The dimensions of lexical competence.

1: Introduction

This paper deals with the idea of lexical competence, and how we can describe it. Lexical competence is an aspect of L2 competence which has not received a great deal of attention. Canale and Swain's seminal paper on communicative competence (1980), for instance, mentions lexis only twice. On the first occasion, lexical competence is lumped indiscriminately with other forms of 'linguistic – or what we call grammatical – forms (i.e. phonological forms, morphological forms, syntactic patterns, lexical items...' 1980:2). Later, Canale and Swain describe what they mean by 'grammatical competence: this type of competence will be understood to include knowledge of lexical items, and rules of morphology, syntax, sentence-grammar semantics, and phonology...' (1980:29). Since the publication of Canale and Swain's paper, the communicative paradigm has come to dominate the way that we think about L2 competence in general, and this has generally had a bad effect on the systematic study of lexical competence. The issues that were foregrounded I that paper have been heavily researched, while less central issues, like lexical competence, have been sidelined. This is rather unfortunate: whichever way you look at it, lexical competence is at the heart of communicative competence.

The shift of interest away from linguistic competence and towards communicative competence occurred at a time when the theoretical study of semantics had not really beeen much applied to the teaching of languages. By 1980, attitudes towards teaching vocabulary were not all that different from what they had been twenty years earlier, and were largely dominated by ideas inherited from the 1930s. If anything, the 1960s saw a shift away from vocabulary, and the adoption of a general assumption that most learners cold get by adequately with a very limited vocabulary. Rudzka, Channel, Putseys and Ostyn (1981) was almost the only book to appear which attempted to apply structural semantics to vocabulary teaching. This book was well received at the time, and its authors eventually produced a second companion volume, Rudzka, Channell, Putseys and Ostyn (1985), but these books do not appear to have made very much impact on teaching practice in the long term. In fact, most of our widely held views about vocabulary teaching remain strongly rooted in practices that were already common many decades ago.

There are several reasons why vocabulary teaching has been spared the kind of upheaval which has been inflicted on other areas of of language teaching. One of these is that most

people, and this includes most language teachers, are remarkably ill-informed about the role that lexis plays in language. Some evidence for this can be found in a recent paper by Zechmeister, D'Anna, Hall, Paus and Smith(1993). They asked people a set of deceptively simple questions about words, such as:

> a) how many words are there in English?
> b) how many of these words would you estimate are part of your passive vocabulary?
> c) how many of these words would you estimate are part of your active vocabulary?

There are no "correct" answers to these questions, of course. The answers depend to some extent on how you define the key concept "what is a word?", a problem which Zechmeister et al. sidestepped by allowing people to come up with their own definitions. The main point of interest in the data is that the answers showed an enormous range of variation in the estimates that people provided. For question (a), for instance, the median estimate was about 325,000 but the question typically produces a huge range of responses around this average; whenever I have used these questions with teachers, I have got estimates that range wildly from a few thousand words to several millions – i.e. the estimates vary by a factor of about 100. This is as if we asked a group of truck drivers how long it would take them to drive from London to Edinburgh, a distance of about 400 miles, and got estimates varying between three hours and twelve days. Mis-estimations of this of this order of magnitude are not trivial, of course. A trucking company that reckoned it could deliver goods over 400 miles in three hours would soon go bankrupt; a company that estimated 12 days for the same journey would go go out of business for lack of orders. The sanctions for language teachers are less obvious, perhaps, but none the less real for that. Clearly the way you think about your own vocabulary and the implicit assumptions yo have about it, influence the way you go about teaching L2 vocabulary to learners. If you think that your own active vocabulary is about 4,000 words, and you plan to teach your students 2,000 words, then they will know about half of what you think you know yourself. On the other hand, if you think your own vocabulary is about 40,000 words, and you teach your students 2,000 words, they will be learning only one twentieth of what you think you know as a fluent native speaker.

If professionals who deal with language make judgements that are as disparate as the ones that we have described here, then it is obvious that our ideas about how to teach vocabulary, and how to develop lexical competence in foreign language learners, are based on some fairly rocky assumptions. The basic problem seems to be that we don't have a properly worked out theory of what factors contribute to lexical competence, but a theory of this sort is absolutely essential if we want to be able to make sensible suggestions for how to teach vocabulary in a foreign language. What is not clear is what such a model might consist of. As we shall see later, a number of people have developed descriptive models of what it means to know a word. The view taken here, however, is that models of

this sort are not the best way to develop the idea of lexical competence. Instead, the idea to be developed in this paper is that, despite the manifest complexities of the lexicon, lexical competence might be described in terms of a very small number of easily measurable dimensions. These dimensions are not properties attached to individual lexical items: rather they are properties of the lexicon considered as a whole.

