A Small-scale Exploration into the Relationship between Word-Association and Learners' Lexical Development

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1. Introduction

1.1 Background and Context

The simple question of *How do we learn a language?* provokes a complex discussion that continues to challenge experts in a number of fields, ranging from linguistics to cognitive psychology, as well as teachers and students in the classroom (Aitchison, 2003; Richards *et al*, 1992:406-7). One important aspect of learning a language is learning vocabulary.

With respect to lexical development, a number of considerations, ranging from the theoretical to the practical, quickly spring to mind, such as:

- how words are inputted and stored in the mind, then later retrieved;

- the kinds of mental links made between words;

- the difference between learning vocabulary and acquisition;

- how to measure receptive and productive word knowledge; and

- pedagogical implications for helping students to learn vocabulary.

1.2 Aims and Objectives

Following Task 123 in McCarthy (1990:152) (**Appendix A**) which aims, "To explore the relationship between word-association and learners' lexical development", this paper will seek to touch on some of the areas outlined above and, more specifically, examine the following three questions:

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

2) At low levels, are phonological similarities playing an important role?

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

The characteristic types of response which McCarthy (1990:34-45) discusses are:

a) Co-ordination (including antonymy)

b) Collocation

c) Superordination and hyponymy

d) Synonymy

e) Encyclopaedic (or word) knowledge

f) Phonological and orthographical links

Key differences between different level Japanese students learning English will be considered and individual idiosyncrasies will also be given brief comment.

2. Literature Review

2.1 Word association

Word association refers to the mental links made between words and the description of those links.   Richards *et al* define word association as:

> ways in which words come to be associated with each other and which influence the learning and remembering of words.   In a word-association test, a person is given a word or list of words and asked to respond with another word or words. Word associations have been studied in SEMANTICS, VERBAL LEARNING theory and PSYCHO-LINGUISTICS.   The following are common associations to words from American college students:
>
> | word | response |
> |------|----------|
> | accident | car |
> | airplane | fly |
> | American | flag |
> | baby | child |
> | depression | recession |
>
> (1992:406-7)

The characteristic types of word association outlined above (**Section 1.2**) are examined in greater detail below (**Sections 2.1.1-2.1.6**).   In addition, *multi-word units* (including idioms and fixed expressions), derived words and compounds are also commented upon briefly (**Sections 2.1.7**).   Word associations may be broadly categorised into *syntagmatic* (or left-to-right/ horizontal) and *paradigmatic* (or vertical) *sense* relations (McCarthy, 1990:16) (**Section 2.4**).

2.1.1 Coordination

Coordination describes words on the same level of detail (Aitchison, 2003:86;

McCarthy, 1990:39-40), and includes antonyms and co-hyponymy (**Section 2.13**). Antonymy refers to semantic opposition or 'unrelatedness' (Coulthard *et al,* 2000:25) and has particularly strong sense relations (Jones, 2002:19). There are a number of different types of antonym as shown below in **Table 1.1**.

Table 1.1   **Types of antonym with illustrative examples**

Types of antonym	Illustrative examples
a) Complementarity Presence or existence of one excludes the other	*in/ out* *come/ go*
b) Converseness or **converses** Meanings are interdependent with a measure of logical reciprocity	*brother/ sister* *give/ receive*
c) Incompatibility or **mutual incompatibles** Relational contrasts and constraints mean that words cannot co-occur	Days of the week, seasons, cycles, generic types, e.g. *Her dress is <u>red</u>* (i.e. it cannot be <u>*blue*</u>)
d) Gradation opposition or **gradable opposites** Maybe modified or 'graded' using adverbs of degree, e.g. *pretty/ quite/ rather/ very/ really/ extremely*, and other items may occur in between	*love/* like/ don't mind/ dislike*/ hate* *excellent/ good/ pretty good/ bad/ very bad/ terrible*
e) Multiple opposites Items carrying different lexical meanings may have numerous opposites	*red/ green* (negative, film) c.f. *in the red/ in the black* (financial terms); and *old/ new* c.f. *old/ young*

(Aitchison, 2003:99-101; Coulthard *et al,* 2000:25; McCarthy, 1990:17-19;
Carter, 1987:18-22)

Aitchison (2003:86) observes that coordination is the most common feature of native-speaker word-association responses.   However, this observation is only made in relation to word-association tests for *butterfly, hungry, red,* and *salt* (i.e. nouns and adjectives) which arguably lend themselves to such responses. Furthermore, it should be appreciated that, by definition, coordination is a broad category.   Nevertheless, research on L1 vocabulary acquisition, *slips of*

the tongue, word searches, and aphasic patients suggest very strong links between coordinates (*ibid*:88-91).

2.1.2   Collocation

Collocation refers to the regular and predictable co-occurrence of words. There are two broad categories of collocation: lexical and grammatical (*colligations*), shown in **Table 1.2** below, which are typically described as *restricted*, *strong*, or *weak* (Coulthard *et al*, 2000:76-80; Sinclair, 1991:109-21; McCarthy, 1990:12-16; Carter, 1987:47-70).

Table 1.2   Collocation and colligation with illustrative examples

Types of collocation	Illustrative examples
a) Lexical collocation Lexical words which co-occur	*red: colour, blood, fire, roses, bright, face, hair, nose, wine, like, white, blue, black, green, communist, yellow, flag*
b) Grammatical collocation or **colligation** Grammatical words which co-occur	*red:* <u>determiner</u> + *red* + (pro)noun (e.g. I'm wearing <u>a</u> *red* dress, I'd like <u>the</u> *red* one); <u>conjunctions</u> (e.g. *red* <u>or</u> blue, *red* <u>and</u> white)

(Aitchison, 2003:86; Sinclair (2003), *Collins COBUILD*)

Strong collocations are those which are more likely to occur and have stronger relationships, compared with weak collocations, as indicated by corpora (Sinclair, 1991).   Restricted collocations describe the exclusive relationship between certain words, such as *auburn* or *blond hair*: *auburn* and *blond* are only used to describe *hair*, and not other nouns, unlike *red* for instance. McCarthy (1990:12) also points out *the*, a weak collocator, for which virtually no useful statement of collocation can be made.   The relative strength of collocation might be represented by a continuum, as shown in **Figure 1**, below.

Figure 1   Relative strength of collocations with *red*

Strong/ Restricted   Weak/ Unrestricted

⟵——————————————————————————————⟶

cross   wine   blood   infra   eyes   dragon   claret   rolling
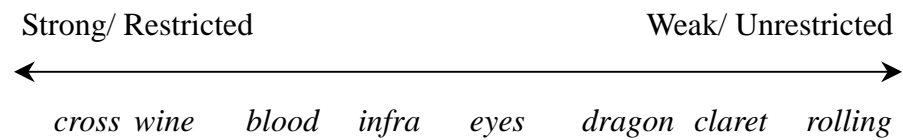
(Based on t-scores for a span of 4 words either side
of the node using *The Bank of English*)

2.1.3   Hyponymy

Hyponymy describes the inclusive lexical relation with asymmetrical synonymy (**Table 1.3**), and is commonly illustrated by taxonomies and word classes. Hence, McCarthy (1990:19) notes the role of hyponymy as, "an organizing principle for vocabulary teaching and learning."

