CONTROLLING FOR POLYSEMY

IN WORD ASSOCIATION TESTS:

A STUDY EXPLORING THE ENGLISH MENTAL LEXICON

OF JAPANESE EFL LEARNERS

by

DAX THOMAS

A dissertation submitted to the
School of Humanities
of the University of Birmingham
in part fulfillment of the requirements
for the degree of

Master of Arts
in
Teaching English as a Foreign or Second Language (TEFL/TESL)

This dissertation consists of approximately 12,000 words
Supervisor: Theron Muller

Centre for English Language Studies
Department of English
University of Birmingham
Edgbaston, Birmingham B15 2TT

March 2008

ABSTRACT

Polysemy in word association tests can lead to variation in response that can skew the data and mask differences in response tendency across a group of respondents. In this study the researcher examines two methods of controlling for polysemy: priming and closed tests. Four tests are conducted (an open-unprimed, an open-primed, a closed-unprimed, and a closed-primed) on three groups of respondents (native English speakers, non-Japanese EFL/ESL speakers, and Japanese EFL speakers). It was shown that: 1) priming is a more effective and efficient means of controlling for polysemy than are closed tests; and 2) native English and non-Japanese EFL/ESL speakers both tended to respond with paradigmatic associations while there was no such tendency with the Japanese EFL speakers.

DEDICATION

For my daughter,
Ema,
whose light and language
are a constant inspiration

ACKNOWLEDGEMENTS

The researcher would like to thank the following people for their assistance in administering the WAT survey that was central to this study. Without their kind assistance, collection of data from such a wide range of respondents would not have been possible.

Ryan Hagglund (South Salem High School)
Greg Jarvie (Jarvie English School)
Theron Muller (Noah Learning Center)
Brindy Smith (Dongchang College)
Sean Lockwood
Kelly Pilch
Brett Iimura
Catherine Oki

The researcher would also like to thank the 97 individuals who took the time to participate in the WAT survey. Their time and effort was greatly appreciated.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

BofE	“Bank of English”
CI	commonality index
CLI	commonality likelihood index
Collins	“Collins Thesaurus A-Z, Complete and Unabridged”
EFL	English as a foreign language
EML	English mental lexicon
ESL	English as a second language
JS	Japanese EFL speakers
NJS	non-Japanese EFL/ESL speaker
NS	native English speaker
par.	paradigmatic association
SD	standard deviation
SF	semantic field
SII	sense identification index
syn.	syntagmatic association
WAT	word association test

INTRODUCTION

Countless investigations have been conducted over the years on how individuals organise words in their minds. While these studies may have varied in their specific details, they all sprang from the same general purpose: to investigate and document the inner workings of the mental lexicon. Study of the mental lexicon, however, has always been problematic. Many of these studies, while certainly of great import to the broad base of knowledge regarding the mental lexicon, have born results that drastically, and quite frustratingly, contradict one another.

An excellent example of these contradictions, and one that is greatly relevant to the thesis of this paper, is Yoneoka's (2001) word association test study on Japanese EFL speakers. In her study she claims that Japanese EFL speakers tend to respond to English stimuli differently than non-Japanese ESL/EFL respondents which contradicts a large body of research.

The problem lies, firstly, in the ethereal nature of the mental lexicon. Researchers are limited in the ways in which they can study it. For example, information can be gleaned from dysfunctions of the brain such as aphasia (Coultard et al, 2000). These

methods are, however, generally limited to psychologists who have access to clinical settings. As a result, many researchers, as with Yoneoka (2001), turn to other research tools to gain insights into the organisation of words in the mind. Perhaps the most common of these is the *word association test* (WAT).

This leads to a second problematic area in mental lexical research: methodology. Particularly in the area of word association testing there are several major issues that can result in diverging results between researchers. Some of these issues relate to experimental design while others relate to the interpretation of results. One such issue, and one central to this study, is the way in which polysemous words can unbalance the nature of responses in a WAT introducing variation that can skew the data.

The purpose of this paper is two-fold. Firstly, it will investigate two potential means of controlling for polysemy in WATs: priming and closed tests. In analyzing the results of a four-part online word association survey, it will show that while closed tests may seem like a useful means of controlling for data-skewing variation, priming proves to be the more effective of the two. Secondly, the study will apply these tests to an investigation of the Japanese English mental lexicon (EML). It will illustrate that the

Japanese EML seems to be organized in a different manner than that of both native English speakers and non-Japanese ESL/EFL speakers.

The paper will begin with a background section that will introduce some issues relating to polysemy in WAT and discuss some of the recent WAT research on native, non-Japanese ESL/EFL, and Japanese EFL speakers. It will then outline the research participants and method used in this study. Finally the results will be discussed, firstly as they relate to the use of priming and closed tests in WAT research, and secondly, as they relate to the study of the Japanese EML. The paper will finish with a very brief discussion of the theoretical and practical implications of the study.

CHAPTER 1

BACKGROUND

1.1 Methods and problems in WAT research

Research on the differences between native and non-native mental lexicons has been conducted in light of several different factors thought to influence lexical storage in the mind. Word class, coreness/prototypicality, level of abstraction, individual word frequency, respondent proficiency level, and respondent age are all factors that have been explored in the past (McCarthy, 1990). More recently, respondent "depth of word knowledge" (Wolter, 2001; Mattheoudakis, 2003), and "frequency of word usage" (Thomas, 2006) have also been investigated.

However, one of the greatest problems in WAT research is one of methodology, particularly in the area of stimulus word selection. Despite the emergence of publications claiming to be word association "norms" over the past years (Russell and Jenkins, 1954; Palermo and Jenkins, 1964; Postman and Keppel, 1970; Kiss et al., 1973; Hirsh and Tree, 2001) there has been little in the way of standardisation in the methods for selection of stimuli. An attempt at this may be seen in the adoption, for a period of time many years ago, of the Kent-Rosanoff list (Kent and Rosanoff, 1910) but, as Meara

(1982) points out in his classic article, this list is insufficient for L2 WAT research in that the stimuli are, firstly, very common words and, secondly, representative of a high percentage of words that are "marked for sex" (Meara, 1982:33). They therefore tend to bias the results by being predisposed to certain types of association. Though it would seem that greater care in word selection has been taken in recent years, aided in large part by the use of corpora to determine frequency of stimuli (Wolter, 2001; Brown, 2006; Thomas, 2006), and by the use of new word lists such as the Academic Word List (Coxhead, 2000) adopted by Fitzpatrick (2006), very little has been done to address the concept of polysemy in stimulus words. Some might argue that polysemy in word association need not be a concern to the researcher, as a person's answers will be, in theory, their natural responses and therefore valuable responses. This, however, need not necessarily be the case, especially when considering response type, as is so often done in the literature. Take, for instance, the Edinburgh Associative Thesaurus (EAT)[1] responses to a polysemous word WILL (Table1.1):

[1] The Edinburgh Associative Thesaurus (EAT) is an online database of British university student word association norms. It is available online at: http://www.eat.rl.ac.uk/

		"future tense"		"strength of mind"		"document"	
	Count	Syn	Par	Syn	Par	Syn	Par
NOT	15	15					
TESTAMENT	12						12
POWER	8			8			
YOU	8	8					
DEATH	7						7
WON'T	6		6				
DO	5	5					
SHALL	4		4				
DEAD	3					3	
WONT	3		3				
Total	71	28	13	8	0	3	19

Table 1.1: Top 10 EAT responses to the stimulus word WILL

These data show that respondents tend to make syntagmatic associations with the "future tense" sense of the word WILL while they tend to make paradigmatic associations to the "document" sense. This sample illustrates well the possibility that one sense of a word might elicit a higher number of syntagmatic or paradigmatic responses. If responses to all senses are totalled together under the same stimulus "label", then there is the possibility for one sense to weight the total towards the type of response associated with that sense. In the case of WILL above, the data is skewed in favour of syntagmatic responses even though one sense clearly elicits a majority of paradigmatic responses.

It may be acceptable to ignore this possibility when examining responses from relatively homogenous groups such as a group of middle-aged Japanese office workers, who might tend to recognize certain senses of a word in roughly equal proportions, but is not acceptable to ignore such a possibility when examining heterogeneous groups, such as a culturally/linguistically diverse group of students at an international language school, who might not identify senses in such equal proportions. Neither is it appropriate when comparing responses across groups of differing backgrounds. To do so would be, in effect, comparing "apples and oranges". In other words, the data would not accurately represent the syntagmatic/paradigmatic association pattern of the participants.

There are two potential solutions to this polysemy problem: 1) attempt to identify which senses are being recognized in the respondents' responses and group them accordingly prior to analysis, such as was done with WILL above; and/or 2) make an attempt to control polysemy when designing the experiment.

Of the two choices mentioned above, controlling for polysemy would seem the more effective. Grouping respondents' responses by sense can be useful but can also prove quite problematic; grouping by word class even more so. Brief interviews with

respondents are sometimes useful to this end, especially in determining which word class was recognized. Thomas (2006:12) notes:

> Other problems were identified in the interview as resulting from polysemy and homophony. In particular, the stimulus word *boring* was understood both as the adjective, *uninteresting*, and the verb, *drilling*. The common Japanese difficulty with /l/ and /r/ further complicated the matter by causing some participants to hear the stimulus word as *bowling*. *Punch* was interpreted variously as a verb (*to hit* or *to make a hole*) or a noun (*a punch* or *fruit punch*). In these cases the interview allowed the researcher to decide what type of association was being made. For instance, given the response *glove* by subject M1, the explanation, "*we use boxing gloves to punch,*" clearly shows that *punch* is being viewed as a verb and is thus indicative of a syntagmatic association.

However, explanations like this are few and far between, and researchers are often left with little more than guesswork to guide them as to which sense and which word class is being recognized. Thus, to control for polysemy seems the more useful of the two approaches.

1.2 Controlling for polysemy

Before discussing controlling for polysemy in detail, it will first be useful to define the term *polysemy* as it is used in this paper.

1.2.1 Defining polysemy

Here polysemy is being used in a very general sense to refer to two separate concepts relating to lexical ambiguity: polysemy proper and homonymy. Polysemy proper refers to a word that has multiple *related* senses (including different grammatical classes of the word) while homonymy refers to a word with multiple *unrelated* senses. It is possible for a homonymous word to also exhibit polysemous characteristics and Beretta, et al. (2005:58) illustrate the difference quite clearly:

> Ambiguity between related senses is known as polysemy. Consider the word *door* in the following sentences.
>
> (1) The door fell off its hinges.
> (2) The child ran through the door.
>
> The sense of *door* in (1) is clearly different from the sense of *door* in (2). In (1), *door* is a physical object, whereas in (2), it is an aperture. As a further example, let us take another look at the homonymous word *bank*. One of its meanings (financial institution) can be seen to possess different polysemous senses:
>
> (3) The bank apologized to its customers.
> (4) The bank was destroyed in an earthquake.
>
> In (3), *bank* is an institution; in (4), a building. … So ambiguous words can be either homonymous or polysemous, and it is also possible for one or more meanings of homonyms to be polysemous. In addition, the number of polysemous senses a word may have can vary a great deal.

As this paper focuses mainly on the variation that can occur in WAT responses due to the lexical ambiguity of stimulus words, the distinction between polysemy and homonymy is not of great concern here. Thus, for convenience *polysemy* will be used to refer to both types of lexically ambiguous words.

Controlling for polysemy can be approached from two different directions: 1) by attempting to control, via the manner in which the stimuli are presented, how senses are identified by the respondent; and 2) by controlling the way in which respondents are permitted to respond to stimuli. The first involves priming for sense while the second involves constraining the responses.

1.2.2 Priming for sense

The term *priming*, as it applies to linguistics, is used in a number of different ways in a number of different contexts. For example, in the field of psycholinguistics a distinction is made between the terms *semantic priming* and *associative priming* (Ferrand and New, 2003). Semantic priming occurs in lexical decision test word pairs that are semantically linked (for example, *bread-cake*) and associative priming occurs in word pairs that are associatively linked (as in *bread-butter*) (Ferrand and New, 2003:29).

Zeelenberg et al (2003), however, make use of *contextual priming* where the sense of the "cue" (i.e. stimulus) word is primed by means of sample sentences during a pre-WAT study session.

Finally, Hoey (2004a, 2004b, 2005) uses the term *lexical priming* to describe the manner in which an individual's vocabulary gathers its semantic and collocational properties (among other things) through exposure to everyday language.

Both Hoey's (2004a/b, 2005) and Zeelenberg et al's (2003) usages can be described as *distance priming* while Ferrand and New's (2003) can be described as *local priming*. With local priming the priming is based on immediate context at the time the stimulus is presented and not upon context presented at an earlier time, such as in a formal language lesson prior to the WAT (Ferrand and New, 2003), or when first learning the word (Hoey, 2005). With local priming the priming is also, to a large degree, temporary, while distance priming relies on a degree of retention over time, or *implicit memory* (Zeelenberg et al, 2003:653), of the sense highlighted in the priming context.

As will be seen in chapter 3, a *local contextual priming* is employed in this study.

1.2.3 Constraining the responses

It is possible to constrain respondents' responses in two ways: 1) by dictating the *semantic field* (Aitchison, 1994:86) within which respondents must remain when responding (see Spiteri, 2004); and 2) by utilising a closed, multiple choice WAT test (see Weingartner and O'Brien, 1971).

There are advantages and disadvantages to both methods. The first method, dictating the semantic field, is very useful in WATs that include respondents who belong to a particular field of study or line of work and where the researcher is interested in only this small sphere of mental lexicon storage. Spiteri (2004) offers an excellent example of this: the researchers, who were attempting to build a specialized thesaurus, were only interested in stimulus-response pairs relating to library information. Here any associated words outside the semantic field in question but appearing in the mind of the respondent after hearing the stimulus would be self-censored by the respondent and replaced with subsequent words/patterns that are more inline with the researchers' interest. As a result, this sort of constraint does not offer a very broad view of

associations in the respondents' mental lexicon and may actually represent an artificially constructed organization based on conscious filters.

The second method of constraining responses, a closed multiple choice test, is useful when the researcher is interested in the general type of association – i.e. semantic or formal – that the respondent is making in a WAT, rather than the relation between specific words. The advantage of a closed test is that the researcher has complete control over the range of responses. The disadvantage is that the likelihood of the respondent's naturally associated response being represented in the multiple-choice response list presented by the researcher is small. As a result, the closed WAT cannot be an accurate measure of word associations as far as specific lexical items are concerned. However, if the researcher is only interested in type of response, then the closed test may be a useful tool. The researcher need only ensure that examples of each possible response type under study, i.e. syntagmatic or paradigmatic, are included in the choice list. Assuming a tendency for syntagmatic responses, it can be hypothesised that the respondent will select a high proportion of syntagmatically related words. Likewise, for paradigmatically associated tendencies the respondent can be expected to select a higher proportion of paradigmaticlly associated words. More will

be said on this in chapter 4 when discussing the results of this study.

1.3 Literature review of WAT research

There are three general bodies of research that will be discussed briefly here. The first relates to native English speakers, the second to non-Japanese EFL/ESL speakers, and the third to Japanese EFL speakers.

1.3.1 "Norms" in native English speaker WAT

In the literature relating to native English speaker word association tests, there are two commonly stated tendencies. The first is that adult native speakers tend to respond to stimuli with words of the same grammatical class, that is, with paradigmatic (often referred to as *coordinate*) responses (Carter, 1987; McCarthy, 1990; Aitchison, 1994). For instance, if presented with the stimulus *dog*, native speakers are more likely to respond with words such as *cat* or *animal*, as opposed to words like *barked* or *furry*. Native speaking children often exhibit a tendency towards phonological or syntagmatic associations but this gradually shifts to paradigmatic associations as they approach adulthood (Entwisle, 1966; Brown and Berko, 1960). It was also shown that adult native speakers tend to respond to unfamiliar adjective stimuli in a similar way to that of

children (Stoltz, 1972), that is, phonologically or syntagmatically.

The second tendency in native WAT responses is that groups of adult native speakers generally exhibit a greater degree of commonality in their responses than do non-native speakers (Carter, 1987; McCarthy, 1990; Aitchison, 1994; though it is disputed to a certain degree by Fitzpatrick, 2007). This second tendency is particularly interesting given that non-native speakers are understood to have a much smaller English mental lexicon than that of native speakers, and thus have a smaller pool of possible words from which to draw their responses.

A brief look at some data from EAT, Cramer (1970), and Simon Holliday's *wordassociation.org*[2] illustrates these two tendencies very well.

EAT (99 respondents)		Cramer (1970) (109 respondents)		wordassociation.org (no count data available)
first	17	minute	37	first
minute	13	first	30	minute
time	12	time	12	third
third	11	third	8	hand
hand	8	hand	2	time

Table 1.2: Top 5 responses to the stimulus word SECOND

[2] Simon Holliday's *wordassociation.org* is an ongoing online word association collection database. It is available online at: http://wordassociation.org/

The top 5 responses to the stimulus SECOND for each of these sets of norms are identical. Furthermore, with the exception perhaps of "second hand", which may be considered collocational in nature, they are all paradigmatic responses.

1.3.2 WAT trends in ESL/EFL research: non-Japanese respondents

While not nearly so prolific in the literature, research on ESL/EFL speakers has presented similar, though sometimes contradicting, findings to those for native speakers regarding paradigmatic and syntagmatic responses. Some studies suggest a general "shift" in response type from syntagmatic to paradigmatic that corresponds with respondents' degree of proficiency in English. Response commonality, however, is often reported as being lower than that of native speakers. Some examples of non-native WAT studies are mentioned below.

Söderman (1993) explored the shift from syntagmatic to paradigmatic responses thought to be characteristic of second language learners. Results of WATs on native Finnish EFL students showed that this shift is not very great, though there does seem to be a decrease in phonological associations with high frequency words.

Dóczi's (2006) study on 15 Hungarian high school students showed that in both L1 (Hungarian) and L2 (English) the respondents tended towards paradigmatic responses with noun stimuli but when verb stimuli were also included no statistically significant difference was observed between paradigmatic response means and syntagmatic response means.

This lack of difference between paradigmatic and syntagmatic response type frequencies was also reported by Kruse, et al. (1987) who find no clear difference between the response types of native and non-native speakers. This bears testimony to the generally inconsistent nature of WAT research.

1.3.3 WAT trends in ESL/EFL research: Japanese respondents

Recent research conducted on Japanese respondents seems to indicate a divergence from the above mentioned general tendency towards paradigmatic responses. That is, where non-Japanese speakers, for the most part, tend to conform to the response type norms of native speakers, especially at higher levels of proficiency, Japanese respondents tend towards a higher count of syntagmatic associations to stimuli (Orita, 1999; Wolter, 2001;

Yoneoka, 2001; Thomas, 2006).

Wolter's (2001) data clearly indicates this tendency. Wolter examines the relationship between type of response and the respondents' "depth of word knowledge" for the particular stimulus. Based on Wesche and Paribakht's (1996) "depth of vocabulary knowledge" test, follow-up questionnaires were constructed and distributed after the WAT to determine, on a scale of 1 to 5, how well the respondent knows the word. He also discusses several problems with the WAT. One such problem is that some words naturally draw certain associations due to lack of any other options. He gives the example of the stimulus REACTOR which elicited the response *nuclear*, a syntagmatic association, more often than not. He attributes this to the paucity of paradigmatic alternatives to the word REACTOR.

Yoneoka (2001) also observes this Japanese syntagmatic tendency and goes on to note the tendency in Japanese native language WATs as well. She suggests that the reason for the so-called "anomaly" could be rooted in culture. One of the problems with WAT can be seen clearly here in Yoneoka's (2001) study. Care was not taken to select words with only one clear word class. Her stimulus MILK, for example, could be interpreted

as both a noun and a verb. It is unclear whether the association pair MILK-cow is a verb-noun syntagmatic association as in “to milk a cow” or a meronymous noun-noun paradigmatic association.

A more recent, and perhaps somewhat more persuasive, account of the Japanese tendency is that of Thomas (2006). Here the researcher examines the issue in light of a single stimulus, multiple response, WAT and demonstrates a clear syntagmatic preference of the Japanese respondents both in a single-response test and a multiple-response test.

CHAPTER 2

RESEARCH PARTICIPANTS

2.1 Selection of participants

Data for this study were collected online (see chapter 3, Research Method, for details on test administration) thus allowing for participation in the study on a global level. A total of 97 respondents participated in the online test. Respondents were organized into three groups based on native language:

1) native English speakers (NS)
2) non-Japanese ESL/EFL speakers (NJS)
3) Japanese EFL speakers (JS)

There were a total of 47 NS, 26 NJS, and 24 JS respondents.

2.2 Respondent language profile summaries

Summaries of the respondents' anonymous language profiles are given in sections 2.2.1, 2.2.2, and 2.2.3 below (see Appendix 1 for complete profiles).

