The Relationship between Word-association and Learners' Lexical Development

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

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 mixture 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? *(the characteristic types of response discussed in 3.2 include the observations that (for L1 speakers) 'words are organized into semantically related families in the mind', 'co-ordination is the commonest feature of native-speaker word-association responses', collocational links are common, as are*

superordination and synonymy responses. L2 speakers may be more likely than L1 speakers to respond based on sound. (see McCarthy:39-40))

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1 Introduction

There are various areas upon which linguists attempting to construct a model of 'the store of words and the interrelations between them in a speaker's mental lexicon' (Carter, 1998, p.197) can focus their attention. These include 'word searches and slips of the tongue of normal people, the word-finding problems of aphasics, psycholinguistic experiments, the work of linguists, brain-scans, and electronic databases.' (Aitchison, 2003, p.28).

The following study will employ a type of psycholinguistic experiment - the word association test - in an attempt to better understand the mental lexicons of a group of English language learners. Following an introduction to lexical relations and word association tests, the results of a small-scale test conducted for this study will be discussed in terms of existing research.

2   Background

2.1   Lexical relations

To compile clues as to what a lexicon 'looks like' by analysing the results of a word association test, one needs to identify patterns that exist in the data, i.e. connections between words[1]. This study will focus on five types of word-relations: those based on contextual structure, (syntagmatic/paradigmatic relations), those based on meaning (sense relations), those based on extra-linguistic experience (encyclopaedic relations), those based on frequency (collocation) and those based on sound (clang associations).

2.1.1   Syntagmatic/paradigmatic relations

A *syntagmatic* response is one that is related sequentially to the stimulus word i.e. it can come either before or after it in context. The relation of *tail* and *lazy* to *dog* is syntagmatic:

> *ex. 1*   The *lazy dog* wagged its *tail*.

The syntagmatic label is a loose one. Consider the following example:

> *ex. 2*   I woke up *early*, went for a jog and finally sat down at the *computer* in the afternoon.

The relation of *early* to *computer* is syntagmatic, but it is such a vague description that we would do better to look elsewhere (see 2.1.3) to draw any useful conclusions about the relationship between the words.

Paradigmatic relations are more specific in nature. A paradigmatic response is one that is drawn from the paradigm of alternative choices for a word at a point in time. For the stimulus word *cat*, possible paradigmatic responses could be *feline*, *pet*, or *animal*, as shown in ex.3:

> *ex. 3*   Get your *cat*/*feline*/*pet*/*animal* out of my room!

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[1] *Words* here means orthographic words, as these are the focus of a word-association test. For more discussion of this point, see 6.1.

Paradigmatic relations can only exist between words of the same grammatical class.

The syntagmatic/paradigmatic distinction is not necessarily clear-cut. If we encounter the response *dog* to the stimulus *pet*, we would tend to classify the relation as paradigmatic. It could, however, be syntagmatic:

> ex. 4   *A dog makes a wonderful pet.*

Hence care must be taken when categorising responses.

2.1.2   Sense relations

Sense relations - the 'system of linguistic relationships which a lexical item contracts with other lexical items' (Carter, 1998, p.17) - range from the general (semantic/lexical fields) to the specific (synonymy, antonymy, hyponymy).

2.1.2.1   Semantic/lexical fields

Semantic field is an elastic term. Taken loosely, it means 'the organization of related words and expressions[2] into a system which shows their relationship to one another' (Richards and Schmidt, 2002, pp.305-306). More specific use refers to a group of related concepts that can be linked together under a single *superordinate* concept (see 2.1.3.2). The semantic field of *vehicle* incorporates the concepts of *car*, *bicycle*, *transport*, *travel*, *traffic-congestion* etc. Words, as opposed to concepts, make up the *lexical fields* which 'realise' semantic fields. This is often done imperfectly: for example there is no lexical item to represent the semantic item of *cow or bull* in the same way that there is a lexical item *horse* to represent the semantic item *stallion or mare* (Richards and Schmidt, p.306).

2.1.2.2   More specific sense relations

Synonymy: Describes the relationship between words which have more or less the same meaning in a given context, e.g. *hit*/*strike*

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[2]Instead of *words and expressions*, *concepts* would be a preferable term here. The writers do not distinguish between lexical and semantic fields.