Table 1.3   Hyponymy with illustrative examples

Features of hyponymy	Illustrative examples
a) Superordinates (or **hyperonyms**) and **subordinates** exist in hierarchical relationships. Words can simultaneously exist as both superordinates and subordinates and maybe subject to layering.	*article* [**superordinate**] / *the* [**subordinate**] (i.e. *the* is a **hyponym** of *article*) *determiner/ article/ definite article*
b) Co-hyponyms share the same **superordinate** and are **coordinates** (**Section 2.1.1** above)	*article* [**superordinate**] / *a/an* , *the* [**co-hyponyms**]
c) Meronymy (or **partonomy)** describes the part-whole relation, especially for nouns	*Internet/ network/ computer* *World Wide Web/ website/ webpage*

(Aitchison, 2003:86-7, 96, 106-7; Coulthard *et al*, 2000:26-7; McCarthy,
1990:19-21; Carter, 1987:20-1)

Aitchison (2003:96-8) makes three notable observations which help to explain

why superordinates are less common responses in word-association tests. Firstly, superordinates, especially those of a technical nature, maybe less accessible than coordinates (e.g. *Where are the knives and forks?* c.f. *Where's the cutlery?*). Secondly, availability may depend on prototypical values of the coordinates and common usage. Thirdly, depending on the coordinates, superordinates appear to change (e.g. *knife/fork/spoon – cutlery* c.f. *fork/spade/hoe* – garden tools).

2.1.4 Synonymy

Synonymy describes sameness or similarity of meaning (Carter, 1987:18-22; Coulthard *et al*, 2000:24; McCarthy, 1990:159). For example, *love/ adore/ like/ be fond of/ be crazy* or *mad about*, and *in/ into/ inside/ within*. Polysemous words, however, have multiple synonyms and are dependent upon context (Aitchison, 2003:94-5, 101). For example, *red* may be synonymous with *debt, anger, blushing*, and *Communism*. Even so, McCarthy (1990:16-7), points out that whilst there is never exact synonymy, "learning and storing words as out-of-context synonyms could be a useful organizing principle."

2.1.5 Encyclopaedic or word knowledge

In addition to linguistic knowledge (for example, word class and syntactic features), through education, knowledge links with the origins (or etymology), history, contexts, causes and effects of words might be made (McCarthy, 1990:41-2).

Similarly, personal experience or *experiential knowledge* will lead to further, individualised associations, such as *it* with Stephen King's horror story (Wright, 2001:11 and 27), and *Internet* with *want*, *interesting*, and *difficult* (Farooq, 1998:24). This notion is supported by Vygotsky's view that learning is interactive and social (Candlin & Mercer, 2001:7), and the fact that people more readily learn the relevant, interesting and useful (Nunan, 1999:233). Other associations might be cultural (Williams, 2001:113-5; Grabois, 1999:227).

2.1.6   Orthographical and phonological links

Native speakers learn to recognise the general shape of a word, mainly noticing the head and tail in a phenomenon described as the *bathtub* effect (Aitchison, 2003:138-47). Additionally, the number of syllables and word stress are attended to (McCarthy, 1990:35). McCarthy, citing Channell (1988), further posits that the similarity between the *tip of the tongue* phenomenon in L1 and L2 suggests:

> 'general shape' is an important feature of the mental lexicon of L1 and L2 in terms of matching input to stored patterns and in retrieving specific items from such stored templates.
>
> (1990:36)

Native speakers appear to form connections between words or group them according to spelling patterns and sounds as indicated by *blends* (McCarthy, 1990:38-9), such as *Do you like ski-boarding?* (skiing/snowboarding), or *spoonerisms* (Dillon, 2001). This also appears to be true with non-native speakers, as shown by the following real-life examples:

A native English granddaughter offering to help her Japanese grandmother with her bags said "***Goukan** shimashou ka*?" which unfortunately meant *Shall we **rape***? rather than *Shall we **change***? (***Koukan** shimashou ka?)*!

A native English-speaker met his host family for the first time and politely asked *O **bembi** desu ka?* which, in fact, translated to *Are you **constipated**?* as opposed to a more customary *How are you?* (*O **genki** desu ka?*)!

The orthographical and phonological patterns above are summarised and exemplified in **Table 1.4** below.

Table 1.4   **Orthographical and phonological links**

	Subcategories	Illustrative examples
Phonological links	**Homophones -** different words with the same sounds	*in/ inn* *come/ cum*
	Homonyms – words with the same spelling but different meanings	*I **love** you* *The score is 40-**love**!*
	Similar sounding words and minimal pairs	*love/ rub, really/ wheelie/ lily, lexicon/ leprechaun*
	Rhyming words	*love/ dove/ glove* *red/ bed/ dead/ head/ said*
Orthographical links	The ***bathtub*** effect	*in**ternet**/ in**tranet*** *la**vatory**/ **la**bora**tory***
	Spelling patterns	*c**ome**/ s**ome**/ d**ome**/ R**ome**/ h**ome**/ gn**ome***
	Homonymy (see *Homonyms*, above*)* **Polysemy** – single lexical item with multiple senses	*Really:* e.g. I *really* don't know c.f. I don't *really* know e.g. Oh, *really?!*

(Hornby, 2000; McCarthy, 1990:22-7; Richards *et al*, 1992:168)

2.1.7   Multi-word units, compounds, and derived words

Multi-word units are comprised of more than one word yet form a single

semantic unit (McCarthy, 1990:6), such as *get up*. Multi-word units include *idioms*, *fixed expressions*, *binomials* and *trinomials*

In this paper, idioms refer to expressions which are semantically opaque or semi-opaque (*ibid*:6-7). That is, the meaning cannot be (easily) derived from its component parts, for example, *no (ands or) buts* (meaning 'no excuses'), *in the red* ('in debt') and *a red herring* ('a distraction') (Speake, 1999:291). In contrast, fixed expressions are semantically transparent; the meaning is self-evident, such as *in love*. For non-native speakers, however, there are differing degrees of transparency and these may vary depending upon the existence of equivalent expressions in learners' native languages (McCarthy, 1990:8-9). For example, describing the act of achieving two aims at once is the same in English (*kill two birds with one stone*) and Japanese (*isseki ni cho*). Idioms are generally, however, most difficult to translate (Speake, 1999).

Binomials (e.g. *in and out*) and trinomials (e.g. *ready, steady, go*) have fixed membership and word order and, according to McCarthy (1990:8), should be treated as single vocabulary items, together with items formed from more than one root, which are known as *compounds* (e.g. *love-sick*). *Derived words* (e.g. *lover*) are comprised of *roots* or single morphemes (e.g. *love*) with bound morphemes (e.g. *–r*) (*ibid*:3-4).

For the purposes of this paper, multi-word units and compounds shall be classed as collocations whilst derived words can be incorporated under

phonological and orthographical links.

2.2   Word-association tests

A word-association test presents the subject with a *stimulus* or *prompt* word.
The subject is asked to respond with the first word or words they think of.
Individual responses are termed *associates* and the total of all the associates is
the *associative meaning* (Richards *et al*, 1992:24).   Although there are a
number of different types of word-association test using single or multiple
responses, and they may be administered in a variety of ways (namely written
or spoken), this paper will not examine these differences in any detail.

The use of word-association tests is well established and documented in
cognitive psychology and linguistics (Richards *et al*, 1992; Carter, 1987), and
interest in the mental lexicon has 'exploded' in the past ten years (Aitchison,
2003).   However, there is relatively little published work in on the mental
lexicon in second language acquisition, especially in the Japanese context
(Aitchison, 2003; Schmitt & McCarthy, 1997; Channell, 1988; Carter, 1987:
157; Meara, 1983, 1987).

2.3   The mental lexicon

The mental lexicon is a metaphor used to describe how words might be stored
in the mind and retrieved.   Commonly cited metaphors include descriptions of
the mental lexicon as a dictionary, a thesaurus, an encyclopaedia, a library, a
computer, a network, and a web (McCarthy, 1990:34-45).   The mental lexicon

is complex, far beyond our current level of understanding or ability to create a complete model based on measurable data: a metaphorical description is therefore limited in its representation and should be treated with caution (Wilks & Meara, 2002:323; Coulthard *et al*, 2000:104-5). Nevertheless, metaphors can be devices for describing what is otherwise beyond comprehension, and, arguably, they have the potential to push our thinking and deepen our understanding (*ibid*:116-8).