2: Vocabulary size

The basic dimension of lexical competence is size. All other things being equal, learners with big vocabularies are more proficient in a wide range of language skills than learners with smaller vocabularies, and there is some evidence to support the view that vocabulary skills make a significant contribution to almost all aspects of L2 proficiency. In view of this relationship, we might expect to find a broad consensus about the rate at which vocabularies grow in an L2, and the factors affecting this growth. Surprisingly, however, this does not appear t be the case. In fact, there are very few studies of vocabulary size in an L2, and most of the widely quoted work deals with cases from which it is very difficult to generalise. Yoshida (1978), for instance, is a single-case study of a three and a half year old Japanese child earning English in a naturalistic situation. Yoshida claims that his subject acquired some 260 words in seven months – mostly nouns with a preponderance of words for food, drink and vehicles. This figure of 260 words – about 500 words in a full year – is broadly in line with other estimates for L2 acquirers, but it remains unclear whether data of this sort can be generalised to older learners, or to learners in more formal learning situations. Studies of people learning a substantial L2 vocabulary in a formal situation are even rarer than studies of people acquiring their L2 vocabulary in a naturalistic setting. The most impressive work here is a large-scale study of Finnish learners of English by Takala (1985). Takala's estimates for vocabulary knowledge in pre-university Finnish students vary between 450 and 1500 words – these figures represent an annual total o new words which is considerably lower than Yoshida's estimate for his acquirer. However Takala's data is difficult to interpret because he finds that thee is no difference between the active productive vocabulary of his testees, and their passive receptive knowledge. This conclusion is so counterintuitive that it is difficult to take the results at face value.

The basic problem seems to be that there are no reliable tests of vocabulary size which could be used to resolve these questions. One might have expected that the recent upsurge of interest in vocabulary acquisition would have produced a large number of basic vocabulary testing tools, an that these tests would have provided relatively straightforward answers to some basic questions about how big people's vocabularies are, and how quickly they grow. Again, surprisingly, this does not appear to be the case. The nearest thing we have to a standard test in vocabulary is Nation's *Vocabulary Levels Test* (Nation 1990). Th is test is a short test which assesses a small number of words grouped by frequency, using a complex multiple choice format (see Table 1). Nation claims that the test gives a rough guide to the extent of a learner's vocabulary, and a number of informal studies using these tests seems to bear these claims out.

Table 1: Example of items in Nation's *Vocabulary Levels Test*
In this test, testees have to identify the meanings of three of the words in the item by writing the number of the appropriate word alongside the given meaning. Item (a) is taken from Nation's 3000 word level; item (b) is from the 5000 word level.

(a) 1   coach
     2   darling   _____ a thin flat piece cut from something
     3   echo   _____ person who is loved very much
     4   interior   _____ sound reflected back to yo
     5   opera
     6   slice

(b) 1   circus
     2   jungle   _____ speech given by a priest in a church
     3   nomination   _____ seat without a back or arms
     4   sermon   _____ musical instrument
     5   stool
     6   trumpet

Development of more formal tests capable of producing reliable estimates of vocabulary size has been hampered by a number of basic problems in lexicography. Given the sheer number of words in a reasonably sized lexicon, it is obviously not practical to test all the words, and some sort of sampling method is necessary. In theory, you could make an estimate of how many words someone knows by taking a sample of words from a large dictionary, devising a suitable test for these words, and calculating the proportion of words the testee knows in the sample. If the sample is a good one, then it would be reasonable to assume that the testee knows the same proportion of words in the entire dictionary. This procedure looks straightforward, but actually, every step in it turns out to be problematical when examined closely.