2.2.1 Native English speakers

The bulk of the NS respondents originate in Canada (27) and America (11) with a small proportion hailing from other countries (Table 2.1):

Canada	27
USA	11
Zimbabwe	2
England	1
Egypt	1
Holland	1
Northern Ireland	1
Turkey	1
USA/Germany/Jap	1
Zambia	1

Table 2.1: Native Country (NS)

Most NS respondents currently reside in Canada and America though some are known to have been living in other countries at the time of the survey.

The majority of the participants were in the 31-60 age range (25) and the 13-20 age range (20; according to information from administrators of the test, respondents are at the high end of this range), with only 2 respondents falling in the 21-20 age range.

Just over half of the respondents (25) report having some experience living abroad while just under one third (15) report some degree of experience studying a foreign language.

2.2.2 Non-Japanese ESL/EFL speakers

The two largest groups of NJS represent respondents from China (7) and Egypt (5). The remaining respondents represent countries in Asia, Africa, Europe and North America (Table 2.2):

China	7
Egypt	5
Turkey	3
Dubai	2
USA	2
Germany	1
Hong Kong	1
Iran	1
Mexico	1
Spain	1
Sudan	1
Ukraine	1

Table 2.2: Native Country (NJS)

Altogether, eight native languages are represented with Chinese (8) and Arabic (8) being the most common (Table 2.3):

Arabic	8
Chinese	8
Spanish	3
Turkish	3
German	1
Italian	1
Persian-Turkish	1
Ukrainian	1

Table 2.3: Native Language (NJS)

The largest age group represented in the data is the 13-20 range (15; information from the administrators places most respondents at the higher end of this range). There were six respondents in the 21-30 range and four in the 31-60 range. One respondent did not select an age range.

Half the respondents (13) have some degree of experience living abroad. Sixteen respondents reported studying English primarily in mainstream schooling and EFL schools; nine respondents reported learning English in international schools, emersion schools or via ESL experience; and one respondent reported learning English by means of self study.

2.2.3 Japanese EFL speakers

Only 6 respondents reported having some experience living abroad while half the

respondents (12) reported studying English in mainstream schooling and EFL schools. Two respondents reported studying in ESL situations and 1 reported self study as the primary means of studying English. All Japanese respondents are currently living in Japan.

The bulk of the respondents fall into the 31-60 age range (17), with 2 in the 21-30 range, 2 in the over 61 range and 2 in the 13-20 range (reports from the administrator put these two respondents at the higher end of this range). One respondent did not provide an age.

CHAPTER 3

RESEARCH METHOD

3.1 WAT design

The WAT survey, intended as a written-written test (see section 3.4) was designed to be administered online. It consists of six main sections (see Appendix 2 for the complete survey):

1. Introduction and Instructions
2. Background
3. Section 1 (open-unprimed test)
4. Section 2 (open-primed test)
5. Section 3 (closed-unprimed test)
6. Section 4 (closed-primed test)

The introduction was given in simple English and the instructions were presented in a list format for clarity and ease of reference for the respondent. The background section consisted of the following questions/instructions:

1. Please enter the session ID code you were given with the link to this webpage.
2. What is your native language?
3. What is your native country?

4. Have you lived for a long period in a country that is not your native country or where the people do not speak your native language? Please give details.
5. If English is not your native language in what ways have you studied it? Please give details.
6. If you have any other comments about your language experience, please mention them here.
7. What is your approximate age?
   - 12 or under
   - 13-20
   - 21-30
   - 31-60
   - 61 or over

In each section, six stimuli were provided followed by an input area (either text box or radio button list) for the response, and an input area (text box) for comments on why that response was chosen. All stimuli were presented in **BOLD CAPS.**

Section 1, the open-unprimed test, consisted of single-word stimuli with a text box for response input. This section followed the more traditional approach to word association tests and represents the standard as generally found in the literature (for a classic example see Jenkins, 1970).

Section 2, the open-primed test, followed the same format as in section 1 with one difference: each stimulus word was presented in a short sentence to provide context. Here the stimulus word in **BOLD CAPS** could be readily identified by the respondent.

Section 3, the closed-unprimed test, consisted again of single word stimuli. However, here respondents were asked to select one word that they thought had the strongest association from a list provided after the stimulus.

Section 4, the closed-primed test, combined the primed test of section 2 with the closed test of section 3. The word was presented in a context sentence and respondents were asked to select from a list of four possible response words.

3.2 Stimulus word selection

Twenty-four words in total were chosen for the stimuli (see Table 3.1).

Section	Cramer (1970)	Additional Words
1. open-unprimed	SECOND	PRESENT
	CASE	BLOCK
	SPRING	PARK
2. open-primed	MINE	PATIENT
	RACE	WATCH
	PASS	SCORE
3. closed-unprimed	PRODUCE	ARTICLE
	MEAN	BOARD
	COURT	FIRE
4. closed-primed	INTEREST	EXERCISE
	MARCH	DRIVE
	CLUB	LIGHT

Table 3.1: Stimulus Word List

As one of the main areas of investigation in this study is polysemy, only words that have multiple senses were chosen. All words have a Bank of English[3] frequency of 20,000 or more, entries in the Edinburgh Associative Thesaurus and exactly half the words are from a word association study of homographs by Cramer (1970). It was deemed that some of Cramer's words had rather obscure secondary senses (like, "compact" equalling "agreement") so only some of her words were selected. The remaining words were selected by the researcher. Words were also selected so as to avoid priming between stimuli. For example, in the first draft of the list, MEAN and KIND were in the same section. KIND was removed for this reason. To further avoid cross-stimulus priming, blank areas were included in the layout of the webpage allowing the respondents to view only one stimulus word at a time and forcing them to scroll down to see the next.

For the closed tests, care was taken to choose words with multiple senses but that did not have multiple word class interpretations within a sense. For example, the word BOARD has multiple word classes. It can be a noun ("managing group" in a

[3] The Bank of English is a general corpus of the English language and is jointly owned by HarperCollins Publishers and the University of Birmingham. In 2007 the corpus stood at 450 million words. More information on the corpus can be found online at: http://www.titania.bham.ac.uk/

company) or a verb ("to get on"). However, if the response word is "chairperson" the sense is more clearly that of a "managing group" which can only be a noun. Thus the association is clearly of the same word class, i.e. paradigmatic. Multiple word class interpretations within a sense would make it impossible to determine the nature of respondent associations. In the open primed test the sense and word class are both decided by the context – special attention was paid to this as ambiguity can occur even in context. For example, the sentence "He took a BOW," is ambiguous despite the sentence context. The sentence could be referring to the action of bending over, or could be referring to someone selecting a knotted ribbon or primitive weapon.

3.3 Closed test response word selection

Choosing the response words for the closed test sections proved difficult. Respondents were provided with four choices: two (one syntagmatic and one paradigmatic) that correspond to a fairly common sense of the word and two (again one each of syntagmatic and paradigmatic association) that associate with a less common sense (Table 3.2).

			Response Choices	
Section	Stimulus	Sense	Syntagmatic	Paradigmatic
3. closed-unprimed	PRODUCE	1. vegetables (n.)	tasty	carrot
		2. create (v.)	product	make
	MEAN	1. personality attribute (a.)	miser	nasty
		2. signify (v.)	explanation	understand
	COURT	1. legal venue (n.)	guilty	law
		2. sports playing area (n.)	play	arena
	ARTICLE	1. item (n.)	buy	thing
		2. written passage (n.)	write	magazine
	BOARD	1. flat piece of wood (n.)	black	wood
		2. management group (n.)	meet	chairperson
	FIRE	1. flames (n.)	burn	water
		2. dismiss (v.)	boss	quit
4. closed-primed	INTEREST	1. attraction (n.)	stimulating	hobby
		2. investment (n.)	pay	bank
	MARCH	1. way of walking (v.)	army	hike
		2. month name (n.)	cool	April
	CLUB	1. association (n.)	join	member
		2. tool for hitting (n.)	swing	golf
	EXERCISE	1. physical training (n.)	healthy	sports
		2. learning task (n.)	difficult	book
	DRIVE	1. opperate a vehicle (v.)	car	move
		2. computer hardware (n.)	reboot	memory
	LIGHT	1. brightness (a.)	bulb	dark
		2. not heavy (a.)	weight	heavy
(n.) = noun; (v.) = verb; (a) = adjective				

Table 3.2: Response Word Choices for Closed Tests

In order to decide which senses to include in the response choices each word was checked in the Collins Thesaurus (Mackie et al, 2002). The Collins Thesaurus was constructed using the Bank of English and the senses are listed according to frequency. However, it was felt that some of the most frequent senses listed in Collins would not necessarily be the ones that would come to respondents' minds first. To test this, the Collins senses were then cross-referenced with the "norms" found in the Edinburgh

Association Thesaurus and it was found that in many cases there was, indeed, a discrepancy. For example, in Collins the most frequently occurring sense of MEAN is the verb *to signify*, while the most frequently identified sense in EAT is the adjective *nasty*. It was deemed more useful to work with the "norms" and the main sense identified in EAT was used as the main sense for the stimulus word here. In the primed tests, the word was primed for the less common sense and in every case the most common EAT response was included as a choice in the closed tests. The responses with association to the most common sense of the stimulus word (unprimed) or with association to the contextual meaning (primed) were not placed in the first position in the list. This was in order to avoid "highlighting" the more common/likely associations.

Finally, in the closed-primed test (section 4), care was taken not to choose direct synonyms as response choices. The reason for this was to prevent respondents from falling into a "substitution" game. In all cases there was enough ambiguity that any one of the responses could be the "right answer" should respondents ignore the reminder that no such "right answer" exists.

3.4 WAT Administration

As mentioned above, the WAT was administered online and as such is a "written-written" test. This is to say that stimuli were received visually as opposed to aurally and responses were "written" into the website interface.

The WAT was hosted on a website and left open for three consecutive months. Colleagues were asked to participate by administering the test to their students and friends. Respondents completed the survey and on clicking the "send" button, responses were sent from the website to the researcher's email account in blocks of tab-delineated text. This block of text was then copied and pasted into a prepared Excel file where the entries were automatically slotted into their appropriate data columns.

In order to verify the language profile of the respondent, a simple session ID code system was implemented. Administrators were sent, via email, a web link to the survey and a unique session ID code. This code was associated with a specific language profile provided by the administrator. The code would then be passed to the participating WAT survey takers and entered in the first section of the survey. When

the data were analysed, the session ID code could be compared with the language information provided by the respondent. Any discrepancy between the two and the data for that respondent could be discarded.

3.5 Analysis

Analysis was conducted in two main areas: 1) controlling for polysemy; and 2) subject response type.

3.5.1 Analysing the effects of controlling for polysemy

The data were analysed according to the type of test (sections 1 through 4) and language group. Two measures were used to assess the effects of controlling for polysemy: 1) effects on respondent commonality; and 2) effects on respondent sense identification. In the first measure commonality was calculated for sections one and two by dividing the number of responses for a particular stimulus by the number of different types. Types were counted using *Oxford WordSmith Tools*[4] text analysis software. This resulted in a positive commonality index where high values indicated high commonality and low values, low commonality. Sections 3 and 4 however, being closed tests with

[4] *Oxford WordSmith Tools 4.0* is available online at http://www.lexically.net/wordsmith/.

only 4 possible types, did not lend themselves usefully to this calculation. An alternative formula was used whereby the standard deviation of the counts for each response word was divided by the total count of the responses. This resulted in a positive commonality index ranging from 1.0 (perfect commonality) to 0.0 (no commonality).

In both measures above, the values for each word were averaged and the means were compared for significant difference using either a t-test or ANOVA (at α=0.01) as appropriate. Finally, both sets of data were mapped onto line graphs for final analysis.

3.5.2 Analysing the response types of NS, NJS, JS respondents

As the primary focus of this study is semantic associations, data on formal associations were not analysed in great depth. The following categories of association were used to classify each response:

a) Syntagmatic (Syn)- These included any responses that were of a different word class than the stimulus word and whose link to the stimulus was clear or could be clearly explained by the respondent. Also included here were responses of same word class

that exhibited a very strong collocational link to the stimulus (ex. *book* + *shelf* and *summer* + *vacation*).

b) Paradigmatic (Par)- Any responses that were of the same word class as the stimulus word and did not exhibit a strong collocational link were considered paradigmatic. The link must be clearly explained by the respondent. Subclasses of paradigmatic links include:

- synonymy (x means the same as y)
- antonymy (x means the opposite of y)
- hyponymy (x is a kind of y; also referred to as "subordination")
- co-hyponymy (x and y are both kinds of z; also referred to as "co-cordination")
- hypernymy (x has y as one of its kinds; also referred to as "superordination")
- meronymy (x is a part of y; also referred to as "partonymy")

c) Other (Oth) - This is the "catch-all" category that encompasses formal associations (orthographical and phonological responses), random associations (responses that have no clear relation to the stimulus and have not been explained in the comments box), and blanks (no response was given).

Four additional categories were also considered when analysing the primed tests (sections 2 and 4):

Syntagmatic (Syn'), Paradigmatic (Par'), and Other (Oth') - When the respondent ignored the priming and made an association that was clearly based on an alternate sense of the stimulus word then it was placed in one of these three categories as appropriate.

False association (Fls) - In section 2 (open-primed) there were several cases where the respondent made associations with non-stimulus words or phrases in the priming sentence or with the meaning of the entire sentence as a whole. These were classed as false associations. This also includes cases where the response was based on conversation-like association with the stimulus sentence. For example, with the stimulus MINE the priming sentence was "My grandpa worked in a gold MINE." A response/comment pair such as "great/He must be rich" was classed as a false association.

Responses were tallied according to association category for each respondent and converted to percentages of the total. Mean percentages were then calculated for each language group. The mean percentages relating to syntagmatic and paradigmatic responses were subjected to statistical analysis (t-test) to determine the significance (α=0.01) of the findings.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Effects of controlling for polysemy

In this section, the study will focus on the effects of controlling for polysemy as they relate to respondent commonality and sense identification.

4.1.1 Commonality

The first measure of the effects of controlling for polysemy – and the data-skewing variation it can introduce to the results – was the degree to which respondents responded to stimuli with the same words. For example, in this study, most NS subjects responded to the stimulus SECOND with *first* (12), *minute* (7), or *third* (5; see Appendix 3 for detailed response counts) thus showing a great deal of commonality.

4.1.1.1 Effects of priming on commonality

It was found that in the traditional WAT (section 1) the NS group had an average commonality index (CI) of 1.79 (total number of responses divided by number of unique types) across the six stimulus words. The same group had an index of 1.54 for the six words in the primed test (section 2). The difference, however, between these figures is

not statistically significant (p=0.28), suggesting priming had little or no effect on commonality of response for native speakers (see Table 4.1).

Section	Stimulus	CI
1. open-unprimed	SECOND	2.61
	CASE	1.77
	SPRING	1.57
	PRESENT	2.09
	BLOCK	1.44
	PARK	1.28
	Mean	**1.79**
2. open-primed	MINE	1.27
	RACE	1.52
	PASS	1.57
	PATIENT	1.68
	WATCH	1.88
	SCORE	1.31
	Mean	**1.54**
Significance (p)		0.28

Table 4.1: NS Commonality Indices for Open Tests

Similar results were found when comparing results for the NJS group (Table 4.2). In the traditional WAT, the NJS group had a CI of 1.39. Their CI in the primed WAT was 1.18. Again, there was no statistically significant difference between these two indices (p=0.13).

Section	Stimulus	CI
1. open-unprimed	SECOND	1.73
	CASE	1.19
	SPRING	1.25
	PRESENT	1.67
	BLOCK	1.04
	PARK	1.47
	Mean	**1.39**
2. open-primed	MINE	1.18
	RACE	1.25
	PASS	1.19
	PATIENT	1.19
	WATCH	1.19
	SCORE	1.09
	Mean	**1.18**
Significance (p)		0.13

Table 4.2: NJS Commonality Indices for Open Tests

With the JS group, however, the results are slightly more interesting (Table 4.3).

In the traditional WAT the JS group had a mean CI of 1.36 while in the primed WAT the index was 1.18. The difference between these means is significant at the 98.4% level (p=0.016) indicating that, in fact, there was more commonality of response among JS respondents in the traditional WAT than in the primed test.

Section	Stimulus	CI
1. open-unprimed	SECOND	1.41
	CASE	1.33
	SPRING	1.33
	PRESENT	1.26
	BLOCK	1.53
	PARK	1.26
	Mean	**1.36**
2. open-primed	MINE	1.31
	RACE	1.14
	PASS	1.14
	PATIENT	1.10
	WATCH	1.09
	SCORE	1.32
	Mean	**1.18**
Significance (p)		0.016

Table 4.3: JS Commonality Indices for Open Tests

This unexpected figure seems to indicate that even when the sense of the word is controlled for, that is, when respondents are responding to only one sense of the word, there can be great variation in response. In other words, variation in response is less a factor of variation in respondent sense identification in general than it is a case of the specific stimulus word itself – or perhaps, some affective aspect on the side of the respondent group – dictating the degree of commonality between responses.

To further examine this notion, it will be useful to look more closely at the specific stimulus words used in each test. Looking at a graph of the results for sections 1 and 2 (Figure 4.1) there are two clear "peaks" in commonality with SECOND and PRESENT

in the NS and NJS groups, while the JS group shows slight peak with BLOCK. It is interesting to note here the similarity in line shape between the NS and NJS groups, but more will be said on this in section 4.2.

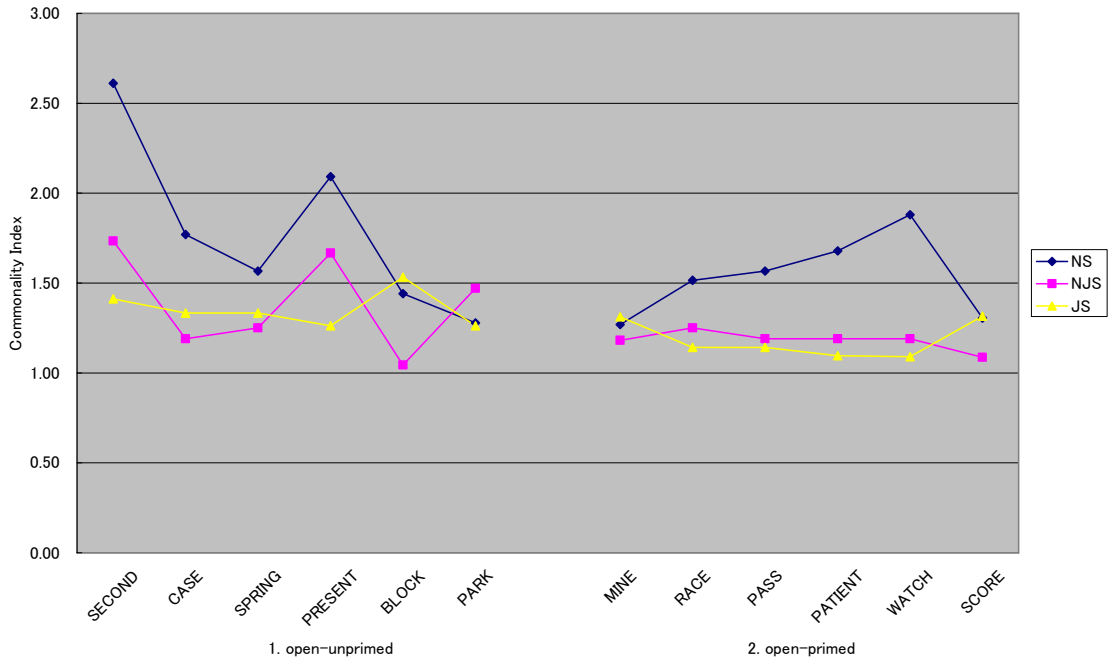


Figure 4.1: Commonality Indices for Open Tests

Looking more closely at the stimulus SECOND, which had the highest CI value for the NS and NJS groups, this word is a fairly frequently occurring word in the English language (BofE frequency of 217,565). A quick search for SECOND on the semantic network database, WordNet[5], shows that the word has a total of 17 different senses (10

[5] WordNet is a semantic network database illustrating the semantic relationships between words. It is available online at: http://wordnet.princeton.edu/

noun senses, 2 verb senses, 4 adjective senses, and 1 adverb sense). Comparatively, BLOCK, which had low commonality in the NS and NJS groups, has a BofE frequency of 23,186 and a WordNet sense count of 28 (12 nouns and 16 verbs). BLOCK clearly has more senses, relative to usage, available to the respondent than does SECOND. One might thus speculate that the more senses a word has in proportion to its frequency, the more likely respondents may be to vary in their responses on a WAT. A "commonality likelihood index" (CLI), a ratio representing the frequency divided by sense count, could then be created for comparison (Table 4.4).

