Exploring the mental lexicon using word association tests: How do native and non-native speakers of English arrange words in the mind?

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> Module 3 Assessment Task LX/11/02

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1.1 Introduction

The mental lexicon is the collection of known words within a person's mind and the connections between them. Aitchison (1994: 32) compares the connections between words in the mind to those between the trains in the London Underground, but explains that unlike the London Underground, there is no visible map to the mental lexicon. The word association test (WAT) is one way researchers can make inferences about the organization of the mental lexicon. This study aims to examine the types of word associations made by non-native speakers of English, from low-intermediate to near-native proficiency levels. For this purpose, an eight item word association test (WAT) was administered to non-native speakers, as well as to a native speaking control group. The study follows task 132 in McCarthy's *Vocabulary*, addressing three particular questions:

- 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?

(McCarthy, 1990: 152).

McCarthy's 'characteristic types of response,' referring to a study by Aitchison (1987; in McCarthy, 1990, 39), include: coordination, collocation, super and subordination, synonyms, encyclopaedic, and form-based (phonological, orthographic).

In addition to McCarthy's three questions, this study will examine the following question about word association tests:

4) Are multiple response WATs more effective than single response WATs, as a means of gaining understanding of the mental lexicon?

This study will begin an overview of different types of word associations. Then, some important studies on the subject will be summarized, focussing on two different methods of classifying responses. Next, the study itself will be explained, and the findings will be assessed in terms of the four questions above.

2.1 Understanding lexical associations

2.2 Semantic associations

Semantic networks consist of words that associate by meaning, rather than by word form or specialized world knowledge or experience. Semantic relations may be divided into *syntagmatic* and *paradigmatic* relations.

2.2.1 Syntagmatic relationships: left-to-right textual relationships

Syntagmatic relationships, or collocations, are a left-to-right textual relationship between a stimulus word and a response word, meaning that the stimulus word cannot replace the response word in a sentence. The stimulus word and the response word are generally of different word classes. Some categories of collocational associations may include:

Idioms or other fixed multi-word items: words may collocate together in idioms or other fixed multi-word expressions that may be difficult to translate or understand as a language learner. (McCarthy, 1990: 7).

Restricted collocation: some collocational descriptions are limited to certain adjectives or adverbs which can only describe certain things: eg. 'blond hair' or 'beige car' (McCarthy, 1990: 12).

Grammatical collocation, or *colligation*: a collocation that depends on a particular grammatical item, such as the preposition 'up' in 'to make up' (one can't say 'to invent up') or the negative 'not' in 'not surprising' (as opposed to 'not amazing'). *Lexical collocation:* a word forms a predictable collocation with another word: eg. lions 'roar' but they don't 'shout'.

How an individual understands or uses collocations likely indicates his or her level of English ability. McCarthy (1990) attributes knowledge of fixed collocations to native-like competence, and Ellis (1997) draws attention to the fact that native speakers generally do not produce 'creative' collocation based on syntactic rule. However, syntagmatic relationships do not need to be fixed, predictable, or adjacent. When dividing responses into paradigmatic and syntagmatic categories, many of the syntagmatic responses are merely words which may occur in the same sentence as the stimulus words.

2.2.2 Paradigmatic relationships: vertical textual relationships

Paradigmatic relationships often occur between words of the same word class, and they may be regarded as 'vertical' relations because grammatically, words that are paradigmatically related may replace one another in a sentence. They are also known as *sense relations* because they relate to other words grammatically, or by their *sense*, as opposed to by *denotation*, or meaning (McCarthy 1990: 16). For example, 'chair' and 'table' are paradigmatically related because in the sentence 'The chair/table is brown', either word choice is possible, regardless of whether it is the table or the chair that is brown. There are different types of sense relations, which are described in McCarthy (1990: 40) and Aitchison (1994: 86). Below is a summary of the relations which occur in this study:

Coordination: responses which occur on a same level of detail: eg. 'salt' - 'pepper'. Coordinates also include antonyms, although depending on the speaker's intention, they may be binomial collocations ('She's been playing him *'hot and cold'*) (Murphy, 2006).

- Superordination: also known as *hyponym*, this occurs when responses are a general category encompassing the stimulus word: eg. 'animal' 'cat'.
- Subordination: this occurs when the response word is a specific category of the stimulus word, eg. 'chair' 'furniture'.
- Synonymy: responses which indicate similarity, if not a direct synonymous relationship with the stimulus word. A direct synonymous relationships exists between 'worried' and 'anxious', while a situation-specific synonymous relationship exists between 'worried' and 'sad'.
- Meronymy: a whole-part relation: eg. 'hand' 'fingers'.

2.3 Formal associations

Formal associations are based on the form, rather than the meaning, of the stimulus word. They can be phonetic, related to sound, or orthographic, related to how the word appears in print. Whether lower level language learners make more phonological associations than higher level learners is a central question to this study. Aitchison (2003) attributes the tendency to confuse similar sounding or looking words with one another to something termed *the bathtub effect*: it is easier to remember the 'head' or the 'feet' of the word than the middle. Malapropisms, which occur in high and low frequency words alike, are evidence that words are, to some extent, phonetically organized in the mental lexicon. Although native speakers may be prone to malapropisms, Meara (1983) finds that they seldom produce clang, or phonographic responses to WAT stimulus words, indicating that they seldom truly mistake a word for a phonetically similar one. However, other studies (Fitzpatrick 2006; Schmitt 1998; Wolter 2001), as well as this one, indicate that native speakers can and do produce clang responses to low frequency words.

2.4 Encyclopaedic associations

Encyclopaedic associations depend upon the respondent's world knowledge, nationality, interests, age, or other personal factors to a greater degree than they do to a dictionary definition of the word's meaning or its collocational properties (McCarthy, 1990: 41-2). McCarthy describes his knowledge of the word 'war' as being comprised of many years of reading and personal memories, producing a 'web-like set of associations' including names of particular wars, the effects of war, political ideals associated with war, and objects seen by civilians during war time. Native speakers, having had a longer personal knowledge of particular words, could presumably produce more encyclopaedic word associations than non-native speakers, if they were prompted to give many a thorough list of their associations with a particular word. However, Sokmen (1993: 140; in Fitzpatrick 2006) found that non-native speakers tended to make their first associations based on personal feelings or memories, rather than on word meaning or collocation; this suggests that perhaps non-native speakers will produce more encyclopaedic responses on single or limited response WATs.

3.1 WAT research: drawing a map of the L2 mental lexicon

Word association tests have previously been the domain of psychologists, but they are now used to build and test models of the mental lexicon as well. One common finding of WAT research is that despite their relatively small vocabulary, lower-level language learners produce a less homogeneous set of associations to word association stimuli (Aitchison 1987: in McCarthy 1990; Meara 1983; Zareva 2007). Meara (1983) attributes this phenomenon to the fact that lower-level non-native speakers produce more clang associations. However, other studies show that native speakers also produce a less homogenous set of responses if the stimulus words are of a low frequency (Fitzpatrick 2006; Schmitt 1998; Wolter 2001).