The first problem arises in counting the number of words in the dictionary from which the sample is drawn. Dictionary publishers usually state the number of entries their dictionaries contain but these figures are often fairly unreliable estimate of the number of word in the dictionary. It is possible to sidestep this problem, and count the entries yourself, but this procedure immediately raises the problem of what is to be counted as a word. Presumably (but not obviously), morphological derivations of a base word should not be counted as separate items, so that *happy, unhappy, happiness, happily*, etc. all count as a single word family, not four separate ones. But what about separate meanings for a single form? The *Longman Dictionary of Contemporary English*, for instance, lists seven distinct but related meanings for the verb *talk*, plus *now you're talking, you can talk, talk of the devil, talk through one's hat, talk turkey, talk somebody down, talk down to somebody, talk somebody into doing something, talk something out*, and *talk somebody out of something*. We also have *talk* [noun] (three meanings), *talkative, talker, talkie*, and a whole set of derivatives of *talk*, not *all*

of which are immediately transparent in meaning. It seems wrong to count all these entries as separate words, but it is also obvious tat words like *talk* are a much richer part of the lexicon than items like *saxophone,* which are relatively straightforward.

Estimating the number of words that make up the vocabulary you are interested in is probably *the* critical variable in constructing a test of vocabulary size. Obviously,if the test you are using suggests that a testee knows fifty percent of the target vocabulary, it is vitally important to know how big or small this target vocabulary is. Fifty per cent of 5,000 words is a lot less than fifty percent of 20,000 words. Estimates of vocabulary size in normal adult L1 speakers suffer from precisely this problem. The published estimates vary over a huge range, from a low of about 15,000 (Seashore 1933) to a high of about 200,000 (Hartmann 1946). Nation (1993) has argued that these discrepancies are largely accounted for terms of different assumptions about the size of the sources, and the way samples were constructed from dictionaries. He suggests that most sampling methds are biassed in such a way that they make it more likely for common words to appear in an apparently random sample, and this makes tests based on these samples easier than they would be if sampling was genuinely random. As a result, most estimates of vocabulary size in native speakers have tended to overestimate the real knowledge of their testees. Nation's own estimates for L1 speakers (Goulden, Nation and Read 1990) suggest that most native speakers have vocabularies in the region of 17,000 word families.

The second factor that makes it difficult for us to produce reasonable estimates of vocabulary size is that it is very difficult to produce estimates of something very large from a small sample. Except in very unusual cases, vocabularies consist of a very large number of discrete items, but tests are typically short, and his discrepancy makes it difficult to assess lexical knowledge accurately. As long as the total number of words a person knows is fairly small, then it is possible to test a reasonable proportion of these words relatively easily. For instance, if we think we are dealing with learners with a vocabulary of about 400 words then we could devise a 40 item test. This would provide a one in ten sample of the entire vocabulary range, and ought to be fairly representative of the testee's vocabulary. However, 400 words is in fact a very small vocabulary – it is about what you would expect of a child aged about 2.5 years (McCarty 1954). Adult vocabularies are very much bigger than this, and this makes it impossible to test them except by sampling them very broadly. A one in ten sample of a 5000 word vocabulary, for instance, would require a test that was 500 items long, clearly far to large for most commonly used test formats. And of course, the bigger the testee's vocabulary gets, the more of a problem this becomes.

The third problem in our equation concerns the score that is derived from the tests we eventually choose. Clearly, this score depends very much on the type of test that is used, ad it is not clear. How the points scored on the commonest types of test actually relate to vocabulary knowledge. Consider this item, for instance, a typical multiple choice definition:

mark the correct definition with a cross

a tome   [ ]   1   a rough split
                 [ ]   2   a pain in the back
                 [ ]   3   a large heavy book
                 [ ]   4   a type of horse

How many words is this item testing? At first glance, it looks as though it is testing knowledge of **tome**. A moment's reflection, however, reveals that it is actually testing a lot more than this: the five content words in the rubric, and the nine words in the definitions, as well as the obvious target word. But each of these items is tested in different ways. The rough split, for instance, seems deliberately designed to catch people with some knowledge of Greek, who use their knowledge of cognates imaginatively. In many cases, testees can eliminate some of the possibilities by guessing, or by eliminating the words they know are *not* connected to the target word. The result is a test item which is much more complex than it looks at first sight. Test designers get round these problems by norming items like these on large populations of testees, and this solution works well in public examinations, where we are interested in the behaviour of testees relative to some predetermined norm. It is much less clear, however, that items like this can be used as a basis for measuring how large vocabularies are.

All these problems have discouraged people from developing standard vocabulary tests which might have been used to ask (and answer) questions about how many words people know, how fast their vocabularies grow, and how these factors are related to other aspects of linguistic competence. A number of people have developed one off vocabulary tests for use with particular groups, and most of our knowledge of how vocaulary influences other skills is based on these tests. The problem is, of course, that tests of this sort are often incompatible with each other. This makes it difficult to integrate data from different sources, and contributes to fragmentation of the field.