		WordNet Sense Count*						BofE	Commonality Likelihood
Section	Word	N	V	Aj	Ad	Pn	Total	Frequency	Index
1. open-unprimed	SECOND	10	2	4	1		17	217565	12798
	CASE	18	2				20	142173	7109
	SPRING	6	5				11	31044	2822
	PRESENT	3	13	2			18	74315	4129
	BLOCK	12	16				28	23186	828
	PARK	6	2				8	86463	10808
2. open-primed	MINE‡	2	2			1	5	22636	4527
	RACE	6	4				10	68839	6884
	PASS	16	26	1			43	36604	851
	PATIENT	2		2			4	25102	6276
	WATCH	6	7				13	46448	3573
	SCORE	11	7				18	28298	1572

*N=noun; V=verb; Aj=adjective; Ad=adverb; Pn=pronoun

‡WordNet does not include pronouns in its database; 1 count was added here to represent the common posessive pronoun sense of MINE

Table 4.4: Commonality Likelihood Indices for Open Tests

If in fact respondents are more likely to respond in a similar way to stimuli that have less senses to choose from then one would expect a high correlation between commonality indices and commonality likelihood indices. When the data for section one and two are examined, however, the results are, again, unspectacular. Table 4.5 shows the correlation coefficients comparing CI values with CLI values for NS, NJS, JS groups in both sections.

	1. unprimed	2. primed
NS	0.44	0.16
NJS	0.65	0.65
JS	-0.32	-0.32

Table 4.5: Correlation Coefficients between CI and CLI Values for Open Tests

As can be seen the correlation is not very strong – the NJS group providing the highest value at 0.65 – and in the case of the JS group even indicates a weak negative correlation. Thus this measure fails to explain why priming did not affect commonality in the predicted manner.

A final approach to the issue is to look yet more closely at the individual words that were selected for stimuli. As Aitchison (1994:86) notes, evidence from previous WAT studies combined with data collected from studies on aphasic patients' lexical recall

errors (Garrett, 1992) seem to indicate that words are stored in the mental lexicon according to their *semantic field*. Thus when a WAT stimulus is presented from a particular semantic field, the respondent is most likely to reply with a word from within the same field. This is of particular interest here. Returning to SECOND, it will be noted that the semantic fields of the main senses of this word are especially small. The two most common senses of SECOND according to Collins are *an ordinal number* and *a small unit of time*. The *ordinal number* sense has other ordinals in its semantic field but little else. Likewise, the *unit of time* sense has time-related lexical items in its field, such as *minute*, *hour*, or *clock* but little else. There are a limited number of words for respondents to choose from when responding to SECOND which explains the high commonality index for this word. The senses for PARK, on the other hand, tend to have much larger semantic fields. In particular, the sense *a common, open area* – a sense that was very commonly identified by respondents in this study – taps into a vast semantic field which contains all the people, things, actions, sights, sounds and smells that are commonly found in a park. With so many possible associations to choose from it is understandable that this word would have a great variety of responses, and therefore a low commonality index. At this point, there is no convenient way to quantify the size of a particular word's semantic field, and even with semantic networks provided by

databases such as WordNet, the only real means of studying semantic fields in this manner is, as Fortier (1997) states, by means of "human informants".

One final point worth noting here is, returning to the graph in figure 4.1, while priming did not seem to succeed in raising overall commonality in any of the groups, it did seem to succeed in reducing the range in variation of commonality between words. This can be seen by the more general "flatness" of the lines in the primed WAT graph and indicates that priming was not totally ineffectual in controlling variation.

4.1.1.2 Effects of closed tests on commonality

As mentioned in chapter 3 above, CI values could not be created for the closed tests in the traditional "token/type" manner. Instead, values were calculated using the formula "standard deviation (SD)/token". In order to be able to compare section 1 and section 3, it was then necessary to recalculate the CI values for section 1 using the SD formula. It should be noted here that this resulted in a slightly different graph line shape (Figure 4.2) for section 1 than in Figure 4.1. This is due to the much more sensitive nature of the SD calculation.

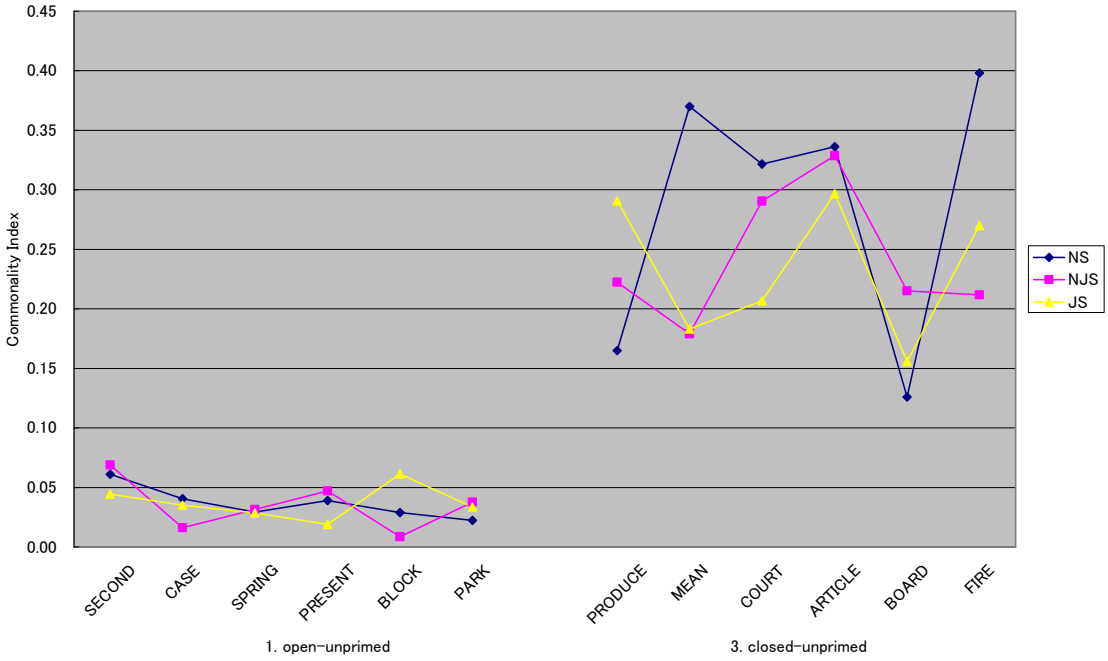


Figure 4.2: Commonality Indices for Unprimed Tests

The token/type calculation looks only at total number of types and actually masks the distribution of the response counts across the different types. The SD version, on the other hand, highlights the distribution, reflecting the tendency, or lack thereof, for responses to cluster around one or more types.

As was expected, commonality indices were much higher in the closed test for all groups (Table 4.6). All differences were statistically significant ($p<0.01$).

		CI Values		
Section	Stimulus	NS	NJS	JS
1. open-unprimed	SECOND	0.06	0.07	0.04
	CASE	0.04	0.02	0.04
	SPRING	0.03	0.03	0.03
	PRESENT	0.04	0.05	0.02
	BLOCK	0.03	0.01	0.06
	PARK	0.02	0.04	0.03
	Mean	**0.04**	**0.03**	**0.04**
3. closed-unprimed	PRODUCE	0.17	0.22	0.29
	MEAN	0.37	0.18	0.18
	COURT	0.32	0.29	0.21
	ARTICLE	0.34	0.33	0.30
	BOARD	0.13	0.22	0.16
	FIRE	0.40	0.21	0.27
	Mean	**0.29**	**0.24**	**0.23**
Significance (p)		0.003	0.0002	0.0002

Table 4.6: Commonality Indices for Unprimed Tests (all groups)

Considering the fact that there are only four possible responses in the closed test, the drastic difference in commonality across the two tests is to be expected; in fact, it is difficult to imagine any possible alternative result.

Perhaps a more useful endeavour would be to apply the two closed tests in further comparing the results of priming. Table 4.7 shows the CI values for stimuli in sections 3 and 4.

		CI Values		
Section	Stimulus	NS	NJS	JS
3. closed-unprimed	PRODUCE	0.17	0.22	0.29
	MEAN	0.37	0.18	0.18
	COURT	0.32	0.29	0.21
	ARTICLE	0.34	0.33	0.30
	BOARD	0.13	0.22	0.16
	FIRE	0.40	0.21	0.27
	Mean	**0.29**	**0.24**	**0.23**
4. closed-primed	INTEREST	0.16	0.18	0.18
	MARCH	0.23	0.30	0.20
	CLUB	0.25	0.12	0.17
	EXERCISE	0.22	0.18	0.20
	DRIVE	0.14	0.16	0.20
	LIGHT	0.14	0.16	0.23
	Mean	**0.19**	**0.18**	**0.19**
Significance (p)		0.10	0.12	0.18

Table 4.7: Commonality Indices for Closed Tests (all groups)

As can be seen, once again, there is no significant difference between the mean CI values between primed (NS 0.19, NJS 0.18, JS 0.19) and unprimed (NS 0.29, NJS 0.24, JS 0.23) tests for any of the groups. Looking at a graph of the values (Figure 4.3) shows, as with the open tests, a general flattening of the lines – with the exception of a spike at MARCH in the NJS group – indicating that while priming did not increase commonality, it did have an effect on the degree of variation in commonality across words.

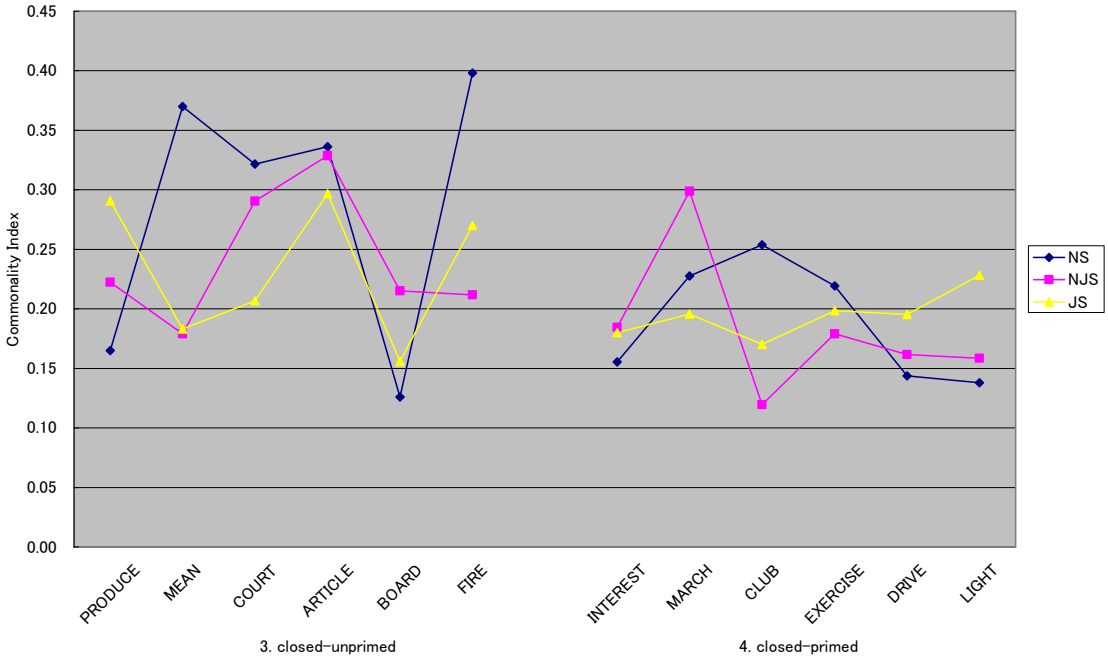


Figure 4.3: Commonality Indices for Closed Tests

4.1.1.3 Summary

The data presented in this section show that while priming seemed to have little effect on commonality of response, closed tests, not surprisingly, showed more significant effects. At this point in the study then, closed tests would seem to be a good option for controlling for polysemy that could potentially lead to data-skewing variation in WATs. Additionally, it was also shown that another potential source for variation in WAT responses is the size of the semantic field, or fields, of the stimulus.

4.1.2 Sense Identification

The second measure for assessing the degree to which priming and closed tests can help reduce data-skewing variation in WAT study is the ability of respondents to identify the sense of the stimuli. For example, in this study, for the stimulus SECOND, the responses for most NS respondents indicated that they identified the sense as "an ordinal number" (see Appendix 3 for detailed response counts according to sense identification).

4.1.2.1 Effects of priming on sense identification

In addition to looking at general commonality of response in section 4.1.1 above, this study examined the degree to which respondents identified the main sense of the word when reading the stimuli. As mentioned in chapter 3 above, the Edinburgh Associative Thesaurus (EAT) was used as a "norm" benchmark for this study. Thus when referring to the "main" sense of a word, the reference is to the most common sense identified in responses for that word in the EAT data. Responses that associated to the main sense of each word were tallied and expressed as a percentage of the total number of responses for that word. These *sense identification indices* (SII) were then averaged and compared across the different sections (Table 4.8). In section 2 the "main sense" was taken to be the sense that was primed for.

		SII Values		
Section	Stimulus	NS	NJS	JS
1. open-unprimed	SECOND	70.21	65.38	79.17
	CASE	44.68	53.85	54.17
	SPRING	76.60	80.77	95.83
	PRESENT	46.81	46.15	12.50
	BLOCK	38.30	26.92	58.33
	PARK	65.96	65.38	91.67
	Mean	**57.09**	**56.41**	**65.28**
2. open-primed	MINE	80.85	50.00	75.00
	RACE	91.49	84.62	100.00
	PASS	68.09	50.00	83.33
	PATIENT	70.21	76.92	70.83
	WATCH	70.21	88.46	87.50
	SCORE	51.06	73.08	70.83
	Mean	**71.99**	**70.51**	**81.25**
Significance (p)		0.11	0.20	0.28

Table 4.8: Sense Identification Indices for Open Tests (all groups)

As with the commonality index data above there seems to be no statistically significant difference between the groups' ability to identify the main sense in section 1 and their ability to identify the primed sense in section 2 (p=0.11, 0.20, and 0.28 for the NS, NJS and JS groups respectively). Once again, priming seems to have had no effect.

Looking at a graph of the SII data (Figure 4.4), there is a remarkable similarity between the NS and NJS groups and this will be discussed in more detail in section 4.2 below.

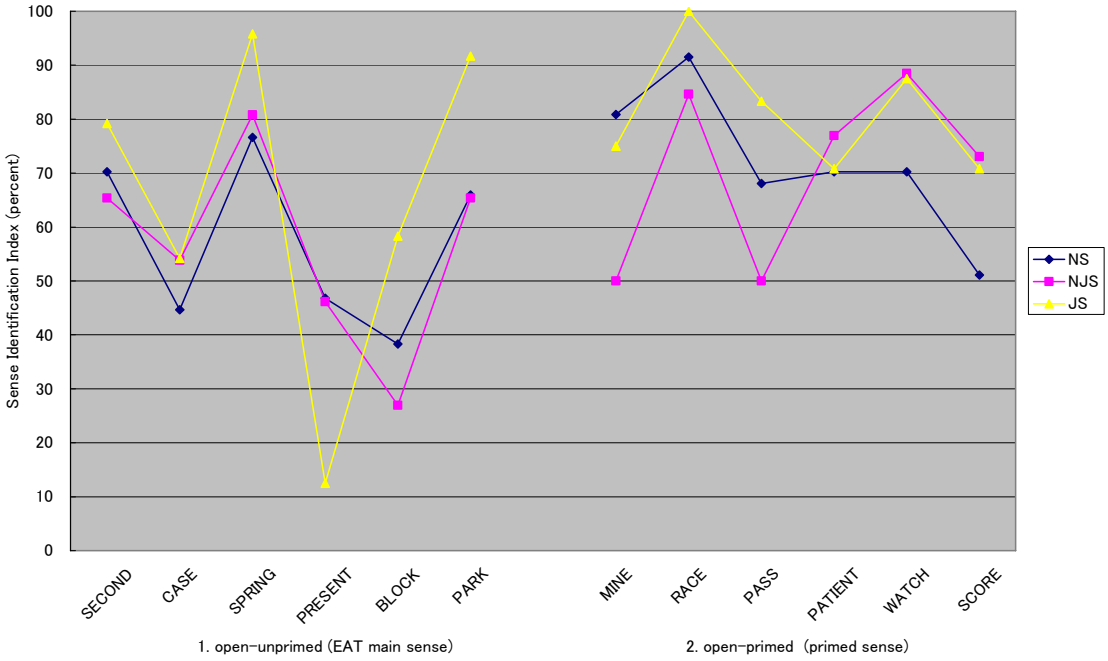


Figure 4.4: Sense Identification Indices for Open Tests

4.1.2.2 Effects of closed tests on sense identification

The final section of this part of the study examined the effects of the closed test on the respondents' tendency to associate their responses with the most common (EAT) sense of the polysemous stimulus word. Table 4.9 illustrates these data:

		SII Values		
Section	Stimulus	NS	NJS	JS
1. open-unprimed	SECOND	70.21	65.38	79.17
	CASE	44.68	53.85	54.17
	SPRING	76.60	80.77	95.83
	PRESENT	46.81	46.15	12.50
	BLOCK	38.30	26.92	58.33
	PARK	65.96	65.38	91.67
	Mean	**57.09**	**56.41**	**65.28**
3. closed-unprimed	PRODUCE	40.43	11.54	4.17
	MEAN	82.98	42.31	20.83
	COURT	70.21	69.23	62.50
	ARTICLE	6.38	7.69	8.33
	BOARD	61.70	76.92	45.83
	FIRE	89.36	84.62	95.83
	Mean	**58.51**	**48.72**	**39.58**
Significance (p)		0.92	0.64	0.21

Table 4.9: Sense Identification Indices for Unprimed Tests (all groups)

Unlike the CI values, there was no significant difference between the mean SII values between the open and the closed tests for any group (p=0.92, 0.64, 0.21 for the NS, NJS and JS groups respectively). A graph of the data (Figure 4.5), however, does show some interesting results:

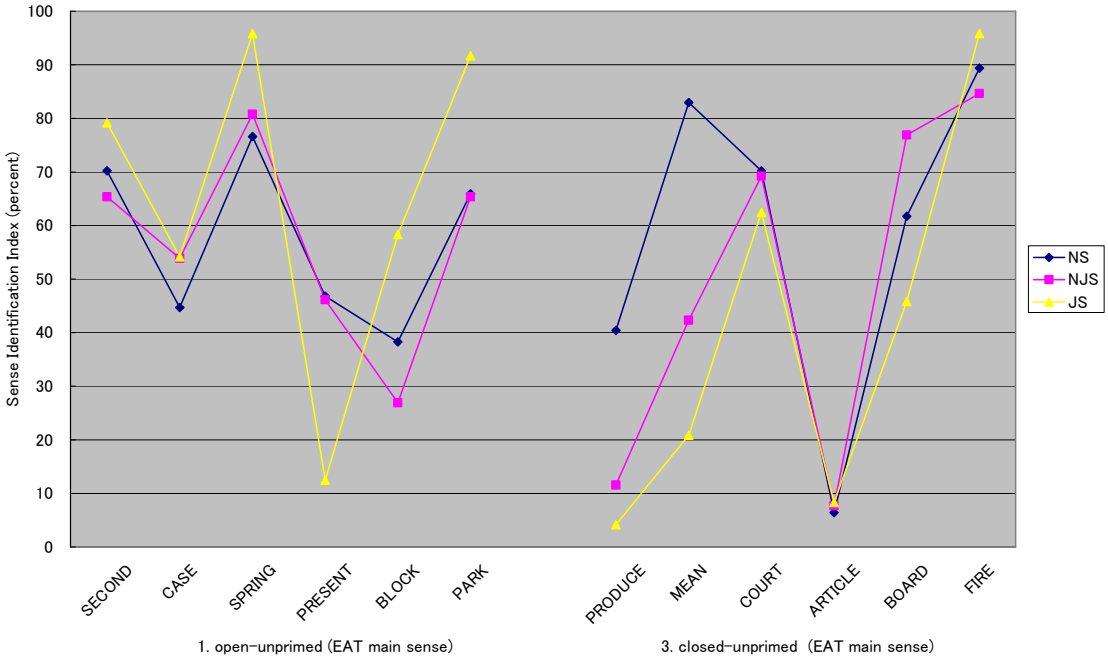


Figure 4.5: Sense Identification Indices for Unprimed Tests

Generally speaking there is not much difference between the shapes of the graphs across all groups. The JS group had a lower SII for PRESENT in the open test than the other two groups which may be due to the fact that *present*, in its *gift* sense, is a commonly used English loanword in Japanese and thus would be more likely to stimulate association in that semantic sphere. Also of interest is that all groups in the closed test tended to avoid the EAT main sense at ARTICLE. The top 2 responses in the EAT data (99 respondents) were *thing* (19 counts) and *clothing* (16 counts). *Magazine* only prompted 3 responses. This is in stark contrast to the data here where *thing* was chosen by only 6 respondents out of the total 97 while *magazine* was chosen by 69 respondents.