Another finding is that native speakers produce more paradigmatic associations than nonnative speakers, and there is a shift from clang to syntagmatic to paradigmatic responses as a learner's proficiency level increases (Soderman 1993; in Wolter 2001). This tendency relates somewhat to a respondent's familiarity with a particular word, as low frequency words produce fewer paradigmatic responses in native and non-native speakers alike (Wolter 2001), but there seems to be a real difference between native and non-native speaker responses. Wolter's study shows that highly proficient non-native speakers produce more syntagmatic responses than native speakers; however, he specifies that these results do not necessarily indicate that the nonnative speakers lack knowledge of possible paradigmatic responses for a particular stimulus word. Rather, he proposes that native speakers possess a vaster mental lexicon from which to draw paradigmatic responses than do non-native speakers.

Wolter rejects the idea that a syntagmatically organized L2 mental lexicon is necessarily inferior to a paradigmatically organized one. In a 2002 paper, he explains that building syntagmatic associations requires a high degree of sophisticated linguistic knowledge, which agrees with the literature stating that collocational knowledge indicates a high linguistic ability (Ellis 1997; McCarthy 1990). However, this is only true if fixed collocations are being used appropriately. Fitzpatrick's study (2006) reassesses the paradigmatic-syntagmatic classification system, and concludes that: native and non-native speakers produce fundamentally different types of WAT responses, and that native speakers actually produce more collocational responses than non-native speakers of any proficiency level.

3.2 Changing the classification system

Fitzpatrick (2006) attributes a lack of conclusive knowledge about the L2 mental lexicon partly to the failure of a clang-syntagmatic-paradigmatic classification system to capture the precise details of the mental lexicon. As shown in section 2.2, there are many distinctions within the categories of 'paradigmatic' and 'syntagmatic'. Thus, Fitzpatrick (2006) proposes a categorization system consisting of three main categories-- meaning-based, position-based, and form-based-- which are then subdivided into 15 subsystems; this system has been streamlined, in Fitzpatrick's 2007 study, into 9 subsystems, plus a category for erratic associations (see table 1). In this study, data will be analyzed in terms of the clang-syntagmatic-paradigmatic system as well as Fitzgerald's system, in order to compare the types of patterns we can identify in each one.

An important addition to the newer categorization system is that of *meaning-based* conceptual associations: while some associations may be classified as syntagmatic because the words are in different word classes (such as 'desk' and 'wood'), there is not a strong collocational association between the two; many 'syntagmatic' responses are really loose conceptual associations, which may be a sort of substitute for paradigmatic associations (Fitzpatrick 2006; Higginbotham 2010).

Table 1: Categories and subcategories used to classify word association responses (x =
stimulus word, y= response word) (Adapted from Fitzpatrick, 2007)

Category	Subcategory	Definition	Example
Meaning-based	Defining synonym	x means the same as y	empty – vacant
association	Specific synonym	x can mean y in some specific	cold -
		contexts	uncomfortable
	Lexical set/context	x/y are the same lexical set	cat - animal
	related	(coordinates, meronym, antonym,	
		hyponomy)	
	Conceptually	x and y have some other conceptual	charity - kind
	related	link	
Position-based	Consecutive xy	y follows x directly (includes	hot - dog
association	collocation	compounds)	
	Consecutive yx	x follows y directly (includes	weight - paper
	collocation	compounds)	
	Other collocational	Y follows/precedes x in a phrase,	bird – (gets the) -
	association	but with words in between	worm
Form-based	Change of affix	Y is x plus or minus a prefix or affix	scared- scary
association	Similar form only	Y looks or sounds similar to x but	very- berry
		there is no other association	
Others	Erratic association	y has no decipherable association to	hamburger -
		X	swim
	blank	no response given	

3.3 Multiple and single response WATs

Some studies propose using a multiple-response, rather than a single-response WAT (Kim 2010; Schmitt 1998; Thomas 2007; Zavera 2007). Schmitt (1998), who conducted a 3-response WAT study, proposes that subjects may produce an 'idiosyncratic' association for a first response, but a more typical response for the second one. Thompson (2007) and Zavera (2007), who also conducted 3-response WAT studies, found that a multiple-response test produced greater commonality between responses, thus giving a more complete picture of respondents' mental lexicons. Some research states a preference for single response WATs, such as Cremer et. al. (2010) which proposes that single response WATs are better at finding a speaker's first (and strongest) association to a stimulus word, and also that multiple WATs produce chain responses, or second and third responses that associate to one another, rather than to the stimulus word. In this study, single and multiple WATs will both be used, in order to explore whether one or the other method is more useful in finding patterns in learners' word associations.

4.1 Research: Overview

The study procedure follows task 123 in McCarthy's Vocabulary (1990: 152):

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.

4.2 Methodology

The word-association test was referred to as a 'word association game', in order to reduce anxiety that may be associated with the term 'test'. The respondents were informed that the nature of the 'game' was actually research, in order to disclose to them the actual purpose of their participation. Of the respondents, 18 were middle school students attending the school where I teach¹, and the remainder were colleagues, acquaintances, and family. Some respondents completed a single-response WAT, while others completed a multiple-response WAT, but both tests followed the aural-written method. However, there were slight differences in procedure, depending on the context:

Classroom context: a class of 9 intermediate level middle school students completed a single WAT test, and a class of 6 intermediate to advanced level middle school students completed a multiple WAT test. In these settings, the stimulus words were spoken aloud, and also shown on a large screen, to reduce confusion. Students wrote their responses on a form which was provided for them. Outside of class context: for the other WAT tests, individual interviews were conducted.

Stimulus words were spoken, but also written if requested. Respondents wrote responses on a piece of paper.

4.3 Participants

There were a total of 47 respondents for this study. Respondents were selected as an 'opportunity sample', or a 'convenience sample' (Dornyei 2007: 98), meaning that probability sampling was not used. This means that this study has more quantitative than qualitative value (97). The respondents were divided into four main proficiency levels (see Table 2). Originally, there was to be only three proficiency levels: beginner-low intermediate (non-fluent speakers), high-intermediate-advanced (conversational level and higher), and a native speaker control group. During the data gathering process, however, another category seemed to emerge: a small

¹ In consideration of the ethics of minor students participating in educational studies, especially as they may be considered as being coerced into a study due to the teacher-student relationship, I consulted the students' Korean teachers, who deemed the study to be appropriate. The 5 minute research session was integrated into a lesson and proceeded by a related, more interesting game. This procedure followed Dornyei's (2007: 71) view is that if educational research is not of a sensitive nature, and does not require extensive participation, then teacher consent is sufficient, if there are no legal obligations to obtain additional consent.

selection of 'near-native' speakers, consisting of individuals who have been speaking English since late childhood. The 'near-native' group is also more diverse, consisting of two German-Swiss Canadians, two Singaporean Canadians, a German Canadian, and a Korean American. By isolating these respondents, this study can consider whether increasing proficiency seems to cause a shift in response patterns, or if it is likely that there are deep fundamental differences between native and non-native speakers. As all of the respondents are at least 13 years old, age is not considered a factor: associations produced by native speaker children tend to be more idiosyncratic and context-dependent than those of native speaker adults, but this phenomenon is associated with children under 11 years old (Cremer et. al.)

Level	S-WAT	M-WAT	Characteristics
Lower	9	5	Beginner-low intermediate levels; non-fluent speakers.
			All respondents are Koreans, living in Korea.
Higher	7	9	High-intermediate- advanced levels; fluent speakers. All
			respondents are Koreans living in Korea, except for one
			Chinese native speaker living in Korea.
Near-native	3	3	Respondents of diverse backgrounds, who have lived in
			English speaking countries since late childhood.
Native	4	7	Native speakers of English, living in Korea or Canada.
			Backgrounds include Canadian, American and English.