My own modest contribution to these problems has been to develop a standardised vocabulary test which, in theory at least, might be able to provide an estimate of vocabulary size in a foreign language. These checklist tests have been described in detail elsewhere (Meara and Jones 1988, 1989; Meara 1990). In their simplest form, the tests consist of a set of real words and a set of imaginary, non-existent words, and the testees' task is to identify which of these they actually know IN the computerised form of the test, this is done by pressing a key when each item is presented on screen. In the pencil and paper version, testees simply mark the known words and ignore the rest. This deceptively simple technique produces some very rich data, which can be analysed using statistical techniques based on Signal Detection Theory (McNichol 1972), and measures derived in this way can be used to estimate with some degree of accuracy how many of the real words testees know. (See Meara in prep. For the details of how the tests are scored.) We generally find that that the tests work best when the target vocabulary is fairly tightly

Table 2: A standard format Checklist test

Level 2 Test 202
what you have to do
Read through the list of words carefully; for each word:
if you know what it means, make a mark in the box beside the word.
If you don't know what it means, or if you aren't sure, then leave the box empty.

1 ☐ regard	2 ☐ invention	3 ☐ calendar
4 ☐ guest	5 ☐ communist	6 ☐ amagran
7 ☐ galpin	8 ☐ hudd	9 ☐ construct
10 ☐ disturb	11 ☐ astin	12 ☐ cylinder
13 ☐ able to	14 ☐ influence	15 ☐ nowadays
16 ☐ sacrifice	17 ☐ burse	18 ☐ contemporize
19 ☐ perrin	20 ☐ temporary	21 ☐ view
22 ☐ prelatoriat	23 ☐ concerned	24 ☐ angle
25 ☐ hermantic	26 ☐ failure	27 ☐ lecture
28 ☐ mine	29 ☐ disportal	30 ☐ ashill
31 ☐ however	32 ☐ bowring	33 ☐ spring
34 ☐ mynott	35 ☐ sensation	36 ☐ percentage
37 ☐ sedgebeer	38 ☐ essential	39 ☐ funny
40 ☐ plenty	41 ☐ flamboyment	42 ☐ uniform
43 ☐ hyde	44 ☐ obtain	45 ☐ rare
46 ☐ abrogative	47 ☐ substance	48 ☐ property
49 ☐ swithin	50 ☐ ahead	51 ☐ cheatle
52 ☐ specialise	53 ☐ case	54 ☐ ensure
55 ☐ nichee	56 ☐ being	57 ☐ delay
58 ☐ request	59 ☐ assume	60 ☐ friction

defined – for instance, the test shown in Table 2 is based on Level Two of Nation's Word Lists (Nation 1986) – roughly the second thousand most frequent words in English. We

know exactly how many words this list includes, and so it makes sense to generalise up from the test score to the target sample: someone who scores 50% on this test will know about 50% of the target vocabulary. Using a set of three or four tests of this type allows us to make claims of this sort with considerable confidence. Using a battery of tests designed to assess different parts of a learner's vocabulary – for instance a range of different frequency bands or a range of different specialist areas of lexis – makes it possible to build up profiles of testees' vocabulary knowledge, and these profiles are sufficiently sensitive that they can measure vocabulary growth over relatively short periods of time. Milton and Meara (in press) for instance have used the tests to estimate how many new English words European exchange students acquire during an extended period of residence in an English speaking country.

Checklist tests have a number of advantages over other forms of vocabulary testing which make them particularly interesting. Their main advantage is that the simple format makes it possible to test a very large number of words in a very short space of time. Our standard pencil and paper test (Table 2) takes only a couple of minutes to complete, and yet it provides for a one in twenty-five sample of the target vocabulary. This makes it possible to test even a very large vocabulary in some detail. The method also appears to work well across a wide range of proficiency levels: unlike many standard test formats, it is equally suitable for use with beginers and with advanced learners. The tests are also easy to construct, and they do not seem to require the complex standardisation that is necessary with other test formats such as multiple choice batteries.