Figure 2   McCarthy's model of a small portion of the mental lexicon

Baird
(1936)

[tele-]
telegram

documentary/
comedy

sofa/ table

/3/fusion

radio

newspaper

/3/collision

lamp

sex/
violence

[tele-]
telephone

BBC/ITV
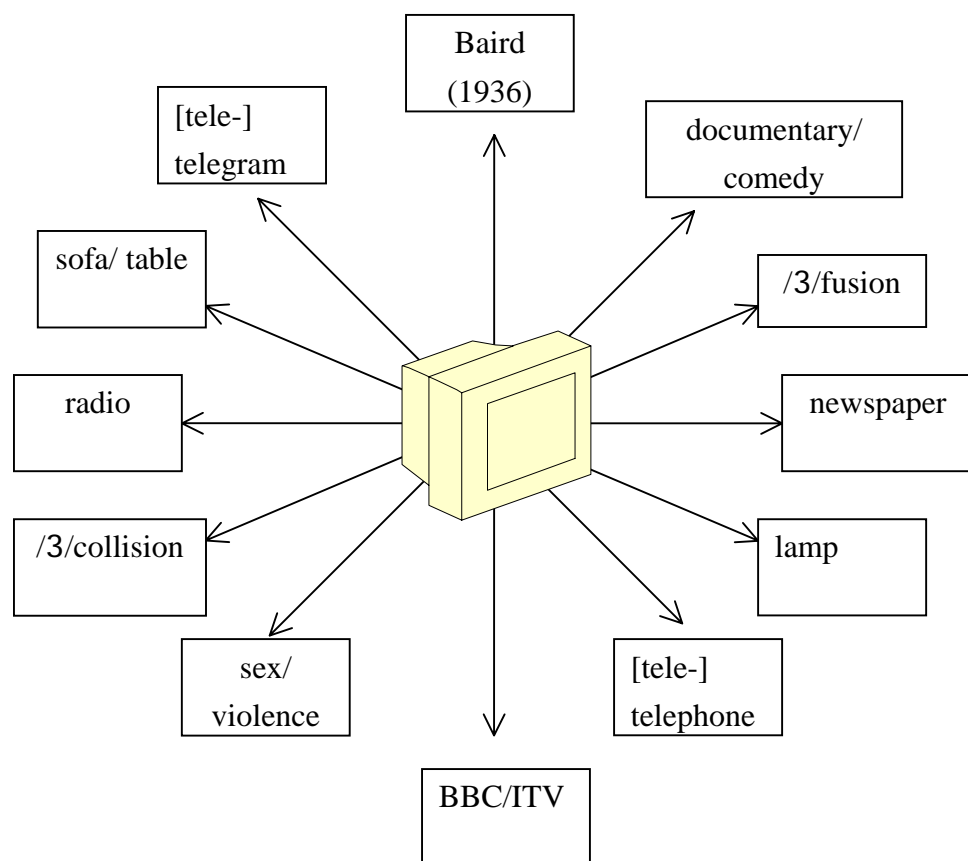
Reproduced from McCarthy (1990:42)

The mental lexicon is perceived to be multi-dimensional with underlying

semantic organising principles, indicated by word associations (McCarthy, 1990:41-2, **Figure 2** above).   It is affected by wide ranging variables which differ from one individual to the next, and change in both time and space (Carter, 1987:159-60).   Word meanings are fuzzy and fluid (Aitchison, 2003), and thus the mental lexicon is never static, but in a constant state of flux (McCarthy, 1990:42).   In other words, the mental lexicon might be considered 'organic': growing, evolving, and even decaying and dying with age (c.f. Brown, 2000:294-6; Nunan, 1999:108-13).

Research into bilinguals and second language acquisition has indicated similarities suggestive of an overlap between the L1 and L2 mental lexicon (Grabois, 2001:205-7; Coulthard *et al*, 2000:27-9; Swan, 1997; Carter, 1987:157-62).   Aitchison (2003:255) points to evidence supporting 'a single integrated network' whilst conceding that the organisation of the mental lexicon in bilingual and multilingual speakers requires further investigation.

2.4   Hypotheses to be investigated

Word-association tests with both natives and non-natives show the most frequent types of associates are predictable across different groups of speakers (Coulthard *et al*, 2000:23-7; McCarthy, 1990:39).   Based upon the literature, a number of hypotheses might be proposed and investigated:

1. Paradigmatic responses may be more common for adult native speakers and higher level students.   Conversely, syntagmatic responses may be more common for lower level non-native speakers and children (Carter,

13

1987: 158-9);

2. Semantically-related responses may be more common (McCarthy, 1990:40), with coordination and collocation more frequent than hyponymy and synonymy (Aitchison, 2003:101);

3. Phonological and orthographical links may be relatively stronger at lower levels (McCarthy, 1990:40);

4. Homophony, homonymy, and polysemy may cause confusion (Aitchison, 2003:239; Carter, 1987:28); and

5. Responses from the same word class may be most common for nouns which account for about 37% of the English language (Hudson, 1994), then verbs and adjectives (Aitchison, 2003:105), *vis-à-vis* other parts of speech.

Table 1.5 below offers some illustrative examples of possible responses.

Table 1.5   **Main categories of word association and examples of possible responses**

Stimuli	Main categories of word association					
	Coordinates	***Collocations and Multi-word units**	**Hyponymy**	**Synonymy**	**Encyclopaedic/ Word/ Experiential knowledge**	**Phonological/ Orthographical**
in	*Out*	[determiner+noun]	*preposition*	*inside, into, within*	*preposition*	*inn/* *an, en, on*
really	adverbs (e.g. *actually, truly*)	*I, it, 't, you, what, that, don, we, know*	*Adverb*	*very, truly, no way*	*adverb*	*wheelie, lilly, rarely/* *reality, ready*
the	determiners (e.g. *a/an*)	[noun]	*determiner, article, definite article*		*determiner, article, definite article*	*Czar/* *them, then, there*
love	*hate, like*	*I, you, and, with, love, her*	*verb, noun*	*like, adore,*	*verb, noun*	*rub, luv, lab/* *above, dove, glove*
Internet	*Intranet, web*	*the, on, access, service, an, site*	*noun, information technology, computing*	*the Net*	*communication, knowledge, difficult*	*intranet, interest*
red	colours (e.g. *blue, black, white*)	*cross, and, white, blue, card, yellow*	*Colour*	*Communist, debt*	*adjective*	*led, lead, read/* *rid, rod, bed, bred*
come	*go,* verbs of motion	*to, from, back, up, out, they*	*Verb*	*enter* (c.f. *come in*)	*verb*	*cum, mum, some/* *home*
and	conjunctions (e.g. *but*)	[?]	*conjunction*	*plus*	*conjunction*	*an/* *band, hand*

*Common collocations were identified using data based on t-score from *The Bank of English*, except for *in, the,* and *and* which are such weak collocators that the results have little meaning (*The Bank of English User Guide*).

3. **Research and research methods**

For simplicity and clarity, the procedure is reproduced from McCarthy (1990)

then commented upon below:

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

McCarthy (1990:152)

3.1   **Designing the word-association task**

Eight words were selected to be used as stimuli.   The selection included a

number of items used in previous studies in order to make further comparisons

and contrasts.   All four of McCarthy's guidelines above (1990:152) were

followed, and additional reasons for selection are outlined in **Table 2.1** below.

