Word Associations of Japanese English Learners

by

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1. Introduction

1.1 The mental lexicon

The 'mental lexicon' is defined as 'a person's mental store of words, their meanings and associations' (Richards and Schmidt, 2002: 327). It has been suggested that educated, adult speakers of English (L1) have access to a mental store of at least 50,000 words, possibly many more, and that these words must be organized in the mind in some way, given their sheer number and ease of retrieval when needed (Aitchison 2003: 5-7). While the number of words stored in the mind of a learner of English as a second or foreign language (L2) is likely to be considerably lower than that of a native speaker, there must still exist some kind of organizing principle in the learner's mental lexicon. How different (Meara, 1983) or similar (Wolter, 2001) the development of the L1 and L2 mental lexicons is the subject of some debate, but there seems to be general agreement on the types of associations made between words (see McCarthy, 1990; Carter, 1998; Aitchison, 2003).

1.2 Objectives of the current study

The main purpose of this paper is 'to explore the relationship between word-association and learners' lexical development' through an experiment designed by McCarthy (1990: 152). Japanese learners of English as a foreign language at three different proficiency levels will be the subjects of a single-stimulus, single-response word association test (WAT) and results will be analyzed to address the following questions, framed by McCarthy:

1. Does such a word-association test tell (us) anything about how (these) learners are making mental links between words they have learnt?
2. At lower levels, are phonological similarities playing an important role?

3. Do the results bear out the characteristic types of response:
   (i) co-ordination
   (ii) collocation
   (iii) superordination
   (iv) synonymy
   (v) world knowledge (ibid.: 34-45, 152)

An additional question to be addressed is:

4. Are there apparent, significant differences in the types of associations made by learners of different proficiency levels?

This paper will deal with the stated objectives first with a brief review of the literature on word association tests and the characteristics of responses to those tests, followed by details on the subjects, stimuli, and administration of the test, and finally, an analysis of the results to address the questions presented above.

2. Literature review

2.1 Word Association Tests

Word association tests, where subjects are required to produce a spoken or written response or responses to a stimulus word, have been widely used in research into the organization of the mental lexicon since Francis Galton's first documented experiment with the technique the late 19th century (Aitchison, 2003: 23-24). The simplicity in the design and execution of word association experiments has led to their continuing popularity among researchers and the tendency of subjects to respond in similar ways has led many to hypothesize that it may be possible to use such tests to 'draw up a reasonably reliable 'map' of the average person's 'word

web" (ibid.: 85). While it is true that WATs can provide researchers with a great deal of information about connections between words in the mental lexicon, the fact that those connections are many and varied has prevented, as yet, any definitive conclusions as to the exact nature of the organization of words in the mind (ibid.: 85).

There have also been serious doubts raised about the validity of the one-word, one-response format of many WATs. Aitchison (2003: 85) points out that giving quick responses to stimuli presented in rapid succession is not a particularly natural way of using language. Others (Schmitt and Meara, 1997; Schmitt, 1998; Wolter, 2002) have suggested that allowing only one answer to a stimulus may limit the information to be gleaned. Meara and Fitzpatrick (2000: 24), for example, have found that in WATs asking for three responses, the first response tends to be a highly frequent word while second and third are of a lower frequency and therefore shed more light on the extent of subjects' vocabulary knowledge. A third problem, mentioned only in passing in the literature (Meara, 1983), is that responses to tests are usually interpreted without reference to the intent of the subjects. This lack of a qualitative element reduces much of the analysis of responses to educated guesswork.

Despite these problems, it is still possible for a single-stimulus, single response WAT to reveal much about the connections between words in the mind.

2.2 Characteristic types of response

It is generally accepted that associations between words in the mental lexicon fall into two main semantic categories: paradigmatic and syntagmatic (Meara, 1983; Carter, 1998: 198-199). Other types of relationships between words which will be considered here are those influenced by phonology, syntactic word classes, and world knowledge.

2.2.1 Paradigmatic associations

Paradigmatic associations are those which fall under the same grammatical class as the stimulus word and are said to be 'choice' relations (Coulthard et al., 2000: 27) in that they encompass those items in the lexicon which can be substituted for one another. Three basic paradigmatic relations are coordination, synonymy, and superordination.

2.2.1.1 Coordination

Coordinates, words which are said to function on the same level of detail (e.g. *table* and *sofa*), including antonyms, are found in previous research to be the strongest of the connections in the mental lexicons of native speakers (Aitchison 2003: 86-90) and comprise the most common responses on those speakers' WATs. Evidence cited in the research points to 'tip-of-the-tongue' experiments where subjects, when searching to find the correct word, 'fumble around not only in the same general semantic area but often within a group of coordinates' (ibid.: 88) (e.g. *table*, not *pencil*, substituted for the target word, *desk*). Further evidence of the power of coordinates in the mind can be found in research on aphasics, which shows that even

in people who have suffered damage to the brain, coordinate associations remain strong (ibid.: 89). Coordinate links in the mental lexicons of L2 learners are thought to become more prominent as proficiency increases (Wolter, 2002: 316).

2.2.1.2 Synonymy

Paradigmatic associations less commonly found in WATs on native speakers are synonyms; words which share the same basic meaning (e.g. *happy* and *glad*) (McCarthy, 1990: 40; Aitchison, 2003: 86). It is important to point out, however, that words function differently in different contexts and synonyms are only sometimes interchangeable (McCarthy, 1990: 16-17; Carter, 1998: 20; Aitchison, 2003: 94).

2.2.1.3 Superordination

Superordinates are terms which encompass subordinate lexical items in terms of inclusion within a group (e.g. *apple* is a subordinate of the superordinate *fruit*) (Aitchison, 2003: 86-87). Occasionally on WATs subjects will produce a superordinate in response to a stimulus, but usually only in cases where one springs easily to mind (e.g. *rose* eliciting *flower*) since finding a suitable superordinate is often a challenge. In general, people usually choose two coordinates (e.g. *coffee or tea*) rather than a 'technical-sounding' superordinate (e.g. *beverage*) (ibid.:91).

2.2.2 Syntagmatic associations

Syntagmatic or collocational links in the mental lexicon are said to be 'chain' relations (Coulthard et al., 2000: 27) in that they encompass words that occur in

sequence in spoken or written discourse. In native speaker word association experiments, collocation has been found to be the strongest type next to coordination (Aitchison, 2003: 86). Second language learners, however, are said to produce more collocates than coordinates (Coulthard et al., 2000: 23) and are 'more likely to construct utterances out of ready-made chunks'(ibid.: 27).

2.2.3 Phonological associations

2.2.3.1 Clang responses and phonological mistakes

Clang associations are responses that 'bear no obvious semantic relationship' (Meara, 1983) to the stimulus words used in word association tests but are more closely associated by shared phonological similarities. These types of associations, along with mistaken associations caused by misunderstanding of stimuli due to phonological similarities with other words, are said to be frequent among beginning learners (ibid.).

2.2.3.2 The 'bathtub effect', stress, and syllables

The 'bathtub effect' (Aitchison, 2003: 138-140), is the idea that words are stored in the mental lexicon according to their beginning and, to a lesser degree, ending sounds. This, coupled with the idea that native speakers only pay attention to the '*general shape*' (McCarthy, 1990: 35) of words in discourse, can lead to associations being made on the basis of sounds, stresses, and syllable structures.

