Joint freq.</b>	<b>t-score</b>
pressure	63210	11865	106.1705
water	123435	1977	31.27868
cover	48103	1258	29.02705
tree	22227	833	25.20414
bridge	25349	666	21.14187
table	59395	885	20.26659
covers	11181	239	12.02468
tunnel	8527	201	11.32093
floor	39406	352	8.786289
desk	17426	204	8.488292
sea	48674	380	7.634716
ground	74288	521	7.36797
shirt	18149	180	6.991682
coat	9192	119	6.906734
line	124299	722	4.899696
subway	1860	29	3.744756

<b>bike</b>			
<b>Collocate</b>	<b>Frequency</b>	<b>Joint Freq.</b>	<b>t-score</b>
mountain	21909	919	30.18638
ride	21834	525	22.74328
riding	15054	346	18.45703
road	102596	183	12.17792
exercise	31246	158	12.12738
race	68839	132	10.42272
shop	39520	100	9.296618
rider	8000	79	8.727999
cycling	6641	64	7.852253
trail	9185	48	6.692246
lock	10571	28	4.935944
park	86463	42	4.106199
fast	43464	22	3.041143
gang	10791	12	2.909674
biking	835	7	2.58958
fun	35257	16	2.431229
school	165332	41	1.807557
wind	25670	8	1.21312
stand	59185	15	1.153164

<b>book</b>			
<b>Collocate</b>	<b>Frequency</b>	<b>Joint freq</b>	<b>t-score</b>
read	75248	2821	50.19028
history	88979	643	18.11828
text	17895	325	15.97992
library	17116	318	15.85242
writer	30636	242	11.4935
interesting	34874	218	9.892009
shelf	5629	112	9.485697
store	27802	170	8.639365
gardening	7458	87	7.677816
shop	39520	186	7.660032
note	32340	129	5.48358
note	32340	129	5.48358
learning	29938	110	4.599208
study	59402	179	4.219397
hotel	51772	148	3.386013

<b>ouch</b>			
<b>Collocate</b>	<b>Frequency</b>	<b>Joint freq.</b>	<b>t-score</b>
hurt	21708	8	2.769971
kick	23737	5	2.155214
pain	33238	4	1.87342
toe	4461	2	1.390188
injection	3647	1	0.972222
wrist	3705	1	0.971781
mistake	17148	1	0.869391
hot	43814	1	0.666288
hot	43814	1	0.666288
door	63835	1	0.513797

<b>fast</b>			
<b>Collocate</b>	<b>Frequency</b>	<b>Joint freq.</b>	<b>t-score</b>
food	97625	2240	45.72946
run	125953	514	18.36445
furious	8567	311	17.25857
running	64633	363	16.42253
car	116419	327	13.09188
speed	36441	163	10.55427
foods	14371	102	8.996323
ran	33618	115	8.293374
downhill	2269	62	7.6506
train	32566	97	7.285325
jet	10721	50	5.8956
work	323761	325	4.104425
runner	8812	27	3.881373
intel	2669	11	2.692728

<b>cold</b>			
<b>Collocate</b>	<b>Frequency</b>	<b>Joint freq.</b>	<b>t-score</b>
water	123435	2711	50.19096
weather	28370	1060	31.86798
winter	34632	841	28.05483
ice	26824	711	25.86839
wind	25670	438	19.95767
beer	16519	249	14.95119
snow	15323	184	12.6706
shower	6689	167	12.51318
flu	4450	119	10.58585
shivering	1027	100	9.918717
drink	32412	111	8.100793
bad	82575	158	7.370445
snowy	1003	29	5.237753
head	142147	175	4.724262
jacket	9790	20	2.739539
vodka	2386	10	2.565105
cave	5972	12	2.099647

<b>surf</b>			
<b>Collocate</b>	<b>Frequency</b>	<b>Joint freq.</b>	<b>t-score</b>
net	51095	133	11.1801
internet	37632	104	9.904473
sand	12387	100	9.901456
waves	10540	47	6.733346
board	77629	47	5.954829
ocean	13859	32	5.46195
wave	17198	32	5.414992
sea	48674	33	5.070492
surfing	2694	23	4.751143
boat	29621	27	4.742646
turf	4326	22	4.617042
water	123435	29	3.561669
sports	39239	17	3.365996
snow	15323	8	2.39744
rider	8000	6	2.189665
cool	23742	8	2.16064
computer	55755	11	1.979251
surfer	694	4	1.972395
toyota	3262	4	1.870246
website	12334	5	1.79725
blue	54775	7	0.998731

<b>tsunami</b>			
<b>Collocate</b>	<b>Frequency</b>	<b>Joint Freq.</b>	<b>t-score</b>
wave	17198	34	5.807277
tidal	2114	23	4.792293
pacific	16981	10	3.119175
disaster	18025	9	2.951772
earthquake	5934	8	2.811587
damage	33837	7	2.543095
coast	40194	7	2.523809
Japanese	43822	6	2.305888
high	211912	8	2.227041
survivors	6055	4	1.975699
sea	48674	4	1.804651
dangerous	27483	3	1.604687
lost	105985	3	1.240886
terrible	19950	1	0.839865
song	26776	1	0.785074
south	156488	1	-0.2561
big	186459	1	-0.49667

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