Table 2.1   Selection of stimuli for the word-association task

Stimulus	Reasons for selection	Previous research
in *prep.*	A very high frequency word. The homonym, 'inn', might also lead to interesting results.	Wright (2001)
really *adv.*	The multi-functional nature of 'really', and high frequency in conversation, creates a potentially huge range of responses.	None found
the *det., def. art.*	The most frequent word in both written and spoken English. Whilst Japanese has a system of determiners (Kaiser *et al*, 2001), the absence of articles is often a concern for Japanese learners of English.	None found
love *noun, verb*	Arguably, a strongly emotive, universal feeling. Love also falls into two word classes; noun and verb. Of further note, in Japanese, the word for *like* (すき – *suki*) can be used to mean *love*: it is polysemous.	Grabois (1999)
Internet or **internet** *Noun*	A relatively 'modern' word which has fast become a part of many people's everyday life but may not be reflected in corpora.	Farooq (1998)
red *adj.*	A distinctive primary colour with a strong visual impression from a young age.	Aitchison (2003); Farooq (1998)
come *verb*	A word displaying both homonymy and extensive polysemy.	Farooq (1998)
and *conj.*	Conjunctions had not featured in the literature reviewed and, hence, was chosen for novelty and interest.	None found

See further, *Collins COBUILD* (Sinclair, 2003)

Appendix B illustrates frequency information obtained from *The Bank of English* corpus (*The BoE*). **Table 2.2** summarises this together with the 'number of hits' from the search engine, *Google* (http://www.google.co.uk/), which seems to be gaining popularity as a layman's corpus tool (Robb, 2003). The most notable result is that Internet is a relatively low frequency word in *The BoE*, but in its own domain, it is a high frequency one.

Table 2.2   Frequency information from *The Bank of English* (Appendix B) and *Google*

Stimulus word	*The Bank of English* (BoE): *Total number of lines*	Rank frequency based on *The BoE*	*Google* search engine: *Number of 'hits'*	Rank frequency based on *Google*
in	8,143,020	3	7,730,000,000	3
really	218,638	5	553,000,000	6
the	24,780,121	1	8,520,000,000	1
love	132,715	6	468,000,000	8
Internet	37,632	8	2,250,000,000	4
red	81,925	7	511,000,000	7
come	248,593	4	708,000,000	5
and	10,608,346	2	8,270,000,000	2

3.2   Participants

Ten native Japanese speakers of English participated in this micro-research. Initially, four students of different levels, ranging from intermediate to high advanced, performed the word-association task during class at the private language school where I teach.   A further three subjects were Japanese staff members.   Two private students also agreed to participate as well as a friend's Japanese girlfriend.   Finally, three native speakers provided answers for comparison and contrast.

3.3   Administering the word-association task

Wright (2001:7) changed the word 'test' to 'quiz' when administering a word-association test.   'Quiz', whilst not threatening like 'test', might

nevertheless be associated with competition so 'task', deemed to be freer from such connotations, was used in this study.

When delivering the word-association task, each stimulus word was repeated after approximately five seconds. It had been intended to allow about fifteen seconds between each item in order to control administrative variables. In practice, however, the amount of time needed by subjects varied from individual to individual and item to item, ranging from immediate responses to a minute which became an impromptu maximum time limit.

In order to bridge the gap between theory and practice, to relate research, teaching and learning, and to make the process beneficial to my students, the task was initially conducted with four students as part of a lesson which included a number of follow-up tasks (**Appendix C**). It was hoped that students would thus be able to explore their own lexical development, better understand the relationships between words, and further empower themselves with regards to learning vocabulary. In addition, this helped with the collection of important qualitative information about what they thought about their responses.

All subjects voluntarily answered a follow-up questionnaire (**Appendix D**) to provide potentially relevant and useful additional information about their educational background, ability and use of English, and reasons for their responses in the task.

4.   Results

All the participants visibly enjoyed being part of the research and expressed interest.   Participants' overall language ability is summarised in **Table 3.1**.

Table 3.1   **Summary of participants by language ability**

Level	Male	Females	Total
Native English speakers	**3**		**3**
Native Japanese:	**3**	**7**	**10**
High advanced	1	1	3
Advanced		1	
High intermediate		1	4
Intermediate	1	1	
Low intermediate		1	
High beginner	1		3
Beginner		2	

The responses to the word-association task, together with preliminary analyses are presented in **Appendix E**, analysed further (**Section 4.1-4.3**), then discussed below (**Section 5**) with reference to the aims and objectives outlined in **Section 1.2** and the hypotheses formulated in **Section 2.4**.

4.1   Paradigmatic and syntagmatic responses

The responses to the word-association task can be tentatively analysed in terms of their paradigmatic or syntagmatic sense relations, as previously discussed in **Section 2.1** and **2.4**.   Despite using a follow-up questionnaire, it is not always clear which sense relation, if either, is operating.   For example, the sense relation between *love* and *heart* might be described as syntagmatic based on collocation (e.g. *I love her with all my heart*) but the subject's explanation of

heart visually representing *love* fits neither sense relation. *Red* and *black* and *come* and *go* may be syntagmatically related (e.g. *She's wearing red and black* and *Bright ideas come and go*) or paradigmatically related (e.g. *I like red* versus *I like black* and *We came to Tokyo* versus *We went to Tokyo*).

Nevertheless, with the exception of responses to *love* and *Internet*, a tentative classification of the results supports the hypothesis that beginner level learners are more likely to make syntagmatic connections, whilst higher levels and native speakers are more inclined to provide paradigmatic responses. The prevalence of syntagmatic responses to *Internet* would seem to be due to the nature of the word itself; there are few paradigmatic substitutes. The beginner level response *like* to the stimulus *love* might be explained by the polysemy of the Japanese word for *like* (**Table 2.1** above).

4.2 Characteristic types of word association

4.2.1 Classification of responses

The results can be analysed in terms of the different types of word associations outlined in **Section 2.1.1-2.1.7**. However, it is evident that the categories are not mutually exclusive and overlap exists: co-hyponymy, for instance, is classified both as coordination and hyponymy; individual links between words may be described by more than one association; and there might be multiple links between some words, for example, *in* and *into* display hyponymy and synonymy in addition to phonological and orthographical links. Meronymy can be seen to provide a useful classification where there is ambiguity:

Internet, for instance, might be considered part of what is on a computer, although, technically, a *computer* is part of the *Internet*!

Responses were initially classified by students wherever possible, but due the impossibility of determining exactly which mental links are operating, all potentially relevant classifications illustrated in **Appendix E** ought to be considered.

4.2.2 Frequency and statistical considerations

Table 3.2 below illustrates the frequency of different types of word association made by subjects in this research.   Total frequency information is calculated so as to avoid 'double-counting' with respect to the main category of association.   The results should be seen as vaguely representative and not statistically reliable for a number of reasons:

- Only eight word classes were investigated using only one item for each class.   Interjections, pronouns, multiword units, and non-words, amongst others, were not examined.   The sample of subjects was also small.

- The items investigated are not proportionally representative of the different word classes in terms of the English language as a whole or language in use, as suggested by measures of lexical density, for example.

- Different words, even within the same word class, due to their intrinsic word properties have different propensities to elicit particular types of response.   For example, *love* and *Internet* are both nouns.   However, *love* is also a verb.   In stark contrast with *Internet*, it displays homophony

(e.g. *luv*), homonymy and extensive polysemy. *Love* has multiple synonymy and antonymy, unlike *Internet* which is only synonymous with *Net*, and possibly *the World Wide Web*.

- Lastly, it is beyond the scope of this paper to decide how to statistically treat items which occur in multiple categories.

Table 3.2   Word-association task results by type and frequency

Main category	Subcategory	Frequency	Total frequency
Coordination	Antonymy	12	**30**
	Co-hyponymy	18	
Collocation	'Plain' collocation	42	**57**
	Idiom	1	
	Binomial	6	
	Fixed phrase	14	
Hyponymy	Co-hyponymy	18	**26**
	Superordinate	4	
	Subordinate	2	
	Meronymy	5	
Synonymy		15	**15**
Encyclopaedic/ Word Knowledge	Grammatical link	7	**37**
Experiential Knowledge		30	
Phonological/ Orthographical link	Homophone	1	**6**
	Similar sound/ spelling	5	
Adjacency Pair		2	**2**

4.2.3   Word associations in this study

Despite the above limitations, the results do highlight the importance of

collocation and experiential knowledge. Co-hyponyms, synonyms, antonyms, and hyponyms, whilst occurring relatively less frequently, are also significant. The hypothesis that collocation will be more frequent than hyponymy and synonymy is clearly supported. Whilst coordination is also more common than hyponymy and synonymy, the significance of co-hyponymy should be considered further and it would appear fruitful to compare subcategories.