2.2.4 Syntactic links

Retention of word class from stimulus to response is another aspect of word

associations that has been examined by previous studies and findings indicate that nouns tend to do so most strongly, around 80%, while verbs and adjectives do so around 50% of the time (Deese, 1965 cited in Aitchison, 2003: 105). Similar results were found in research on the 'tip of the tongue' phenomenon (Hotopf, 1980 cited in Aitchison, 2003: 104-105) in regard to nouns and adjectives. When responses deviate from their class, they tend to be nouns (ibid.). Following this, it could be presumed that retaining word class with responses to a WAT is an indication of a higher level of proficiency on the part of the learner.

2.2.5 World knowledge

Results of word WATs seem to point to a semantic organization in the mental lexicon, but this may be 'an oversimplification' (McCarthy, 1990: 40). The concept of 'encyclopaedic' or world knowledge (ibid.: 41) suggests that beyond the syntactic, paradigmatic, and phonological links between words in the mind there are also links to the experiences of the individual. Each individual's knowledge of a word connects to his or her knowledge of the world and forms associations that go beyond semantic information and '(bring) in origins, causes, effects, histories, and contexts' (ibid.: 41).

3. Method

3.1 The subjects

The subjects for this study are 33 Japanese learners attending classes for one hour per week at a small English conversation school in Japan. They represent a broad cross-section of age and occupation from 17 year old high school students to a 70

year old retiree. Included in the group are university professors, university students, professionals, non-native English teachers and homemakers. Proficiency levels range from lower-intermediate (13 subjects) to upper-intermediate (11 subjects) to advanced (9 subjects) and learners study in classes grouped loosely by those proficiency levels. Level is a difficult problem in itself in that, in some cases, learners of different proficiency levels may study together in the same class. This is the reality in a small private language school, where there are a limited number of classes and teachers and students have limited availability to attend classes. For the purposes of this study, when comparing results between proficiency levels, students will be grouped according to the classes which they have been assigned by the administration.

3.2 The test items

Stimulus words for the WAT were chosen with several criteria in mind. First, as suggested by McCarthy (1990: 152):

1. At least one grammar/function word (e.g. preposition, pronoun).

   In this study, the stimulus words *what* (question word), *between* (preposition), and *but* (conjunction) satisfy the requirement.

2. One or two items from the everyday physical environment (e.g. 'table', 'car').

   Pocket was selected to satisfy this requirement.

3. A relatively uncommon or low-frequency word but one which your students will nonetheless know.

   Mystery fits this criterion.

4. A mix of word-classes (e.g. noun, adjective, verb).

   Words from several different classes were selected and are identified below in the manner in which the subjects of the study understand them:

   Pocket (noun)

   What (question word)

   Kill (verb)

   Interesting (adjective)

   But (conjunction)

   Make (verb)

   Between (preposition)

   Mystery (noun, adjective)

   Mystery was viewed alternately, by an even split in the subjects' responses, as a noun (16 subjects) and an adjective (17 subjects) and so was treated as two separate items in the analysis.

In addition, considerations were made in regard to frequency:

1. Stimuli are relatively high-frequency in order to ensure recognition across proficiency levels. Most appear in the first 1000 of the General Service Wordlist (West, 1953) and in the 1000 most frequent word families developed by Bauer and Nation (1993). *Pocket* and *mystery* appear in the first 2000 of Bauer and Nation's list.
2. Stimulus words selected also elicited a wide range of responses from native speakers tested for the Edinburgh Associative Thesaurus (Kiss, et al., 1973) (see Appendix 4). Using the criteria of most frequent native speaker response equaling 15% or less of the total responses and non-idiosyncratic

responses (two or more native speakers giving the same response) equaling 60% or more of the total responses (Wolter, 2002: 319), stimuli were selected to avoid obvious pairs (Aitchison, 2003: 85) (e.g. *knife* and *fork*, *fast* and *slow*), which elicit a high number of most frequent response, and ensure enough variety in responses without becoming overly idiosyncratic.

3.3 Procedure for administration of the test

Subjects completed the WAT (see Appendix 1) during approximately the first ten minutes of their regular lessons. It was decided to call this a "survey", rather than a "test" or "quiz", in the hopes of alleviating some of the stress associated with tests in the minds of the subjects. Each class was presented with brief oral instructions for what to do, as well as two examples (black and car) presented on the whiteboard. Students were instructed not to think too deeply about their responses, reminded that there are no correct answers and instructed not to use their dictionaries. The WAT sheets were then distributed and stimuli were presented one at a time both orally and in written form on the whiteboard. This was done to lessen confusion over the sounds of words, though in the results there were several instances of students who mistook the stimulus for another word despite having both the aural and written form. On one or two occasions during the data gathering, students had to be reminded not to think too much and to write whatever came to their heads. Words were presented in the same order (see section 3.2) to each group of subjects and when the survey was finished, responses were briefly discussed. Each subject read their response to each stimulus in turn and gave their reason for selecting it, sometimes by using it in a sentence, sometimes by explaining what they meant by it.

In this way, associations that, on paper, could seem unintelligible or difficult to interpret became clear. It should be noted, however, that this may not be the most ideal way of obtaining qualitative information, due to the tendency of subjects to occasionally simply agree with the person who precedes them in the discussion. Following collection of the papers from the subjects, the purpose of the exercise was briefly discussed.

4. Analysis

The subjects in this study were able to produce responses for nearly all the stimulus words (one null response) resulting in 263 items of data to be analyzed. In the process of organizing the responses it was decided to group certain word forms together if the general meaning was not disrupted, as in the case of plural forms (e.g. *cookie* and *cookies*) or the present continuous form for verbs (e.g. *cook* and *cooking*), but care was taken to separate such responses for phonological similarity analysis. Though the subjects were carefully instructed to respond with single words, several multiple word responses were gathered. These were analyzed as whole units as it was felt that breaking them down into head words would likely change their intended meaning. Reasons for the responses given by subjects were briefly noted to give a more precise picture of the intent of associations in the minds of the students. Using this approach, no responses were discounted since 'any association given, however unusual, is by definition an association' (Schmitt, 1998: 390).

Responses were examined first for the links firmly established in the literature on

word association tests: paradigmatic, syntagmatic, and phonological. In the absence of satisfactory categorization under these three headings, responses were then examined for their connection to the world knowledge of the individual respondents. Responses which fit none of the above were designated as 'other'. Full details of responses can be found in Appendices 2A-H.

4.1 Coordination

Since they are reported as the strongest associations of native speakers, it was decided to first examine the data for evidence of coordination. It was also decided to give credit for 'loose' coordinates, based on explanations provided by respondents as to the intent of their response, and allowing for responses from different word classes to be matched as coordinates. An example of this can be seen with the stimulus *kill*, where the response of *life* was explained by the respondent to mean the opposite of *kill*. Though not an antonym in the strictest sense, it was felt that the intent was enough to justify the classification.

4.2 Synonymy and Superordination

These two categories of response were fairly straightforward, though again it was decided to give credit for 'loose' examples of the associations.