Our initial experiences with the checklist tests were very promising. The tests were extraordinarily popular with the users. This applied particularly to the computerised version, which was able to provide instant feedback to the testees in the form of an easily interpretable vocabulary size estimate. There were no other available measures of vocabulary size which we could use to cross-validate our tests, but the data seemed to correlate moderately well with other vocabulary tests which were not attempting to measure size. The test scores also correlated moderately well with other tests of linguistic skills, particularly integrative tests like Cloze, listening comprehension and reading comprehension, where you would expect vocabulary knowledge to make an important contribution. These correlations were not spectacular, but they were good enough to allow us to use the vocabulary tests as a rough placement test (Meara and Jones 1988).

As we gained more experience with the tests, however, it soon became clear that they were not as good as they appeared to be at first sight. We found that the tests did not work well with low-level learners, who often misread items in the tests in unpredictable ways ("LEDDY? Ah oui! C'est FEMME n'est-ce pas?"). We also found that the tests worked better with some L1 groups than with others. French L1 speakers seemed to be particularly problematical. For these testees, the checklist tests seemed to correlate much less well with other linguistic skills the was the case for testees with other L1 backgrounds. This is not necessarily a criticism of the checklist tests qua vocabulary tests, of course: it could be that

the peculiarly close relationship between the lexicons of English and French means that vocabulary size per se is less important for learners of these two languages than it is or speakers of German or Japanese. A more worrying problem was that we consistently found some learners who returned extremely low scores on the checklist test because they were over-willing to say 'yes' to the imaginary words. In theory, the statistical analysis of the checklist data is capable of separating out testee's ability to distinguish between the two types of item, and their willingness to say 'yes' when in doubt. In practice, this 'response bias' effect seems to be rather more complex than we would have expected, and looks like being a major individual difference affecting the performance of tests.

These problems obviously need to be taken seriously, but my feeling is that they are not intractable. A certain amount of work still needs to be done to iron out the wrinkles, but in principle, I believe, the checklist methodology is a good solution to the problem of measuring vocabulary size in foreign language learners. The estimates these tests provide are obviously not perfect, but they appear to be reliable enough for many purposes: in particular, they make it possible for us to begin to look at the way vocabularies grow at advanced levels, and to examine how this growth is affected by learners' circumstances, and how it is reflected in their performance.

The major criticism of te tests comes from people who feel that the checklist format is really no more than a test of passive recognition ability, and while the checklist tests ight be able to measure how many words a person is familiar with, they are in principle incapable of measuring how well these words are known, and how far the learner has internalised the detailed nuances of their meaning and their use. (This distinction is sometimes confusingly referred to as a difference between breadth and depth of vocabulary knowledge. See Wesche and Paribakht 1993; Read 1993). This, too, is a criticism that needs to be considered very carefully. It is certainly the case that the checklist tests make very few demands on the testees: basically, the only skill they test is the testees' ability to recognise whether an item is a word or not - a sort of *sine qua non* of vocabulary knowledge. The checklist tests certainly do not measure whether testees can actually use correctly the words that they claim to know. However, it might be possible to mae a case for the view that measuring vocabulary size with a checklist test does rather more than give you a rough measure of how many words a testee can recognise. The argument would be that in L1 it would be very unusual to find a speaker with a very large vocabulary who did not also have a good grasp of the meaning of at least some of the words being recognised. It would be unusual, for example, to find someone with a vocabulary of 10,000 words who did NOT know that *child* is a common word, used in slightly formal situations, that it is a noun, makes it plural with *-ren*, and is associated with *boy*, *girl*, *parent* and so on. In short, the circumstances which lead people to develop moderately large vocabularies in their L1 also allow them to acquire other types of information about the words as well. This link is not so strong in an L2 , but something similar may hold for this case too: a learner with a huge vocabulary and nothing else is a possibility, but something of a freak (see, for example, Gouin 1892). Most people acquire L2 words from exposure to the

language, not from learning lists of words in the abstract, and it is inevitable that while they are doing this, they also acquire a broader knowledge about the words they already know. There is, in fact, some evidence to support this view. Schmitt (unpublished) has shown that Japanese learners with large vocabularies are much better at identifying morphological derivatives of English root words, for instance, than are learners with smaller vocabularies. In this case, it appears that vocabulary size and knowledge of the way these words word exploit the derivational morphology of English are not unrelated. It is also possible that a similar relationship holds for other aspects of vocabulary breadth. Wesche and Paribakht (1993), for instance, report a moderately good correlation between the 'Vocabulary Knowledge Scale', which they explicitly constructed to assess breadth, and a checklist test of vocabulary size (Meara ad Jones 1990). Relationships of this sort suggest that a measure of vocabulary size might be a much more powerful measure than it looks at first sight. My current view is that vocabulary size is probably the only dimension of any real importance as long as we are dealing with a small lexicon. For English, a 'small' lexicon is anything up to five or six thousand words. For other languages, particularly languages which have a very rich derivational morphology, I suspect that this figure might be somewhat lower (see Ringbom 1983). Once this critical threshold is reached, vocabulary size per se seems to become less important. This change is probably related to the frequency distribution of words in English, and the fact that, compared to other languages, English appears to have rather a lot of different lexical items, and relatively less in the way of a lexical system. For other languages, the critical point may be rather different.