For the stimuli selected, co-hyponym responses are more often given by intermediate and higher level learners, with the exception of *like* in response to *love* and results for *Internet*. Similarly, antonyms and synonyms were more prevalent amongst more proficient participants.

Phonological and orthographical links appear to be of limited significance in this study and do not demonstrate any support for the proposition that they are stronger for lower level students. A beginner student with low listening ability unexpectedly misheard the stimulus *really* as *well*. Homophony of *in/ inn* did, however, affect the response of a high advanced student and caused confusion for one native speaker who asked for clarification. This lends support to the notion that multiple links exist between words and suggests they may be stimulated simultaneously.

Finally, an additional category for adjacency pairs has been included based on subjects' response to the follow-up questionnaire. There is no discussion in the literature of this relation with regards to the mental lexicon although it is

evident that such links exist.

4.3 Grammatical word class

The responses may be analysed in terms of grammatical word class, as shown in **Table 3.3** below.   The results for *love* are subdivided according to whether *love* was interpreted as a noun or verb by the subject.

The dark-grey shaded boxes highlight the trend for words of the same grammatical class to be elicited, particularly in the case of nouns as hypothesised in **Section 2.4**.   Furthermore, this hypothesis might be extended to grammatical words with deeper investigation, as evidenced by the results for *in*, *the*, and *and*.   Closer examination of **Appendix E** also reveals that, with the exception of the results for *love*, responses from the same parts of speech are more commonly produced by intermediate and higher levels.

There is a strong tendency for nouns to be elicited significantly more often than any other word.   The degree to which the selection of stimuli affects this might also be an area for further study as hinted by Wright (2001:15) who rightly pointed out that, "… choice of prompt word can potentially influence results …" in that certain words are more likely to evoke particular (types of) response.

Table 3.3   **Word-association task results by grammatical word class**

Stimulus	Noun	Noun/ Verb*	Verb	Adjective	Adverb	Preposition	Determiner	Conjunction	Interjection	Pronoun
Internet *noun, P*	6	2		2						
love *noun*	3		1	1						
love *verb*	3		2							
come *verb*	2		5	2					1	
red *adj.*	5		1	4						
really *adv.*	2		1	4	3					
in *prep.*	5					5				
the *det.*	4			1			5			
and *conjunction*	3				2			4		1
Total	**33**	**2**	**10**	**14**	**5**	**5**	**5**	**4**	**1**	**1**

*The responses *Google* and *blog* may be classified as either nouns or verbs.

See *The Free Dictionary* and *The American Heritage® Dictionary of the English Language.*

5.   Discussion

5.1   Word-association tests and the mental lexicon

Word-association tests can be seen to provide useful but limited insight into the way words are connected and organised in the mind.   The results of this study (**Section 4**) support a number of hypotheses proposed in **Section 2.4**, indicating the following:

1. Language learners, like native children, initially tend to make syntagmatic connections between words.   Paradigmatic relations then gradually develop.   Alternatively, words with syntagmatic relations may be relatively more accessible to lower level learners.   Intermediate and higher level learners are, therefore, comparatively more likely to form stronger links with synonyms, antonyms, hyponyms, and words from the same parts of speech.   These sense relations, however, are not always clear (Meara, 1996).

2. Nouns appear to be the most readily accessible words in a word-association test and, possibly, in the mental lexicon.

3. Experiential knowledge appears to influence lower level learners' responses more, with collocation perhaps operating at a more subconscious level.   However, collocation describes the majority of word relations in this study, regardless of word class or learner abilities.

4. Phonological and orthographical similarities may cause greater difficulty with word recognition at lower levels.   Increased knowledge of homophony and polysemy may lead to simultaneous activation of multiple links between words, as suggested by Aitchison (2003:226).

5.2   Limitations of the word-association test

5.2.1   *A word or two*

Word-association tests are traditionally limited to single item prompts and responses.   By design, this would therefore fail to address the issue of multi-word items (Moon, 1997) which notably have their own set of collocates (McCarthy, 1990:15).   Ellis (1997) draws attention to the importance of lexical chunks and Bazell (1954:339) further warns that:

> … to seek a semantic unit within the boundaries of the word simply because these boundaries are clearer than others, is like looking for a lost ball on the lawn simply because the thicket provides poor ground for such a search.
>
> (Cited in Carter, 1987:29)

This test also only examines subjects' first response and therefore ignores other associations which might be made with the stimulus (Grabois, 1999).   It is thus limited in its ability to examine the depth and breadth of vocabulary knowledge (Read, 2004).

Responses may vary depending upon whether or not the prompt is spoken or written.   Written prompts would significantly reduce the likelihood of problems due to homophony (e.g. *in/ inn*).   One might speculate that different textual associations could also be made, for example, between the written and spoken uses of the word *really*, including changes in meaning due to intonation. The order of stimuli and time interval between items may also be of consequence as indicated by a follow-up discussion with a native-speaker respondent.

5.2.2   *It depends on the situation*

In **Section 2.3,** it was suggested that the mental lexicon constantly changes and responses to the same word-association test may differ over time.   Responses based on experience and recent events by the high beginner support this observation.

Carter (1987:29) further emphasises the need to, "… consider the role and function of words in larger linguistic and contextual units" whilst heeding stylistic and associative meanings.   For example, *love* may function as a noun or verb, e.g. *Patriotism is the love of one's country/ Patriotism means to love one's country*, with the same or entirely different sense (Grabois, 1999:202-3; Voβhagen, 1999:292), e.g. *The score is 40-love/ I'd love to come/ There's no love lost between them* (Hornby, 2000:764).

Where stimuli may provoke potentially embarrassing responses, subjects may alter their answers.   For example, one lady apologised for the word *blood* being 'too straight' and wanted to change her answer to *heart* which she felt was 'much nicer'.   Two out of three young, native male respondents joked about the stimulus *come* initially evoking a sexual response associated with the homonym *cum*, but they did not think such responses would be appropriate.

5.2.3   *How are word associations classified?*

In hindsight, it is clear that the qualitative data gathered through the follow-up questionnaire, is invaluable for interpreting responses to word-association tests. Even so, it is evident that there are difficulties with definitions and labels (e.g. meronymy/hyponymy, homonymy/polysemy), overlap (e.g. co-hyponymy), and analysis – we cannot 'see' what links exist or which ones are activated. These create significant problems for generating reliable and valid statistical results, and comparing different studies.

5.2.4 Learners' lexical development

Word-association tests may provide a glimpse at learners' lexical development in terms of knowledge, but they do not indicate ability to use language:

> "… ultimately the question is not what learners know about a word but what they can do with it: being able to pronounce it, recognize it in connected speech and writing, and use it fluently in their own production. Thus measure of declarative knowledge need to be complemented by test of vocabulary in use in order to obtain a full picture of the learners' lexical competence."
>
> Read (2004:24)

5.3 Suggestions for improvement and further study

Given the vastness and complexity of the mental lexicon, it seems logical that a number of different research tools are needed to investigate it. Different types of word-association test might be employed with the same stimuli to research a number of areas, some also suggested by Aitchison (2003:254-5), including:

- multiword units;
- lexical chains/networks and associative meaning;

- changes and developments in the mental lexicon over time;

- 'upward' and 'downward' collocation (Sinclair, 1991:115-6);

- differences between written and spoken forms;

- differences between children and adults, age, sex, nationality, occupation, educational background, monolingual and bi- or multilingual speakers;

- differences between languages; and

- the recognition of links between words. For instance, subjects might be asked to identify associates or categorise types of word-association (Read, 1997, 2004).