4.3 Collocation

Responses that were thought to be collocational, based on subjects using them in sentences in the post-WAT discussion, were checked against The Bank of English corpus for concordances (accessed online, March 11, 2006). Stimuli and responses,

input in the same way the subjects intended them, that found more than 5 matching concordances were deemed to be acceptable collocations. Tallies of concordances that surpassed 100 instances were listed as 100+ .

It is important to note that, in word association analysis, use of collocational data obtained through computer concordance programs can be somewhat misleading if it does not take into account the intent of a given response. An example from this study was encountered with the stimulus *what*. The response given was *what*, which is a rather strong collocation according to the concordance program. However, in consultation with the subject, it was discovered that the response was given because the subject couldn't think of an answer (i.e. "I don't know what to write!"). Therefore, the intent was certainly not to produce a collocation. To further emphasize the point, other examples were found where stimuli and responses fed into the concordance program irrespective of the intended collocation produced far more concordance matches than were relevant upon closer inspection. This clearly illustrates the importance of adding qualitative elements to word association research.

4.4 Phonological

Responses which bore no semantic relationship to the stimuli were examined for phonological similarities, to determine if they represented clang associations. Also analyzed under this heading were responses that were based on mistaken interpretation of the stimuli for phonologic (sound) and/or orthographic (written form) reasons.

A second aspect of phonological analysis was the investigation of similarities in the initial and final sounds, stress patterns, and number of syllables shared by responses and stimuli.

4.5 World Knowledge

Discussion with the subjects following the completion of the WAT as to the intent of their responses revealed a large number which could not easily be classified into the paradigmatic, syntagmatic, and phonological categories noted above. Responses which were determined to be based on personal experiences, emotions, current events, or knowledge of the world at large were classified as world knowledge. Also included in this category were responses that described the usage or meaning of stimuli, which will be discussed in greater detail below.

4.6 Syntactic Links

Word class links were, in general, simple to calculate. The stimulus *mystery* presented a special problem in that it was treated as both an adjective and a noun by nearly equal numbers of subjects, necessitating separate investigation of both word classes. *What* also had the potential to be problematic in this sense, but since nearly all the students identified it as a question word, it was treated as such.

5. Results

Overall results (Table 1) seem to generally fall in line with previously reported studies, though the inclusion of the category of world knowledge, coupled with the

qualitative assessment of responses, can be seen to have had a significant effect. Collocates were the commonest response overall, with world knowledge second most common, and coordinates third. Clang responses and phonological confusion did not exert a particularly strong influence in this study, due mostly to the fact that there were no beginners in the subject group and the stimuli were of relatively high frequency. Full details of results can be found in Appendices 2A-H.

Table 1: Responses by type

(A = Advanced, U = Upper-Intermediate, L = Lower-Intermediate, O = Overall)

	Lvl.	Paradigmatic			Syntagmatic	Phonological	World Knowledge	Other
		coordinate	synonym	superordinate	collocate			
Number of Responses	A	10	6	0	33	0	23	0
	U	7	7	6	44	2	19	2
	L	9	9	4	43	3	35	1
	O	25	22	10	121	5	77	3
Percentage of Responses (whole #s)	A	14%	8%	0%	46%	0%	32%	0%
	U	8%	8%	7%	51%	2%	22%	2%
	L	9%	9%	4%	41%	3%	34%	1%
	O	10%	8%	4%	46%	2%	29%	1%

5.1 Collocation

Collocates accounted for nearly half of the total responses elicited, giving credence to the argument that L2 learners are likely to produce a high percentage of this type. Upper-intermediate subjects produced most of these, followed by advanced and lower-intermediate. Evidence from collocations showed that learners are storing fixed lexical phrases in their minds. In the case of *make*, there were several examples such as, *mind* (make up your mind), *sense* (make sense), and *friends* (make friends) that could be construed as learned chunks.

5.2 World knowledge

Nearly a third of the responses fell into this category, with advanced and lower-intermediate learners producing an almost equal amount, for generally similar reasons. Cultural influence was seen to be a factor in these types of responses, especially in the case of *pocket* which elicited 12 responses, across all levels, directly related to Japanese culture. Current events were also a strong influence with several students referencing the Torino Winter Olympics (in progress at the time of testing) and local news stories.

Other responses which seemed only to fit in this category were those that displayed learners' knowledge of a word in terms of functional description. Many such instances arose from the stimulus *but*, where subjects, instead of trying to use the stimulus in a sentence, described its usage. Lower-intermediate subjects produced the majority of these responses indicating perhaps that while they do have receptive knowledge of many words, their productive knowledge may be lacking.

5.3 Coordination

Coordination was a much weaker category compared to reported results of native speaker word associations, so results here seem to support previous studies. Advanced learners did return the highest number of coordinates (14%) which is to be expected if coordinate associations do in fact become stronger with higher proficiency. Upper-intermediates and lower-intermediates were not far behind, however, with 8% and 9% respectively, which doesn't seem to be a particularly large margin of difference. This possibly points to a need for more exposure to

paradigmatic associations in the vocabulary learning of these subjects.

The adjective stimulus *interesting* produced a small number of coordinate associations, which seems natural to the nature of adjectives, but it was the function words *what* and *but* that elicited the most responses of this type. This seems to be an indication that grammatical knowledge has a stronger influence on these learners than vocabulary knowledge, but given the limited nature of this experiment it is impossible to draw any firm conclusions.

5.4 Synonymy

The relatively small number of synonyms, even boosted by the acceptance of 'loose' synonyms (e.g. *creation* as a synonym of *make*), produced by subjects may be the result of stimulus selection, but may also be an indication of these learners' reliance on a limited range of words with which to express themselves. In general, there seems to be a tendency for learners to acquire one meaning of a word and not be taught other meanings of, or synonyms for, that word. The stimulus *make*, to cite one example, elicited responses related to food preparation in more than half of the responses (18 of 33 responses), and 5 of 8 synonyms. The Cambridge Advanced Learner's Dictionary (2005) lists more than a hundred possible uses (including idioms) for *make* and it seems that these learners would benefit from vocabulary teaching techniques to expand their range of word usage.

5.5 Clang responses and phonological mistakes

The phonological relationship of responses to stimulus did not seem to play a

significant role in the current study. Only two clang responses appear among the 263 responses gathered, both as a response to the stimulus *but*, from a lower-intermediate respondent and an upper-intermediate. Three other instances of responses not connected to the stimulus were the result of mistaken identification due to phonological and orthographic similarity to other words. *But* was mistaken for *bad* by two lower-intermediate respondents, resulting in responses of *good* and *steal*, and *what* was mistaken for *white* by an upper-intermediate respondent, resulting in a response of *chocolate*.

5.6 Phonological similarities

Somewhat contrary to findings on the 'bathtub effect' (Aitchison 2003: 138), similarities to stimulus words (Table 2) in the beginning sounds of responses (10%) were slightly less prominent than similarities in ending sounds (13%) overall. General stress patterns were found to be relatively similar (62%), but this is likely because the majority of the stimulus words were stressed on the first syllable. In contrast, the stimulus *between* elicited a significantly lower proportion of responses with the same stress pattern (12%). The number of syllables in responses compared to stimuli was not found to be of particular significance except in the cases of multi-syllable stimuli, *interesting* and *mystery*. Whereas the shorter stimulus words elicited between 39% and 64% of responses with the same number of syllables, interesting and mystery elicited 3% and 9% respectively. This is possibly indicative of a simpler vocabulary possessed by the subjects in the study.