Table 2: Respondent information

4.4 Stimulus word selection

Stimulus words for this study were chosen in consideration of McCarthy's (1990) Task 123. The following table lists the prompt words and their details, including their number of occurrences in the Bank of English:

Table 3: Stimulus word information

Stimulus	Part of	Bank of	Reason for selection
	speech	English	

		frequency	
Up	adverb,	1,009,342	A common preposition, which would seem primarily
	adjective, verb		prompt the antonym 'down'
Computer	noun	55,755	An everyday noun which is very important in
			contemporary life, in Asian and western culture
Incredible	adjective	9,643	A lower frequency word which may prove
			challenging to learners
Play	verb, noun	155,929	An extremely common verb, used frequently by even
			lower level speakers
Very	adverb,	436,637	A preposition which is used in many unfixed
	adjective		collocations, but which has clear synonyms
Desk	noun	17,426	A common object in school and work life
Hot	adjective	43,814	A common adjective; personal association
Scared	adjective,	8,985	A very common synonym of the adjective 'afraid',
	verb		which seems to be used synonymously with 'scary'
			by many English learners. Also, a homonym with
			'berry' to Korean speakers (lack of v/b distinction).

4.5 **Pre-experiment hypotheses**

From the research consulted to prior to conducting the study, here are some general hypotheses about the potential results:

- Native speakers will be likely to respond with a word of the same word class (Aitchison 2003: 85).
- Native speakers will respond with an obvious partner of the word if one exists (an antonym, for example) (Aitchison 2003: 85)
- Using a clang-syntagmatic-paradigmatic categorization system, there will be a positive relationship between proficiency level and the number of paradigmatic associations produced (Soderman 1993; Wolter 2001).

- Using Fitzpatrick's (2007) 9-subcategory categorization system, the majority of all responses will fall under the category of 'meaning-based', native speakers will produce the most 'position-based' responses and the most synonym responses. Non-native speakers will produce more conceptually related meaning based responses. (Fitzpatrick 2006).
- Higher frequency words will elicit a greater percentage of paradigmatic responses (Fitzpatrick 2006; Schmitt 1998; Wolter 2001).
- Lower level learners will produce more form-based associations (Meara 1983; Wolter 2001; Fitzpatrick 2006).
- Lower-level learners will produce more encyclopaedic responses, as other types of associations may not be firmly established in their mental lexicons.

4.5.1 Considerations about single and multiple response WATs

As there are differing findings about the effectiveness of single and multiple response WATs, this study proposes two pre-experimental inquiries:

- Do multiple response WATs tend to produce chain responses?
- Do multiple WATs produce a greater degree of response commonality?

5.1 **Results: classifying the associations**

As previously mentioned, responses will be assessed in terms of clang-syntagmaticparadigmatic responses, as well as Fitzgerald's 9 subcategory system, in order to explore general and more particular patterns of word association in L2 learners. Encyclopaedic associations, as they generally fall within other types of association, will be assessed when addressing McCarthy's (1990: 152) third question, of whether responses resemble the findings of Aitchison (1987; in McCarthy 1990: 39). Also, the 9 subcategory system (Table 1, section 3.2) has been adapted slightly for this study:

• The 'position-based' category has conflated XY, YX and other collocational associations because few non-XY collocations have been identified in this study.

• The 'position-based' category includes two subcategories, which I believe indicate different levels of linguistic knowledge: 'fixed' and 'non-fixed' collocation, to make distinctions between more fixed types of adjacent collocations (lexical, grammatical, and restricted collocations, and multi-word units) and unfixed adjacent collocations (eg. 'computer - shop').

Responses will also be assessed in terms of word class and obvious partners. Single and multiple response WATs will also be analyzed for chain patterns and commonality.

5.2 McCarthy's first question

This study does reveal patterns in L2 word associations. For one, the findings clearly indicate that *native speakers produce a significant deal more paradigmatic associations than do lower and higher level learners combined*, while near-native speakers also produce more, but significantly fewer than do native speakers (see Table 4). However, there is only a slight difference between paradigmatic responses produced by lower and higher level speakers: in fact, higher level speakers produce more paradigmatic responses. Kim's study (2010) also found little difference between the numbers of paradigmatic responses between intermediate and advanced level respondents, so perhaps that difference between different groups of learners, in this study and in Kim's, is not dramatic enough to warrant different levels of paradigmatic and syntagmatic responses.

Table 4: Clang-synt	tagmatic-paradigmatic	associations	(in percentages	of total	responses
per speaker categor	: y)				

	Paradigmatic	Syntagmatic	Clang	Other (no response, chain response, indecipherable response)
Lower learners	31	63	4	7
Higher learners	28	67	2	1
Lower & higher	29	63	3	4
Near native	36	59	0	3
Native	50	44	3	4

Using this study's adaptation of Fitzpatrick's (2007) 9-subcategory system, it was found that in accordance with Fitzpatrick's study, most responses fell under the meaning-based category. Also, native speakers produced the most synonyms (see figure 1). However, native speakers did not dominate the position-based category, and in fact produced the lowest percentage of position-based responses (see Table 5).

Table 5 Meaning-position-form	associations (i	in percentages	of total	responses	per s	speaker
category)						

	Meaning-based	Position-based	Form-based	Other (no response, chain response, indecipherable response)
Lower learners	59	30	4	7
Higher learners	69	28	2	1
Lower & higher	64	28	3	4
Near native	72	27	0	3
Native	75	18	3	4

A reason for the unexpectedly low percentage of position-based responses produced by native speakers in this study could be explained by the inclusion of the words 'play' and 'very' in this study, both of which resulted in high numbers of position-based responses in lower, higher and near-native speakers (see table 5). These high numbers are due to 'play' being the verb in a high degree of common lexical collocations (eg. 'play sports') and 'very' collocating with a high degree of adjectives (eg. 'very good'): these collocations are familiar even to very beginner level English learners.

Table 6 Meaning-position-form associations to 'play' and 'very' (in percentages of totalresponses per speaker category)

Word	Speaker level	Meaning-based (percentage)	Position-based (percentage
Play	Lower &	26	67
	higher		
	Near native	42	58
	Native	60	40
Very	Lower &	14	79
	higher		
	Near native	8	75
	Native	28	40

Figure 1: Total associations divided into meaning, position and form-based subcategories



5.2.1 Word class associations

In accordance with Aitchison's (2003: 85) finding that native speakers are likely to produce same word-class responses, native speakers produced significantly more same wordclass responses than did any other speaker category, including near-native (see table 7). Nouns, as they tend to have many coordinate and meronym relations, produced significantly more same word-class responses than did any other word class. Verbs did not produce any same word-class responses. In future studies, it would be beneficial to include at least two verbs, especially ones which do not also function as nouns. 'Play' produced many noun responses which were lexically associated with 'play' as a noun, meaning a theatre production.