3: Organisation

If vocabulary size becomes a less important factor as the lexicon gets bigger, what takes its place Most people seem to accept that alongside measures of how many words people know, we also need independent measures of how well these words are known. This distinction is sometimes characterised as a distinction between tests of vocabulary depth and tests of vocabulary breadth (Read 1993; Wesche and Paribakht 1993), though personally I find this a rather confusing description. In practice 'depth' tests are designed to assess detailed knowledge of words and their attributes, unlike the checklist tests, which simply assess a testee's ability to recognise that a particular form might be a word at all. The question they ask is 'does the testee really **know** this word?'

A great deal has been written on the topic of what it means to know a word. Most of this work goes back to a paper by Richards (1976), and others who have written on the same topic largely re-iterate Richards' views (Cohen 1986; Gass 1989; Robinson 1989; Nation 1990; Wesche and Paribakht 1993). Richards identifies seven main aspects of word knowledge. For him, knowing a word means: a) knowing the degree of probability of encountering a word in speech or print; b) knowing the limitations imposed on the use of the word according to function and situation; c) knowing the syntactic behaviour associated with the word; d) knowing the underlying form of the word ad the derivations that can be made of it; e) knowing the associations between the word and other words in the language; f) knowing the semantic value of the word; and g) knowing many of the

different meanings associated with the word.

Richards' list is a good specification of what it means to know a word, of course, and we have no quarrel with it at that level. The problem with Richards' specification of word knowledge is a practical one. It might be possible in theory to construct measures to assess each of these types of knowledge for particular words; in practice, it would be very difficult to do this for more than a handful of items. If we wanted to test knowledge of, say, a 50 word sample, then the resulting test would need to consist of at least 350 separate subtests, one for each feature for each of the words that we are interested in, which is far too many for a practical test. Subsequent writing on what it means to know a word has tended to extend Richards' list. Nation (1990), for instance, has a list of eight types of word knowledge, each specified both for receptive and productive knowledge. Testing all these subcomponents for a 50 word sample would require a test with 800 separate subtests, even assuming that we could test each component with a single item. Clearly, this is a mammoth task for the test constructor, and completely unmanageable for the testee.

Given that vocabulary 'breadth' seems to become more important only as vocabularies get very large, we clearly have a serious problem here. The obvious question that arises, then, is whether it might be possible to reduce Richards' characterisation of word knowledge to one or two important dimensions that can be measured succinctly and conveniently. At first sight, none of the features in Richards' list looks like an obvious candidate for this role. The problem seems to be that Richards' features are all features of individual words: they tell us something about a person's knowledge of a single word, but they are not obviously generalisable to a person's entire vocabulary. What we really need is a measure hat applies to a whole vocabulary, and could be used alongside the size dimension to characterise vocabularies of different types. Ideally, what we need is a characteristic that is able to distinguish between someone who has a large vocabulary because they have just learned a long list of words, and someone whose vocabulary is more structured than that.