Table 2: Phonological nature of responses by level
(A = Advanced, U = Upper-Intermediate,
L = Lower-Intermediate, O = Overall)

Stimulus Words	Lvl.	Same Initial Sound	Same Final Sound	Same Stress Pattern	Same Number of Syllables
pocket	A	0%	22%	100%	67%
	U	20%	20%	100%	60%
	L	15%	0%	85%	46%
	O	13%	13%	94%	56%
what	A	11%	11%	78%	78%
	U	36%	9%	100%	36%
	L	15%	0%	100%	54%
	O	21%	9%	94%	55%
kill	A	0%	11%	100%	78%
	U	0%	9%	91%	55%
	L	0%	0%	100%	62%
	O	0%	6%	97%	64%
interesting	A	0%	22%	89%	0%
	U	0%	0%	73%	9%
	L	0%	8%	92%	0%
	O	0%	9%	85%	3%
but	A	11%	11%	44%	44%
	U	18%	18%	64%	36%
	L	23%	0%	54%	46%
	O	18%	9%	48%	42%
make	A	22%	33%	78%	56%
	U	27%	36%	73%	55%
	L	15%	46%	77%	62%
	O	15%	39%	70%	58%
between	A	11%	0%	33%	44%
	U	18%	9%	0%	45%
	L	8%	0%	8%	31%
	O	12%	9%	12%	39%
mystery	A	0%	0%	89%	11%
	U	0%	9%	91%	9%
	L	8%	8%	100%	8%
	O	3%	6%	94%	9%
All Stimulus Words	A	7%	14%	76%	47%
	U	15%	14%	74%	38%
	L	11%	8%	77%	38%
	O	10%	13%	62%	41%

5.7 Syntactic relations

Again contrary to results reported in previous studies, only the two nouns featured as stimuli were seen to retain their word class in a majority of responses (Table 3).

Verbs and adjectives fell well below previously reported figures (see section 2.2.4) at an average of 21% and 11% respectively. Though nothing in the literature was found regarding the particular word class, it is interesting to note that the conjunction *but* did manage to elicit 30% of its responses in the same class, the strongest showing for maintaining word class next to nouns. The significance of differences between proficiency levels was found to be inconclusive (Appendix 3) due to the limited number of each word class used in the research.

Table 3: Overall responses by word class

(A = Advanced, U = Upper-Intermediate, L = Lower-Intermediate, O = Overall)

	Lvl.	noun	pronoun	verb	adjective	adverb	question word	conjunction	preposition
Number of responses in word class	A	51	4	5	3	3	2	4	0
	U	55	6	13	2	4	4	3	0
	L	69	3	14	9	2	2	4	1
	O	175	13	32	14	9	8	11	1
Percentage of responses in word class (whole #s)	A	71%	6%	7%	4%	4%	3%	6%	0%
	U	63%	7%	15%	2%	5%	5%	3%	0%
	L	66%	3%	13%	9%	2%	2%	4%	1%
	O	67%	5%	12%	5%	3%	3%	4%	0%

6. Conclusion

The results of this study show that there is much to be learned through WATs about the nature of the L2 learner's mental lexicon. The abundance of certain characteristic types of associations, and relative scarcity of others, can provide teachers with insights into where their learners' strengths and weaknesses lie in terms of vocabulary development and act as a focal point for the development of improved teaching and learning methodologies.

A research project of this general focus and limited scale, however, only scratches the surface of a vast and complex area of linguistics and language learning. In

order to fully explore the potential of word associations as a tool for the assessment and/or improvement of lexical development, refined methods are needed. If the goal of mapping the mental lexicon is ever to be achieved, future studies will need to be longitudinal, investigating greater numbers of subjects, allowing for more than single responses, employing carefully selected stimuli and analyzing data for both the quantitative and qualitative nature of associations between words.

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Appendix 1: Word Association Test Paper

Word Association Survey

Your teacher will read a series of words and write them on the whiteboard. When you hear the word, please write the first word you think of in the space provided. When the survey has finished, please write your name at the bottom of the page. There are no correct answers!

1._____

2._____

3._____

4._____

5._____

6._____

7._____

8._____

Name:_____ Class:_____

Appendix 2A: Word Association Responses - Pocket

Response to pocket	# of responses total & by level				Syntactic links to stimulus	Type of response							Comments
						PARADIGMATIC			SYNT	PHON	WORLD	OTHER	
	#	Adv	UI	LI		coord	syn	super	coll				
cookie(s)	6	1	1	4	noun						6		Response based on rememberance of Japanese children's song
biscuit	4	2	2		noun						4		Response based on rememberance of Japanese children's song
coin	4	3		1	noun				4				22 conc w/ "coin(s) in (pronoun) pocket"
money	4	1	1	2	noun				4				100+ conc w/ "pocket money"
Doraemon	2			2	noun						2		Doraemon' is an animated character in Japan with a magic pocket
pick	2		2		verb				2				27 conc w/ "pick pocket"
billiards	1	1			noun						1		"In billiards, you have to put the balls in the pockets."
candy	1		1		noun						1		"I keep candy in my pocket."
cellphone	1		1		noun						1		"I keep my cellphone in my pocket."
clothes	1		1		noun						1		"Most clothes have pockets."
goods	1		1		noun						1		"I keep goods in my pocket."
hole	1			1	noun		1						Loose synonym - "A pocket is a hole in my clothing."
pants	1			1	noun				1				30 conc w/ "pants pocket"
pen	1			1	noun						1		"I carry my pen in my pocket."
special	1	1			adj.						1		"I have a special pocket in my bag."
sweets	1			1	noun						1		"I keep small sweets in my pocket."
	32	9	10	13	29 noun 2 verb 1 adj.	0	1	0	11	0	20	0	

Key to Appendices				
	Adv = advanced learners	**coord** = coordinate	**SYNT** = syntagmatic links	**WORLD** = encyclopaedic knowledge
	UI = upper-intermediate learners	**syn** = synonym	**coll** = collocate	**OTHER** = difficult-to-classify responses
	LI = lower-intermediate learners	**super** = superordinate	**PHON** = phonological response	# conc = number of concordances in corpus
	Note: Quotations in **Comments** indicate paraphrase of responses to stimulus words			