Antonymy: Describes the relationship between words which have more or less the opposite meaning in a given context, e.g. *black*/*white*, *slow*/*fast*.[3]

Hyponymy: A hierarchical relationship involving a *hyponym* and a *superordinate*. *Vehicle* is the superordinate of *car* and *bus* i.e. it incorporates the meaning of both. *Car* and *bus* are *co-hyponyms* (or *co-ordinates*), because they share the same superordinate.

As with the syntagmatic/paradigmatic distinction (2.1.1), we must take care when classifying responses according to sense relations. In ex. 4, *dog* is the hyponym of *pet* (while *pet* is the superordinate of *dog*), but in ex. 3, *cat*, *feline*, *pet* and *animal* are co-hyponyms.
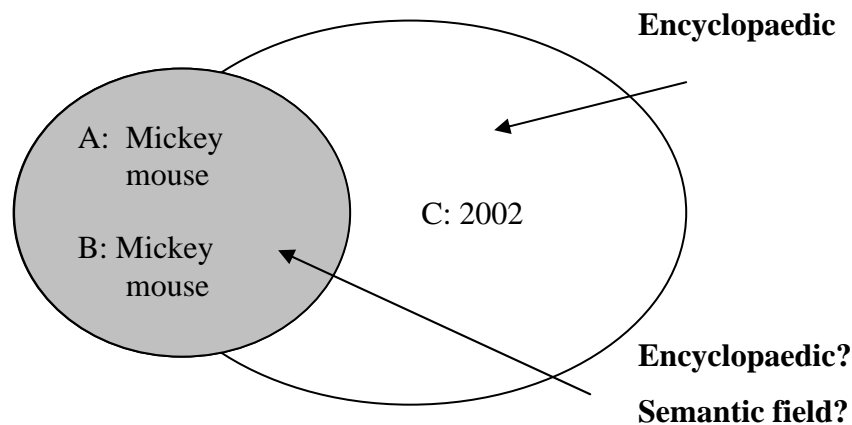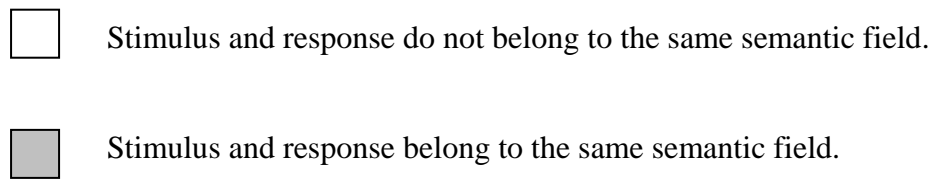
2.1.3 Encyclopaedic relations

McCarthy (1990, p.41) summarises the concept of *encyclopaedic* knowledge - links between words that arise from the experience of the individual:

> Native-speakers can say a lot more about a word than just what co-ordinates, collocates, and superordinates, or what synonyms it has. [Words are] related by an intricate series of links to an encyclopaedia of world knowledge gathered over many years…..This kind of knowledge produces a web-like set of associations.

If a test subject responds with *fire* to the stimulus *disaster* because she remembers her house catching fire as a child, her response could be classified as encyclopaedic. However, as *fire* could be considered to exist within the same semantic field as *disaster*, we can see that the distinction between semantic and encyclopaedic responses can be problematic unless the response is clearly not part of the stimulus word's semantic field. Diagram 1 shows three theoretical test responses to the stimulus *Disneyland*:

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[3] Antonyms can be subdivided further, but because antonym responses do not play a sizeable role in this study only a brief introduction is given. For a more detailed discussion, see Carter, 1998, pp.20-21.

Diagram 1

☐   Stimulus and response do not belong to the same semantic field.

▨   Stimulus and response belong to the same semantic field.

Encyclopaedic

A: Mickey mouse

B: Mickey mouse

C: 2002

Encyclopaedic?
Semantic field?

Response *A* is selected from the semantic field of *Disneyland*. Response *B* is given because the respondent recalls having his picture taken with *Mickey Mouse* when he went to *Disneyland*. Response *C* is given because the respondent recalls going to *Disneyland* in *2002*. We can see that, to the analyst who is unaware of the respondent's reasoning, the only unambiguously encyclopaedic response is response *C*. Responses *A* and *B* prove difficult to categorise unless we know the reason for the respondent's 'choice'. For ways in which the semantic/encyclopaedic distinction can be clarified, see 6.2.