It is natural that the figures are lower in the open test; there is much more room for variety. However, it is interesting that the "popularity" of *thing* and *magazine* should be inverted in this way. It could be, perhaps, that he position of *magazine* as first in the response list subconsciously led people to select it over *thing* and could indicate that order of presentation of response stimuli is an important concern in closed tests. Another possible reason could be a quirk in the EAT data. As it happens, ARTICLE is one of the cases, mentioned in chapter 3, where the EAT and Collins data differed. In Collins the most common sense of the word is *a written document*. It may be the EAT data that is exhibiting unusual properties here. Whichever the case, this part of the study points out one of the potential problems of utilizing so-called "norms" of word association.

4.1.2.3 Summary

The data in this section of the study presented little in the way to suggest that priming or closed tests are useful in reducing data-skewing variation in WAT responses. Sense identification did not seem to be affected by either of the controls. This section of the study did, however, provide some insight into the problems of using closed tests in WAT research.

4.2 Comparing response types between NS, NJS and JS respondents

The following section will discuss the type of associations respondents made with the stimuli. See appendix 4 for detailed data lists.

4.2.1 Section 1: Open-unprimed (traditional WAT)

This section and subsequent sections (4.2.2 – 4.2.5) will be comparing the type of responses (paradigmatic and syntagmatic) generated by respondents of each language group across all four types of test. The main focus in this study is the difference in frequency between paradigmatic and syntagmatic responses. Thus all phonological, orthographical and random or false responses have been grouped under "other". It was understood that the visual nature of this method of administration could potentially lead to a greater number of orthographic responses and a lesser number of phonological responses. Since neither orthographic associations nor phonological associations are central to this study, variation in this respect was deemed to be of little concern.

In the first test, the traditional WAT, the NS group and the NJS group showed a clear preference for paradigmatic responses. 61.35% of the NS group's responses were paradigmatically associated while only 35.46% were associated syntagmatically

($p<0.01$). Results were similar for the NJS group (par. 58.97%, syn. 28.85%, $p<0.01$). The JS group, however, showed no significant difference between the two types of response (Table 4.10)

Group		Syn %	Par %	Significance
NS	All Responses	35.46	61.35	2.8E-06
NJS	All Responses	28.85	58.97	3.9E-05
JS	All Responses	48.61	46.53	0.7374

Table 4.10: Response Types for Open-unprimed Test

This supports much of the current research on WAT regarding a native tendency towards paradigmatic responses. What is particularly interesting however, is the lack of any preference on the part of the JS group. While this does not lend much direct support to the notion that Japanese tend to make syntagmatic associations to WAT stimuli as reported in Yokeoka (2001) and Thomas (2006), it does seem to support the idea that the Japanese EML may not be organized paradigmatically as with native and non-Japanese ESL/EFL speakers, but instead relies on some other mental-lexical "map" for organizing its lexis.

4.2.2 Section 2: Open-primed

For section 2 the data were analysed first as a whole, and then in subgroups based on

whether the priming had been followed or ignored. In addition to the above three categories (paradigmatic, syntagmatic and other) a category was added to express cases of "false" priming where the response seemed to have been primed by the entire sentence as a whole or by a word in the sentence other than the stimulus word itself. The NS group again showed a tendency for paradigmatic responses (par. 57.80%, syn. 24.47%, $p<0.01$) as did the NJS group (par. 48.72%, syn. 20.51%, $p<0.01$; Table 4.11).

Group		Syn %	Par %	Significance
NS	All Responses	24.47	57.80	2.9E-11
	Primed Only	14.54	41.13	1.4E-07
	Priming Ignored	9.93	16.67	0.0448
NJS	All Responses	20.51	48.72	4.1E-05
	Primed Only	12.82	35.26	0.0003
	Priming Ignored	7.69	13.46	0.1615
JS	All Responses	34.72	30.56	0.5660
	Primed Only	26.39	24.31	0.7805
	Priming Ignored	8.33	6.25	0.4878

Table 4.11: Response Types for Open-primed Test

The JS group, once again, produced results indicating no significant difference between response type tendencies (par. 30.56%, syn. 34.72%, $p=0.5660$). Looking only at responses where priming was clearly followed, the results are similar: an NS and NJS tendency for paradigmatic response over syntagmatic, and a lack of any tendency at all for the JS group. However, it is interesting to note the results of isolating the cases where priming was ignored. In all groups, there was no strong statistically significant

difference between paradigmatic and syntagmatic responses. This illustrates well the variation that can be inherent in a traditional WAT containing polysemous words, variation that can potentially skew the results by artificially inflating the counts of one type of response over the other. Here priming allowed the researcher to isolate this variation from the data and provide more reliable results.

4.2.3 Section 3: Closed-unprimed

The results from the closed test confirm, yet again, the NS and NJS groups' tendency to respond to WAT stimuli with words of paradigmatic association (Table 4.12).

Group		Syn %	Par %	Significance
NS	All Responses	33.69	63.83	2.9E-11
NJS	All Responses	39.10	59.62	0.0024
JS	All Responses	43.06	55.56	0.0368

Table 4.12: Response Types for Closed-unprimed Test

The NS group had a mean paradigmatic response tendency of 63.83% and a syntagmatic response tendency of 33.69% ($p<0.01$); the NJS group had similar scores (par. 59.62, syn. 39.10, $p<0.01$). However, here the results for the JS group begin to show signs of change. The JS group's response scores were 55.56% paradigmatic and 43.06% syntagmatic, a fairly drastic difference from the results of the previous two, open, tests.

The statistical significance of this difference in mean response type is not quite strong enough to rule out random influence – p, at 0.037, is just slightly greater than the stated alpha for the experiment – but it is close and worth noting here.

4.2.4 Section 4: Closed-primed

The final test combines the priming aspect of section 2 with the closed aspect of section 3 and as such it exercises the strictest control for polysemy. Here some very interesting results can be seen. One point of interest is that for the first time in the NS and NJS groups the results across all responses show an insignificant difference between syntagmatic and paradigmatic associations (Table 4.13).

Group		Syn %	Par %	Significance
NS	All Responses	44.33	53.55	0.0641
	Primed Only	20.57	43.97	2.7E-06
	Priming Ignored	23.76	9.57	0.0007
NJS	All Responses	44.23	55.77	0.0773
	Primed Only	19.23	42.95	0.0003
	Priming Ignored	25.00	12.82	0.0328
JS	All Responses	38.89	59.72	0.0010
	Primed Only	21.53	38.19	0.0131
	Priming Ignored	17.36	21.53	0.4105

Table 4.13: Response Types for Closed-primed Test

However, if those responses that clearly associate with the primed sense are isolated and analysed separately, as in section 2, then the differences (par. 43.97%, syn. 20.57% for

the NS group; par. 42.95%, syn. 19.23% for the NJS group) are again significant in favour of paradigmatic responses ($p<0.001$).

It is of great interest to note that with the NS group, when the cases of ignored priming are isolated there is actually a significant tendency towards syntagmatic responses (par. 9.57%, syn. 23.76%, $p<0.001$)! This is clearly a case where polysemy – despite the controls impressed upon it – has influenced the response type counts and skewed the data. This influence would have gone unnoticed had it not been for the priming which allowed for separation of responses in accordance with respondent sense identification.

The JS data provide similar results regarding the isolation of responses where priming was followed by the respondent. Across all responses, there is a strong statistically significant tendency to respond paradigmatically (par. 59.72%, syn. 38.89%, $p<0.01$). However, isolating the primed responses uncovers a skew in the data. The primed responses data show, as in the JS group data in section 3, a significance level falling just above the alpha level for the experiment ($p=0.013$) in favour of paradigmatic tendency.

Because the nearly significant JS paradigmatic tendency in both closed tests deviates from the much more moderate results in the open tests, it will be worth while investigating the nature of the closed test stimuli in more detail. There may be other factors that contribute to the unexpected results.

On examining the stimuli in the closed tests it becomes apparent that, despite the care taken to avoid such a problem, there are several stimulus-response pairs that could be classed as syntagmatic even though they were meant to represent paradigmatic associations. In section 3, ARTICLE is one such case. *Magazine article* is such a common collocation that the association is closer to sygtagmatic in nature than paradigmatic, despite being the same word class. This can be partially confirmed by looking at the comments respondents left after the entry for ARTICLE. For example, respondent NJS3 wrote, "magazine articles are like damn interesting...well the ones in Teen People." This is clearly a case of syntagmatic association. Compare this to NS7 who wrote, "Articles are in magazines," which is a much more clearly paradigmatic (meronymic) association. BofE corpus "picture" data further confirm this (Table 4.14) showing that *magazine* is in fact one of the most common antecedent collocations of ARTICLE; it's one of the top 5 most common content word collocations and one of the

top 14 collocations if grammar words are included.

leading	ARTICLE
an	ARTICLE
the	ARTICLE
this	ARTICLE
your	ARTICLE
of	ARTICLE
his	ARTICLE
under	ARTICLE
newspaper	ARTICLE
in	ARTICLE
recent	ARTICLE
that	ARTICLE
page	ARTICLE
magazine	ARTICLE
genuine	ARTICLE
to	ARTICLE
by	ARTICLE
her	ARTICLE
finished	ARTICLE
one	ARTICLE

Table 4.14: Bank of English Collocation "Picture" for ARTICLE

Thus if the results are re-calculated with the clear cases of syntagmatic and paradigmatic association counted accordingly, slightly different figures are derived (Table 4.15):

Group		Syn %	Par %	Significance
NS	All Responses	35.50	62.10	2.7E-09
NJS	All Responses	39.70	59.00	0.0036
JS	All Responses	52.08	46.43	0.3196

Table 4.15: Response Types for Closed-unprimed Test (accounting for clear cases of syntagmatic association)

As can be seen, there is little change in the results for the NS and NJS groups–both groups favour paradigmatic responses (62.06% and 59.00%) over syntagmatic (35.50% and 39.70%, $p<0.01$). The JS group, however, falls more into line with the results of the open tests in sections 1 and 2 (par. 46.53%, syn. 52.08%, $p=0.32$).

A similar problem was encountered with the stimulus CLUB in section 4. While the response word *golf* was intended by the researcher to represent a paradigmatic (meronymic) association with CLUB, there are many instances where it is clear that the respondent was making a syntagmatic association. Much like *magazine article* above, *golf club* is a very common collocation. Respondent NJS9 writes in the comments section: "golf club is the combination that I heard the most". The BofE collocation "picture" view for CLUB (Table 4.16) confirms that golf is the second most common content word associated with CLUB (sixth, including grammar words).

the	CLUB
a	CLUB
his	CLUB
football	CLUB
this	CLUB
golf	CLUB
country	CLUB
jockey	CLUB
new	CLUB
old	CLUB
former	CLUB
division	CLUB
league	CLUB
and	CLUB
yacht	CLUB
at	CLUB
of	CLUB
their	CLUB
fan	CLUB
london	CLUB
health	CLUB

Table 4.16: Bank of English Collocation "Picture" for CLUB

When the figures are recalculated with clearly syntagmatic associations accounted for, the results once again mirror those of sections 1 and 2 (Table 4.17):

Group		Syn %	Par %	Significance
NS	All Responses	22.34	42.20	2.1E-05
NJS	All Responses	20.51	41.67	0.0009
JS	All Responses	29.17	30.56	0.8132

Table 4.17: Response Types for Closed-primed Test (accounting for clear cases of syntagmatic association)

There is little change in the NS and NJS results (par. 42.20 and 41.67; syn 22.34 and 20.51; $p<0.01$) and the JS data approaches more closely the results in the open tests (par. 30.56; syn. 29.17; $p=0.81$).

One other problem can be seen in the closed-primed test of section 4. Under the stimulus word DRIVE, it will be noted that just over 50% of the JS group selected a response that reflected compliance with the priming (a computer drive). However, only 1 person selected the response *reboot*, which was meant to represent syntagmatic association. In Japanese, *reboot* occurs in two forms. One is the more traditional form, **saikidou** (再起動)and is much more common, especially with older or less proficient computer users. The other is the newer katakana form, **ribu-to** (リブート) and is more common with younger or more proficient users. Data from the survey introduction indicate that the sole JS respondent who selected reboot was indeed in the 13-20 age range. Thus here can be seen the influence, perhaps not so much of "depth of word knowledge" (Wolter, 2001) but of depth of semantic field knowledge. It may be that most respondents in the JS group simply did not know the word *reboot*. This highlights a major flaw in the design of the closed tests: the number of response choices. As it stands in this experiment, participants were given a selection of only 4

response choices, one synatagmatic/paradigmatic pair related to the main sense or primed sense, and one syntagmatic/paradigmatic pair relating to a secondary sense. In the case of DRIVE, when the syntagmatic response *reboot* was eliminated due to lack of knowledge of this word, the respondents then had little choice but to use the paradigmatic response or, in the case of the primed test, one of the words from an unrelated sense. This suggests that it would have been better to offer participants more response choices in the closed tests. This regrettable oversight in the stimulus response set design, however, helps to point out some of the downfalls of the closed test in general. Extreme care must be exercised in constructing a closed test where the researcher must consider all aspects of the response choice list: semantic field, frequency of usage, cross-linguistic influence, phonological influence – in fact, there may be too many variables involved to permit any usefulness at all for closed tests, even if the main focus of the research is a simple syntagmatic/paradigmatic dichotomy.

4.2.5 Summary

The response type study indicates that while the EML of non-Japanese ESL/EFL speakers seems to be organized in a similar way to that of native English speakers – both groups show a tendency for paradigmatic associations in WAT responses – the EML of

Japanese EFL speakers seems to be organized differently. The data presented here does not *directly* support Yoneoka's (2001) and Thomas's (2006) claims that Japanese respondents tend towards syntagmatic responses but it does seem to indicate that Japanese EML is not organized paradigmatically as is believed of most adult ESL/EFL learners.

Furthermore, while the results of the commonality study and sense identification study seemed to indicate that closed tests are a better means of controlling for data-skewing variation in WAT responses, practical application of the tests in the response type study actually indicates that the primed tests played a much more useful and important role than did the closed tests. The primed tests revealed data-skewing variation that would have been masked otherwise. The closed tests, on the other hand, showed a dependency on meticulous variable control on the part of the researcher during test construction and as such may not be a practical means of controlling for the effects of polysemy in WAT.

4.3 Other indicators for a differently organized mental lexicon in JS group

In addition to the direct results of the response type study, there are some other findings of the study that seem to suggest that the JS EML is organised differently than the NS or

NJS EML. One interesting point is that there seems to be a strong correlation between CI and type of response in the closed-primed test. When comparing CI to response type, the NS group produces a correlation coefficient of 0.76 for paradigmatic responses and -0.77 for syntagmatic. The NS group had a much weaker correlation (par. 0.42, syn -0.42). The JS group, quite surprisingly, had correlation coefficients of 0.89 for syntagmatic and -0.93 for paradigmatic – the opposite of the other two groups. This seems to indicate that in the closed test, for the NS and JS groups, the higher the commonality between the members of the group the higher the tendency for one particular type of response. The significance here lies not so much in that there is a correlation, but that the correlation is exactly opposite for the NS group and the JS group, with the NJS group falling, weakly, on the side of the NS group's results. This, coupled with data from the response type study, seems to add more support for Yoneoka's (2001) and Thomas's (2006) claims that the Japanese EML is organised syntagmatically.

Another point worth noting is the shape of the various CI graphs. Returning to figure 4.1, in the open-unprimed test there is a remarkable similarity between the NS and NJS line shapes, while the JS line seems to follow a somewhat different pattern. From an

L1 point of view, the NS group is a fairly homogenous group (all native English speakers), as is the JS group (all native Japanese speakers). The NJS group, however, is fairly heterogeneous, with respondents of many different language and culture backgrounds. It is surprising that their commonality across different words should vary in such a similar way to that of the NS group while the more homogenous JS group does not. Had the NJS group been the diverging group, this would not have been of such great note. That it was the JS group that diverged may indicate some difference in the way associations are made in an uncontrolled environment (the open-unprimed test) – perhaps indicating that the JS EML is more flexible in its associations when given free range of choice. This is confirmed to a degree when looking at the primed test where the lines flatten out and the JS and NJS lines come into more of an agreement.

4.4 Theoretical implications: Modeling the EML

While the central feature of this paper is not to construct a detailed model of the EML (examples of such endeavours can be found in Hall, 1992, and Wolter, 2006) some mention should be made as to how the data from this study relates to current ML theory.

When discussing EML organization it has often been suggested in this paper that a lexicon can be organized "paradigmatically" or "syntagmatically". This may be somewhat misleading as it implies a physical proximity of like words in the brain based on the assumption that shorter distance between words equates to stronger associations. However, in absence of any real evidence of physical word proximity, it makes more sense to examine mental lexical organization from a "strength of activation" point of view.

One of the most recently accepted models of word recognition relies on the theory of "parallel activation" (Forster, 1989). When a verbal or visual signal is received, many words are activated simultaneously, "in parallel" and the word that best matches that signal is selected for recognition. This model can be applied to word association responses.

The following adaptation of the parallel activation theory might be a reasonable way of looking at mental lexical activation of response words to polysemous stimuli in WAT. When the stimulus is heard the semantic fields (hereafter SF) for all senses of the word are activated. The senses are activated at different strengths depending on a number of

factors that could include: 1) the presence or absence of priming; 2) the size, frequency, and "depth of knowledge" of the SF; and 3) recent or current experiential/environmental influence. Naturally, the respondent's familiarity with the word will dictate the number and strength of the SFs that are activated for any polysemous word. Obscure senses of a word may not be known – such as COMPACT's secondary sense of "agreement" in Cramer's (1970) WAT – and thus fewer SFs would be activated.

Next, within all SFs, multiple words are activated. Generally speaking, the words within the "stronger" SFs will be activated at a higher strength than those within the "weaker "SFs. More commonly-used words (Thomas, 2006) or better-known words (Wolter, 2001) would be activated even more strongly. These words are the prime candidates for selection. Within this group of words, as shown in this study (particularly with the NS and NJS groups), "association type" may strengthen the activation still further. At this stage, if there is a small number of very strongly associated words left to choose from the respondent may resort to random selection. This random factor is a rarely discussed aspect of response word selection in the literature on WATs. However, it seems an appropriate explanation for the slight variation among groups of high commonality. Figure 4.6 depicts this suggested

activation process visually.

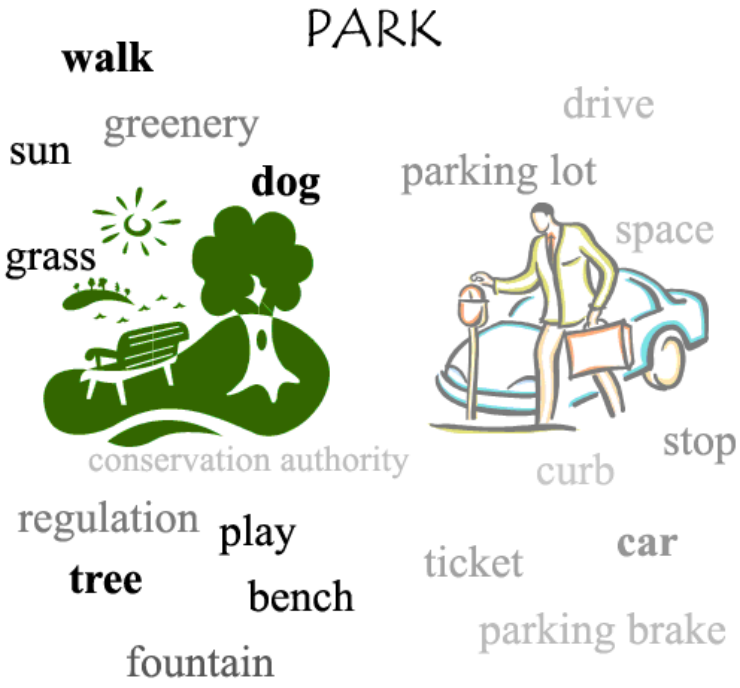


Figure 4.6: Illustration of Response Word Activation on Hearing Stimulus PARK

4.5 Practical implications: Testing and teaching

If indeed the Japanese EML is organized differently from that of native English speakers and non-Japanese ESL/EFL speakers, then this may have useful implications for testing and teaching.