Appendix 2B: Word Association Responses - What

Response to what	# of responses total & by level				Syntactic links to stimulus	Type of response							Comments
						PARADIGMATIC			SYNT	PHON	WORLD	OTHER	
	#	Adv	UI	LI		coord	syn	super	coll				
question	8		4	4	noun			8					"'What' is a type of question."
why	4	1	2	1	quest.	4							Coordinate - question word
happen	2		1	1	verb				2				100+ conc w/ "what happened"*
shop	2	1		1	noun						2		"There is a shop in the city called 'WHAT'."
colour	1		1		noun				1				10 conc w/ "what colour is ..."
confusion	1	1			noun						1		"When I feel confusion, I say 'What?'."
date	1	1			noun				1				34 conc w/ "what's the date"
hell	1	1			noun				1				100+ conc w/ "what the hell"
how	1	1			quest.	1							Coordinate - question word
is	1	1			verb				1				100+ conc w/ "what is..."
name	1			1	noun				1				100+ conc w/ "what's your name"
problem	1			1	noun				1				100+ conc w/ "what's the problem"
quiz	1	1			noun						1		"I can see 'what' on many quizzes."
surprise	1	1			noun				1				25 conc w/ "what a surprise"
think	1			1	verb				1				100+ conc w/ "what do you think"
this	1			1	pro				1				100+ conc w/ "what's this"
time	1			1	noun				1				38 conc w/ "what time is it"
what	1		1		quest.							1	Respondent indictated that she couldn't think of an answer
when	1		1		quest.	1							Coordinate - question word
where	1			1	quest.	1							Coordinate - question word
*chocolate	1		1		noun					1			Phonological mistake - "I thought you said 'white'."
	33	9	11	13	20 noun 8 quest. 4 verb 1 pro.	7	0	8	12	1	4	1	

*"What happen?" is a common error among Japanese learners and 22 concordances were found with the erroneous form in the corpus.

Appendix 2C: Word Association Responses - Kill

Response to kill	# of responses total & by level				Syntactic links to stimulus	Type of response							Comments
						PARADIGMATIC			SYNT	PHON	WORLD	OTHER	
	#	Adv	UI	LI		coord	syn	super	coll				
murder	6	1	3	2	verb		6						Respondents all indicated that synonym was their intent
blood	4	2	1	1	noun						4		"When a person is killed, there is blood."
knife	3		2	1	noun				3				8 conc w/ "kill (noun/pronoun) with (a) knife"
war	3	1		2	noun				3				5 conc w/ "war kills"
Bill	2	1	1		noun						2		Title of a popular film, 'Kill Bill'
death	2	1		1	noun		2						Loose synonym - different word class
sad	2			2	adj.						2		"It's sad when people are killed."
children	1			1	noun						1		"In the news these days, many children are killed."
gun	1		1		noun				1				9 conc w/ "gun to kill"
insect	1			1	noun				1				24 conc w/ "kill insects"
life	1	1			noun	1							Loose antonym - different word class
men	1	1			noun				1				18 conc w/ "men kill"
murderer	1			1	noun						1		"A murderer is someone who kills another person."
no	1			1	adv.						1		Personal emotional response to killing
oneself	1		1		pro.				1				7 conc w/ "kill oneself"
painkiller	1		1		noun						1		"I'm taking painkillers for my back right now."
Quentin Tarantino	1	1			noun						1		Name of the director of the film, 'Kill Bill'
you	1		1		pro.				1				100+ conc w/ "I'll kill you."
	33	9	11	13	22 noun 6 verb 2 adj. 2 pro. 1 adv.	1	8	0	11	0	13	0	

Appendix 2D: Word Association Responses - Interesting

Response to interesting	# of responses total & by level				Syntactic links to stimulus	Type of response							Comments
						PARADIGMATIC			SYNT	PHON	WORLD	OTHER	
	#	Adv	UI	LI		coord	syn	super	coll				
book	4	1	2	1	noun				4				68 conc w/ "interesting book"
fun	2		1	1	adj.	2							Coordinate - adjective
movie	2	2			noun				2				13 conc w/ "interesting movie(s)"
music	2		1	1	noun				2				20 conc w/ "interesting music"
sports	2			2	noun						2		"We had a sports festival at our school."
amusing	1	1			adj.	1							Coordinate - adjective
art	1	1			noun				1				7 conc w/ "interesting art (works, objects)"
concern	1		1		verb							1	Respondent, looking for synonym, mistook 'interesting' for 'interest'
curling	1	1			noun						1		"I've been watching Olympic curling. It's really interesting."
disappoint	1		1		verb	1							Loose antonym - Respondent's intent was "Disappoint(ing) is the opposite."
English	1	1			noun						1		"Studying English is interesting for me."
funny	1			1	adj.	1							Coordinate - adjective
hobby	1			1	noun				1				11 conc w/ "interesting hobb(ies)"
Kagoshima	1		1		noun						1		"Kagoshima is a very interesting place."
like	1			1	verb						1		"If something is interesting, I like it."
news	1			1	noun						1		"I like to watch the news. It's interesting."
olympics	1		1		noun						1		"The Olympics are interesting."
P.E.	1			1	noun						1		"I like P.E. (physical education). It's my most interesting class."
performance	1			1	noun				1				8 conc w/ "interesting performance(s)"
play	1		1		noun				1				12 conc w/ "interesting play(s)"
sense	1	1			noun						1		"My friend has a very interesting fashion sense."
Sherlock Holmes	1	1			noun						1		"I've been reading 'Sherlock Holmes' lately. It's interesting."
shopping	1			1	noun						1		"Shopping is interesting!"
story	1		1		noun				1				100+ conc w/ "interesting stor(ies)"
strange	1			1	adj.	1							Coordinate - adjective
talk	1		1		verb						1		"Talking with friends is interesting to me."
	33	9	11	13	24 noun 5 adj. 4 verb	6	0	0	13	0	13	1	

Appendix 2E: Word Association Responses - But

Response to but	# of responses total & by level				Syntactic links to stimulus	Type of response							Comments
						PARADIGMATIC			SYNT	PHON	WORLD	OTHER	
	#	Adv	UI	LI		coord	syn	super	coll				
and	4	3		1	conj.	4							Coordinate - conjunction
because	4	1	1	2	conj.	4							Coordinate - conjunction
however	4	2	2		adv.		4						but = however
excuse	2			2	noun						2		Understanding of usage - "'But' is used to make excuses."
if	2		1	1	conj.				2				100+ conc w/ "but if... then"
not	2	1	1		adv.				2				100+ conc w/ "but not..."
also	1		1		adv.				1				100+ conc w/ "but also..."
bad	1			1	adj.					1			Clang response - bears only a phonological connection to 'but'
bat	1		1		noun					1			Clang response - bears only a phonological connection to 'but'
deny	1			1	verb						1		Understanding of usage - "'But' is used to deny."
disagree	1	1			verb						1		Understanding of usage - "'But' is used to disagree."
I	1		1		pro.				1				100+ conc w/ "but I..."
negative	1		1		adj.			1					Loose superordinate - "'But' is a negative word."
objection	1	1			noun						1		Understanding of usage - "'But' is used to make an objection."
persuade	1		1		verb						1		Understanding of usage - "'But' is used to persuade."
reason	1		1		noun						1		Understanding of usage - "'But' is used to give reasons."
reverse	1			1	verb						1		Understanding of usage - "'But' is used to give reverse an argument."
anti	1			1	prep.						1		Understanding of usage - "'But' is used to give the 'anti' side in a debate."
*good	1			1	adj.					1			Phonological mistake - 'but' mistaken for 'bad'
*steal	1			1	verb					1			Phonological mistake - 'but' mistaken for 'bad'
*mean	1			1	verb							1	Respondent wrote 'mean' to express "I don't know what this word means."
	33	9	11	13	10 conj. 7 adv. 6 verb 5 noun 3 adj. 1 pro. 1 prep.	8	4	1	6	4	9	1	