2.1.4   Collocation

McCarthy (1990, p.12) metaphorically describes the relation of collocation as '….a marriage contract between words, and some words are more firmly married to each other than others'. Collocation is a relationship that is strong between words that frequently appear together, for example *blonde* and *hair*. As it is possible for any two words to appear in close proximity to each other on more than one occasion, it is preferable to view collocation in terms of a cline, rather than speaking of whether words collocate or not:

Diagram 2

strong collocation (*blonde*/*hair*)

↑
│
│
↓

weak collocation (*blonde*/*extrapolate*)
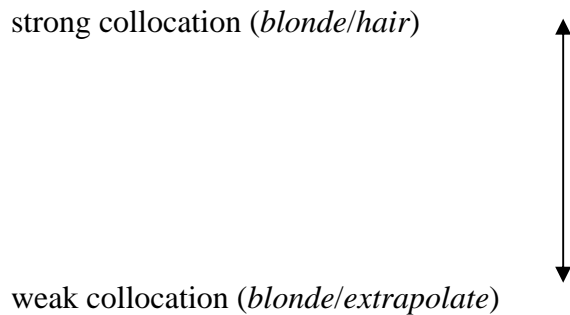
It is interesting to note that the collocational relationship between two words does not necessarily act at the same strength in both directions. Thus *blonde* would be thought to collocate strongly with *hair* perhaps more than with any other word, whereas *hair* collocates with a wide range of words, e.g. *brown*, *short*, *blonde*, *cut* etc.

Diagram 3

blonde ——————→ hair   hair ⟨ → brown
                                    → cut
                                    → *blonde*
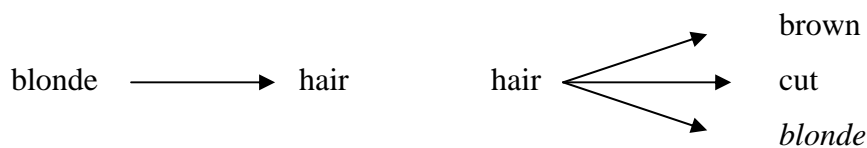
2.1.5 Clang associations

Clang associations are phonological relations between words. *Butter*/*batter, hit*/*sit*, are examples of clang associations. If a response does not show any evident lexical relationship with a stimulus word, but shares phonological similarities, we can consider it a clang response.

2.1.6 Summary

It is important to remember that the categories listed in 2.1 are not mutually exclusive. The relationship of *black* to *cat*, for example, could be thought of as simultaneously and to varying degrees syntagmatic, encyclopaedic, and collocational, and semantic field-based.

Or, as McCarthy (1990, p.41) puts it:

> …the total model for the place of any word in the lexicon will have to be three-dimensional, with phonological nets crossing orthographic ones and criss-crossing semantic and encyclopaedic nets.

2.2   Word association tests

The first known word association test was conducted in the early nineteenth century by the British psychologist Francis Galton. Galton glanced at seventy-five randomly selected words in turn, writing down the first two words that entered his head as a consequence. Regarding the results, he wrote:

> The records lay bare the foundations of a man's thoughts with curious distinctness and exhibit his mental anatomy with more vividness and truth than he himself would probably care to publish to the world. (Aitchison, 2003, p.24).

Originally the domain of psychologists, word-association tests have more recently been used by linguists to collect 'useful information about how words might be linked together in a person's mind' (*ibid*., p.24). Three important findings emerged from linguists' early investigations into the average person's lexicon. First, people almost always select items from the semantic field of the original word. Second, people almost always pick the partner if the word is one of a pair. Third, adults are more likely to respond with a word from the same word class e.g. noun-noun, adjective-adjective etc. (*ibid*., p.85) According to Aitchison (2003, p.86), co-ordination is the most common relation between L1 speaker test responses, while collocation, superordination and synonymy also occur frequently.