Many multiple choice tests, including a number of standardized tests, require test-takers to differentiate paradigmatically between answer choices. An example of this can be

found on the TOEIC (Fujita, 1998:21):

> I inadvertently left a magnet next to the floppy disk and lost its entire --------.
> (A) capacity
> (B) content
> (C) quantity
> (D) amount

If the Japanese ML is not organized paradigmatically – or more specifically, if it is organized syntagmatically as Yoneoka (2001) and Thomas (2006) suggest – then it may be that Japanese are at something of a disadvantage, either in relation to the difficulty of the test or to the time it takes to complete the test, when compared to their fellow NS and NJS test-takers. Such a situation would demand the attention of test makers in Japan, particularly so if the test is an international one.

Furthermore, the results may have some relation to teaching. If the Japanese EML is organized differently than the NS or NJS EML then the way JS students are taught English might need more consideration. This is not to say that a syntagmatically-based lexicon would be in any way inferior to that of a supposedly more "native-like" paradigmatically-based lexicon, but that teaching methods that take this into account may be comparatively more efficient. While further speculation is

beyond the scope of this paper, it is clear that the topic deserves a good deal more research.

CONCLUSION

This study had two main purposes. The first was to examine ways of controlling the variation that can be introduced into WAT study data sets as a result of lexical ambiguity in stimulus words. The second was to apply these controls to the study of the Japanese EML – an area of research that has sparked a degree of controversy over the past several years.

In the first part, two means of controlling for polysemy were examined and it was found that while the closed tests *initially* seemed to be the more successful of the two, priming later proved to be the most efficient in not only controlling for variation, but also in allowing the researcher to uncover variation that would have otherwise been masked.

The closed tests are sensitive to such a large number of variables that in order to use the tests, painstaking care must be exercised on the part of the researcher in order to ensure accurate results are met. Furthermore, because researchers select the response words themselves, the closed test can lend itself too easily to researcher manipulation of response type data.

Priming, on the other hand, allows the researcher to manage sense-based variation in subject responses while at the same time involving much less preparation. Priming also allowed the respondents to produce the kind of natural responses not possible under the constrained conditions of the closed test which is valuable if the response words are to be analyzed in any more depth than simply type of response.

In the second part, the study looked at the response types of NS, NJS, and JS respondents and found that NJS respondent results seemed to correspond fairly closely to those of the NS group. The JS group's responses, however, did not correspond so closely. The NS and NJS groups tended towards paradigmatically associated responses to the stimuli whereas the JS did not. While this finding does not lend any direct support to the claims that the Japanese EML is organised syntagmatically, it does seem to indicate that it is organised differently than those of NS and NJS respondents. These findings suggest that it may be worth looking into the relationship between the mental lexicon and both the structure of multiple choice tests and the way in which English is taught in the Japanese EFL classroom.

Like much research conducted on the mental lexicon, however, the results of this study are far from concrete. Much still remains to be learned about the mental lexicon and the ways in which words are stored in the mind. In examining both a methodological aspect of WAT design and its practical application, it is hoped that this study has advanced, if only marginally, researchers' understanding of both word association tests and the English mental lexicon.

APPENDIX 1

RESPONDENT LANGUAGE PROFILES

Native Speaker (NS) Profiles

Respondent	Country	Foreign Experience	Study Methods	Other Comments	Age
1	USA	I spent 4 weeks in Germany, even though most people I met spoke enough English to communicate, I tried my best to utilize my knowledge of German. Sometimes it worked, other times I failed miserably, it depends on who you speak to.		I study German, and although I am not fluent yet, I hope to be so soon.	13-20
2	Holland	Yes Ive lived here in USA all life but my grandparents speak dutch.			13-20
3	USA				13-20
4	USA	no			13-20
5	USA	no			13-20
6	usa				13-20
7	USA	No	English is my native langauge	no comments	13-20
8	USA	no			13-20
9	USA				13-20
10	canada	no			13-20
11	Germany/ Japan/ USA	Lived: 3 years in Japan, 3 years in Zimbabwe, 2 years in Thailand, 7 years in the USA	N/A		13-20

12	Canada	Nope.	n/a	I₮'d like to learn Latin someday...:)	13-20
13	canada	never	n/a		13-20
14	zimbabwe	yes, i have stayed in Egypt for 5 year and the people her are not so good in English.		well i also learned another language at the same time which is Shona	13-20
15	zimbabwe	I₮'ve lived in egypt-cairo for 5 years now since the age of 13		I did grow up in an english speaking family however still learned our mother tongue (Shona) from school as well as other family members.	13-20
16	Zambia	I have lived in Egypt for close to 4 years . The native language in Egypt is Aarabic and very few people here speak english.		My first language is english but many people find that suprising because both my parents first language is not english. Also because i come from a third world country....Zambia	13-20
17	USA	I have lived in a native country for about 4 years now. Yet i have returned home a few times during the time period.	n/a	I have been learning another lamguage, and coming from only knowing English it is actually a challenge.	13-20
18	USA	Ive been in Egypt for a long time	It is	i speak english, french, arabic and greek	13-20
19	egypt	4 years in qatar			13-20
20	Canada	Romania working with abandoned infants and children.			21-30
21	Turkey	I was born in Turkey but moved to Canada when I was 8. I lived there for 17 years and I₮'m a native			21-30

		speaker of both English and Turkish.			
22	US				31-60
23	Canada	Nope	NA		31-60
24	canada	no			31-60
25	Canada	4 1/2 years in Saudi Arabia		learned a bit of Arabic	31-60
26	canada	no		french as a child	31-60
27	Canada	I have lived in Japan for eleven years and before that, Luxembourg for one year, and The Czech Republic for six months.			31-60
28	CANADA	NO			31-60
29	CANADA	no			31-60
30	Canada	I have lived for the last two years in Istanbul, Turkey.			31-60
31	Canada	1) lived in Switzwerland for 3 months in a French-speaking community 2) lived in California for 1 year in English-language community, but where different dialects/slang were present	I grew up bilingual from birth - hearing and speaking English and French, with some decent exposure to German (until age 3) Attended French-language school (all instruction in French) from pre-K to grade 8 then switched to English-language schools for hi	Also studied German, Latin and Ancient Greek in university. Passed MA required reading tests in German and French.	31-60
32	Canada	We lived for 10 months in California, U.S.A.	N/A	N/A	31-60
33	Canada	lived in Italy for two years		I speak English, French, Italian, some Spanish and	31-60

				German and read Latin	
34	Canada	No		I went to French Immersion school from age of 13 to 18. While I forget most of it, I find it is still in my mind somewhere and the experience definately helps me to catch on to other languages more easily and understand grammar and how languages are orga	31-60
35	Canada	Live in the USA now for 13 years and are now American citizens	English is my native language		31-60
36	Canada	No	n/a	Parents are originally from a europeon country and came to Canada after WW2. They had to learn English as a second language. It was challenging.	31-60
37	Canada	No	n/a		31-60
38	canada	no ... i only wish			31-60
39	canada				31-60
40	Canada	No			31-60
41	England	Yes. I have lived in Japan		I speak Punjabi & Japanese	31-60
42	canada	italy on/off	using it, high school OAC level	I like talking!	31-60
43	Canada	USA	--	A little Spanish and French from working in other countries	31-60
44	Northern Ireland	I have been living in Japan since June 2001.			31-60

45	Canada	2 years in china, 4 years in egypt		31-60
46	Canada	spent a year in Cairo...where most people speak English and I have made no attempt to use Arabic		31-60
47	canada	yes, i lived in canada for a long time, and then in london. then i went to sudan, saudi arabia, and egypt.	i was born in canada and lived their for a while, so i had to study arabic in schools and from parents. then when i came here in Egypt.	13-20

Non-Japanese EFL/ESL Speaker (NJS) Profiles

Respondent	Native Language	Country	Foreign Experience	Study Methods	Other Comments	Age
1	Arabic	Sudan	Yes. All my life I've been moving from one country another. I moved out of Sudan when i was 7 years old, and from then on, ive been moving from one country to the other.	I've studied English all my life. In Sudan i attended international schools, therefore i had some English vocabulary. However, i then went to England at the age of 7, and that is where i fluently spoke it.	Well.. i found it interesting that in only took me 2 months to fluently speak the English language with a british accent. However, this should not be surprizing because at a young age, your expected to adapt and learn faster.	13-20
2	Arabic	Dubai	I lived in Canada for 7 years and I had to learn English to fit in and understand the education provided by public schools	I have studied English in Canada (School)		13-20
3	arabic	Dubai	yes in Canada, for 8 years	i learned it in school	my schooling is in english	13-20
4	Arabic	Spanin	yes, spain	I went to school for it and took private courses.	Im in an English school.	13-20
5	Arabic	Egypt	No	I have studied it in school.	I have learned some french, but I don¥'t know anything about it.	13-20

6	Arabic	Egypt		I studied english since i was in KG		13-20
7	Arabic	Egypt		Studied English in school since I was in kg1		13-20
8	arabic	egypt	no	school		21-30
9	Cantonese (Chinese)	Hong Kong	15 years in Hong Kong 6 years in UK	started in kindergarten when I was 3		21-30
10	chinese	china	i have not lived for an long period in a country.	study new words; talk to people who knows English	chinese is easy to speak. you just know alots chinese words then you will doing very good with chinese	13-20
11	Chinese	China	sorry, i don¥'t have such experience so far.	I learned it at school		13-20
12	Chinese	China	no	learn it at school		13-20
13	Chinese	China	no	at school		21-30
14	chinese	china	no	at school(6 years)		21-30
15	Chinese	China	No,I haven¥'t left my country.	at school.		31-60
16	Chinese	China				
17	German	Germany	3 years Malaysia, 4 years Thailand, 7 years Japan, 8 years USA, 3 years Zimbabwe	Studied from 5th grade through high school; read and listened to music; attended US university; used it on the job		31-60

18	Italian	Egypt	My parents are both Italian, however i was born in Egypt and so was my father, i have lived here all my life and have come to consider myself Egyptian as much as Italian.	I went to english schools all my life.	Although Italian is my native language,because i have been in english schools all my life, im more fluent in english than Italian.	13-20
19	Persian-Turkish	Iran	I have been living in Turkey for more than 20 years. My mother comes from Turkey. I can speak both Turkish and persian fluently.	In 1984 I attended to a English language course in Turkey.	In 1984 when I came to Turkey to stay permanently,I attended to a English language course in Turkey. That year I learned both English and Turkish.	31-60
20	spanish	mexico	the u.s is where i lived for a long time and mosst of my faimly still don¥'t any english at all.	i¥'m gaesing from watching t.v. as litte kid i start it speaking english.		13-20
21	spanish	US	nope	School	nope	13-20
22	Spanish	USA	I Lived In Mexico for 5 years after i was born in the U.S	When i was in elementery school i started learning english		13-20
23	Turkish	Turkey	No	At school		21-30
24	Turkish	Turkey	Yes. I lived in Indonesia for 2 years. I went to an English-speaking high school.	I started studying English when I was 10 years old. Untill I was 15, I just studied English at school, as a second language. Then	at 7th grade i got an F from my English class, I thought that i had not got the ¥"talent¥" for language, (as so many people think like that) then i started to study	21-30

				I moved to Indonesia and enrolled to an international school where I passed the ESOL exam and attended regular high school	more and more, my receptive skills were good (listening and reading) but my productive ski	
25	Turkish	Turkey	I have lived in Paris for 4 years.	I have started lerarning English in secondary school until University.I did my BA studies in English as well.	Learning a foreign language has alwats been my greatest interest.Plus,I ve been teaching English for 12 years.	31-60
26	Ukraine	Ukraine	here	in school, at home, with my friends	yes, i speak Russian and Ukraine	13-20

Japanese EFL Speaker (JS) Profiles

Respondent	Foreign Experience	Study Methods	Other Comments
1			
2	I stayed in UK one month and USA also one month for studying English.	Going to English Convedation School and study myself with some text books.	When I study other laungage, I also study or reflect own langage deeper.
3	i was born japan.	at school, by myself.	
4	no	Just from listening. At first I memoried the formula of grammar, basic grammar. Then i kept listening.	I am married to an American. I didn¥'t hesitate to use English, which I just remembered. And I still made so many mistakes.
5	No.but i am learning English hard.My TOEIC score I had several years ago were 760.I am glad to take part in your survey.	ah,for fan and bussiness.	I am a deligent English learner.
6	I lived in Canada almost one year.	School	nothing
7	I¥'ve never lived in nonnative country, but I¥'ve stayed in Boston for one month.	I studied it at school and English conversation institute.	My husband was working for English and American company,so I had some oppotunities to speak English.
8	no	studied for 10years at scool	
9	No, I haven¥'t.	I studied in junior-high, high-school and university.	I have no other experiences.
10		I went to English conversation school for 6 months. And I have been taught by foreign teachers whose native languege is English once a week for over ten years.	

11			
12	I¥'ve lived in Seattle for 2 years.	First 6 months,I¥'ve studied English.	One of my friends is Korean,so I tried to study Korean but I thought it was more difficult than English. Finally,I gave up.
13	Yes, UK for 2 years to study English. It was from March, 1995 to February, 1997.	I studied my spoken English in Eastbourne, UK after my graduation of university in Japan. I went to private language school for 2 years. The name of school is Eastbourne School of English.	I think it was great experience and the time spent there is a kind of treasure of my life.
14	I am living in Japan and never have experience to live a long period in overseas.	I learned English in Junior high school and high scool in Japan. And now I am getting English lesson every monday from Canadian English teacher.	I can read English but it is difficalt to communicate with native English speaker at daily .
15	I¥'ve lived in Japan.	I have studied English at langage school.	
16	1 year in USA 1+1 years in Switzerland	English classes at Junior high, high school and at the university. When living abroad, the level went up dramatically.	
17	No	Have studied through media educational programs like TV and radio.and also newspapers/magazines.	Dutch,chinese

18	no	I study in an English conversation circle 4 times a month for 70 minutes. Sometimes I watch an English conversation TV program or read an English conversation book.
19		
20		
21	no	I have studied for 3 years at an English conversations school, once a week for 70 minutes. I started studying after age 70. Sometimes I study using NHK¥'s English conversation program.
22	United States	JHS, HS, college, living in the US
23	no	I studied from 12 to 18 at school, 2 or 3 times a week for 50 minutes. Then, after turning 50, I went to an English lesson 3 times a month for 90 minutes and now 4 times a month for 70 minutes. Also, I watch an English conversation instruction show on TV
24	no	

APPENDIX 2

ONLINE SURVEY

(spaces and "scroll down" arrows have been removed)

Hi.

Thanks for visiting this page. I'm currently doing research on vocabulary learning and the ways people organize words in their minds. There are several ways to study this topic but one of the best is with a word association survey. A word association survey is a very simple questionnaire where you are given a word (called the "stimulus") and you write down the first word that comes into your mind when you read it. You answer quickly without thinking too long or deeply. Just write down the first word you think of, whatever it is. The kind of associations people make with these words can tell us about how they are organizing vocabulary in their mind - and this information can be useful to ESL teachers and to textbook and thesaurus writers.

I'd be very happy if you could help me with my research by taking a few minutes to complete the word association survey below. It doesn't take long, can be done completely online and all necessary instructions are provided.

Your honest responses to the survey will help me a great deal in my research. Thanks very much - I really appreciate your time and effort.

Take care,

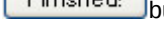
DMT

Oh, and just so you know:

1. this survey is completely anonymous
2. no private information is collected from your computer or server
3. the word-association information you give here will be used as the primary data source in my MA dissertation and will not be used for any other purpose
4. this word association test is not a psychological analysis - the words were chosen, and the results will be analysed, for purely linguistic reasons

---

Instructions

1. In the survey below there are four word association sections. In sections 1 and 2 you **type** your responses. Just type whatever word comes into your mind when you see the **BOLD** word. For example, if the stimulus word is **DOG** you might think of “cat”, or maybe “bite” or maybe “brown” or maybe even “Rover”. Everyone will have their own personal response. In sections 3 and 4 you **select** a response word from a short list. Choose the word that feels like it has the strongest link to the **BOLD** stimulus word. Please do **all** the parts in every section.
2. After you type in your word (or select it from the choice list) please make a short **comment** on why you chose this word.
3. Don’t think too long or hard about your response. Do it quickly. Remember, there are **no** wrong answers. So just relax and let the word come out naturally.
4. Please give all answers in **English**.
5. Don’t worry about spelling. If you don’t know the spelling of a word, it’s ok - just try your best and write what you think it might be. Please don’t change your word just because you don’t know the spelling.
6. No dictionaries, textbooks, internet or help from other people.
7. Don’t forget to enter the **session ID code** you were given with this link, in the background section below.
8. When you are done please click the 

button at the bottom of the page.
9. Please do not forward the link to this survey to anyone.

10. Do the survey **one** time only.

Ok... let's begin!

(Note: It's best to use the mouse or the arrow keys to scroll through the survey. If you use the space bar you may find that some sections don't align themselves nicely on the screen.)

Background

1. Please enter the session ID code you were given with the link to this webpage.

2. What is your native langauge?

(eg. English, French, Japanese)

3. What is your native country?

(eg. USA, Brazil, Indonesia)

4. Have you lived for a long period in a country that is not your native country or where the people do not speak your native language? Please give details.

5. If English is not your native language in what ways have you studied it? Please give details.

6. If you have any other comments about your language experience, please mention them here.

7. What is your approximate age?

- 12 or under
- 13-20

- [ ] 21-30
- [ ] 31-60
- [ ] 61 or over

Section One

Please type the first word that comes to your mind when you read the following **BOLD** words.

	Response	Comments. Why did you choose this word?
1. SECOND		

	Response	Comments. Why did you choose this word?
2. CASE		

	Response	Comments. Why did you choose this word?
3. SPRING		

	Response	Comments. Why did you choose this word?

4.	**PRESENT**		
		Response	Comments. Why did you choose this word?
5.	**BLOCK**		
		Response	Comments. Why did you choose this word?
6.	**PARK**		

Section Two

Please type the first word that comes to your mind when you read the following **BOLD** words.

		Response	Comments. Why did you choose this word?
1.	Grandpa worked in a gold **MINE**.		
		Response	Comments. Why did you choose this word?

2.	She won the **RACE**.		
		Response	Comments. Why did you choose this word?
3.	**PASS** me the salt please.		
		Response	Comments. Why did you choose this word?
4.	She is a very **PATIENT** person.		
		Response	Comments. Why did you choose this word?
5.	I didn't **WATCH** television last night.		
		Response	Comments. Why did you choose this word?
6.	He got a high **SCORE** on the math test.		

Section Three

Please select the word you feel has the strongest link with the **BOLD** words below. You can only choose one but remember, there are no wrong answers.

1. PRODUCE

Response	Comments. Why did you choose this word?
☐ product	
☐ tasty	
☐ carrot	
☐ make	

2. MEAN

Response	Comments. Why did you choose this word?
☐ miser	
☐ explanation	
☐ nasty	
☐ understand	

Response	Comments. Why did you choose this word?

- ☐ play
- ☐ law

3. COURT

- ☐ arena
- ☐ guilty

Response | Comments. Why did you choose this word?

- ☐ magazine
- ☐ buy

4. ARTICLE

- ☐ write
- ☐ thing

Response | Comments. Why did you choose this word?

- ☐ chairperson
- ☐ wood

5. BOARD

- ☐ black
- ☐ meet

		Response	Comments. Why did you choose this word?
6.	**FIRE**	☐ quit	
		☐ burn	
		☐ boss	
		☐ water	

Section Four

Please select the word you feel has the strongest link with the **BOLD** words below. You can only choose one but remember, there are no wrong answers.

		Response	Comments. Why did you choose this word?
1.	I think the **INTEREST** is fifteen percent.	☐ stimulating	
		☐ bank	
		☐ hobby	
		☐ pay	

		Response	Comments. Why did you choose this word?

2. Her birthday is in **MARCH**.

- ☐ hike
- ☐ cool
- ☐ April
- ☐ army

Comments. Why did you choose this word?

3. I bought a new **CLUB** yesterday.

Response

- ☐ join
- ☐ swing
- ☐ golf
- ☐ member

Comments. Why did you choose this word?

4. Please do **EXERCISE** three.

Response

- ☐ healthy
- ☐ book
- ☐ difficult
- ☐ sports

		Response	Comments. Why did you choose this word?
5.	The disk **DRIVE** is broken.	☐ move ☐ reboot ☐ memory ☐ car	

		Response	Comments. Why did you choose this word?
6.	This is a **LIGHT** book.	☐ bulb ☐ weight ☐ heavy ☐ dark	

Now just click on the "finished" button to send me your responses and you're done.

Finished!