A longitudinal, follow-up study might provide a basis for investigating changes and developments in the mental lexicon and the effects of the immediate environment and circumstances. Laboratory research would arguably provide a more thorough line of approach in seeking to control a greater number of variables, whereas an online word-association test might provide the necessary anonymity for respondents to answer more honestly and not be bound by social constraints such as embarrassment.

5.4 Pedagogical implications

This study supports a number of pedagogical implications for vocabulary teaching and learning. In general, raising students' awareness of the types of word associations they can and do make is motivating and may have practical learning outcomes, including the development of cultural understanding (Carter, 1998), discourse (McCarthy & Carter, 2001), vocabulary learning strategies

and circumlocution skills (Schmitt, 1997).

The importance of personalisation of language, particularly for beginner levels, is also highlighted (Loucky, 2004), together with the need to consider the relative learning load of different word classes: nouns appear to be easier to learn and recall.

Finding ways to help learners recognise, categorise, and strengthen mental links between words is the role of teachers, materials writers and researchers: **Table 4** below summarises a number of related areas:

Table 4   **The importance of lexis and learners' lexical development**

Authority	Area of study or research
MacIver (1978)	*Word-association exercises* may be used to develop lexical knowledge. For example, learners are required to identify a wide range of associations from gender to collections, similes, antonyms, synonyms, homonyms, derivations, proverbs, colloquial expressions, popular phrases, analogies, collocations, and so on.
McCarthy (1990:20)	*Semantic mapping:* psycholinguistic evidence suggests vocabulary learning and retention can be assisted by presenting learners with semantically-related items.
Willis (1990)	The lexical syllabus.
Sinclair (1991)	*Collocation and lexical chunking*: syntagmatic relations may be more readily made at lower levels and beginners can often benefit from learning stock phrases or 'chunks' of language.
Hall (1992)	Vocabulary learning and the mental lexicon, and the inevitability of links between the L1 and L2 mental lexicon.
McCarthy (1990) Laufer (1997)	*Learnability* of vocabulary items.
McCarthy & Carter (1997)	*Word frequency, availability and usefulness.*
Sokmen (1997)	A broad overview of second language vocabulary teaching trends, reviewing three broad areas: *inferring from context*, *explicit teaching*, and *learning strategies* and *learner autonomy*
Schmitt (1997)	*Vocabulary learning strategies.*
Ellis (1999:35-61)	L2 acquisition from oral input.
Waring (2001)	*Dictionary skills* for Japanese students in the classroom.
Nakamura (2003)	Teaching collocations to Japanese children.
McCarthy (2004)	Corpus-informed teaching materials.
Loucky (2004)	Maximising L2 vocabulary development through a *semantic field keyword approach* and pedagogical implications for Japanese college students.
Boers & Lindstromberg (2005, 2006)	Learning and remembering large numbers of multi-word expressions: the importance of *phrase-learning*, mnemonic devices, and mental images.

6.   Conclusion

Through examining and relating research, pedagogy, and learning, I hoped to bridge the gap between theory and practice.   In trying to further understand the mental lexicon, and more specifically, learners' second language mental lexicon, we might find more successful ways to promote vocabulary acquisition and language learning.   In addition to considering how words are recognised, stored, and retrieved from the mind theoretically and investigating the subject practically, sharing this knowledge with students can be empowering, as one learner commented:

> I am old so it is difficult to remember new words.   Yesterday, I learnt many different ways to remember.

Brown, "Teaching Journal: January 2006-". Entry on 27th January, 2006

Finally I would like to suggest that comparing the mental lexicon to the Internet and World Wide Web might offer a more dynamically descriptive metaphor: they contain vast amounts of information stored and represented in a multitude of ways; words can be located in a fraction of a second; hyperlinks between words offer minimal constraints on time and space; the networks are ever-evolving; and, yet, connections may be lost, access may be problematical at times and errors may occur.   A word-association test might thus be likened to a primitive form of search engine.

7.   Appendices

7.1   Appendix A: Task 123 in McCarthy, M (1990: 152)

Aim
To explore the relationship between word-association and learners' lexical development.
Resources
A list of test items.
Procedure

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

Evaluation

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

Reproduced from McCarthy, M. (1990) *Vocabulary*.   Oxford: OUP, p152

7.2   Appendix B: The Bank of English 450 Million Word Corpus

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Accessed on 9th January, 2006

Key to sub-corpora listed below:

usacad	6341888	US	academic books
usephem	3506272	US	ephemera
newsci	7894959	UK	New Scientist
npr	22232422	US	public radio
sunnow	44756902	UK	Sun/NoW
brbooks	43367592	UK	books
brmags	44150323	UK	magazines
guard	32274484	UK	Guardian
econ	15716140	UK	Economist
bbc	18604882	UK	BBC radio
usspok	2023482	US	spoken
wbe	9648371	UK	Business
strathy	15920137	CA	Canadian mixed corpus
oznews	34940271	OZ	papers
brephem	4640529	UK	ephemera
usbooks	32437160	US	books
usnews	10002620	US	papers
indy	28075280	UK	Independent
times	51884209	UK	Times
brspok	20078901	UK	spoken

The data comes from the Bank of English corpus jointly owned by HarperCollins Publishers and the University of Birmingham. In 2005 the corpus stands at 450 million words.

7.2.1   Appendix B-I   Search: *in*

Corpus	Total Number of Occurrences	Average Number per Million Words
bbc	447313	24042.8/million
usacad	144876	22844.3/million
econ	325660	20721.4/million
strathy	321325	20183.6/million
npr	448447	20170.9/million
wbe	191741	19872.9/million
newsci	156514	19824.5/million
guard	614371	19035.8/million
indy	530088	18881.0/million
usbooks	600430	18510.6/million
brbooks	796120	18357.5/million
oznews	640416	18328.9/million
times	946692	18246.2/million
usnews	172219	17217.4/million
brmags	709685	16074.3/million
sunnow	714619	15966.7/million
brephem	72641	15653.6/million
usspok	31517	15575.6/million
usephem	49184	14027.4/million
brspok	229162	11413.1/million
Total number of matching lines:		**8,143,020**

7.2.2   Appendix B-II   Search: *really*

Corpus	Total Number of Occurrences	Average Number per Million Words
brspok	45571	2269.6/million
usspok	2830	1398.6/million
npr	18674	839.9/million
sunnow	25403	567.6/million
brmags	24425	553.2/million
usbooks	13687	422.0/million
brbooks	17750	409.3/million
indy	10534	375.2/million
oznews	13007	372.3/million
guard	10581	327.8/million
strathy	5093	319.9/million
times	16113	310.6/million
brephem	1335	287.7/million
bbc	4228	227.3/million
newsci	1793	227.1/million
usephem	780	222.5/million
usnews	2085	208.4/million
econ	2848	181.2/million
usacad	899	141.8/million
wbe	1002	103.9/million

Total number of matching lines: 218, 638

7.2.3 Appendix B-III   Search: *the*

Corpus	Total Number of Occurrences	Average Number per Million Words
bbc	1361435	73176.2/million
newsci	524413	66423.8/million
usacad	415259	65478.8/million
wbe	609819	63204.3/million
strathy	972642	61095.1/million
econ	948817	60372.1/million
guard	1923073	59584.9/million
indy	1644816	58585.9/million
brbooks	2523503	58188.7/million
usbooks	1854431	57170.0/million
npr	1261042	56720.9/million
times	2924038	56357.0/million
oznews	1955405	55964.2/million
usspok	107437	53095.1/million
brmags	2255447	51085.6/million
usnews	504831	50469.9/million
brephem	220032	47415.3/million
sunnow	2011718	44947.7/million
usephem	142512	40644.9/million
brspok	619451	30850.8/million
Total number of matching lines:	**24,780,121**	