Until the 1980s, most word association work tended to focus on the mental lexicons of fluent speakers. One of the chief projects to investigate the mental lexicon of L2 speakers was the Birkbeck Vocabulary project, which ran in the early 1980s at the University of London. It asked the question: 'What does a learner's mental lexicon look like and how is it different from the mental lexicon of a monolingual native speaker?' (Carter, 1998, p.197). The main findings of the Birkbeck Vocabulary project were:

(a) that the connections between words in the second language learner's mental lexicon are less stable than the connections of native speakers, and (b) that the semantic links between words in the learner's mental lexicon are fairly tenuous ones, easily overridden by phonological similarities (Meara in Mattheoudakis, 2001, p.1).

Two reasons were put forward to explain the fact that L2 responses to stimulus words tended to be more varied than those of L1 speakers: a) L2 speakers tend to produce clang associations, b) they often misunderstand the stimulus word. McCarthy (1990, p.41) explains that L2 speakers' tend to give clang responses because they 'may for a long time lack the ability to make instantaneous collocational associations, and may be more inclined to associate L2 words by sound similarities.'

L2 speakers produce more syntagmatic responses (hence less paradigmatic responses) than L1 speakers. According to Coulthard *et al.* (2000, p.27), this 'suggests that non-natives are more likely to construct utterances out of ready-made chunks (idioms)'. As L2 ability grows, there is a shift in response type from syntagmatic to paradigmatic. This shift is also seen in L1 learner responses.

2.2.1 Stimulus words

The choice of stimulus words obviously affects potential range of responses to a word association test. For example, the less 'core' a word is, the more difficult it is to find an antonym for it (see Carter, 1990, p.38). Considering that L2 speakers may not be aware of how 'core' a word is, we can expect less antonym responses even for core words. While it may be easy to think of a synonym for *intelligent*, it is clearly difficult to think of one for table, or chocolate.

2.2.2 Problems with word association tests

Aitchison (2003, p.85), lists a number of faults of word association tests that prevent us from using them to 'build up a detailed mental map from [the] responses…'(*ibid.* p.85): First, providing a supposedly automatic response to a single word is unnatural, and does not necessarily mirror ordinary retrieval. Second, results can be altered dramatically by presenting the stimulus word as part of a group. Third, and most importantly, respondents are only asked for one response, and response types are multifarious.

As Deese (in Katzer, in Wright, 2001, p.16) puts it:

> …any particular linguistic form, at various times, elicits a variety of responses in the same person. Therefore the meaning of any form is not given by a single response [sic], or, indeed, by a collection of responses at some particular time, but by the potential distribution of responses to that form.

3 Materials and Method

3.1 Students

Four male and two female pre-intermediate level students (aged 19-24yrs.) were tested towards the end of a one-year full-time English course, in which they studied sixteen hours a week with Japanese teachers (grammar, composition, dictionary skills, vocabulary, reading, TOEIC[4], video, listening, and speaking classes) and four hours a week with native teachers (communication, pronunciation and vocabulary classes).

3.2 Stimulus words

Eight stimulus words were drawn up according the instructions laid out in the task assignment. The relevant portions of the task assignment are reproduced below. Words selected as stimuli are shown in bold:

- *at least one grammar/function word (e.g. preposition, pronoun):* **she; and**
- *one or two items from the everyday physical environment (e.g. 'table', 'car'):* **table**
- *a relatively uncommon or low-frequency word but one which your students will nonetheless know…..:* **intelligent**
- *a mixture of word classes (e.g. noun, adjective, verb):* **table; chocolate; hot; dangerous; speak**

3.3 Procedure

Students were instructed to listen to each stimulus word and write down the first word that occurred to them. Students were given as much time as necessary to complete the task. Words were repeated if the students requested it.

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[4] 'Test of English for International Communication': an English language proficiency test. A high TOEIC score is considered to be a valuable qualification by many in Japan.

4　Results

The following table shows students' responses to the stimulus words. Spelling mistakes have been corrected.

chocolate:	table:	hot:	and:
sweet	food	the sun	English and Japanese
sweet	dinner	summer	two words
delicious	have breakfast	sun	together
sweet	apples	summer	R & B
sweet	circle	summer	or
sweet	dinner	hot dog	or
speak:	**dangerous:**	**she:**	**intelligent:**
interesting	red	beautiful	teacher
sharp	underworld	Aki	I don't mean it
friend	war	beautiful	smart
English	gun	beautiful	math
English	cars	small	parents
Japanese	bomb	lady	professor

5 Discussion

For a summary of response types, see Appendix 1.