Appendix 2F: Word Association Responses - Make

Response to make	# of responses total & by level				Syntactic links to stimulus	Type of response							Comments
						PARADIGMATIC			SYNT	PHON	WORLD	OTHER	
	#	Adv	UI	LI		coord	syn	super	coll				
cake	8	2	2	4	noun				8				12 conc w/ "make a cake"
cook(ing)	4		1	3	verb		4						Synonym in the context of food preparation
food	2		1	1	noun				2				30 conc w/ "make food" in the sense of 'prepare a meal'
friends	2	1	1		noun				2				100+ conc w/ "make friends"
mistake	2		2		noun				2				100+ conc w/ "make a mistake"
break	1	1			verb	1							Antonym - "'Break' is the opposite of 'make'."*
cookies	1	1			noun				1				15 conc w/ "make (1 or 2 adjectives) cookies"
creation	1	1			noun		1						Loose synonym - different word class
destroy	1		1		verb	1							Antonym - "'Destroy' is the opposite of 'make'."
dinner	1		1		noun				1				22 conc w/ "make dinner" in the sense of 'prepare a meal'
dishes	1			1	noun				1				7 conc w/ "make dishes (of food)"
hand	1			1	noun				1				8 conc w/ "make (noun/pronoun) by hand"
invention	1			1	noun		1						Loose synonym - different word class
Lexus	1	1			noun						1		"Lexus is a 'make' of car."
machine	1			1	noun				1				5 conc w/ "machines make (noun/pronoun)"
manufacture	1			1	verb		1						Synonym in the context of industry
mind	1		1		noun				1				100+ conc w/ "make up (pronoun) mind"
prepare	1	1			verb		1						Synonym in the context of food preparation
sense	1		1		noun				1				100+ conc w/ "make sense"
skills	1	1			noun				1				16 conc w/ "skill(s) to make (noun/pronoun)"
	33	9	11	13	25 noun	2	8	0	22	0	1	0	
					8 verb								

*The fixed expression 'make or break' was unknown to the respondent

Appendix 2G: Word Association Responses - Between

Response to between	# of responses total & by level				Syntactic links to stimulus	Type of response							Comments
						PARADIGMATIC			SYNT	PHON	WORLD	OTHER	
	#	Adv	UI	LI		coord	syn	super	coll				
two	4	1	1	2	pro.				4				100+ conc w/ "between two (noun)"
buildings	2	1	1		noun				2				71 conc w/ "between (adjective) buildings"
people	2	1	1		noun				2				100+ conc w/ "between people"
relationship	2	2			noun				2				100+ conc w/ "relationship between..."
them	2	1	1		pro.				2				100+ conc w/ "between them"
and	1		1		conj.				1				100+ conc w/ "between (noun) and (noun)"
association	1		1		noun				1				100+ conc w/ "association between..."
border	1		1		noun				1				100+ conc w/ "border between..."
boy and girl	1			1	noun				1				21 conc w/ "boy and girl" with various intervening adjectives
country	1			1	noun				1				100+ conc w/ "between countr(ies)"
friend	1			1	noun				1				89 conc w/ "between friend(s)"
line	1			1	noun				1				100+ conc w/ "line between (noun) and (noun)"
man and woman	1		1		noun				1				72 conc w/ "between (a) man and (a) woman"
middle	1		1		noun		1						Loose synonym - "'Between' means in the middle."
mountain	1		1		noun						1		"It reminds me of a movie I saw."
ours	1		1		pro.						1		Understanding of meaning - "It's ours so it's shared between us."
ourselves	1	1			pro.				1				52 conc w/ "between ourselves"
parents	1			1	noun						1		"As a child, I used to walk between my parents."
river	1			1	noun						1		"A river runs between our city."
road	1			1	noun				1				100+ conc w/ "road between (Point A and Point B)"
time	1			1	noun				1				100+ conc w/ "time between (time/date) and (time/date)"
together	1			1	adv.						1		Understanding of meaning - "Time spent between us is time spent together."
toothbrush	1	1			noun						1		"'Between' is a brand of toothbrush in Japan."
trees	1			1	noun				1				79 conc w/ "between the trees"
us	1	1			pro.				1				100+ conc of "between us"
window	1			1	noun				1				9 conc of "between the window and (noun)"
	33	9	11	13	22 noun 9 pro. 1 conj. 1 adv.	0	1	0	26	0	6	0	

Appendix 2H: Word Association Responses - Mystery

Response to mystery	# of responses total & by level				Syntactic links to stimulus	Type of response							Comments
						PARADIGMATIC			SYNT	PHON	WORLD	OTHER	
	#	Adv	UI	LI		coord	syn	super	coll				
novel	7	3	2	2	noun				7				72 conc w/ "mystery novel(s)"
book	2		1	1	noun				2				9 conc w/ "mystery book(s)"
detective	2	1	1		noun				2				6 conc w/ "detective myster(ies)"
caller	1		1		noun				1				21 conc w/ "mystery caller(s)"
castle	1		1		noun						1		"Castles have a lot of mystery."
cats' behaviour	1	1			noun						1		"My cat's behaviour is a mystery to me."
Christie	1		1		noun				1				7 conc w/ "Christie myster(ies)"
complicated	1			1	adj.						1		"Mysteries are complicated."
dark	1	1			adj.				1				14 conc w/ "dark myster(ies)"
drama	1			1	noun				1				7 conc w/ "mystery drama(s)"
fact	1	1			noun	1							Loose antonym - "A fact is not a mystery."
fiction	1		1		noun			1					"'Mystery' is a type of 'fiction'."
fog	1			1	noun						1		"Fog looks mysterious."
forest	1	1			noun						1		"The forest has a lot of mystery in it."
interesting	1			1	adj.						1		"I find mystery novels very interesting."
love	1		1		noun				1				8 conc w/ "mystery of love"
movie	1			1	noun				1				6 conc w/ "mystery movie(s)"
life	1			1	noun				1				28 conc w/ "mystery of life"
park	1			1	noun						1		"The park near my house is mysterious at night."
past	1	1			noun						1		"No one really knows the past, so it's a mystery."
place	1		1		noun				1				17 conc w/ "mysterious place(s)"
pyramid	1			1	noun						1		"The pyramids in Egypt are a mystery."
scare	1		1		verb						1		"Mysteries scare me."
UFO	1			1	noun				1				6 conc w/ "UFO mystery"
wonder	1			1	verb						1		"Mysteries make me wonder."
	33	9	11	13	28 noun 3 adj. 2 verb	1	0	1	20	0	11	0	

Appendix 3: Word Classes of Responses (number of responses/percentage of responses in whole numbers)

(A = Advanced, U = Upper-Intermediate, L = Lower-Intermediate, O = Overall, **Bold** denotes word class of stimulus)