One possibility that is hinted at in Richards' list is 'the network of associations between [a] word other words in the language'. Traditionally, this idea has been interpreted (for example by Meara 1982; Politzer 1978; Kruse, Pankhurst and Sharwood Smith 1987) as an ability to produce native-like associations to L2 words: i.e. association behaviour has been seen as a characteristic of individual words, and a great deal of research effort has gone into studying the way L2 word associations are different from L1 associations. Most of this work has been descriptive in nature, and not much concerned with models of how words are associated or the properties of the networks that these associations form. However, there are other ways of looking at these associations. Figure 1 is a simplified diagram (based on Deese 1965) which shows some of the associational relationships involving *butterfly* in English. The diagram shows that *butterfly* is the centre of a complex web of associations for native speakers, some paradigmatic, some syntagmatic, some situational, some emotional, but all of them contributing in different ways to the 'meaning' of *butterfly*. Kiss (1968) has suggested that it might be possible to treat these association networks as
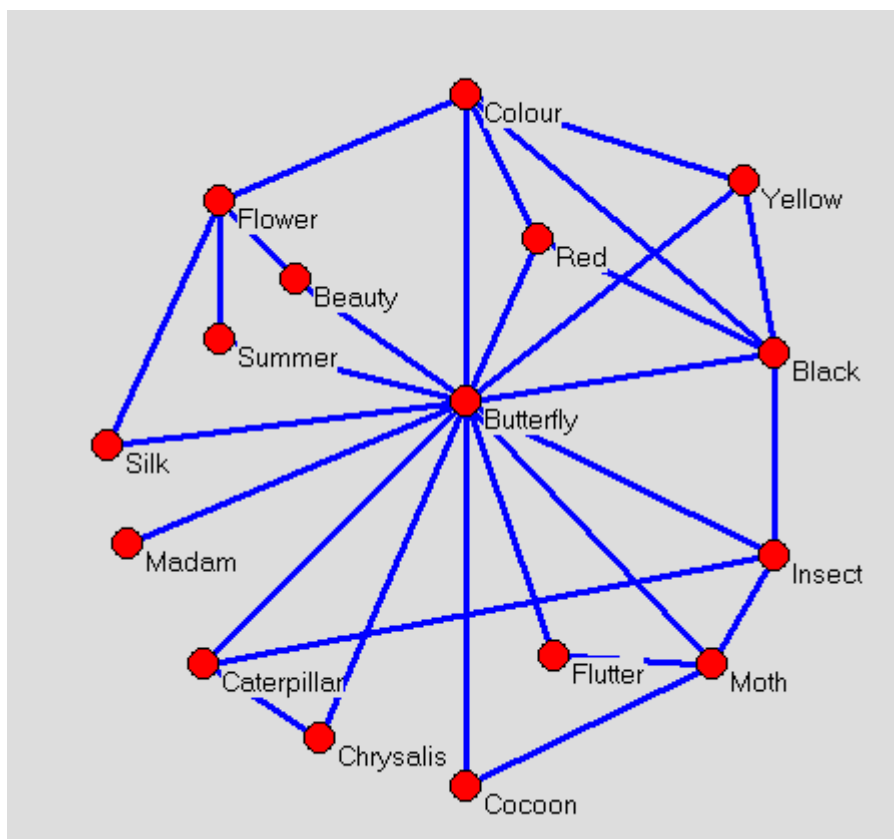
Figure 1: Part of the association network of *Butterfly*

'formal graphs', and to derive measures of their complexity using graph theory. These measures would include the degree of connectivity of a network, the average number of connections that link each of the items in the network, the average distance between randomly selected items in the network and so on. Connections of this sort are precisely what distinguishes a true vocabulary from a mere list of words. There is some evidence to suggest that L2 speakers' vocabularies are not as well structured as the vocabularies of L1 speakers. L2 speakers, for instance, find it less easy to produce associations than native speakers do, and are often unable to see connections between words that are obvious to native speakers. This suggests that 'lexical organisation' might be an important dimension of lexical competence, and that a measure of this organisation might be a useful way of distinguishing between learners at different levels of proficiency. The important thing to note here is that 'organisation' is a property of the vocabulary as a whole, not just a characteristic of individual words.

No simple measure of lexical organisation in an L2 has been developed so far, though the idea has been discussed in an exploratory way in Meara (1992). This paper suggested that it might be possible to infer something about the degree of connectivity in a lexicon by asking a testee to produce chains of associations to connect pairs of words chosen at

random. For native speakers, this task is relatively easy: two randomly chosen words often turn out to have very obvious associations. If they don't then it is usually very easy to construct a chain of associations between them – often, only a single additional link is required, as in the examples shown in Table 3. The mathematics of this is very similar to the model explored by Milgram in his famous parcel experiment (Milgram 1967). IN this experiment, Milgram produced a number of packages which he addressed to people selected at random from locations across the USA. He gave each parcel to a 'source person', and asked for it to be forwarded to the target addressee by hand, by passing it on to some other intermediary. The question of interest was how many times did the parcels change hands before they reached their destination. The answer was surprisingly few. Most parcels reached their destination in five steps or fewer; only a handful took as many as en steps. This counterintuitive result can be explaned very simply. The number of steps you would expect for the parcel to arrive at its destination depends on a number of different factors: the size of the population the average number of people any individual knows, how many common acquaintances people share, and so on. Analogies similar to this model may be identifiable in lexicons. For native speakers, it is not the case that all words in their vocabularies are directly connected to every other word. Overall, however, the pattern of connections is rich enough to make it easy to construct links between different parts of the lexicon with ease. This means that the degree of connectivity must be fairly high. For non-native speakers, it seems to be much harder to make connections between different parts of the lexicon. Given that L2 lexicons are generally smaller than L1 lexicons anyway, this suggests that each item in an L2 lexicon might be directly linked only to a very small number of words, and that, in general, L2 words have a smaller number of shared associations than would be the case in an L1 lexicon.