5.1 Syntagmatic vs. paradigmatic

For a breakdown of paradigmatic/syntagmatic responses, please see Appendix 2.

Thirty-nine (81%) of the forty-eight responses are syntagmatic in nature, while only one response (2%) is unambiguously paradigmatic (the response of *smart* to the stimulus *intelligent*), Five more responses are possibly paradigmatic in nature. The remaining responses are *meta-linguistic* responses (see 5.1 and 5.3.1. Classification is tentative), which are inherently neither syntagmatic or paradigmatic. Not including the responses to the grammatical stimuli *and* and *she*, thirty-five (97%) out of thirty-six responses are syntagmatic and one (3%) is paradigmatic. For certain stimuli, there is a strong noun-adjective correlation. For example, the noun stimulus *chocolate* prompted 100% adjective responses, while the adjective *dangerous* prompted 100% noun responses. However the same is not true for the stimulus words *table* or *intelligent*. A possible reason for this apparent inconsistency is that students are unaware of adjectives that could accurately describe *table* (e.g. *round*, *wooden*), although one student did respond with *circle*, which may have been *intended* as an adjective (see 5.2.1).

5.2 Sense relations

For a breakdown of sense relations, clang, and collocational responses, see Appendix 3.

5.2.1 Membership of semantic fields

The limits (if they exist) of the semantic field of any particular word are difficult to define, so the categorisation of some responses proves difficult. It is especially hard to envisage semantic fields for the grammatical items *and* and *she*. Discussion here will thus be limited to the lexical stimuli (although the decision to limit the discussion in such a way may be an arbitrary one, see 5.2.2, 5.2.3). At least 30 (83%) out of 36 responses can be considered to be members of the stimulus words' semantic fields. Five of the remaining six responses could be thought to be part of looser semantic

fields e.g. *speak*/*interesting*, *table*/*circle*. Perhaps such responses are an expression of partially formed semantic networks and incomplete grammatical ability, and as such should be seen as legitimate expressions of the learner's interlanguage rather than as mistakes. Another example of a respondent's intention being imperfectly realised is the response *I don't mean it* to the stimulus *intelligent*. It appears that the respondent meant *This word does not describe me* or *Not me!* Such responses highlight the arbitrary nature of limiting responses to one orthographic word (see 6.1, 6.2).

5.2.2   Synonymy

Only one clear instance of synonymy is found: the response of *smart* to the stimulus *intelligent*.

Carter (1998, p.17) states that sense relations are 'the system of linguistic relationships which a lexical item contracts with other lexical items.' (p.17) If this is true, we would not expect the grammatical stimuli *she* and *and* to elicit sense relation responses such as synonymy. During testing, these stimuli prompted double-takes from the students – an indication that responding was an unnatural, and certainly not an automatic, act. *And* provoked a great deal more head-scratching than *she*. This would suggest that on a cline of lexicality, *she* is more lexical than *and*. This is to be expected, since *she* is a pronoun, which takes the place of nouns in context:

Diagram 4:

and   ↑   *less lexical*

                  ↓

she   *more lexical*
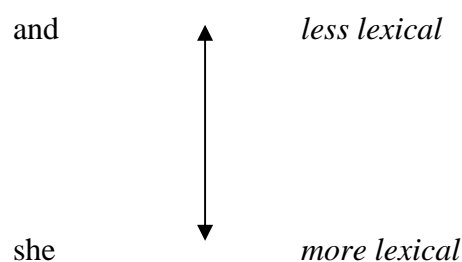
Student responses of *or* to the stimulus word *and* are of interest. Consider the following two English sentences followed by their Japanese translations:

> *ex. 5*   I like apples *and* oranges. (ringo *mo* orenji *mo* suki)
>
>   I don't like apples *or* oranges. (ringo *mo* orenji *mo* suki ja nai)

In the Japanese translation, there is no distinction between the English use of *and* and *or* in these two sentences, so the relationship of *or* to *and* could be seen as one of synonymy. Such a classification begs the question: What role is L1 playing in the data? (see 6.2).