7.2.4   Appendix B-IV   Search: *love*

Corpus	Total Number of Occurrences	Average Number per Million Words
brmags	12848	291.0/million
usephem	886	252.7/million
sunnow	11081	247.6/million
brbooks	9060	208.9/million
brephem	926	199.5/million
newsci	1562	197.8/million
strathy	3011	189.1/million
usbooks	5891	181.6/million
oznews	6249	178.8/million
indy	4924	175.4/million
npr	3714	167.1/million
times	8652	166.8/million
guard	5293	164.0/million
bbc	2939	158.0/million
usnews	1098	109.8/million
usacad	690	108.8/million
econ	1574	100.2/million
brspok	1278	63.6/million
wbe	216	22.4/million
usspok	33	16.3/million

Total number of matching lines: 132,715

7.2.5   Appendix B-V   Search: *Internet*

Corpus	Total Number of Occurrences	Average Number per Million Words
wbe	2332	241.7/million
times	10899	210.1/million
guard	5191	160.8/million
newsci	1202	152.2/million
oznews	5164	147.8/million
econ	1957	124.5/million
indy	3343	119.1/million
usnews	1026	102.6/million
usephem	335	95.5/million
sunnow	3913	87.4/million
brmags	1956	44.3/million
usspok	81	40.0/million
brephem	36	7.8/million
strathy	122	7.7/million
brspok	23	1.1/million
usbooks	32	1.0/million
npr	18	0.8/million
bbc	2	0.1/million
brbooks	0	0.0/million
usacad	0	0.0/million

Total number of matching lines: 37,632

7.2.6   Appendix B-VI   Search: *red*

Corpus	Total Number of Occurrences	Average Number per Million Words
brmags	12848	291.0/million
usephem	886	252.7/million
sunnow	11081	247.6/million
brbooks	9060	208.9/million
brephem	926	199.5/million
newsci	1562	197.8/million
strathy	3011	189.1/million
usbooks	5891	181.6/million
oznews	6249	178.8/million
indy	4924	175.4/million
npr	3714	167.1/million
times	8652	166.8/million
guard	5293	164.0/million
bbc	2939	158.0/million
usnews	1098	109.8/million
usacad	690	108.8/million
econ	1574	100.2/million
brspok	1278	63.6/million
wbe	216	22.4/million
usspok	33	16.3/million

Total number of matching lines: 81,925

7.2.7 Appendix B-VII Search: *come*

Corpus	Total Number of Occurrences	Average Number per Million Words
brspok	23347	1162.8/million
usspok	1811	895.0/million
brbooks	32320	745.3/million
npr	15508	697.5/million
usbooks	21130	651.4/million
sunnow	26067	582.4/million
brmags	22789	516.2/million
indy	14297	509.2/million
econ	7722	491.3/million
guard	15828	490.4/million
strathy	7655	480.8/million
times	24085	464.2/million
bbc	8504	457.1/million
oznews	15095	432.0/million
brephem	1920	413.7/million
newsci	3161	400.4/million
usephem	1356	386.7/million
usnews	3017	301.6/million
usacad	1823	287.5/million
wbe	1158	120.0/million
Total number of matching lines:	**248,593**	

7.2.8   Appendix B-VIII   Search: *and*

Corpus	Total Number of Occurrences	Average Number per Million Words
usacad	179194	28255.6/million
brephem	128960	27789.9/million
brbooks	1174535	27083.2/million
usbooks	867638	26748.3/million
brmags	1176892	26656.5/million
wbe	256870	26623.1/million
usephem	92011	26241.8/million
strathy	417297	26211.9/million
usspok	50679	25045.4/million
brspok	484786	24144.1/million
oznews	809674	23173.1/million
npr	509867	22933.5/million
guard	716935	22213.7/million
indy	615922	21938.2/million
times	1128776	21755.7/million
newsci	167638	21233.5/million
sunnow	937231	20940.5/million
usnews	205367	20531.3/million
bbc	378165	20326.1/million
econ	309909	19719.2/million
Total number of matching lines:		**10,608,346**

7.3**Appendix C:****Word-Association Task: Classroom Research**

(Brown, "Teaching Journal: January 2006-")

Thursday 26th January, 2006

Voice Class [Total: 40 minutes]
Four students: High advanced, Advanced, High Intermediate, Intermediate

Word-Association Task [5 minutes]
I said stimulus word twice after approximately 5 seconds.   The students were instructed to write down the first word they thought of.   A 15 to 60-second interval was allowed between stimulus words, given in the following order: *in, really, the, love, Internet, red, come,* and *and*.

All students opted to write down the stimulus words.   One student wrote a number of responses (associates).

Follow-up Discussion [15 minutes]
In pairs of similar abilities, students shared and discussed why responded the way they did.   Feedback in open class followed.   Answers were compiled on pieces of paper as below:
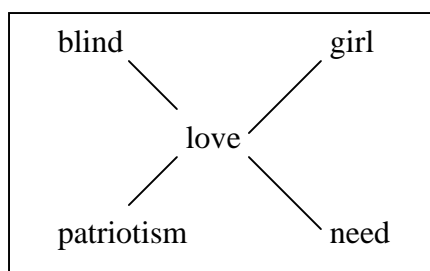
Classification and Categorising Tasks [10 minutes]
As a class, students were asked to identify similar types of word association. They found six categories: opposites (antonyms), similar words (synonyms), words which go together in a phrase (collocation), words which are in a set (hyponyms), grammatically-related words, and words which were associated from experience or imagery (experiential link).   I supplied links based on sound (phonology) or spelling (orthography).

In pairs, students then chose a piece of paper and worked together to categorise

each of the four word-associations.

Feedback and Q&A [10 minutes]

I briefly explained that the purpose of my research was to investigate how learners store words in the mind, and hopefully make a connection between research, teaching and learning.

We then looked at what questions they could ask themselves when learning a new word. Students identified seven related questions:

1) What are the opposites?
2) What words have a similar meaning?
3) What words does it go together with?
4) What group of words does it belong to?
5) What grammatical features does it have?
6) What does it look and sound like (i.e. spelling, pronunciation, and stress)?
7) What experiences can you relate it to?

Lastly, it was pointed out that there are three basic things to consider when learning a word: form, meaning, and use (in appropriate situations and context).

The high advanced students then asked about the word *muggy* and so we applied our seven questions, establishing the following:

- *humid* and *damp* were similar words
- *muggy* and *humid* were generally used to describe hot weather, e.g. *It's hot and humid*
- *damp* is often used to describe *cold weather*, e.g. *It's cold and damp*
- *damp* can also be used to describe other things, e.g. *a warm, damp cloth*

7.4 Appendix D Follow-up Questionnaire to Word-association Task

Age: _____ **Sex:** M/F

Nationality: _____ **Native language:** _____

English is a 2nd/3rd/4th **language Highest level of education:** _____

TOEIC score: _____ **TOEFL score:** _____

Other language qualification(s): _____

1. **How long have you studied English?** (Formally or informally)

2. **Have you ever lived abroad?** **Where, when, for how long, and why?**

3. **Do you use English currently?** **How often and what for?**

4. **What do you think your level of English is?**

a) **Listening** Beginner----------Intermediate----------Advanced

b) **Speaking** Beginner----------Intermediate----------Advanced

c) **Reading** Beginner---------Intermediate----------Advanced

d) **Writing** Beginner---------Intermediate----------Advanced

5. **Why/How did you choose your answers to the word association task?**

i) v)

ii) vi)

iii) vii)

iv) viii)

7.5   Appendix E   Word-association Task: Results

KEY	DESCRIPTION
Adv	Advanced level student
Int	Intermediate level student
Beg	Beginner level student
M	Male
F	Female
<u>Underlined word</u>	Subjects' actual response in the word-association task
Italicised word	Grammatical class (per *Oxford Advanced Learner's Dictionary* (Hornby, 2000)
Bolded words	Classification and analysis by students or based on their response to the Follow-up Questionnaire
(Bracketed words)	Alternative/Additional classification
CLL	Collocation
Bin	Binomial
Idm	Idiom
FP	Fixed phrase
ANT	Antonym
HYP	Hyponym
Co-Hyp	Co-hyponym
Super	Superordinate
Sub	Subordinate
Mer	Meronymy
SYN	Synonym
EWK	Encyclopaedic/ Word knowledge
Grm	Grammatical knowledge
EXP	Experiential knowledge
PHO	Phonological link
Hom	Homophone
ORT	Orthographical link
*AP	Adjacency pair
Light grey shading	Syntagmatic sense relation
No shading	Either syntagmatic or paradigmatic sense relation, or unclear
Dark grey shading	Paradigmatic sense relation

*   This category was added based upon two students' responses and explanation.