Tabl	e 7	Same wor	d-class	responses	(in	percentages	of	total	responses	per	speaker	categor	y)
------	-----	----------	---------	-----------	-----	-------------	----	-------	-----------	-----	---------	---------	----

	Noun	Verb	Adjective	Adverb	Preposition	Total same class
						responses
Lower learner	22	0	12	0	5	39
Higher	20	0	9	1	3	33
learner						
Near native	14	0	11	0	10	35
Native	28	0	21	2	9	60

5.2.2 Obvious word-partner associations

Stimulus words 'up' and 'hot' elicited obvious partner responses ('down' and 'cold') almost exclusively among native and near-native single-response WAT responses (see Table 8). These findings support Aitchison's (2003: 85) finding that native speakers are likely to choose an obvious word partner when it is available, and seem to support Cremer et. al.'s (2010) statement that single-response WATs elicit stronger associations than do multiple-response WATs². In addition, the tendency of native speakers to produce obvious word-partner associations may

² Even when the total number of multiple-response WAT responses have been scaled down by 1/3, it is evident that multiple-response WAT respondents were far less likely than single WAT respondents to choose the obvious partner response.

indicate a native speaker preference of collocational responses, if the responses are actually meant to form binomials rather than antonyms, such as 'life has many *ups and downs*' (Murphy 2006). A weakness of this study is that it did not include a follow-up interview, in which respondents could state whether their association was an antonym or part of a binomial.

Stimulus -	Respondent	Single WATs	Multiple WATs	Multiple WATs
response	level			scaled by 1/3
up – down	low/high learner	44	12	36
	near native	100	20	60
	native	100	24	71
hot - cold	low/high learner	38	0	0
	near native	67	7	20
	native	100	14	43

Table 8: Obvious partner responses to 'up' and 'hot', in percentages of totals per category

5.2.3 Word frequency and paradigmatic responses

Word class and respondent category seemed to influence percentages of paradigmatic responses per word more than did BoE word frequency counts (see table 9): nouns account for more paradigmatic responses than other word classes, and native speakers produced the most paradigmatic results. Wolter (2001) finds that familiar stimulus words tend to prompt more paradigmatic responses than do unfamiliar ones, and the fact that non-native speakers produce fewer paradigmatic responses for every word seems to support this finding. However, aside from the fact that ten responses to 'incredible' were blank or clearly indicative of misunderstanding, respondents appeared to be familiar with all stimulus words, so this study cannot account for the types of responses given in terms of familiar or unfamiliar words.

Stimulus	Part of speech	BoE frequency	Low/high	Near	Native
		ranking	learners	Native	
Up	adverb, adjective, verb	1	24	67	60
Very	adverb, adjective	2	9	0	8
Play	verb, noun	3	7	0	24
Computer	noun	4	66	42	76
Hot	adjective	5	28	25	44
Desk	noun	6	64	25	76
Incredible	adjective	7	33	34	64
Scared	adjective, verb	8	9	17	16

 Table 9: Word frequency and percentage of paradigmatic responses, by respondent category

5.3 McCarthy's second question

Native speakers produced a higher percentage of phonetic associations than expected (see tables 4 and 5), especially in the four rhyming responses to 'very'. Interestingly, Korean speakers, who tend to miss the distinction between the 'b' and 'v' sounds in English, only produced two clang responses to 'very'. This finding gives strength to Fitzpatrick (2006) and Wolter's (2001) claims that WATs do not necessarily assess respondents' level of word knowledge, as they sometimes produce syntagmatic, and even clang responses to words they know well. However, it does not seem that non-native speakers produce clang responses because they confuse stimulus words for phonetically similar ones. For example, a higher-level learner produced the responses 'professional', 'trained' and 'trainer' to the word 'scared', which was misheard as 'skilled', but none of the native speakers made such a mistake

5.4 McCarthy's third question

In reference to McCarthy's 'characteristic' responses (1990: 152), collocation, when classified as any sort of syntagmatic response, accounted for the largest number of responses among all respondent groups. However, the examples of collocation referenced to in

McCarthy's (1990: 152) task are examples of adjacent collocation: 'butterfly – net', 'bright – red', 'salt – water' (40). If the collocational responses found in this study are classified in terms of Fitzgerald's (2007) position-based responses, rather than as any parallel syntagmatic relation, then the findings for native speakers are more in line with McCarthy's 'characteristic responses': coordination accounts for a greater number of responses than do collocation, although the greatest percentage of responses for native speakers are synonyms (see Table 10). Regardless of how collocations are defined, though, they make up the majority of responses for all non-native speaker categories (see Table 10).

Table 10: Coordination, collocation, super/subordination, synonymy, encyclopaedic, formal, and meronymy (total percentages of responses per speaker category)

	Coord.	Coll. (2 ty classificat	pes of tion)	Super/subord.	Syn.	Encyc.	Formal	Meron.
		Syntag.	XY fix/unfix					
Lower	18	60	28	.5	4	3	4	6
Higher	11	63	27	.7	11	4	2	7
Near- native	14	52	28	0	11	7	0	6
Native	21	40	18	0	22	4	3	7

5.4.2 Encyclopaedic responses

Percentages of encyclopaedic responses did not vary much between native and nonnative speakers. There was no obvious tendency for lower-level non-native speakers to produce contextual, personal responses in lieu of more universal ones.

5.5 Single and multiple responses

5.5.1 Chain responses

In this study, chain responses accounted for only 1.3% of all multiple-WAT responses. These responses were easy to isolate and did not seem to adversely affect the study.

5.5.2 Commonality

Thomas (2006) and Zareva (2007) find that multiple-response WATs yield greater commonality among responses than do single-response WATs. WAT response commonality is calculated as the number of different responses divided by the total responses per category; the higher the percentage, the lower the commonality. The current study shows that multipleresponse WATs, by generating a greater number of responses, are less likely to result 'all or nothing' levels of commonality found in single-response WAT responses (see table 11). As mentioned in section 5.2.2, single-response WATs seemed to produce more obvious-partner responses, which calls into question whether multiple-response WATs are effective for determining strongest word associations. However, they also render quite idiosyncratic results, if the word does not have an obvious partner. Perhaps single-response WATs would be most effective for measuring a learners' 'native-likeness' by testing how likely they are to choose a word's obvious partner. However, limiting respondents to one word association gives a rather narrow view of the mental lexicon. Kim's study (2010) allows respondents to produce as many associations as possible within a certain amount of time. Perhaps this style of WAT is the most effective way by which to observe word association, as it does not place false limits upon word association choice.

	Single: Low	Multiple Low	Single: High	Multiple: High	Single:	Multiple:
	learners	learners	learners	learners	Native	Native
Up	33	73	100	74	25	67
Computer	77	60	100	63	100	67
Incredible	55	66	100	89	100	76
Play	66	53	86	59	100	71
Very	55	66	71	67	100	86
Desk	22	47	86	63	75	48
Hot	55	73	43	67	25	71
Scared	66	66	100	78	75	71

Table 11: Comparison of commonality between single and multiple WATs

Tot. Avg.	<u>54</u>	<u>63</u>	<u>86</u>	<u>70</u>	<u>75</u>	<u>70</u>

6.1 Conclusion

This study proved to be quite illuminating, illustrating that non-native speakers, even those who may be considered to be 'near-native' in linguistic knowledge and ability, tend to produce different types of word associations than native speakers. Using the clang-syntagmaticparadigmatic system of response categorization revealed the most dramatic difference between native and non-native speakers, while Fitzgerald's (2007) system of more distinct subsystems of classification found mostly that native speakers produce more synonyms than other respondent groups. A problem with this study, and why it could not find more specific differences between native and non-native response types, was that the stimulus words tended to lead to too many adjacent-XY associations that would be familiar with lower-level non-native speakers ('very good'; 'play sports'): this study perhaps did not exploit the range of adjacent XY associations which could have shown differences between native and non-native respondent patterns. In order to fully examine the L2 mental lexicon through a WAT, the stimulus words must be carefully selected. Furthermore, multiple-response WATs do seem to produce greater commonality of responses, in that they compensate for the possibility that a respondent's single response is an idiosyncratic one. However, a larger study would be more appropriate in testing the extent of this claim.