APPENDIX 3

COMMONALITY AND SENSE IDENTIFICATION DATA

Section 1

SECOND Main Sense = ordinal number

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
FIRST	12	12		FIRST	7	7		FIRST	5	5	
MINUTE	7		7	TIME	5		5	THIRD	3	3	
THIRD	5	5		TWO	2	2		BOXING	2		2
CHANCE	3	3		A RACE	1	1		ANSWER	1	1	
TIME	3		3	COOL	1	1		BASE	1	1	
TWO	3	3		END	1		1	BASEBALL	1	1	
BASE	2	2		FLOOR	1	1		FRENCH	1	1	
PLACE	2	2		HAND	1		1	HOUSE	1	1	
AFTER FIRST	1	1		HOUR	1		1	LANGUAGE	1	1	
EVERYONE BEFORE ME	1	1		MINUTE	1		1	LIFE	1	1	
HAND	1		1	PLACE	1	1		ME	1	1	
LOSER	1	1		PLASE OR THINGS	1	1		MINUTE	1		1
NEXT	1	1		PUNCH	1	1		SOFT BALL	1	1	
PERIOD	1	1		SECOND PLACE	1	1		TIME	1		1
QUICK	1		1	THIRD	1	1		TIME WATCH	1		1
THE NUMBER TWO	1	1						TWO	1	1	
WATCH	1		1					UNHAPPY	1	1	
WHAT	1		1								
Count	18	12	6		15	10	5		17	13	4
Total Responses	47	33	14		26	17	9		24	19	5
Commonality	2.61				1.73				1.41		

CASE Main Sense = container

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
STUDY	9		9	IN	2	2		STUDY	4		4
BOX	5	5		STUDY	2		2	BOX	3	3	
BRIEF	5	5		SUIT	2	2		FILE	2	2	
COURT	3		3	SUITCASE	2	2		BAG	1	1	
BAG	2	2		ACCIDENT	1		1	EVENT	1		1
BRIEFCASE	2	2		BAGGAGE	1	1		EXAMPLE	1		1
BEER	1	1		BLACK SUITCASE	1	1		HDD	1	1	
BOOK	1	1		BOX	1	1		IN	1	1	
CSI	1		1	CASESTUDY	1		1	IN THAT CASE	1		1
FILES	1		1	CASH	1	1		IN THIS CASE	1		1
FLOWER	1		1	COMPUTER	1	1		JEWELRY	1	1	
FOLDER	1	1		COURT	1		1	MURDER	1		1
GLASSES	1	1		CRIME	1		1	PEN	1	1	
HARD	1		1	EVENT	1		1	PENCIL CASE	1	1	
HOLIDAY	1		1	FILES	1	1		RING	1	1	
LATIN	1		1	LAW	1		1	SITUATION	1		1
LAW	1		1	RESULT	1		1	SQWEOR	1	1	
LOAD	1		1	SODA	1	1		SUPPLYMENT	1		1
LOWER	1		1	SOLVE	1		1				
MYSTREY	1		1	SOMTHING TOGETHE	1	1					
POLICEORIENTED	1		1	TRIAL	1		1				
SENSITIVE	1		1								
SOMETHING YOU HOLD											
SOMETHING IN	1	1									
SUITCASE	1	1									
TRUNK	1	1									
WORKER	1		1								
Count	26	11	15		21	11	10		18	10	8
Total Responses	46	21	25		25	14	11		24	13	11
Commonality	1.77				1.19				1.33		

SPRING Main Sense = season

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
SUMMER	8	8		SUMMER	4	4		CHERRY BLOSSOM	3	3	
FALL	3	3		AUTUMN	3	3		SUMMER	3	3	
FLING	3	3		BREAK	1	1		FLOWER	2	2	
TIME	3	3		BREICK	1	1		WARM	2	2	
BOARD	2		2	COOL WEATHER	1	1		CHERRY BLOSSOMS	1	1	
CLEANING	2	2		FLING	1		1	FALL	1	1	
FLOWERS	2	2		FLOWER	1	1		FIRST SEASON	1	1	
SEASON	2	2		FLOWERS	1	1		FRESH	1	1	
AUTUMN	1	1		GOOD WEATHER	1	1		HAS COME	1	1	
BED SPRING	1		1	GRASS	1	1		HOT SPRING	1		1
BEES	1	1		HAPPINESS	1	1		MANY FLOWERS	1	1	
BOK	1		1	K	1		1	PINK	1	1	
BREAK	1	1		NICE WEATHER	1	1		SEASON	1	1	
CHICKEN	1	1		ROLLS	1	1		SMELLS	1	1	
FEVER	1	1		SEASON	1	1		TULIP	1	1	
FLOWER	1	1		SUNNY FLOWERS	1	1		VERY GOOD	1	1	
FLOWERS AND COLORFUL (GREEN)	1	1		SUNSET	1	1		WIND	1	1	
GARDEN	1	1		TREAD	1		1	WORM	1	1	
GREEN	1	1		TREE	1	1					
JUMP	1		1	WATER	1		1				
RIDING	1		1								
SHOWERS	1	1									
SPRUNG	1		1								
STEP	1		1								
SUN	1	1									
THE WASTELAND	1		1								
TRAILER	1		1								
TRAINING	1	1									
WARM	1	1									
WATER	1		1								
Count	30	20	10		20	16	4		18	17	1
Total Responses	47	36	11		25	21	4		24	23	1
Commonality	1.57				1.25				1.33		

PRESENT

Main Sense = time

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
PAST	7	7		GIFT	4		4	BIRTHDAY	2		2
FUTURE	6	6		NOW	4	4		CHRISTMAS	2		2
GIFT	5		5	BIRTHDAY	3		3	GIFT	2		2
CHRISTMAS	4		4	FUTURE	3	3		HAPPY	2		2
BIRTHDAY	3		3	A RAPPED BOX	1		1	PAST	2	2	
HERE	2		2	BEFORE	1	1		CAKE	1		1
NOW	2	2		BIRTHDAYS	1		1	CURRENT	1	1	
TENSE	2	2		FUTURE AND PAST	1	1		FLOWER	1		1
TODAY	2	2		HERE	1		1	FORGIVE	1		1
ABSENT	1		1	PAST	1	1		GOD	1		1
ARMS	1		1	PERSENT	1		1	GREAT	1		1
DAY	1	1		PRESENTS ON PARIS	1		1	JEWERY	1		1
FORME	1	1		SURPRISE	1		1	ME	1		1
FOR ME HOW NICE	1		1	TENSE	1	1		MOTHER	1		1
GREED	1		1	TIME	1	1		PRESENT (GIFT) OR PRESENT (NOW)	1		1
INTRODUCE	1		1					RIBBON	1		1
MINE	1		1					SHOW	1		1
OPEN	1		1					SURPRISE	1		1
SPEECH	1		1					WRAPPING	1		1
TALK ABOUT IT	1		1								
TIME	1	1									
WHERE	1		1								
Count	22	8	14		15	7	8		19	2	17
Total Responses	46	22	24		25	12	13		24	3	21
Commonality	2.09				1.67				1.26		

BLOCK

Main Sense = cube

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
PARTY	9		9	MSN	2		2	HARD	5	5	
HEAD	3	3		AVENUE	1		1	WALL	5	5	
BUILDING	2	2		BARRIER	1		1	BALL	1		1
BUSTER	2		2	BLACK	1		1	BLACK	1		1
PARENT	2		2	BLANK	1		1	BRICK	1	1	
STOP	2		2	BRICK WALL	1	1		BROWN	1	1	
TOY	2	2		BUILDING	1	1		CHILDREN	1		1
BABIES	1	1		BUILDINGS	1	1		FINCE	1		1
BLOCKED FROM SOMETHING	1		1	BUSTER	1		1	GAME	1		1
BRICK WALL	1	1		CANCEL	1		1	KIDS	1		1
CHOP	1	1		CENSOR	1		1	MAP	1		1
CINDER	1	1		HEAD	1	1		SOLID	1	1	
CITY	1		1	HIM	1		1	STREETBLOCKS	1		1
ELDEN	1		1	HOUSE	1	1		TOY	1	1	
FLATS	1		1	JENNIFER LOPEZ	1		1	WAY	1		1
GARD	1		1	LOT	1		1				
				MASS	1	1					
KARATE	1		1	OF FLATS	1		1				
LEGO	1	1		SCHEDULE	1		1				
LIGHT BROWN	1	1		SOMETHING NOT RIC	1		1				
ME	1		1	SQUARE	1	1					
MSN	1		1	STREET	1		1				
PREVENT	1		1	WHITE	1		1				
QUEBECQUOIS	1		1								
RED	1	1									
SAILBOAT	1	1									
STONE	1	1									
STREET	1		1								
TACKLE	1	1									
TOWER	1	1									
TRAPPED	1		1								
VIEW	1		1								
WRITER'S	1		1								
Count	32	14	18		23	7	16		15	6	9
Total Responses	47	18	29		24	7	17		23	14	9
Commonality	1.47				1.04				1.53		

PARK

Main Sense = natural area

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
CAR	7		7	CAR	4		4	GREEN	4	4	
BENCH	2	2		GRASS	3	3		DOG	3	3	
GRASS	2	2		ZOO	3	3		ANIMAL	1	1	
PLAY	2	2		GREEN	2	2		CAR	1		1
TREES	2	2		ANIMAL	1	1		CHILD	1	1	
ADE	1		1	BENCH	1	1		DAUGHTER	1	1	
AVENUE	1	1		CARS	1		1	DOGS	1	1	
BALL	1	1		DOGS POO	1	1		FUN	1	1	
BREEZE	1	1		FOREST TREASE AN	1	1		GARDEN	1	1	
CANATARA	1	1		HOMETOWN	1	1		KIDS	1	1	
CARS	1		1	LOT	1		1	OLD PEOPLE	1	1	
CAT	1	1		LOTS OF GRASS	1	1		PEOPLE	1	1	
CENTRAL PARK	1	1		MEET	1	1		PLAY	1	1	
DOG	1	1		OVER THERE	1		1	POND	1	1	
FRIEND	1	1		PULL OVER	1		1	REST	1	1	
FUN	1	1		RANGER	1	1		TREES	1	1	
INGLOT	1		1	ROLLERCOASTER	1	1		WATER	1	1	
LET'S PLAY	1	1						WIDE	1	1	
LOT	1		1					WORKING	1		1
MOUNTAIN	1	1									
NEIGHBOURHOOD	1		1								
OUTSIDE	1	1									
PICNIC	1	1									
PLAYGROUND	1	1									
PLAYTIME	1	1									
RANGER	1	1									
RIDE	1		1								
SIGN	1		1								
SNOW	1	1									
SPACE	1		1								
SPRINGTIME	1	1									
SUNNY	1	1									
SWING	1	1									
VIEW	1	1									
WALK	1	1									
WALKING WITH THE ONE YOU LOVE	1	1									
Count	36	27	9		17	12	5		19	17	2
Total Responses	46	31	15		25	17	8		24	22	2
Commonality	1.28				1.47				1.26		

Section 2

MINE

Main Sense = pronoun

NS

Word	Freq.	Primed Sense	Other Sense
CAVE	3	3	
DARK	3	3	
HOLE	3	3	
YOURS	3		3
GREED	2	2	
SHAFT	2	2	
CALIFORNIA	1	1	
CHILD LABOUR	1	1	
COAL	1	1	
DANGER	1	1	
DANGEROUS	1	1	
DEATH	1	1	
DIAMONDS	1	1	
DIDHE	1	1	
DIRTY	1	1	
DISASTER	1	1	
DWARFS	1	1	
EXPLOSITIOIN	1	1	
GOLD	1	1	
HARDWORK	1	1	
HILL	1	1	
HIS	1		1
HOLES	1	1	
I OWN IT	1		1
LABOR	1	1	
MONEY	1	1	
MYSELF	1		1
NICKEL	1	1	
OURS	1		1
POOR	1	1	
RICH	1	1	
ROCKS	1	1	
SILVER	1	1	
SOMETHING I OWN	1		1
UNDERGROUND	1	1	
VALENTINES DAY	1		1
WEALTH	1	1	
Count	37	30	7
Total Responses	47	38	9
Commonality	1.27		

NJS

Word	Freq.	Primed Sense	Other Sense
GOLD	2	2	
MY	2		2
POSSESSION	2		2
YOURS	2		2
#	1		1
AN EXPLOSIVE	1	1	
CAVE	1	1	
COAL	1	1	
DAUGHTER	1		1
DIGGING	1	1	
I	1		1
IMRICH	1	1	
LOVE	1		1
ME	1		1
MINE WORKER	1	1	
MONEY	1	1	
NOT	1	1	
OH MY GOD	1	1	
SOMETHING THAT BELONGS TO ME	1		1
TRUE	1	1	
WEALTH	1	1	
WINE	1		1
	22	12	10
	26	13	13
	1.18		

JS

Word	Freq.	Primed Sense	Other Sense
HARD	3	3	
HELMET	2	2	
MONEY	2	2	
MOUNTAIN	2	2	
DREAM	1	1	
GREAT	1	1	
I HOPE SO	1	1	
MANEY	1	1	
ME	1		1
MINE	1		1
MINER	1	1	
SHOVEL	1	1	
SMALL HOUSE	1	1	
STORE	1	1	
WEAPON	1		1
WESTERN	1	1	
	16	13	3
	21	18	3
	1.31		

RACE

Main Sense = ethnicity

NS

Word	Freq.	Primed Sense	Other Sense
RUNNING	7	7	
RUN	4	4	
MARATHON	3	3	
CAR	2	2	
COMPETITION	2	2	
FAST	2	2	
RAT	2	2	
SPEED	2	2	
BLACK	1		1
CHALLANGE	1	1	
COMPETE	1	1	
ETHICNICITY	1		1
FIRST	1	1	
HAPPY	1	1	
HORSE	1	1	
HORSES	1	1	
HOT	1	1	
HUMANS	1		1
HURDLES	1	1	
MY DAD	1	1	
PLACE	1	1	
RABBIT	1	1	
REALLY	1	1	
RIBBON	1	1	
SCORED	1	1	
SHE	1	1	
TALENTED	1	1	
TO WHERE	1	1	
TWICE	1	1	
WEAPONS	1		1
YIPPEE	1	1	
Count	31	27	4
Total Responses	47	43	4
Commonality	1.52		

NJS

Word	Freq.	Primed Sense	Other Sense
COMPETITION	4	4	
MATCH	2	2	
TROPHY	2	2	
#	1	1	
A RACE OF CARS	1	1	
AWARD	1	1	
DISCRIMINATION	1		1
EXCITMENT	1	1	
FAST	1	1	
FIRST	1	1	
GREAT	1	1	
ME	1	1	
MEDAL	1	1	
MEXICAN	1		1
RICE	1		1
RUNNING	1	1	
SO PROUD OF HER	1	1	
SUCCESS	1	1	
TRACK	1	1	
WHO	1	1	
	20	17	3
	25	22	3
	1.25		

JS

Word	Freq.	Primed Sense	Other Sense
#	2	2	
CAR	2	2	
RUN	2	2	
ATHLEATE	1	1	
BICYCLE	1	1	
COMPETITION	1	1	
CONPETITION	1	1	
CONTEST	1	1	
FAST	1	1	
GREAT	1	1	
GROUND	1	1	
LIFE	1	1	
LOOSER	1	1	
MARASON	1	1	
ME	1	1	
MEDAL	1	1	
MONEY	1	1	
MY WIFE	1	1	
RUNNING	1	1	
STRONG	1	1	
TAFF	1	1	
	21	21	0
	24	24	0
	1.14		

PASS

Main Sense = succeed at a test

NS

Word	Freq.	Primed Sense	Other Sense
HAND	7	7	
GIVE	6	6	
FAIL	3		3
THROW	3	3	
FOOTBALL	2	2	
SCHOOL	2		2
BATHROOM	1		1
CARRY	1	1	
DINNER	1	1	
ETIQUETTE	1	1	
FASR	1		1
FREE	1	1	
GO AROUND SOMETHING	1		1
GRADES	1		1
HALL PASS	1		1
HAND ME	1	1	
HUNDRED	1		1
HUNGRY	1	1	
MANNER	1	1	
MISS	1		1
MOUNTAIN	1		1
MOVE	1	1	
OVER	1	1	
PAIN WILL PASS	1		1
PASS THE SALT	1	1	
PEPPER	1	1	
SEND	1	1	
SURE	1	1	
TEST	1		1
TOSS	1	1	
Count	30	18	12
Total Responses	47	32	15
Commonality	1.57		

NJS

Word	Freq.	Primed Sense	Other Sense
GIVE	5	5	
BEAT	1		1
CAR	1		1
CATCH	1	1	
COOPERATION	1	1	
EXAMS	1		1
FAIL	1		1
FAILURE	1		1
FOOD	1	1	
GIVE ME WHAT I ASK	1	1	
GRADUATE	1		1
HANDING	1	1	
ITS IN THE MIDDLE C	1	1	
NEEDS MORE SALT	1	1	
PASSING THE EXAM:	1		1
PASS MY EXAM	1		1
POLICE	1		1
RACE	1		1
THROUGH	1		1
THROW	1	1	
UMMM	1		1
	21	9	12
	25	13	12
	1.19		

JS

Word	Freq.	Primed Sense	Other Sense
DINNER	4	4	
A TABLE	1	1	
BAD	1		1
BASKETBALL	1	1	
BIG TABLE	1	1	
EXAM	1		1
FAR	1	1	
GIVE	1	1	
GIVE ME	1	1	
KINDNESS	1	1	
MANNER	1	1	
MEALS	1	1	
PASSCARD	1		1
PEPPER	1	1	
SAUCE	1	1	
SUGER	1	1	
SURE	1	1	
TEST	1		1
THANKS	1	1	
THANK YOU	1	1	
WOMAN	1	1	
	21	17	4
	24	20	4
	1.14		

PATIENT

Main Sense = sick person

NS				NJS				JS			
Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense
CALM	6	6		ANGRY	2	2		HOSPITAL	2		2
HOSPITAL	5		5	DOCTOR	2		2	STRONG	2	2	
DOCTOR	4		4	IMPATIENT	2	2		BAD	1	1	
SICK	3		3	KIND	2	2		ENDURABLE	1	1	
IMPATIENT	2	2		A QUITE GIRL	1	1		GOOD	1	1	
KIND	2	2		BETTER WAIT	1	1		IMPATIENT	1	1	
PATIENT	2	2		FATIMA	1	1		INTELLIGENT	1	1	
QUIET	2	2		GOOD	1	1		LIFE	1	1	
TIME	2	2		HOSPITAL	1		1	ME	1	1	
BE PATIENT WITH PEOPLE	1	1		MY MOTHER	1	1		MY MOTHER	1	1	
BITCH	1	1		NICE PERSON	1	1		MY WIFE	1	1	
CANWAIT	1	1		NO WORD CAME TO	1		1	NEEDLE	1		1
COLDBLOODED	1	1		PATIENCE	1	1		NURSE	1		1
FRUSTRATED	1	1		PATIENT	1	1		OLD	1	1	
ILL	1		1	QUIET	1	1		PAINFUL	1		1
INSENSITIVITY	1	1		SICK	1		1	PASTRY CHEF	1	1	
JESUS	1	1		SLOWLY	1	1		PATIENCE	1	1	
LEVELHEADED	1	1		SO	1	1		SICK	1		1
LOVE	1	1		TEACHER	1	1		TEACHERS	1	1	
MOTHER	1	1		VIRTUE	1	1		TV PROGRAM	1	1	
NURSE	1		1	WAITING	1	1		WONDERFUL	1	1	
OH IS SHE	1	1									
RELAXED	1	1									
SILENT HILL	1	1									
SLOW	1	1									
UNDERSTANDING	1	1									
WAIT	1	1									
WOMAN	1	1									
Count	28	23	5		21	17	4		21	16	5
Total Responses	47	33	14		25	20	5		23	17	6
Commonality	1.68				1.19				1.10		

WATCH

Main Sense = time piece

NS				NJS				JS			
Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense
SEE	11	11		SEE	3	3		SEE	2	2	
LOOK	4	4		TV	3	3		WHY	2	2	
WRIST	4		4	A TV SHOW	1	1		BORING	1	1	
CLOCK	3		3	BORING	1	1		CAREFULLY	1	1	
TIME	3		3	CARELESNESS	1	1		COACH	1	1	
TIRED	2	2		CINEMA	1	1		ENGLISH TV PROGRAM	1	1	
VIEW	2	2		CLOCK	1		1	EXPENSIVE	1		1
BABYSIT	1	1		ENJOY	1	1		EYES	1	1	
BATS	1	1		FILM	1	1		I DON'T HAVE A TV	1	1	
BROKEN	1		1	LOOK	1	1		LITSEN	1	1	
BUSY	1	1		LOOKING	1	1		LOOK	1	1	
HOMEWORK	1	1		MAN	1	1		MIRACLE	1	1	
LISTENED	1	1		ME	1	1		MOVIE	1	1	
LOOKAT	1	1		MOVIE	1	1		NEWS	1	1	
MY WRIST	1		1	NECKLACE	1		1	SHIP	1	1	
PRECEIVE	1	1		NOT TRUE	1	1		SLEEPY	1	1	
ROLEX	1		1	SEE SOMTHING	1	1		SWATCH	1		1
SAD	1	1		SPY	1	1		TELEVISION	1	1	
SKY	1	1		THEATRE	1	1		TIRED	1	1	
STUPID	1	1		WATCH	1	1		TV	1	1	
SWATCH	1		1	WATCH TV	1	1		WRIST	1		1
TV	1	1						YESTERDAY	1	1	
VEG	1	1									
WHAT	1	1									
WHY	1	1									
Count	25	18	7		21	19	2		22	19	3
Total Responses	47	33	14		25	23	2		24	21	3
Commonality	1.88				1.19				1.09		