**   See http://thefreedictionary.com/

Stimulus	Canadian Male	Canadian Male	American Male
in *prep.*	in(n)? *N/A* **EXP/HOM: confusion**	out *prep.* **ANT**	out *prep.* **ANT**
really *adv.*	party *noun* **EXP: "Desire?"**	Really? *adv.* **EXP: "Surprise"**	really *adv.* **EXP: "Can't think"**
the *det., def. art.*	party *noun* **EXP: Still thinking about previous answer**	an *det. indef. Art.* **HYP: Co-hyp/ EWK: Grm**	is *verb* **CLL**
love *noun,* *verb*	happens *verb* CLL: FP	hate *noun, verb* **ANT** (CLL: Bin)	hate *noun, verb* **ANT** (CLL: Bin)
Internet *noun, Proper*	Internet *noun, Proper* **EXP: "Stuck"**	surf *verb* **CLL: FP**	web *noun* **SYN/ HYP**
red *adj.*	blue *adj.* **EXP: "First colour which came to mind"** (HYP: Co-hyp)	blue *adj.* **HYP: Co-hyp**	blue *adj.* **ANT: Opposite teams, boys/ girls HYP: Co-hyp**
come *verb*	here *adv.* **CLL: FP**	go *verb* **ANT/ CLL: FP**	go *verb* **ANT/ CLL: FP**
and *conj.*	what *det. pronoun* **CLL: FP**	but *conj.* **HYP: Co-hyp/ ANT**	also *adv.* **HYP/ SYN/ CLL: FP**

Stimulus	High Adv M	High Adv F	Adv F	High Int F	Int F	Int M	Low Int F	High Beg M	Beg F	Beg F
in *prep.*	hotel *noun* **SYN: inn =** **PHO: Hom** (CLL)	out *prep.* **ANT** (CLL: Bin/ FP/ HYP: Co-hyp)	on *prep.* **HYP:** **Co-hyp** (PHO/ ORT)	into *prep.* (HYP: Co-hyp/ SYN/ PHO/ ORT)	on *prep.* **PHO/ ORT** (HYP: Co-hyp)	house *noun* (CLL)	door *noun* **CLL**	(my) car *noun* **CLL/ EXP:** **"I'm always** **in my car"**	room *noun* **CLL**	between *prep.* **SYN** (CLL: FP/ HYP: Co-hyp)
really *adv.*	sure *adv.* ***AP: "Yes."** (CLL/ SYN/ HYP: Co-hyp)	true *adj.* **SYN** (CLL/ HYP: Co-hyp)	actually *adv.* **SYN/ HYP:** **Co-Hyp** (ORT)	truth *noun* **SYN: true**	true *adj.* **SYN** (CLL/ HYP: Co-Hyp)	love *verb* (CLL)	amazing *adj.* **EXP: "Feel** **surprise"** (CLL)	broken *adj.* **CLL/ EXP:** **Recent** **events**	health *noun* **CLL** **(PHO** **Error)**	Yes *adv.* ***AP:** **"Answer"** (CLL/ SYN)
the *det., def.* *art.*	article *noun* **HYP: Super/** **EWK: Grm**	a *det., indef. art.* **HYP:** **Co-hyp/** **EWK: Grm:** **"*a* or *the*"**	specific *adj.* **EWK: Grm**	a *det., indef. art.* **HYP:** **Co-hyp/** **EWK: Grm:** **"*a* or *the*"**	a *det., indef.* *art.* **HYP:** **Co-hyp/** **EWK: Grm**	place *noun* (CLL)	the *det., def. art.* **N/A** (Only able to respond *the*)	Earth *noun* **CLL/ EXP:** **"I always** **write in my** **address"**	hotel *noun* **CLL/** **EXP:** **"Recently** **studied"**	one *number, det.* **EWK:** **Grm: "One** **thing"**
love *noun,* *verb*	patriotism *noun* **SYN: "love of** **one's** **country"**	dog *noun* **EXP/ CLL:** **"Popular** **answer in** **Japan"**	blind *adj.* **CLL: Idm:** **"Love is** **blind"**	need *verb* **EXP** (CLL)	heart *noun* **EXP:** **"Image"** (CLL)	girl *noun* **EXP** (CLL)	peace *noun* **CLL: FP** (Bin)	Yuko *noun,* *Proper* **CLL/ EXP:** **"I love** **Yuko"**	like *verb* **SYN** (HYP: Co-hyp)	like *verb* **SYN** (HYP: Co-hyp)

Internet *noun, Proper*	Google** *noun, verb* **CLL/ EXP** (HYP: Sub/ Mer)	website *noun* **EXP: "I use everyday"** (CLL/ HYP: Sub/ Mer)	blog** *noun, verb* **EXP: "I like blog"** (CLL/ HYP: Sub/ Mer)	computer *noun* **EXP/ CLL** (HYP: Mer)	web *noun* **SYN** (CLL)	P.C. *noun, abbr.* **EXP/ CLL** (HYP: Mer)	difficult *adj.* **EXP: "Feeling"** (CLL)	computer *noun* **EXP/ CLL** (HYP: Mer)	difficult *adj.* **EXP: "dislike/ hate"** (CLL)	I.T. *noun* **EXP: "Image"** (CLL/ HYP: Super)
red *adj.*	ultraviolet *adj.* **ANT: [infrared] "opposites in the spectrum in Japanese"** (CLL)	white *adj.* ****HYP/ ANT: Co-hyp "[They are] a 'set'"** (CLL)	black *adj.* **HYP: Co-hyp** (ANT/ CLL)	blood *noun* **EXP: "Strong image and impression."** (CLL)	black *adj.* **ANT: "[In a deck of] cards"** (CLL/ HYP: Co-hyp)	color *noun* **HYP: Super** (CLL)	like *verb* **EXP: "I like red"** (CLL)	sun *noun* ****EXP: "Image"** (CLL)	dress *noun* **EXP: "Image"** (CLL)	fire *noun* **EXP: "Image"** (CLL)
come *verb*	leave *verb* **ANT: "It's same as the opposite, go"**	go *verb* **ANT/ CLL: Bin: "Come and go"** (FP)	go *verb* **ANT/ FP/ CLL: Bin: "Opposite"**	close *adj.* **EXP/ CLL: "Come close to me"**	go *verb* **ANT** (CLL: Bin/ FP)	true *adj.* **EXP/ CLL: FP "J-Pop"**	go *verb* **ANT** (CLL: Bin/ FP)	friend *noun* **EXP: "I always say my friend"**	dog *noun* **EXP: "Calling a dog"**	hello *interjection* **EXP/ CLL: "Hello. Come here"**
and *conj.*	conjunction *noun* **HYP: Super EWK: Grm**	also *adv.* **SYN/ CLL: FP**	both *conj* **SYN/ CLL: FP**	but *conj.* **HYP: Co-hyp** (ANT)	but *conj.* **ANT** (HYP: Co-hyp)	you *pron.* **CLL/ FP: "And you?"**	then *conj.* **CLL: FP SYN** (HYP: Co-Hyp)	Japanese friend *noun* **EXP: (re: a joint invite)**	you *noun* **CLL: FP: "And you?"**	too *adv.* **CLL/ FP: "And me too"**

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