APPENDIX: WAT RESPONSES

Word Association Responses: UP (prep)

Low: beginner-low intermediate (not fluent speakers) High: high-advanced (fluent speakers) nNS: near-native speakers, who have spoken mostly English, in an English speaking nation, since childhood or adolescence

RESPONSE	Low &	Low	High	Low	High	nNS	nNS	NS	NS M	POS	Link A	Link B
	high total	S	S	М	М	S	М	S				
Down	12	7		1(3)	3(1)	3	3(1)	4	5(1)	prep	PAR:	M: lex
					1(2)						ant	set
Sky	4	1			1(1)				1(1)	Noun	SYNT	M: conc
					1(2)				1(2)			
-					1(3)				1(3)			
Elevator	5		1	3(1)	1(1)					Noun	SYNT	M: conc
Mountain	3			1(1)	2(3)					Noun	SYNT	M: conc
Jump	2			1(1)	1(2)				1(3)	Verb	SYNT	P: XY
(Put your)	2			2(3)						Phrase	PHON	F: affix
hands up												
Stairs	2			1(3)	1(2)					Noun	SYNT	P: XY
No	2			1(2)								
response				1(3)								
Climb	1			1(2)						Verb	SYNT	M: conc
Tall	1				1(2)					Adj	ENCY	M: conc
Beyond	1	1								Prep	PAR-	M: lex
											cor	
Over	1				1(3)					Prep	PAR-	M: lex
											cor	
Get up	1		1							Phrase	PHON	F: affix
Balloon	2		1		1(1)					Noun	SYNT	M: conc
(Air)plane	1				1(2)				1(1)	Noun	SYNT	M:

						1(2)			concept
Arrow	1			1(3)			Noun	SYNT	M: conc
Cloud	1			1(3)		1(3)	Noun	SYNT	M: conc
Blue	1			1(2)		1(2)Ch	Adj	SYNT	M: conc
Float	1			1(3)			Verb	SYNT	M: conc
High	2			2(1)	1(2)		Prep	SYNT	M: conc
Step up	1		1(2)				Phrase	PHON	F: affix
Make-up	1		1(2)				Phrase	PHON	F: sim
Test result	1		1(2)				Noun	SYNT	M: conc
Go	2	1		1(1)			Verb	SYNT	P: XY
Above	2	1		1(2)	1(3)		Prep	PAR-	M: lex
								syn	
Light	1	1					Noun	SYNT	M: conc
Side	1	1					Noun	SYNT	P: XY
Stand	2			1(2)			Verb	SYNT	P: XY
				1(3)					
Come	1			1(3)			Verb	SYNT	P: XY
Movie	0				1(2)		Noun	ENCY	M: conc
Lift	0				1(3)		Verb	SYNT	P: XY
Higher	0					1(2)	Prep	SYNT	P: XY
Across	0					1(2)	Prep	PAR-	M: lex
								cor	
Around	0					1(3)	Prep	PAR-	M: lex
						4(2)		cor	
Under	0					1(3)	Prep	PAR-	M: lex
Sidowova	0				-	1(2)	Drop		Milov
Slueways	0					1(2)	ыер	ran-	IVI. IEX
Left	0				1(2)	1(2)	Prep	PAR-	M: lex
-0.0	°				-(-)	-(-/		Cor	
North	0					1(3)	Prep	SYNT	P: XY
Right	0				1(3)	1(3)	Prep	PAR-	M: lex
Ŭ								Cor	

COMPUTER (noun)

RESPONSE	Low-	Low	High	Low	High	nNS	nNS	NS	NS	POS	Link A	Link B
	High	S	S	М	М	S	М	S	М			
	Total											
Game	9	2	1	3(1)	1(1)				1(3)	Noun	SYNT	P: XY
				1(3)	1(3)							
Internet	7	2	1		1(1)		1(2)		1(2)	noun	PAR-	M: lex
					3(2)				1(3)		mer	
Keyboard	5	1		1(3)	1(1)	1	1(1)		1(2)	Noun	PAR-	M: lex
					1(2)				1(3)		mer	
					1(3)							
Mouse	5	1		1(1)	2(3)		1(2)		1(1)	Noun	PAR-	M: lex
				1(3)					1(3)		mer	
TV	3	1	1	1(2)	1(1)					Noun	PAR- cor	M: lex
Information	2			1(2)	1(2)					Noun	SYNT	M:
												conc
DDOS	2			2(2)						Noun	PAR-	M: lex
											mer	
V3	2			2(3)						Noun	PAR-	M: lex
											mer	
Window	1				1(3)					Noun	PAR-	M: lex
											mer	
Email	1				1(3)					Noun	PAR-	M: lex
											mer	
Machine	1				1(1)					Noun	PAR-	M:
											super	super
Web	1				1(2)					Noun	PAR-	M: lex
											mer	
Shopping	1				1(3)					Verb	CHAIN	CHAIN
											web -	
											shopping	
PC	2				2(1)				3(1)	Noun	PAR- syn	M:
												spec
												syn
Laptop	3				3(2)				2(2)	Noun	PAR-	M:

											subor	spec
												syn
Plan	1	1								Noun/verb	SYNT	M:
												conc
Monitor	1	1					1(3)			Noun	PAR-	M: lex
											mer	
Programming	0					1				Verb	SYNT	P: XY
Business	1			1(1)						Noun	SYNT	M:
												conc
Shop	1			1(2)						Noun	SYNT	P: XY
Туре	1		1							Verb	SYNT	M:
												conc
Terrible	1		1							Adj	ENCY	M:
Twittor	1		1							Neur	DAD	
Twitter	1		T							Noun	PAR-	wi: lex
Modicino	1		1							Noun	FNCV	M· XV
MacIntach	1		1						1(1)	Noun		
Wachitosh									1(1)	Nouri	FAIL- SYII	snec
												syn
Facebook	1				1(1)		1(3)			Noun	PAR-	M: lex
rucebook							(-)				mer	_
Video game	1				1(3)					Noun	PAR-	M: lex
0											mer	
Interesting	1				1(1)					Adj	SYNT	M:
												conc
Comfortable	1				1(3)					Adj	SYNT	M:
												conc
Stupid	0						1(1)			Adj	ENCY	M:
							4 (4)				EN OV	conc
Problem	0						1(1)			Noun	ENCY	M:
Fuck	0						1(2)			Interioction	ENCY	
FUCK	0						1(2)			interjection	ENCT	ivi.
Come on	0						1(3)			Interiection	ENCY	M·
come on	Ū						1(3)			interjection	LINCI	conc
Network	0								1(3)	Noun	SYNT	P: XY
Program	0							1	-(-)	Noun/verb	SYNT	P: XY
Whiz	0							1		Noun	SYNT	P: XY
IT	0				ł – –	1		-		Noun	SYNT	M
	Ű					-				Houri	5	conc
Hard drive	0							1		Noun	PAR-	M: lex
											mer	
Chip	0							1		Noun	PAR-	P: XY
											mer	
Processor									1(1)	Noun	PAR-	M: lex
											mer	
Screen									2(2)	Noun	PAR-	M: lex
											mer	
Desktop									1(3)	Noun	PAR- syn	M:

								spec
								syn
Data					1(1)	Noun	SYNT	M:
								conc
iPad					1(3)	Noun	PAR- cor	M: lex
Technology					1(2)	Noun	SYNT	P: XY