SCORE

Main Sense = points in a sports game

NS				NJS				JS			
Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense
GOAL	5		5	GRADE	2	2		SPORTS	4		4
MARK	4	4		SOCCER	2		2	GOLF	2		2
HOCKEY	3		3	#	1	1		POINT	2	2	
BOARD	2		2	AGAIN	1	1		STUDY	2	2	
GRADES	2	2		A HUGR NUMBER	1	1		#	1	1	
ACHIEVEMENT	1	1		DOT	1	1		BOWLING	1		1
AVERAGE	1	1		EXAM	1	1		CLASS	1	1	
BASEBALL	1		1	FOOTBALL	1		1	CONGRATULATIONS	1	1	
BASKET	1		1	GOAL	1		1	GOOD	1	1	
BONUS	1	1		HARD	1	1		GREAT	1	1	
CARD	1		1	LIKE HIGHEST NUMB	1	1		HARD	1	1	
FOOTBALL	1		1	LOSE	1		1	HUSBAND	1	1	
GAME	1		1	MARK	1	1		JR HIGH	1	1	
GOT SOME	1		1	NOT TRUE	1	1		MARK	1	1	
GRADE	1	1		NUMBER	1	1		MUSIC AND TV GAME	1		1
HAPPY	1	1		NUMBERS	1	1		POINTS	1	1	
HE	1	1		POINTS	1	1		STUDYING	1	1	
MARKS	1	1		SAT SCORES	1	1		TEST	1	1	
MEN	1	1		SEX	1		1	WORK	1	1	
MRERIC	1	1		STUDY	1	1					
MUSIC	1		1	TEN	1	1					
NO	1	1		TEST	1	1					
NUMBERS	1	1		TESTS	1	1					
PERCENTAGE	1	1									
RATING	1	1									
RECORD	1	1									
RESULT	1	1									
SAT	1	1									
SEX	1		1								
TEST RESULT	1	1									
TOUCHDOWN	1		1								
TRIBALISM	1		1								
UNUSUAL	1	1									
WEED	1		1								
WIN	1		1								
WON	1		1								
Count	36	20	16		23	18	5		19	15	4
Total Responses	47	24	23		25	19	6		25	17	8
Commonality	1.31				1.09				1.32		

Section 3

PRODUCE

Main Sense = vegetables

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
CARROT	18	18		MAKE	12		12	PRODUCT	15		15
PRODUCT	16		16	PRODUCT	10		10	MAKE	8		8
MAKE	11		11	CARROT	2	2		CARROT	1	1	
TASTY	1	1		TASTY	1	1		TASTY	0		
Count	4	2	2		4	2	2		4	1	2
Total Responses	46	19	27		25	3	22		24	1	23
Commonality	0.17				0.22				0.29		

MEAN

Main Sense = negative character trait

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
NASTY	37	37		NASTY	11	11		UNDERSTAND	11		11
EXPLANATION	4		4	UNDERSTAND	8		8	EXPLANATION	8		8
UNDERSTAND	3		3	EXPLANATION	7		7	NASTY	4	4	
MISER	2	2		MISER	0			MISER	1	1	
Count	4	2	2		4	1	2		4	2	2
Total Responses	46	39	7		26	11	15		24	5	19
Commonality	0.37				0.18				0.18		

COURT

Main Sense = legal venue

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
LAW	33	33		LAW	17	17		LAW	12	12	
PLAY	9		9	PLAY	7		7	PLAY	8		8
ARENA	4		4	ARENA	1		1	GUIILTY	3	3	
GUILTY	0			GUILTY	1	1		ARENA	1		1
Count	4	1	2		4	2	2		4	2	2
Total Responses	46	33	13		26	18	8		24	15	9
Commonality	0.32				0.29				0.21		

ARTICLE

Main Sense = item

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
MAGAZINE	34		34	MAGAZINE	19		19	MAGAZINE	16		16
WRITE	9		9	WRITE	5		5	WRITE	6		6
THING	3	3		BUY	1	1		THING	2	2	
BUY	0			THING	1	1		BUY	0		
Count	4	1	2		4	2	2		4	1	2
Total Responses	46	3	43		26	2	24		24	2	22
Commonality	0.34				0.33				0.30		

BOARD

Main Sense = flat piece of wood

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
WOOD	16	16		BLACK	13	13		CHAIRPERSON	11		11
CHAIRPERSON	14		14	WOOD	7	7		WOOD	6	6	
BLACK	13	13		CHAIRPERSON	5		5	BLACK	5	5	
MEET	3		3	MEET	0			MEET	2		2
Count	4	2	2		4	2	1		4	2	2
Total Responses	46	29	17		25	20	5		24	11	13
Commonality	0.13				0.22				0.16		

FIRE

Main Sense = flames

NS				NJS				JS			
Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense	Word	Freq.	Main Sense	2nd Sense
BURN	38	38		BURN	12	12		BURN	13	13	
WATER	4	4		WATER	10	10		WATER	10	10	
QUIT	3		3	BOSS	4		4	BOSS	1		1
BOSS	0			QUIT	0			QUIT	0		
Count	4	2	1		4	2	1		4	2	1
Total Responses	45	42	3		26	22	4		24	23	1
Commonality	0.40				0.21				0.27		

Section 4

INTEREST

Main Sense = attraction

NS				NJS				JS			
Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense
BANK	22	22		BANK	13	13		BANK	12	12	
PAY	10	10		HOBBY	7		7	HOBBY	6		6
HOBBY	7		7	PAY	4	4		STIMULATING	4		4
STIMULATING	7		7	STIMULATING	2		2	PAY	2	2	
Count	4	2	2		4	2	2		4	2	2
Total Responses	46	32	14		26	17	9		24	14	10
Commonality	0.16				0.18				0.18		

MARCH

Main Sense = walk

NS				NJS				JS			
Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense
APRIL	27	37		APRIL	18	18		APRIL	12	12	
COOL	8	8		ARMY	4		4	COOL	6	6	
ARMY	7		7	COOL	3	3		HIKE	3		3
HIKE	4		4	HIKE	1		1	ARMY	2		2
Count	4	2	2		4	2	2		4	2	2
Total Responses	46	45	11		26	21	5		23	18	5
Commonality	0.23				0.30				0.20		

CLUB

Main Sense = association

NS				NJS				JS			
Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense
GOLF	29	23		GOLF	11	11		GOLF	11	11	
MEMBER	6		6	MEMBER	6		6	MEMBER	6		6
SWING	6	6		SWING	5	5		SWING	6	6	
JOIN	5		5	JOIN	4		4	JOIN	1		1
Count	4	2	2		4	2	2		4	2	2
Total Responses	46	29	11		26	16	10		24	17	7
Commonality	0.25				0.12				0.17		

EXERCISE

Main Sense = physical training

NS				NJS				JS			
Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense
HEALTHY	22		22	HEALTHY	11		11	HEALTHY	11		11
BOOK	18	18		BOOK	10	10		SPORTS	9		9
SPORTS	5		5	DIFFICULT	3	3		BOOK	3	3	
DIFFICULT	1	1		SPORTS	2		2	DIFFICULT	1	1	
Count	4	2	2		4	2	2		4	2	2
Total Responses	46	19	27		26	13	13		24	4	20
Commonality	0.22				0.18				0.20		

DRIVE

Main Sense = operate a vehicle

NS				NJS				JS			
Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense
MEMORY	16	16		CAR	11		11	MEMORY	12	12	
REBOOT	16	16		MEMORY	9	9		CAR	7		7
CAR	12		12	REBOOT	4	4		MOVE	4		4
MOVE	2		2	MOVE	2		2	REBOOT	1	1	
Count	4	2	2		4	2	2		4	2	2
Total Responses	46	32	14		26	13	13		24	13	11
Commonality	0.14				0.16				0.20		

LIGHT

Main Sense = brightness

NS				NJS				JS			
Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense	Word	Freq.	Primed Sense	Other Sense
WEIGHT	18	18		WEIGHT	12	12		WEIGHT	13	13	
BULB	14		14	BULB	6		6	HEAVY	7	7	
HEAVY	11	11		HEAVY	6	6		DARK	4		4
DARK	3		3	DARK	2		2	BULB	0		
Count	4	2	2		4	2	2		4	2	1
Total Responses	46	29	17		26	18	8		24	20	4
Commonality	0.14				0.16				0.23		

APPENDIX 4

RESPONSE TYPE DATA SUMMARIES

Native Speakers

	Section 1			Section 2										Section 3			Section 4								
	All Responses			Primed Only			Priming Ignored			False	All Responses			All responses			Primed Only			Priming Ignored			All Responses		
Res	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Fls %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %
1	33.3	66.7	0.0	33.3	50.0	0.0	16.7	0.0	0.0	0.0	50.0	50.0	0.0	33.3	66.7	0.0	33.3	0.0	0.0	66.7	0.0	0.0	100.0	0.0	0.0
2	33.3	66.7	0.0	16.7	83.3	0.0	0.0	0.0	0.0	0.0	16.7	83.3	0.0	16.7	83.3	0.0	50.0	33.3	0.0	16.7	0.0	0.0	66.7	33.3	0.0
3	66.7	33.3	0.0	0.0	66.7	0.0	16.7	16.7	0.0	0.0	16.7	83.3	0.0	16.7	83.3	0.0	0.0	66.7	0.0	16.7	16.7	0.0	16.7	83.3	0.0
4	83.3	16.7	0.0	0.0	16.7	0.0	50.0	33.3	0.0	0.0	50.0	50.0	0.0	16.7	83.3	0.0	0.0	16.7	0.0	33.3	50.0	0.0	33.3	66.7	0.0
5	16.7	66.7	16.7	16.7	16.7	0.0	16.7	33.3	16.7	0.0	33.3	50.0	16.7	33.3	66.7	0.0	0.0	16.7	0.0	50.0	33.3	0.0	50.0	50.0	0.0
6	66.7	16.7	16.7	16.7	66.7	0.0	0.0	16.7	0.0	0.0	16.7	83.3	0.0	50.0	33.3	16.7	16.7	16.7	0.0	16.7	50.0	0.0	33.3	66.7	0.0
7	33.3	66.7	0.0	16.7	83.3	0.0	0.0	0.0	0.0	0.0	16.7	83.3	0.0	16.7	83.3	0.0	33.3	16.7	0.0	50.0	0.0	0.0	83.3	16.7	0.0
8	50.0	50.0	0.0	16.7	50.0	0.0	0.0	16.7	16.7	0.0	16.7	66.7	16.7	16.7	83.3	0.0	33.3	16.7	0.0	16.7	33.3	0.0	50.0	50.0	0.0
9	50.0	33.3	16.7	33.3	0.0	0.0	0.0	50.0	0.0	16.7	33.3	50.0	0.0	66.7	33.3	0.0	33.3	16.7	0.0	33.3	16.7	0.0	66.7	33.3	0.0
10	66.7	33.3	0.0	33.3	66.7	0.0	0.0	0.0	0.0	0.0	33.3	66.7	0.0	66.7	33.3	0.0	50.0	50.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0
11	33.3	66.7	0.0	33.3	33.3	0.0	0.0	33.3	0.0	0.0	33.3	66.7	0.0	33.3	66.7	0.0	0.0	50.0	0.0	16.7	33.3	0.0	16.7	83.3	0.0
12	0.0	100.0	0.0	16.7	16.7	0.0	33.3	16.7	0.0	16.7	50.0	33.3	0.0	50.0	50.0	0.0	16.7	16.7	0.0	50.0	16.7	0.0	66.7	33.3	0.0
13	50.0	50.0	0.0	16.7	33.3	0.0	0.0	50.0	0.0	0.0	16.7	83.3	0.0	50.0	50.0	0.0	0.0	16.7	0.0	33.3	50.0	0.0	33.3	66.7	0.0
14	83.3	0.0	16.7	16.7	16.7	0.0	33.3	16.7	0.0	16.7	50.0	33.3	0.0	33.3	66.7	0.0	0.0	50.0	0.0	33.3	16.7	0.0	33.3	66.7	0.0
15	66.7	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	33.3	66.7	0.0	0.0	16.7	0.0	33.3	50.0	0.0	33.3	66.7	0.0
16	50.0	50.0	0.0	0.0	16.7	16.7	33.3	33.3	0.0	0.0	33.3	50.0	16.7	33.3	66.7	0.0	50.0	50.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0
17	33.3	66.7	0.0	0.0	16.7	0.0	33.3	33.3	0.0	16.7	33.3	50.0	0.0	66.7	33.3	0.0	0.0	33.3	0.0	50.0	16.7	0.0	50.0	50.0	0.0
18	33.3	66.7	0.0	33.3	50.0	0.0	0.0	16.7	0.0	0.0	33.3	66.7	0.0	33.3	66.7	0.0	33.3	66.7	0.0	0.0	0.0	0.0	33.3	66.7	0.0
19	16.7	66.7	16.7	16.7	16.7	16.7	0.0	0.0	0.0	50.0	16.7	16.7	16.7	0.0	33.3	66.7	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
20	16.7	83.3	0.0	0.0	50.0	16.7	0.0	0.0	0.0	33.3	0.0	50.0	16.7	33.3	66.7	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0
21	33.3	66.7	0.0	0.0	16.7	0.0	50.0	33.3	0.0	0.0	50.0	50.0	0.0	66.7	33.3	0.0	0.0	33.3	0.0	66.7	0.0	0.0	66.7	33.3	0.0
22	0.0	100.0	0.0	16.7	33.3	0.0	16.7	16.7	0.0	16.7	33.3	50.0	0.0	66.7	33.3	0.0	0.0	50.0	0.0	50.0	0.0	0.0	50.0	50.0	0.0
23	16.7	66.7	16.7	16.7	33.3	0.0	0.0	33.3	0.0	16.7	16.7	66.7	0.0	33.3	66.7	0.0	16.7	50.0	0.0	33.3	0.0	0.0	50.0	50.0	0.0
24	16.7	83.3	0.0	16.7	33.3	0.0	33.3	16.7	0.0	0.0	50.0	50.0	0.0	16.7	83.3	0.0	33.3	50.0	0.0	16.7	0.0	0.0	50.0	50.0	0.0
25	83.3	16.7	0.0	16.7	33.3	0.0	0.0	0.0	0.0	50.0	16.7	33.3	0.0	16.7	83.3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0
26	16.7	83.3	0.0	16.7	50.0	0.0	0.0	0.0	0.0	33.3	16.7	50.0	0.0	16.7	83.3	0.0	33.3	66.7	0.0	0.0	0.0	0.0	33.3	66.7	0.0
27	16.7	83.3	0.0	16.7	50.0	16.7	0.0	16.7	0.0	0.0	16.7	66.7	16.7	0.0	100.0	0.0	33.3	66.7	0.0	0.0	0.0	0.0	33.3	66.7	0.0
28	16.7	83.3	0.0	0.0	0.0	0.0	16.7	0.0	0.0	83.3	16.7	0.0	0.0	33.3	66.7	0.0	50.0	16.7	0.0	33.3	0.0	0.0	83.3	16.7	0.0
29	50.0	33.3	16.7	16.7	33.3	0.0	16.7	33.3	0.0	0.0	33.3	66.7	0.0	33.3	50.0	16.7	16.7	33.3	0.0	50.0	0.0	0.0	66.7	33.3	0.0
30	50.0	50.0	0.0	16.7	33.3	0.0	16.7	33.3	0.0	0.0	33.3	66.7	0.0	66.7	33.3	0.0	0.0	83.3	0.0	16.7	0.0	0.0	16.7	83.3	0.0
31	50.0	50.0	0.0	0.0	33.3	0.0	50.0	16.7	0.0	0.0	50.0	50.0	0.0	33.3	66.7	0.0	33.3	66.7	0.0	0.0	0.0	0.0	33.3	66.7	0.0
32	16.7	83.3	0.0	16.7	33.3	16.7	0.0	33.3	0.0	0.0	16.7	66.7	16.7	33.3	66.7	0.0	16.7	50.0	0.0	33.3	0.0	0.0	50.0	50.0	0.0
33	33.3	66.7	0.0	16.7	83.3	0.0	0.0	0.0	0.0	0.0	16.7	83.3	0.0	50.0	50.0	0.0	16.7	66.7	0.0	0.0	16.7	0.0	16.7	83.3	0.0
34	0.0	100.0	0.0	16.7	83.3	0.0	0.0	0.0	0.0	0.0	16.7	83.3	0.0	16.7	83.3	0.0	50.0	33.3	0.0	16.7	0.0	0.0	66.7	33.3	0.0
35	16.7	83.3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	16.7	66.7	16.7	16.7	66.7	0.0	16.7	0.0	0.0	33.3	66.7	0.0
36	0.0	100.0	0.0	16.7	66.7	0.0	0.0	16.7	0.0	0.0	16.7	83.3	0.0	16.7	83.3	0.0	33.3	50.0	0.0	16.7	0.0	0.0	50.0	50.0	0.0
37	16.7	83.3	0.0	0.0	66.7	0.0	0.0	16.7	0.0	16.7	0.0	83.3	0.0	16.7	83.3	0.0	33.3	66.7	0.0	0.0	0.0	0.0	33.3	66.7	0.0
38	0.0	83.3	16.7	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	33.3	66.7	0.0	33.3	33.3	0.0	33.3	0.0	0.0	66.7	33.3	0.0
39	66.7	33.3	0.0	33.3	33.3	0.0	0.0	16.7	0.0	16.7	33.3	50.0	0.0	16.7	83.3	0.0	33.3	50.0	0.0	0.0	16.7	0.0	33.3	66.7	0.0
40	33.3	66.7	0.0	16.7	0.0	0.0	0.0	66.7	0.0	16.7	16.7	66.7	0.0	16.7	83.3	0.0	16.7	83.3	0.0	0.0	0.0	0.0	16.7	83.3	0.0
41	33.3	66.7	0.0	16.7	16.7	0.0	0.0	0.0	0.0	66.7	16.7	16.7	0.0	33.3	66.7	0.0	33.3	66.7	0.0	0.0	0.0	0.0	33.3	66.7	0.0
42	16.7	83.3	0.0	0.0	16.7	0.0	16.7	0.0	0.0	66.7	16.7	16.7	0.0	66.7	33.3	0.0	50.0	16.7	0.0	16.7	16.7	0.0	66.7	33.3	0.0
43	83.3	16.7	0.0	16.7	50.0	0.0	0.0	33.3	0.0	0.0	16.7	83.3	0.0	16.7	83.3	0.0	0.0	83.3	0.0	16.7	0.0	0.0	16.7	83.3	0.0
44	0.0	100.0	0.0	50.0	33.3	0.0	0.0	16.7	0.0	0.0	50.0	50.0	0.0	66.7	33.3	0.0	16.7	16.7	0.0	66.7	0.0	0.0	83.3	16.7	0.0
45	50.0	33.3	16.7	0.0	0.0	0.0	16.7	16.7	0.0	66.7	16.7	16.7	0.0	33.3	66.7	0.0	16.7	50.0	0.0	33.3	0.0	0.0	50.0	50.0	0.0
46	33.3	66.7	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	50.0	50.0	0.0	33.3	66.7	0.0	0.0	0.0	0.0	33.3	66.7	0.0
47	33.3	66.7	0.0	33.3	50.0	0.0	0.0	0.0	0.0	16.7	33.3	50.0	0.0	16.7	83.3	0.0	0.0	0.0	0.0	83.3	16.7	0.0	83.3	16.7	0.0
Av	35.5	61.3	3.2	14.5	41.1	1.8	9.9	16.7	0.7	15.2	24.5	57.8	2.5	33.7	63.8	2.5	20.6	44.0	2.1	23.8	9.6	0.0	44.3	53.5	2.1