Stimulus Word	Word Class	Lvl.	Responses by Word Class							
			noun	pronoun	verb	adjective	adverb	question word	conjunction	preposition
pocket	noun	A	**8/89**	0/0	0/0	1/11	0/0	0/0	0/0	0/0
		U	**8/80**	0/0	2/20	0/0	0/0	0/0	0/0	0/0
		L	**13/100**	0/0	0/0	0/0	0/0	0/0	0/0	0/0
		O	**29/91**	0/0	2/6	1/3	0/0	0/0	0/0	0/0
what	question word*	A	6/67	0/0	1/11	0/0	0/0	**2/22**	0/0	0/0
		U	6/55	0/0	1/9	0/0	0/0	**4/31**	0/0	0/0
		L	8/62	1/8	2/15	0/0	0/0	**2/15**	0/0	0/0
		O	20/61	1/3	4/12	0/0	0/0	**8/24**	0/0	0/0
kill	verb	A	8/89	0/0	**1/11**	0/0	0/0	0/0	0/0	0/0
		U	6/55	2/18	**3/27**	0/0	0/0	0/0	0/0	0/0
		L	8/62	0/0	**2/15**	2/15	1/8	0/0	0/0	0/0
		O	22/67	2/6	**6/18**	2/6	1/3	0/0	0/0	0/0
interesting	adjective	A	8/89	0/0	0/0	**1/11**	0/0	0/0	0/0	0/0
		U	7/64	0/0	3/27	**1/9**	0/0	0/0	0/0	0/0
		L	9/69	0/0	1/8	**3/23**	0/0	0/0	0/0	0/0
		O	24/73	0/0	4/12	**5/15**	0/0	0/0	0/0	0/0
but	conjunction	A	1/11	0/0	1/11	0/0	3/33	0/0	**4/44**	0/0
		U	2/18	1/9	1/9	1/9	4/31	0/0	**2/18**	0/0
		L	2/15	0/0	4/31	2/15	0/0	0/0	**4/31**	1/8
		O	5/15	1/3	6/18	3/9	7/21	0/0	**10/30**	1/3
make	verb	A	7/78	0/0	**2/22**	0/0	0/0	0/0	0/0	0/0
		U	9/82	0/0	**2/18**	0/0	0/0	0/0	0/0	0/0
		L	9/69	0/0	**4/31**	0/0	0/0	0/0	0/0	0/0
		O	25/76	0/0	**8/24**	0/0	0/0	0/0	0/0	0/0
between	preposition	A	5/56	4/44	0/0	0/0	0/0	0/0	0/0	**0/0**
		U	7/64	3/27	0/0	0/0	0/0	0/0	1/9	**0/0**
		L	10/77	2/15	0/0	0/0	1/8	0/0	0/0	**0/0**
		O	22/67	9/27	0/0	0/0	1/3	0/0	1/3	**0/0**
mystery (16)**	noun	A	**5/83**	0/0	0/0	1/17	0/0	0/0	0/0	0/0
		U	**4/80**	0/0	1/20	0/0	0/0	0/0	0/0	0/0
		L	**3/60**	0/0	1/20	1/20	0/0	0/0	0/0	0/0
		O	**12/75**	0/0	2/13	2/13	0/0	0/0	0/0	0/0
mystery (17)**	adjective	A	3/100	0/0	0/0	**0/0**	0/0	0/0	0/0	0/0
		U	6/100	0/0	0/0	**0/0**	0/0	0/0	0/0	0/0
		L	7/88	0/0	0/0	**1/13**	0/0	0/0	0/0	0/0
		O	16/94	0/0	0/0	**1/6**	0/0	0/0	0/0	0/0

*Majority of respondents treated 'what' as a question word

**Even split between respondents in treatment of 'mystery' as a noun (16) or an adjective (17) so responses are divided

Appendix 4: Word Associations from Edinburgh Associative Thesaurus

pocket stimulated the following associations
Number of different answers: 29
Total count of all answers: 100
WATCH 15 0.15
MONEY 13 0.13
HANDKERCHIEF 9 0.09
BOOK 7 0.07
HOLE 7 0.07
KNIFE 7 0.07
PICK 6 0.06
TROUSERS 6 0.06
HAND 5 0.05
HANKY 4 0.04
COAT 3 0.03
BILLIARDS 1 0.01
DICTIONARY 1 0.01
EMPTY 1 0.01
FAGIN 1 0.01
GLOVE 1 0.01
JACKET 1 0.01
LAMP 1 0.01
MACHINE 1 0.01
POUCH 1 0.01
RUBBISH 1 0.01
SIDE 1 0.01
SIZE 1 0.01
STEAL 1 0.01
SUIT 1 0.01
SYMPHONY 1 0.01
TORCH 1 0.01
TROUSER 1 0.01
WALLET 1 0.01

what stimulated the following associations
Number of different answers: 37
Total count of all answers: 98
WHY 12 0.12
QUESTION 9 0.09
NOW 8 0.08
WHERE 7 0.07
WHICH 7 0.07
EVER 6 0.06
NOT 5 0.05
WHEN 5 0.05
FOR 3 0.03
THAT 3 0.03
ABOUT 2 0.02
EXCLAMATION 2 0.02
HO 2 0.02
HOW 2 0.02
IS 2 0.02
WHO 2 0.02
ARE 1 0.01
ASK 1 0.01
CLOT 1 0.01
DO 1 0.01
DO YOU KNOW 1 0.01
GIRL 1 0.01
IF 1 0.01
IS IT 1 0.01
ME 1 0.01
MORE 1 0.01
MR. 1 0.01
MY 1 0.01
PARDON 1 0.01
RUBBISH 1 0.01
SHOULD 1 0.01
THING 1 0.01
TIME 1 0.01
WHAT 1 0.01
WHEREFORE 1 0.01
WILL 1 0.01
YES 1 0.01

Appendix 4: Word Associations from Edinburgh Associative Thesaurus

kill stimulated the following associations
Number of different answers: 51
Total count of all answers: 100

MURDER 14 0.14
DIE 9 0.09
NO 5 0.05
DEATH 4 0.04
HATE 4 0.04
ME 4 0.04
BLOOD 3 0.03
GUN 3 0.03
JOY 3 0.03
LIVE 3 0.03
DEAD 2 0.02
HIM 2 0.02
LIFE 2 0.02
MAIM 2 0.02
SLAY 2 0.02
STAB 2 0.02
WRONG 2 0.02
APPLE 1 0.01
BAD 1 0.01
BANG 1 0.01
BAYONET 1 0.01
BEAST 1 0.01
BIRTH 1 0.01
CURE 1 0.01
DAGGER 1 0.01
DARE 1 0.01
DESTROY 1 0.01
ENEMY 1 0.01
FILL 1 0.01
HEAL 1 0.01
HELP 1 0.01
HORROR 1 0.01
HURT 1 0.01
KISS 1 0.01
KNIFE 1 0.01
MAN 1 0.01
MANIA 1 0.01
MEN 1 0.01
NASTY 1 0.01
NOBODY 1 0.01
PAIN 1 0.01
PEOPLE 1 0.01
RED 1 0.01
ROBIN 1 0.01
SAVE 1 0.01
SEEK 1 0.01
SHOOT 1 0.01
VIETCONG 1 0.01
WHAT 1 0.01
WHO 1 0.01
WOG 1 0.01

interesting stimulated the following associations
Number of different answers: 47
Total count of all answers: 93