INCREDIBLE (adj)

RESPONSE	High-	Low	High	Low	High	nNS	nNS	NS	NS	POS	Link A	Link B
	low	S	S	Μ	М	S	Μ	S	М			
	total	-						_	. (2)			
Unbelievable	6	3	1		2(1)		1(1)	1	1(3)	Adj	PAR- syn	M- syn
Amoring	C	2	1		2(1)		1(2)		1/1)	٨٩:		M aug
Amazing	0	Z	T		2(1) 1(2)				2(2)	Auj	PAR- Syn	ivi- syn
No response	4			1(2)	1(3)	2			. ,		*difficult	
				2(3)	-(-)						word	
Movie	3	2			1(1)					Noun	ENCY- "The	M-
											Incredibles"	concept
											is a movie	
Hulk	2			2(1)						Noun	SYNT	P: XY
Strong	2			2(2)						Adj	PAR- syn	M- spec
												syn
Speed	2			2(3)						Noun	SYNT	P: XY
Miracle	2			1(1)	1(1)		1(2)			Noun	SYNT	M-
												conc
Magic	2			1(3)	1(3)					Noun	SYNT	M-
-												conc
Cazy	1	1									OTHER	ERR
Surprise	1			1(3)						Noun	SYNT	M: conc
Universe	1				1(2)					Noun	SYNT	M-
												conc
Nature	1				1(3)					Noun	SYNT	M-
												conc
Superman	1				1(1)				2(1)	Noun	SYNT	M-
												conc
Mr.	1				1(2)					Noun	ENCY	M-
Incredible												conc
Success	1				1(3)					Noun	SYNT	P- XY

Story	1				1(2)					Noun	SYNT	P- XY
S.F.	1				1(1)					Noun	SYNT	M-
												conc
Accident	1				1(2)					Noun	SYNT	M-
												conc
Smart	1				1(3)					Noun	ENCY	M-
student												conc
Awesome	1				1(2)		1(1)	1		Noun	PAR- syn	M- syn
Cool	1				1(3)					Noun	PAR- syn	M- syn
Possible	1	1								Adj	OTHER	ERR
Super	0					1				Adj	PAR- syn	M- syn
Ghost	1			1(2)						Noun	SYNT	M-
												conc
Evening	1		1							Noun	SYNT	P- XY
My life	1		1							Noun	ENCY	M- con
Matter	1			1(1)						Noun,	OTHER-	ERR
				. ,						verb	student was	
											unsure of	
Everencien	1	-		1(2)		-				Noun	meaning	
Expression	1			1(2)						Noun	Student was	EKK
											unsure of	
											meaning	
Surprising	2		1		1(3)					Noun	PAR- syn	M- syn
Pyramid	1		1							Noun	SYNT	M: conc
Kang-ho Dong	1		1							Noun	ENCY-	M: conc
											celebrity	
Person	1				1(2)					Noun	SYNT	P: XY
Animation	1				1(3)					Noun	SYNT	M: conc
Scene	1				1(1)					Noun	SYNT	P: XY
Mind	1				1(2)					Noun	SYNT	M: XY
Fashion	1				1(3)					Noun	SYNT	M: conc
Terrific	0								1(1)	Adj	PAR- syn	M: syn
Fantastic	0								2(2)	Adj	Par- syn	M: syn
Outstanding	1				1(2)				1(3)	Adj	PAR- syn	M: syn
Scam	0						1(3)			Noun	SYNT	M: XY
Great	0						1(1)			Adj	PAR- syn	M: syn
Weird	0						1(2)			Adj	PAR- syn	M: syn
Strange	0						1(3)			Adj	PAR- syn	M: syn
Hardly	0						1(1)			Adv	SYNT	P: YX
Power	0							1		Noun	SYNT	P: XY
Wow	0							1		Interj	SYNT	M: conc
Space									1(2)	Noun	SYNT	M: conc
Stars									1(3)	Noun	SYNT	M: conc
Fly	1								1(2)	Verb	CHAIN-	CHAIN
, ,										-	Superman	
Stupendous	ł								1(1)	Adj	PAR-syn	M: syn

Magnificent					1(2)	Adj	PAR-syn	M: syn
Wonderful					2(3)	Adj	PAR-syn	M: syn
Thailand					1(1)	Noun	ENCY	M: conc
Beaches					1(3)	Noun	ENCY	M: conc
Disney					1(1)	Noun	ENCY	M: conc
Edible					1(3)	Noun	PHON	F: sim

PLAY (<u>verb</u>, noun)

RESPONSE	B/LI-	B/LI	HI/A	B/LI	HI/A	nNS	nNS	NS	NS	POS	Link A	Link B
	HI/A	S	S	М	Μ	S	М	S	М			
	Total											
Game(s)	12	2	1	2(1)	4(1)	1		1	1(3)	Noun	SYNT	P: XY
				1(2)	1(2)				2(2)			
Sports	7	3			2(2)		1(2)		1(1)	Noun	SYNT	P: XY
					2(3)				1(2)			
Soccer	7	1	2	1(1)	1(2)		1(2)			Noun	SYNT	P: XY
				1(2)								
D.A	2			1(3)	1(1)				1(2)	Nerre	CVNIT	D. V/V
Music	3			1(2)	1(1)				1(3)	Noun	SYNI	P: XY
Fun	3		1	1(3)	2(3)		1(1)	1	1(3)	ih۵	SYNT	M·
1 dil	5		-		2(3)		1(2)	1	1(3)	/ tuj	51111	concept
Baseball	2			2(3)						Noun	SYNT	P: XY
Computer	2			2(1)						Noun	SYNT	P: XY
game												
Ground	2	1		1(2)		1		1	1(2)	Noun	SYNT	P: XY
Actor	2				1(2)				1(1)	Noun	PAR- mer	M: lex
					1(3)							
Actress	1				1(3)					Noun	PAR- mer	M: lex
Drama	1			1(2)						Noun	PAR- syn	M- syn
Instrument	3				2(2)					Noun	SYNT	M: XY
					1(3)							
Children	1				1(1)				1(3)	Noun	SYNT	M- conc
Break	1				1(3)					Noun	SYNT	M- conc
Daughter	1				1(2)					Noun	ENCY	M- conc
Football	1				1(3)					Noun	SYNT	P- XY
Read book	1	1								Noun	ENCY	M- conc
study	1	1								Noun	ENCY	M- conc
TV	1			1(3)						Noun	CHAIN-	CHAIN

									from	
									"music"	
Together	1	1						Adj	SYNT	P- XY
Childhood	1	1						Noun	SYNT	M- conc
Swing	1	1						Noun	SYNT	M- conc
Stage	1		1(1)					Noun	SYNT	M- conc
Friend	1		1(1)					Noun	SYNT	M- conc
A role	1		1(1)					Noun	SYNT	P- XY
Cards	1		1(2)					Noun	SYNT	P-XY
Toy(s)	0				1(3)		3(1)	Noun	SYNT	M- conc
Theater	0					1	1(1)	Noun	PAR- syn	M- syn
Воу	0			1				Noun	SYNT:	P: XY
									compound	
Act	0						1(2)	Noun	PAR: mer	M- lex
Intermission	0						1(3)	Noun	Par: mer	M- lex
Musical	0						1(1)	Noun	PAR: syn	M- syn
							1(2)			
Production	0						1(2)	Noun	PAR- syn	M- syn
Shakespeare	0						1(3)	Noun	SYNT	M- conc
Bill	0						1(3)	Noun	SYNT	P- XY
Monopoly	0				1(1)			Noun	SYNT	P-XY
Tennis	0				1(3)			Noun	SYNT	P-XY
Enjoyment	0				1(3)			Noun	SYNT	M- conc
Time	0				1(1)			Noun	SYNT	P- XY