5.2.3   Antonymy

No clear examples of antonymy are encountered. However, confusingly, the response *or* to the stimulus *and* (see 5.2.2) could be considered antonym responses if we hypothesise that the students are aware of the meta-language of grammar. In other words, the sentences in ex. 5 could be considered to be opposite in meaning, and if the students are aware of this concept, then they could see *and* and *or* as playing opposite roles. Whether we regard *or* as an antonym or synonym, we should be open to the possibility that a) the students' L1 (Japanese) may be playing a role here, and b) students are responding on a meta-linguistic level. In addition, we should consider the possibility that *and* and *or* could be seen to be part of the same lexical/semantic field (that of 'grammar words', for example).

5.2.4   Hyponymy

There are no instances of hyponymy in the data.

5.3   Encyclopaedic responses

It is impossible to state categorically that any of the responses in the data are *not* encyclopaedic in nature. However, it would be unwise to rule out the usefulness of the encyclopaedic category as a tool for classification. It is possible that encyclopaedic responses are less automatic than linguistic responses, and so the longer it takes for a student to respond to a stimulus, the more he/she is drawing on encyclopaedic knowledge as opposed to linguistic knowledge. It is also possible that the Syntagmatic-paradigmatic shift of L1 and L2 learners (see 2.2) could be accompanied by an encyclopaedic/semantic field-based shift, as connections between words become firmer. An interview, or timing of the students' responses could be used to test these hypotheses. For further discussion of this point see 6.1 and 6.2.

5.3.1   Meta-linguistic responses

An interesting subset of the encyclopaedic category is that of meta-language. The responses *two words* and *together* to the stimulus *and* can be viewed as meta-linguistic explanations of *and*, while *English and Japanese* and *R&B* appear to be meta-linguistic examples of the stimulus in context (although collocation could also play a role). Both types of response can be regarded as breakdowns in the word-association test machinery, if we assume that the stimulus words are intended to elicit *automatic* responses.

5.4   Collocation

It is difficult to measure strength of collocation without the use of a corpus. The responses *English* and *Japanese* to the stimulus *speak* appear to exhibit strong collocation: one imagines that, in the course of their studies, students have encountered the two words in close proximity multiple times. Also, the response of *hot dog* to the stimulus *hot* is a collocational response.

5.5   Clang associations

There are no clang responses in the data.

5.6   Summary

This section will refer back to the evaluation points listed in the assignment topic.

5.6.1   Does such a word association test tell us anything about how learners are making mental links between words they have learnt?

> While we should not necessarily conclude that word-association games mirror the retrieval process in any way, they do seem to suggest that words are organized into semantically related families in the mind. (McCarthy, 1990, p.39).

The results presented here support McCarthy's position. For lexis stimuli, up to 97% of responses can be considered part of the semantic field of the stimuli. More specific sense relations do not play a large role in the data. This suggests that words are organised more loosely in the L2 than in the L1 lexicon. Encyclopaedic responses play a role that, while not clearly defined, is nonetheless of interest. Responses that

seem only loosely to be part of the semantic field of the stimuli, could be encyclopaedic responses: since the student's vocabulary is not as big as that of an L1 speaker, he/she falls back on an encyclopaedic response, drawing on his/her own experience. As for syntagmatic/paradigmatic distinction, we see that the L2 speakers in this study gave mostly syntagmatic responses. However, the syntagmatic label appears to be so all-inclusive as to be rather useless for categorisation, except to act as a contrast to paradigmatic (i.e. *not* paradigmatic). Collocational relations play an undefined role, but links appear to be strong in at least three responses.

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

The results of this study do not suggest that phonological similarities play an important role in the responses of pre-intermediate students.

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

Words do appear to be 'organized into semantically related families in the mind' (McCarthy, 1990, pp.39-40). The results of this study suggest that co-ordination is not a common feature of pre-intermediate L2 speaker word association responses. Collocational links are apparent in the data. No sound-based responses are encountered.

6 Conclusion

The results of this study suggest that the most important link between words in the L2 lexicon is mutual membership of semantic/lexical sets. Encyclopaedic knowledge plays an undefined role but warrants further study. There is no data to support all of the characteristic response-types mentioned by Carter (1998, pp.34-45) such as phonological connections and misunderstandings, and the importance of co-ordination. However, the results of such a small-scale test cannot be used as a basis to challenge such findings.

6.1 Shortcomings of the analysis

For a discussion of general problems with word association tests see 2.2.2.