Non-Japanese ESL/EFL Speakers

	Section 1			Section 2										Section 3			Section 4								
	All Responses			Primed Only			Priming Ignored			False	All Responses			All responses			Primed Only			Priming Ignored			All Responses		
Res.	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Fls %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %
1	16.7	83.3	0.0	16.7	16.7	0.0	0.0	33.3	0.0	33.3	16.7	50.0	0.0	83.3	16.7	0.0	0.0	0.0	0.0	83.3	16.7	0.0	83.3	16.7	0.0
2	16.7	83.3	0.0	16.7	16.7	0.0	16.7	50.0	0.0	0.0	33.3	66.7	0.0	16.7	83.3	0.0	0.0	33.3	0.0	66.7	0.0	0.0	66.7	33.3	0.0
3	16.7	83.3	0.0	0.0	50.0	0.0	16.7	0.0	0.0	33.3	16.7	50.0	0.0	16.7	83.3	0.0	0.0	16.7	0.0	66.7	16.7	0.0	66.7	33.3	0.0
4	83.3	16.7	0.0	16.7	0.0	16.7	16.7	0.0	0.0	50.0	33.3	0.0	16.7	50.0	50.0	0.0	16.7	50.0	0.0	16.7	16.7	0.0	33.3	66.7	0.0
5	16.7	66.7	16.7	0.0	33.3	0.0	0.0	16.7	16.7	33.3	0.0	50.0	16.7	16.7	83.3	0.0	16.7	66.7	0.0	16.7	0.0	0.0	33.3	66.7	0.0
6	50.0	33.3	16.7	0.0	50.0	0.0	16.7	0.0	16.7	16.7	16.7	50.0	16.7	66.7	33.3	0.0	0.0	16.7	0.0	50.0	33.3	0.0	50.0	50.0	0.0
7	16.7	83.3	0.0	16.7	33.3	0.0	16.7	0.0	16.7	16.7	33.3	33.3	16.7	83.3	16.7	0.0	33.3	50.0	0.0	16.7	0.0	0.0	50.0	50.0	0.0
8	33.3	50.0	16.7	16.7	33.3	0.0	0.0	0.0	0.0	50.0	16.7	33.3	0.0	50.0	50.0	0.0	16.7	66.7	0.0	16.7	0.0	0.0	33.3	66.7	0.0
9	0.0	100.0	0.0	16.7	83.3	0.0	0.0	0.0	0.0	0.0	16.7	83.3	0.0	16.7	83.3	0.0	16.7	83.3	0.0	0.0	0.0	0.0	16.7	83.3	0.0
10	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	83.3	16.7	16.7	50.0	0.0	33.3	0.0	0.0	50.0	50.0	0.0
11	16.7	83.3	0.0	0.0	83.3	0.0	0.0	16.7	0.0	0.0	0.0	100.0	0.0	50.0	50.0	0.0	0.0	83.3	0.0	0.0	16.7	0.0	0.0	100.0	0.0
12	33.3	16.7	50.0	16.7	50.0	16.7	0.0	0.0	0.0	16.7	16.7	50.0	16.7	50.0	50.0	0.0	0.0	33.3	0.0	33.3	33.3	0.0	33.3	66.7	0.0
13	16.7	83.3	0.0	16.7	66.7	0.0	0.0	16.7	0.0	0.0	16.7	83.3	0.0	50.0	50.0	0.0	50.0	16.7	0.0	16.7	16.7	0.0	66.7	33.3	0.0
14	16.7	66.7	16.7	16.7	66.7	0.0	0.0	16.7	0.0	0.0	16.7	83.3	0.0	33.3	66.7	0.0	16.7	33.3	0.0	0.0	50.0	0.0	16.7	83.3	0.0
15	16.7	83.3	0.0	16.7	16.7	16.7	16.7	33.3	0.0	0.0	33.3	50.0	16.7	33.3	66.7	0.0	33.3	50.0	0.0	0.0	16.7	0.0	33.3	66.7	0.0
16	0.0	83.3	16.7	16.7	33.3	0.0	0.0	33.3	0.0	16.7	16.7	66.7	0.0	66.7	33.3	0.0	33.3	33.3	0.0	16.7	16.7	0.0	50.0	50.0	0.0
17	16.7	83.3	0.0	16.7	16.7	0.0	33.3	0.0	0.0	33.3	50.0	16.7	0.0	33.3	66.7	0.0	33.3	33.3	0.0	33.3	0.0	0.0	66.7	33.3	0.0
18	66.7	33.3	0.0	0.0	16.7	0.0	50.0	33.3	0.0	0.0	50.0	50.0	0.0	50.0	50.0	0.0	33.3	33.3	0.0	33.3	0.0	0.0	66.7	33.3	0.0
19	33.3	66.7	0.0	33.3	16.7	0.0	0.0	0.0	0.0	50.0	33.3	16.7	0.0	33.3	66.7	0.0	16.7	83.3	0.0	0.0	0.0	0.0	16.7	83.3	0.0
20	50.0	50.0	0.0	16.7	0.0	16.7	0.0	0.0	0.0	66.7	16.7	0.0	16.7	0.0	100.0	0.0	50.0	0.0	0.0	16.7	33.3	0.0	66.7	33.3	0.0
21	33.3	50.0	16.7	0.0	0.0	33.3	0.0	33.3	16.7	16.7	0.0	33.3	50.0	50.0	50.0	0.0	16.7	16.7	0.0	66.7	0.0	0.0	83.3	16.7	0.0
22	33.3	50.0	16.7	33.3	66.7	0.0	0.0	0.0	0.0	0.0	33.3	66.7	0.0	33.3	50.0	16.7	33.3	66.7	0.0	0.0	0.0	0.0	33.3	66.7	0.0
23	50.0	50.0	0.0	0.0	83.3	0.0	0.0	0.0	0.0	16.7	0.0	83.3	0.0	33.3	66.7	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0
24	33.3	66.7	0.0	16.7	33.3	16.7	0.0	33.3	0.0	0.0	16.7	66.7	16.7	33.3	66.7	0.0	33.3	33.3	0.0	16.7	16.7	0.0	50.0	50.0	0.0
25	66.7	33.3	0.0	16.7	16.7	0.0	16.7	33.3	0.0	16.7	33.3	50.0	0.0	0.0	100.0	0.0	33.3	33.3	0.0	16.7	16.7	0.0	50.0	50.0	0.0
26	16.7	33.3	50.0	16.7	33.3	0.0	0.0	0.0	0.0	50.0	16.7	33.3	0.0	66.7	33.3	0.0	0.0	33.3	0.0	33.3	33.3	0.0	33.3	66.7	0.0
Av	28.8	59.0	12.2	12.8	35.3	8.3	7.7	13.5	2.6	19.9	20.5	48.7	10.9	39.1	59.6	1.3	19.2	42.9	0.0	25.0	12.8	0.0	44.2	55.8	0.0

Japanese EFL Speakers

	Section 1			Section 2										Section 3			Section 4								
	All Responses			Primed Only			Priming Ignored			False	All Responses			All responses			Primed Only			Priming Ignored			All Responses		
Res.	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Fls %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %	Syn %	Par %	Oth %
1	50.0	50.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	50.0	33.3	16.7	0.0	33.3	0.0	16.7	50.0	0.0	16.7	83.3	0.0
2	50.0	50.0	0.0	16.7	50.0	0.0	16.7	16.7	0.0	0.0	33.3	66.7	0.0	66.7	33.3	0.0	50.0	33.3	0.0	16.7	0.0	0.0	66.7	33.3	0.0
3	33.3	66.7	0.0	0.0	50.0	0.0	16.7	33.3	0.0	0.0	16.7	83.3	0.0	50.0	50.0	0.0	0.0	16.7	0.0	33.3	50.0	0.0	33.3	66.7	0.0
4	50.0	33.3	16.7	16.7	0.0	0.0	0.0	0.0	0.0	83.3	16.7	0.0	0.0	16.7	83.3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0
5	83.3	16.7	0.0	16.7	0.0	16.7	0.0	16.7	0.0	50.0	16.7	16.7	16.7	16.7	83.3	0.0	33.3	0.0	0.0	50.0	16.7	0.0	83.3	16.7	0.0
6	66.7	33.3	0.0	50.0	16.7	16.7	0.0	0.0	0.0	16.7	50.0	16.7	16.7	50.0	50.0	0.0	33.3	50.0	0.0	0.0	16.7	0.0	33.3	66.7	0.0
7	66.7	33.3	0.0	16.7	33.3	0.0	16.7	0.0	0.0	33.3	33.3	33.3	0.0	16.7	83.3	0.0	16.7	0.0	16.7	16.7	50.0	0.0	33.3	50.0	16.7
8	50.0	50.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	33.3	66.7	0.0	33.3	50.0	0.0	16.7	0.0	0.0	50.0	50.0	0.0
9	16.7	83.3	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	33.3	66.7	0.0	16.7	50.0	0.0	16.7	16.7	0.0	33.3	66.7	0.0
10	33.3	66.7	0.0	16.7	33.3	0.0	16.7	16.7	0.0	16.7	33.3	50.0	0.0	83.3	16.7	0.0	16.7	66.7	0.0	0.0	16.7	0.0	16.7	83.3	0.0
11	66.7	33.3	0.0	50.0	16.7	16.7	0.0	0.0	0.0	16.7	50.0	16.7	16.7	0.0	100.0	0.0	16.7	50.0	0.0	33.3	0.0	0.0	50.0	50.0	0.0
12	16.7	66.7	16.7	0.0	0.0	16.7	16.7	0.0	0.0	66.7	16.7	0.0	16.7	50.0	50.0	0.0	33.3	33.3	0.0	33.3	0.0	0.0	66.7	33.3	0.0
13	33.3	50.0	16.7	0.0	16.7	33.3	33.3	16.7	0.0	0.0	33.3	33.3	33.3	66.7	33.3	0.0	33.3	16.7	0.0	16.7	33.3	0.0	50.0	50.0	0.0
14	83.3	16.7	0.0	50.0	0.0	16.7	0.0	0.0	0.0	33.3	50.0	0.0	16.7	50.0	50.0	0.0	33.3	16.7	0.0	0.0	50.0	0.0	33.3	66.7	0.0
15	50.0	50.0	0.0	66.7	16.7	0.0	0.0	16.7	0.0	0.0	66.7	33.3	0.0	66.7	33.3	0.0	0.0	83.3	0.0	16.7	0.0	0.0	16.7	83.3	0.0
16	33.3	66.7	0.0	16.7	33.3	0.0	16.7	0.0	0.0	33.3	33.3	33.3	0.0	50.0	50.0	0.0	16.7	66.7	0.0	0.0	16.7	0.0	16.7	83.3	0.0
17	33.3	66.7	0.0	50.0	33.3	0.0	0.0	0.0	0.0	16.7	50.0	33.3	0.0	33.3	66.7	0.0	16.7	66.7	0.0	16.7	0.0	0.0	33.3	66.7	0.0
18	50.0	50.0	0.0	0.0	16.7	0.0	16.7	0.0	16.7	50.0	16.7	16.7	16.7	50.0	50.0	0.0	0.0	50.0	0.0	33.3	16.7	0.0	33.3	66.7	0.0
19	50.0	16.7	33.3	33.3	0.0	16.7	0.0	0.0	0.0	50.0	33.3	0.0	16.7	50.0	50.0	0.0	33.3	33.3	0.0	0.0	33.3	0.0	33.3	66.7	0.0
20	16.7	83.3	0.0	0.0	33.3	0.0	0.0	16.7	0.0	50.0	0.0	50.0	0.0	50.0	50.0	0.0	33.3	0.0	16.7	16.7	33.3	0.0	50.0	33.3	16.7
21	100.0	0.0	0.0	0.0	16.7	33.3	33.3	0.0	0.0	16.7	33.3	16.7	33.3	50.0	50.0	0.0	16.7	33.3	0.0	33.3	16.7	0.0	50.0	50.0	0.0
22	50.0	50.0	0.0	16.7	16.7	33.3	0.0	0.0	16.7	16.7	16.7	16.7	50.0	33.3	66.7	0.0	16.7	33.3	0.0	33.3	16.7	0.0	50.0	50.0	0.0
23	33.3	50.0	16.7	33.3	0.0	50.0	0.0	16.7	0.0	0.0	33.3	16.7	50.0	50.0	33.3	16.7	0.0	16.7	0.0	16.7	66.7	0.0	16.7	83.3	0.0
24	50.0	33.3	16.7	16.7	66.7	0.0	16.7	0.0	0.0	0.0	33.3	66.7	0.0	16.7	83.3	0.0	66.7	16.7	0.0	0.0	16.7	0.0	66.7	33.3	0.0
Av	48.6	46.5	4.9	26.4	24.3	10.4	8.3	6.3	1.4	22.9	34.7	30.6	11.8	43.1	55.6	1.4	21.5	38.2	1.4	17.4	21.5	0.0	38.9	59.7	1.4

REFERENCES

Aitchison, J. (1994) *Words in the Mind*. (2nd edn.) Oxford: Blackwell.

Berretta, A., Fiorentino, R. and Poeppel, D. (2005) 'The effects of homonymy and polysemy on lexical access: an MEG study', *Cognitive Brain Research* 24, 57-65.

Brown, E. and Berko, J. (1960) 'Word association and the acquisition of grammar', *Child Development*, 31, 1-14.

Brown, P. (2006) 'A Small-scale Exploration into the Relationship between Word-Association and Learners' Lexical Development'. Available at: http://www.cels.bham.ac.uk/resources/essays/Brown%20%20Mod%203.pdf Accessed on January 20, 2008.

Carter, R. (1987) *Vocabulary: Applied Linguistic Perspectives*. London: Routledge.

Cramer, P. (1970) 'A study of homographs', in Postman, L. and Keppel, G. (eds): 361-382.

Coulthard, M., Knowles, M., Moon, R., and Deignan A. (2000) *Lexis*. Birmingham: Centre for English Language Studies.

Coxhead, A. (2000) 'A new academic word list', *TESOL Quarterly* 34/2:213-238.

Dóczi, B. (2006) 'Mapping the mental lexicon of pre-intermediate learners: Word associations in a depth of word knowledge elicitation task', in Nikolov, M. and Horváth, J. (eds): 117-137.

Entwisle, D. (1966) *Word-associations of young children*. Baltimore: The Johns Hopkins University Press.

Ferrand, L. and New, B. (2003) 'Semantic and associative priming in the mental lexicon'. Available at: http://ludovic.ferrand.googlepages.com/Semantic-final-2003.pdf Accessed on

August 1, 2007.

Fitzpatrick, T. (2006) 'Habits and rabbits: word associations and the L2 lexicon', *EUROSLA Yearbook* 6, 121-145.

Fitzpatrick, T. (2007) 'Word association patterns: unpacking the assumptions', *International Journal of Applied Linguistics* 17:3, 319-331.

Forster, K. (1989) 'Basic Issues in Lexical Processing', in Marslen-Wilson, W. (ed.): 75-107.

Fortier, P., Keen, K. and Fortier, L. (1997) 'Semantic fields and polysemy: a correspondence analysis approach'. Available at: http://www.cs.queensu.ca/achallc97/papers/p017.html Accessed on January 25, 2008.

Fujita, T. (1998) TOEIC Marathon: Advanced Course for the Score of 730. Tokyo: ALC Press Inc.

Garrett, M. (1992) 'Lexical retrieval processes: semantic field affects', in Lehrer A. and Kittay, E.

Hall, C. (1992) 'Making the right connections: vocabulary learning and the mental lexicon'. ERIC

Hammarberg, B. (ed.) (1993) *Problems, processes and product in language learning*. Stockholm.

Hirsh, K. and Tree, J. (2001) 'Word association norms for two cohorts of British adults,' *Journal of Neurolinguistics*, 14, 1-44.

Hoey, M. (2004a) 'Lexical priming and the properties of text', in Parington, A., Morley, J. and Haarman, L. (eds): 385-412

Hoey, M. (2004b) 'Textual colligation: a special kind of lexical priming'. *Proceedings of ICAME 2002: The theory and use of corpora*, the 23rd International Conference on

English Language Research on Computerized Corpora of Modern and Medieval English, Göteborg.

Hoey, M. (2005) *Lexical Priming: A new theory of words and language*. New York: Routledge.

Jenkins, J. (1970) 'The 1952 Minnesota word association norms', in Postman, L. and Keppel, G. (eds): 1-37.

Kent, G.. and Rosanoff, A. (1910) 'A study of association in insanity'. *American Journal of Insanity* 67, 37-96 and 317-390.

Kiss, G., Armstrong, C., Milroy, R. (1973). *An associative thesaurus of English.* Wakefield: EP Microfilms.

Kruse, H., Pankhurst, J. and Sharwood Smith, M. (1987) 'A multiple word association probe in second language acquisition research'. *Studies in Second Language Acquisition*, 9:2, 141-154.

Lehrer, A. and Kittay, E. (eds) (1992) *Frames, Fields and Contrasts*. Hillsdale: Lawrence Erlbaum.

Mackie, W., Gilmour, L., Butterfield, J., Higgleton, E. (2002) *Collins Thesaurus A-Z: Complete and Unabridged*. Glasgow: HarperCollins Publishers.

Marslen-Wilson, W. (ed) (1989) *Lexical Representation and Process*. Cambridge: Massachusetts Institute of Technology.

Mattheoudakis, M. (2003) 'The developmental model for the mental lexicon: evidence from Greek learners of English'. Paper presented at the 6th International Conference of Greek Linguistics.
http://www.philology.uoc.gr/conferences/6thICGL/ebook/e%5Cmattheoudakis.pdf

Meara, P. (1982) 'Word associations in a foreign language: a report on the Birkbeck Vocabulary Project'. *The Nottingham Linguistic Circular* 11:2, 29-38.

McCarthy, M. (1990) *Vocabulary*. Oxford: Oxford University Press.

Nikolov, M and Horváth, J (eds) (2006) *UPRT 2006: Empirical studies in English applied linguistics.* Pécs: Lingua Franca Csoport.

Orita, M. (1999) 'Word association patterns of Japanese novice EFL learners: a preliminary study'. Annual Review of English Teaching and Learning, 4, 79-94.

Palermo, D. and Jenkins, J. *Word association norms: Grade school through college*. Minneapolis: University of Minnesota Press.

Parington, A., Morley, J. and Haarman, L. (eds) (2004) *Corpora and Discourse*. Bern: Peter Lang.

Postman, L. and Keppel, G. (eds) (1970) *Norms of Word Association*. New York: Academic Press.

Russell, W. and Jenkins, J. (1954) 'The complete Minnesota norms for responses to 100 words from the Kent-Rosanoff word association test', *University of Minnesota, Department of Psychology, Technology Report No. 11.*

Söderman, T. (1993) 'Word associations of foreign language learners and native speakers – different response types and their relevance to lexical development', in Hammarberg, B. (ed.): 157-169.

Spiteri, L. (2004) 'Word association testing and thesaurus construction'. *Libres*, 14:2. Available at: http://libres.curtin.edu.au/libres14n2/ Accessed on February 10, 2008.

Stolz, W and Tiffany, J. (1972) 'The production of "child-like" word associations by adults to unfamiliar adjectives'. *Journal of Verbal Learning and Verbal Behavior*, 11:38-46.

Thomas, D. (2006) 'Second Language Word Associations: How Japanese Make Mental Links Between English Words They Have Learned'. Available at: http://www.cels.bham.ac.uk/resources/essays/DaxThomas2006a.pdf Accessed on

February 20, 2008.

Weingartner, H. and O'Brien, J. (1971) 'Discriminability of free associations', *Journal of Clinical Psychology* 27:2, 254-257.

Wesche, M. and Paribakht, S. (1996) 'Assessing second language vocabulary knowledge: depth versus breadth'. *The Canadian Modern Language Review*, 53:1, 13-40.

Wolter, B. (2001) 'Comparing the L1 and L2 mental lexicon'. *Studies in Second Language Acquisition*, 23, 41-69.

Wolter, B. (2006) 'Lexical network structures and L2 vocabulary acquisition: the role of L1 lexical/conceptual knowledge', *Applied Linguistics*, 27:4, 741-747.

Yoneoka, J. (2001) 'Word Associations: The Universal Paradigmatic Pattern Assumption and the Japanese/Korean Anomaly,' *Kumamoto Gakuen Daigaku Ronshu Sogo Kagaku* 7:2, 161-174. http://www2.kumagaku.ac.jp/teacher/~judy/gyoseki/25.japankoreamonkeywrench.rtf

Zeelenberg, R., Pecher, D., Shiffrin, R. and Raaijmakers, J. (2003) 'Semantic context effects and priming in word association,' *Psychonomic Bulletin & Review*, 10:3, 653-660.

Software and Online Databases

Bank of English - http://www.titania.bham.ac.uk/
Edinburgh Associative Thesaurus - http://www.eat.rl.ac.uk/
wordassociation.org - http://www.wordassociation.org/
WordNet - http://wordnet.princeton.edu/
WordSmith Tools - http://www.lexically.net/wordsmith/