VERY (<u>adv</u>, adj)

RESPONSE	L2	B/LI	HI/A	B/LI	HI/A	nNS	nNS	NS	NS	POS	Link A	Link B
	Response	S	S	М	М	S	М	S	М			
	Total											
Good	12	3	1	2(1)	1(1)	2	1(1)	1	2(1)	Adj	SYNT	P: XY
				1(2)	2(2)		1(3)					
				1(3)	1(3)							
Much	11	3	3		1(1)		1(1)	1	2(2)	Adj	SYNT	P: XY
					3(2)							
					1(3)							
Big	3			2(1)	1(3)		1(2)			Adj	SYNT	P: XY
Many	2			1(3)	1(3)					Adj	SYNT	P: XY
Important	2	1		1(1)						Adj	SYNT	P: XY
Beautiful	2				1(1)					Adj	SYNT	P: XY
					1(3)							
People	1			1(2)						Noun	OTHER	ERR
Strawberry	1			1(2)						Noun	PHON	F: sim
Blueberry	1			1(3)						Noun	PHON	F: sim
Long	1			1(2)						ADJ	SYNT	P: XY
Nice	1				1(3)		1(2)			Adj	SYNT	P: XY
Hot	1				1(1)					Adj	SYNT	P: XY
Strange	1				1(2)					Adj	SYNT	P: XY
Hard	2		1		1(3)					Adj	SYNT	P: XY
So	2				1(1)					Adv	PAR- syn	M:
					1(2)							syn
Adjective	1				1(2)					Noun	PAR-	M: lex
											super	
serious	1				1(2)					Adj	SYNT	P: XY
Various	1				1(3)					Adj	PHON	F: aff
A lot	1				1(1)					Adj	SYNT	M:

												conc
More	1				1(3)		1(2)			Adj	SYNT	M:
												conc
So much	1	1								Adj	SYNT	M:
												conc
Money	1	1								Noun	OTHER	ERR
Pretty	1			1(2)						Adj	SYNT	P: XY
Lucky	1			1(3)						Adj	SYNT	P: XY
Definitely	1		1							Adv	PAR- syn	M:
-												syn
Interesting	1		1				1(3)			Adj	SYNT	P: XY
Thank you	1				1(1)					Interj	SYNT	P: YX
Thoughtful	1				1(3)					Adj	SYNT	P: XY
Incredible	0							1		Adj	SYNT	P: XY
Extremely	0								1(1)	Adv	PAR-	M:
,											Syn	syn
Extreme	0								1(1)	Adi	SYNT	M:
	-									- ,	-	conc
Exceptional	0								1(2)	Adi	SYNT	P: XY
Unusual	0								1(3)	Adi	SYNT	P: XY
Lots	0							1	1(3)	Adj	SYNT	M:
										,		conc
Practical	0					1				Adi	SYNT	P: XY
Not	0								1(1)	- ,	OTHER	ERR
Ouite	1				1(1)				1(2)	Adv	PAR- svn	P: syn
Really	0								1(3)	Adv	PAR	M:
,	-								-(-)			svn
Marv	0								1(1)	Noun	PHON	F: sim
Scarv	0								1(2)	Noun	PHON	F: sim
Berry	_								1(2)	Noun	PHON	F: sim
- /									1(3)		_	-
Mui	0								1(2)	Adv	OTHFR-	FRR
	-								_(_/		Spanish	
Great	0								1(3)	Adi	SYNT	P: XY
Extra	0								1(3)	Adi	SYNT	M:
	-								(-)	- ,	-	conc
Bad	0								1(2)	Adj	CHAIN-	CHAIN
										-	from	
											"good"	
Ugly	0								1(3)	Adj	CHAIN-	CHAIN
											from	
											"ugly"	
Most	0		İ	İ	İ	1	1(3)	Ì	İ	Adj	SYNT	M:
										-		conc
Verv	0			İ			1(1)		İ	Adi	OTHER	ERR

DESK (noun)

RESPONSE	High-	Low	High	Low	High	nNS	nNS	NS	NS	POS	Link A	Link B
	low	S	S	М	М	S	М	S	М			
	Total											
Chair	17	8	1	3(1)	2(1)	2	1(1)	2	4(1)	Noun	PAR- cor	M: lex
				1(2)	1(2)		1(2)		1(2)			
					1(3)							
Study(ing)	9	1		1(1)	1(1)					Verb	SYNT	M:
				1(2)	1(2)							conc
				1(3)	3(3)							
Book	8		1	2(2)	3(1)					Noun	PAR- cor	M: lex
				2(3)								
Тор	3		2	1(1)		1	1(1)	1		Prep	SYNT	P: XY
Pencil	2			1(3)	1(2)					Noun	PAR- cor	M: lex
Table	3		1		1(1)				1(1)	Noun	PAR- cor	M: lex
					1(2)				2(2)			
									1(3)			
Wood	2			1(2)	1(1)					Adj	SYNT	M:
												conc
Exam	1				1(3)					Noun	SYNT	M:
												conc
Work	2		1		1(2)		2(3)			Verb	SYNT	M:
												conc
Hardworking	1				1(2)					Adj	SYNT	M:
												conc
Dust	1				1(3)					Verb	SYNT	M:
												conce
Counter	1				1(2)					Noun	PAR- cor	M: lex
Picture	1			1(3)						Noun	CHAIN-	CHAIN

								from "book"	
Pencil case	1	1					Noun	PAR- cor	M: lex
Drawer	1		1(3)				Noun	PAR-	M: lex
								mer	
Stationary	1		1(2)				Noun	Par- cor	M: lex
Bookshelf	1		1(1)				Noun	Par- cor	M: lex
Mirror	1		1(2)				Noun	Par- cor	M: lex
Lamp	1		1(3)				Noun	Par- cor	M: lex
School	0			1(3)			Noun	SYNT	M: lex
Green	0			1(2)			Adj	ENCY	M:
									conc
Hard	0			1(1)			Adj	SYNT	M:
									conc
Square	0			1(2)			Adj	SYNT	M:
									conc
Write(ing)	0					2(3)	Verb	SYNT	
Computer	1		1(3)			1(1)	Noun	PAR- cor	M: lex
						2(3)			
Mess	0					1(2)	Noun	ENCY	M:
									conc
Death	0				1		Noun	PHON	F: sim
Stool	0					1(3)	Noun	PAR- cor	M: lex
Teacher	0					1(2)	Noun	PAR- cor	M: lex
Workspace	0					1(1)	Noun	PAR- syn	M: syn
Cubicle	0					1(2)	Noun	PAR- cor	M: lex
Operator	0					1(2)	Noun	PAR- cor	M: lex

HOT (adj)