The nature and context of this investigation preclude analysis of a statistically viable sample of data. More attention should have been paid to the choice of stimulus words An adverb stimuli, for example, is conspicuously absent. More generally, it would have been desirable to project beforehand the range of possible response-types, and view the results in the light of this knowledge (for an interesting approach to stimulus word selection, see Wolter, 2001). Limiting stimuli/responses to single words is arbitrary: 'a language user has available to him or her a large number of semi-pre-constructed phrases that constitute single choices, even though they might appear to be analysable into segments.' (Sinclair, in Coulthard et al., 2000). Potential orthographic links between words were ignored. The analysis touches on the patterns exhibited in word association responses, but does not focus sufficiently on *why*, and *by what process(es)* such responses were given. Understanding the reasons behind responses is central to the construction of a meaningful model of the L2 lexicon. A model, after all, has to describe *how* something works, not simply what it *looks like*.

6.2 Suggestions for further research

Multi-word stimuli/responses would add credibility to the concept of the word-association test, tackling point 3 raised in 2.2.2., and also Katzer's misgivings (see 2.2.2). So would the testing of subjects more than once (see Meara, in Carter, 1990, p.200). A short interview with each student (see Wright, 2001), and a video recording of the test would help to clarify response types and the processes that led to them.

Visscher (personal correspondence) suggests asking respondents to think out loud during testing, and that a comparison between students thinking out loud in their L1 or L2 could yield interesting results. Such methods could help distinguish encyclopaedic from semantic field-based responses, clarify whether there is a shift between the two as L2 proficiency increases, and shed light on the role played by L1 in L2 responses.

Appendix 1: Overview of response types

Italics indicate the results for lexical stimuli only.

Syntagmatic	39/48: 81% *35/36: 97%*
Paradigmatic	1-6/48: 2-12% *1-6/36: 3-17%*
Semantic field	*30-35/36: 83-97%*
Synonymy	1/48: 2% *1/36: 3%*
Antonymy	0/48: 0%
Hyponymy	0/48: 0%
Encyclopaedic (inc. meta-linguistic)	4–48: 8–100%
[strong] collocation	3/48: 6% *3/36: 8%*
clang	0/48: 0%
meta-language	4/48: 8%

Appendix 2: Results classified according to paradigmatic/syntagmatic responses:

Classification according to paradigmatic (p), syntagmatic (s) is shown in brackets. (*) marks responses that proved difficult to classify.

chocolate:	table:	hot:	and:
sweet (s)	food (s)	the sun (s)	English and Japanese (*)
sweet (s)	dinner (s)	summer (s)	two words (*)
delicious (s)	have breakfast (s)	sun (s)	together (p*)
sweet (s)	apples (s)	summer (s)	R & B (*)
sweet (s)	circle (s)	summer (s)	or (p*)
sweet (s)	dinner (s)	hotdog (s*)	or (p*)

speak:	dangerous:	she:	intelligent:
interesting (s)	red (s)	beautiful (s)	teacher (s)
sharp (s)	underworld (s)	Aki (p*)	I don't mean it (s*)
friend (s)	war (s)	beautiful (s)	
English (s)	gun (s)	beautiful (s)	smart (p)
English (s)	cars (s)	small (s*)	math (s)
Japanese (s)	bomb (s)	lady (p*)	parents (s)
			Professor (s)

Appendix 3: Sense relations, clang, collocational, meta-linguistic and explanatory responses

Key: Synonymy   (s)

      Antonymy   (a)

      Collocational responses: (col.)

      Doubtful classification   (*)

      Meta-language response   (me)

chocolate:	table:	hot:	and:
sweet	food	the sun	English and Japanese (me)
sweet	dinner	summer	two words (me)
delicious	have breakfast	sun	together (p*)
sweet	apples	summer	R & B (me)
sweet	circle (*)	summer	or (a* / s*)
sweet	dinner (col*)	hotdog (col)	or (a* / s*)
speak:	**dangerous:**	**she:**	**intelligent:**
interesting (m*)	red	beautiful	teacher
sharp (m*)	underworld	Aki	I don't mean it (m) (*)
friend	war	beautiful	smart (s)
English (col)	gun	beautiful	math (*)
English (col)	cars	small	parents
Japanese (col)	bomb	lady (s*)	Professor

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