BOOK 10 0.11
GOOD 9 0.10
BORING 7 0.08
VERY 6 0.06
EXCITING 5 0.05
AMUSING 4 0.04
LIFE 3 0.03
DULL 2 0.02
FASCINATING 2 0.02
NOVEL 2 0.02
PEOPLE 2 0.02
SEX 2 0.02
STORY 2 0.02
SUBJECT 2 0.02
UNINTERESTING 2 0.02
WORK 2 0.02
BIRD 1 0.01
BORE 1 0.01
BORED 1 0.01
DIFFERENT 1 0.01
ENJOYABLE 1 0.01
ENTERTAINING 1 0.01
EVERYTHING 1 0.01
FEATURE 1 0.01
FINE 1 0.01
GEOGRAPHY 1 0.01
GEOLOGY 1 0.01
GIRL 1 0.01
GIRL GUIDE 1 0.01
IDEA 1 0.01
INFORMATIVE 1 0.01
KEEN 1 0.01
LATIN 1 0.01
LOVED 1 0.01
MALE 1 0.01
MEDIOCRE 1 0.01
MONEY 1 0.01
NEWS 1 0.01
PERSON 1 0.01
PROBLEM 1 0.01
REALLY 1 0.01
SOON 1 0.01
STIMULATION 1 0.01
STUPID 1 0.01
THOUGHTS 1 0.01
VAGUE 1 0.01
WORTHWHILE 1 0.01

Appendix 4: Word Associations from Edinburgh Associative Thesaurus

but stimulated the following associations
Number of different answers: 47
Total count of all answers: 96

NOT 10 0.10
AND 8 0.08
IF 7 0.07
NO 6 0.06
WHY 6 0.06
WHAT 4 0.04
ALSO 3 0.03
FOR 3 0.03
HOWEVER 3 0.03
THEN 3 0.03
ALTHOUGH 2 0.02
BUTTER 2 0.02
HIT 2 0.02
I 2 0.02
NOW 2 0.02
YES 2 0.02
ABER 1 0.01
ALL 1 0.01
ANYWAY 1 0.01
BECAUSE 1 0.01
BOOM 1 0.01
CATCH 1 0.01
CHALLENGE 1 0.01
COULD 1 0.01
END 1 0.01
EXCEPT 1 0.01
EXCEPTION 1 0.01
HESITANT 1 0.01
HESITATE 1 0.01
HESITATION 1 0.01
HOW 1 0.01
LONELINESS 1 0.01
MAYBE 1 0.01
NEVER 1 0.01
OBJECT 1 0.01
ONLY 1 0.01
PERHAPS 1 0.01
RATHER 1 0.01
SHE 1 0.01
SO 1 0.01
SURELY 1 0.01
THE 1 0.01
TOCKS 1 0.01
WELL 1 0.01
WHEN 1 0.01
YET 1 0.01
YOU 1 0.01

make stimulated the following associations
Number of different answers: 48
Total count of all answers: 99

DO 13 0.13
UP 9 0.09
BUILD 7 0.07
BREAK 4 0.04
CONSTRUCT 4 0.04
CREATE 4 0.04
HASTE 3 0.03
LOVE 3 0.03
MONEY 3 0.03
AMENDS 2 0.02
BELIEVE 2 0.02
BRAKE 2 0.02
CAKE 2 0.02
FORCE 2 0.02
IT 2 0.02
MADE 2 0.02
MANUFACTURE 2 0.02
MEND 2 0.02
TAKE 2 0.02
BED 1 0.01
CLOTHES 1 0.01
CURTAINS 1 0.01
DISTRUST 1 0.01
EMANCIPATION 1 0.01
FABRICATE 1 0.01
FORM 1 0.01
GAIN 1 0.01
GIRL 1 0.01
GIVE 1 0.01
GOOD 1 0.01
HAY 1 0.01
MAR 1 0.01
MISTAKES 1 0.01
MODEL 1 0.01
NOT 1 0.01
OBJECT 1 0.01
PLAN 1 0.01
PREPARE 1 0.01
PRETEND 1 0.01
SEW 1 0.01
SEX 1 0.01
SHAKE 1 0.01
STATUE 1 0.01
THINGS 1 0.01
TIME 1 0.01
USE 1 0.01
WHAT 1 0.01
WHOLE 1 0.01

Appendix 4: Word Associations from Edinburgh Associative Thesaurus

between stimulated the following associations
Number of different answers: 51
Total count of all answers: 96
US 11 0.11
AMONG 10 0.10
MIDDLE 7 0.07
IN 5 0.05
TWO 4 0.04
INTER 3 0.03
THEM 3 0.03
TOGETHER 3 0.03
ABOVE 2 0.02
DIFFERENCE 2 0.02
FRIENDS 2 0.02
LEGS 2 0.02
OURSELVES 2 0.02
THE 2 0.02
YOU 2 0.02
ADJACENT 1 0.01
AFTER 1 0.01
AMONGST 1 0.01
ANNOYANCE 1 0.01
ARCH 1 0.01
AROUND 1 0.01
ASIDE 1 0.01
BELONG 1 0.01
BENEATH 1 0.01
BREAKS 1 0.01
BUTTONS 1 0.01
DECISIONS 1 0.01
DEVIL 1 0.01
GAP 1 0.01
HALFWAY 1 0.01
JOIN 1 0.01
LINES 1 0.01
MEALS 1 0.01
NEAR 1 0.01
NEXT 1 0.01
NOW 1 0.01
POSTS 1 0.01
RAILS 1 0.01
RIVER 1 0.01
SEAS 1 0.01
SHEETS 1 0.01
SIDES 1 0.01
SOMETIMES 1 0.01
STOOL 1 0.01
SUCH 1 0.01
THEN 1 0.01
THREE 1 0.01
TIMES 1 0.01
TRANSITION 1 0.01
TWIXT 1 0.01
WHEN 1 0.01

mystery stimulated the following associations
Number of different answers: 46
Total count of all answers: 94
IMAGINATION 14 0.15
STORY 10 0.11
MAN 5 0.05
SUSPENSE 5 0.05
TOUR 5 0.05
BOOK 4 0.04
PLAY 3 0.03
PROBLEM 3 0.03
CRIME 2 0.02
DARK 2 0.02
NOVEL 2 0.02
PUZZLE 2 0.02
SECRET 2 0.02
SEX 2 0.02
THRILLER 2 0.02
ABSTRACT 1 0.01
ADVENTURE 1 0.01
AIR 1 0.01
BLACK 1 0.01
BOX 1 0.01
CASTLE 1 0.01
CHOICE 1 0.01
CYCLE 1 0.01
DEATH 1 0.01
EXPLAIN 1 0.01
FAIRY TALE 1 0.01
GAME 1 0.01
GHOST 1 0.01
INTRIGUING 1 0.01
LIFE 1 0.01
MAGIC 1 0.01
ME 1 0.01
MICK 1 0.01
MIST 1 0.01
ODD 1 0.01
OLD 1 0.01
PARLIAMENT 1 0.01
PECULIAR 1 0.01
SCIENCE 1 0.01
STORMY 1 0.01
TALE 1 0.01
TRIP 1 0.01
UNSOLVED 1 0.01
UNUSUAL 1 0.01
VOICE 1 0.01
WONDER 1 0.01