RESPONSE	Low- High Total	Low S	High S	Low M	High M	NNS S	NNS M	NS S	NS M	POS	Link A	Link B
Summer	16	1	5	3(1) 1(2)	6(1)		1(1)			Noun	SYNT	M: conc
Cool	4	3		1(1)						Adj	PAR- Ant	M: lex
Fire	4	1		1(2) 1(3)	1(3)				1(2)	Noun	SYNT	M: conc
Cold	3	3				2	1(2)	4	1(1) 2(2)	Adj	PAR- Ant	M: lex
Air conditioner	2				1(2) 1(3)					Noun	SYNT	M: conc
Rain	2				2(2)					Noun	SYNT	M: conc
Coffee	2	1			1(2)					Noun	SYNT	M: conc
Ice cream	1			1(2)						Noun	SYNT	M: conc
Swimming pool	1			1(3)						Noun	SYNT	M: conc
Fan	1			1(3)						Noun	SYNT	M: conc
Jimjilbang	1			1(2)						Noun	SYNT- Korean sauna	M: conc
Dog	3			1(1)	2(3)					Noun	SYNT	P: XY
Warm	1			1(3)					2(1)	Adj	PAR- cor	M: lex
Sunny	1				1(2)					Adj	PAR- cor	M: lex
Humid	1				1(3)			1	1	Adj	PAR- cor	M:

												lex
Temper	1				1(3)					Noun	SYNT	P: XY
Korea	1				1(1)					Noun	ENCY	M:
												conc
Water	1				1(3)					Noun	SYNT	P: XY
Sun	1				1(2)		1(2)		1(1)	Noun	SYNT	M:
									1(3)			conc
Sexy	2				1(1)				1(3)	Adj	PAR- syn	M:
					1(3)							syn
Food	1			1(2)						Noun	SYNT	P: XY
Temperature	1			1(3)						Noun	PAR-	M:
											superor	lex
Good	1		1							Adj	ENCY	M:
												conc
Boiling	1				1(3)				1(2)	Adj	PAR- syn	M:
												syn
Sweating	1				1(2)					Adj	PAR- syn	M:
												syn
Chick	1						1(1)			Noun	SYNT	P: XY
Weather	2		1		1(2)					Noun	SYNT	P: XY
Chocolate	1				1(1)					Noun	SYNT	P: XY
Burn	0								1(2)	Verb	SYNT	M:
									1(3)			conc
Painful	0						1(1)			Adj	SYNT	M:
												spec
												syn
Stove	0						1(3)			Noun	SYNT	M:
												conc
Cooking	0					1				Noun	SYNT	M:
												conc
Caliente	0								1(3)	Adj	OTHER-	ERR
											Spanish	
Girl	0								2(1)	Noun	SYNT	P: XY
Steam	0								1(3)	Noun	SYNT	M:
												conc
Oven	0								1(3)	Noun	SYNT	M:
												conc
Texas	0								1(2)	Noun	ENCY	M:
												conc
Spicy	1				1(2)				1(3)	Adj	PAR- syn	M:
												syn
Arizona	0								1(1)	Noun	ENCY	M:
												conc
Thai	0								1(1)	Adj	ENCY	M:
							4/2)				ENO:	conc
Mexico	0						1(3)			Noun	ENCY	M:
llast							4(2)				C) (NIT	conc
пеас	U						1(2)			Noun	SYNI	
1	1	1	1	1	1	1	1	1	1	1	1	

Glow	0			1(3)		Verb	SYNT	M:
								conc

SCARED (adj)

RESPONSE	Low-	Low	High	Low	High	nNS	nNS	NS	NS	POS	Link A	Link B
	High	S	S	М	М	S	М	S	М			
	Total											
Ghost	12	3	1	3(1)	1(1)					Noun	SYNT	M:
					2(2)							conc
					2(3)							
Horror	3	2			1(3)		1(2)			Noun	SYNT	M:
							1(3)					conc
Movie	5	1	1	2(1)	1(1)		1(2)		2(3)	Noun	SYNT	M:
												conc
Dark	4		1	1(2)	2(2)		1(2)			Noun	SYNT	M:
												conc
Zombie	2			2(2)						Noun	SYNT	M:
												conc
Cool	2			2(2)						Adj	CHAIN-	CHAIN
											zombie	
Tomb	1			1(2)						Noun	SYNT	M:
												conc
Tiger	1			1(3)						Noun	SYNT	M:
												conc
Angry mom	1				1(2)					Noun	ENCY	M:
												conc
Scream	1				1(1)					Noun	SYNT	M:
												conc
Alone	1				1(1)					Noun	SYNT	M:
												conc
Rat	1				1(1)					Noun	SYNT	M:
												conc

Man	1				1(3)					Noun	SYNT	M:
												conc
Frightened	2				2(1)		1(1)		5(1)	Adj	PAR-	M:
											syn	syn
Blood	1				1(2)					Noun	SYNT	M:
												conc
Terrified	2	1			1(3)					Adj	PAR	M:
											Syn	syn
Worried	1	1						1	1(2)	Adj	PAR	M:
											Syn	syn
Нарру	0					1				Adj	PAR-	M: lex
											cor	
Father	1			1(2)						Noun	ENCY	M:
												conc
Teacher	1			1(3)						Noun	ENCY	M:
												conc
Avoid	1		1							Verb	SYNT	M:
												conc
Death	1		1							Noun	SYNT	M:
												conc
Night	2		1		1(2)					Noun	SYNT	M:
0					. ,						-	conc
Animal	1		1							Noun	SYNT	M:
-											-	conc
Amazed	1				1(2)					Adi	PAR-	M:
					(,					,	svn	spec
											- /	svn
Scarv	2	1			1(3)					Adi	PHON	F:
ocary	-	-			-(3)					, (0)		affix
English	1				1(3)					Noun	ENCY	M:
Linghisti	-				1(3)					Noun	LINCI	conc
Boadkill	1				1(1)		1			Noun	SYNT	M·
nouunn	-				-(-)					Noun	51111	conc
Speeding	1				1(3)					Verh	SVNT	M·
Speculig	1				1(3)					VCID		conc
Professional	1				1(1)					٥di	PHON	F' sim
Trained	1				1(1)					Adj	PHON	F: sim
Trainer	1				1(2)		1			Noun		F: cim
	1			1(2)	1(5)	-	-			Nouli	PHON	F. SIIII
NO Resp	1			1(3)				2	1(1)	A	CVNT	N.4.
AITalu	0							2	1(1)	Auj	STINT	
	0							4	2/2)	Nerve	SYN	Syn
ivionster(s)	U							1	2(2)	Noun	SYNI	
				<u> </u>		<u> </u>			4/21	A 1: /A:	D AC	conc
Chicken	0								1(2)	Adj/Noun	PAR-	M:
											syn	syn
Cat	0	1	1	1	1	1	1		1	Noun	SYNT	P: XY

Vampire	0			1			Noun	SYNT	M:
									conc
Petrified	0					1(3)	Adj	PAR-	M:
								Syn	syn
Clowns	0					1(1)	Noun	ENCY	M:
									conc
Cry	0					1(3)	Verb	SYNT	M:
									conc
Spider	0					1(1)	Noun	SYNT	M:
									conc
Me	0					1(2)	Noun	ENCY	M:
									conc
Children	0					1(3)	Noun	SYNT	M:
									conc
Stiff	0				1(1)	1(2)	Adj	SYNT	P: XY
Witless	0					1(3)	Adj	SYNT	P: XY
Fear	0					1(2)	Verb	SYNT	M:
									conc
War	0				1(3)		Noun	SYNT	M:
									conc
Shit	0				1(1)		Interjection	SYNT	M:
									conc
Anxious	0				1(3)		Adj	PAR-	M:
								syn	syn

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