Table 3: Examples of association chains between *sea* and *butterfly*.
Sea ... blue ... sky ... fly ... butterfly
sea ... wave ... flutter ... butterfly
sea ... horse ... horse fly ... butterfly
sea ... green ... cabbage ... caterpillar ... butterfly
sea ... salt ... sugar ... insect ... butterfly
sea ... black ... melanism ... butterfly
sea ... sea king ... emperor ...red emperor ... butterfly
sea ... fish ... fly ... butterfly
sea ... float ... flutter ... butterfly
sea ... swim ... butterfly stroke ... butterfly
sea ... sand ... sandwich ... butter ... butterfly
sea ... sand ... yellow ... butterfly
sea ... holiday ... summer ... butterfly
sea ... sail ... fly ... butterfly
sea ... river ... mosquito ... insect ... butterfly
sea ... weed ... flower ... butterfly
sea ... seagull ... bird ... butterfly
sea ... ... butterfly
The fact that a large number of plausible chains can be found, and the fact that these chains are relatively short suggests that there is a high level of interconnection between words in an L1. For L2 speakers, connections seem to be more tenuous.

This idea suggests that it might be possible to develop an alternative way of characterising a lexicon, one that is largely, though not entirely, independent of size. This would allow us to describe a lexicon in two separate dimensions, and to distinguish, for example, between a large unstructured vocabulary, and a smaller but highly structured one. My guess is that people whose vocabularies are highly structured would be better performers on most real language tasks than people with less structured vocabularies of an equivalent size.

So far, then, I have suggested that it might be possible to describe lexical competence in terms of two global characteristics: size and organisation. These characteristics are rather different from the features that are normally used to characterise vocabulary, because they are characteristics of the system as a whole, rather than features of the individual words that make up the system. Simple dimensions of this type seem to me to offer a rather more promising approach to the problems of measuring lexical competence than do complex models of vocabulary knowledge based on componential analyses of what it means to know a word. Two dimensions, both of which are scalar, already offer a fairly rich framework for describing different types of lexical competence, and suggest some interesting questions about the way vocabularies grow. I have suggested, for instance that the size dimension becomes less important, and that the organisation dimension might increase in importance, as the size of the lexicon gets larger. A shift of emphasis of this sort arises quite naturally out of a consideration of the lexicon as a structure. For example, maintaining a reasonable level of closeness between all the items in a 50 item lexicon is relatively simple; even if each item is directly connected to only three other items, none of them is very distant from any other item. In a 500 item vocabulary, items need to have a larger number of direct connections to other items if the network as a whole is to remain reasonably in touch with itself, and for larger vocabularies, this problem becomes correspondingly more acute. It is perhaps significant in this regard that a surprisingly large proportion of the empirical work on vocabulary acquisition has used learners with very small vocabularies – often complete beginners. They way these learners perform might be very different from what happens with more advanced learners with bigger vocabularies to maintain. Maybe adding a handful of items to a relatively unstructured lexicon is very different from what happens when items are added to a lexicon that already has a rich internal structure?

4: Conclusion

The idea that I have been exploring in this paper is that lexical competence might not be such an intractable idea as it is sometimes made out to be. Traditionally, people have attempted to describe lexical competence in terms of a specification of all the knowledge that speakers might have about words in their lexicons – a fully specified model of the way individual words work in the language. The view I have put forward here is that this kind of approach seems to be very laudable in theory, but rather difficult to develop in practice: you can only really develop models of lexical competence of this sort if you have a complete model of semantics, and a complete specification of the syntactic and associational behaviour of all the words in a speaker's lexicon. So far, this level of description seems far from being realised.

What I have put forward instead is the idea that, for practical purposes, it might be possible to describe the salient features of lexical competence in terms of a small number of critical dimensions. The two I have identified here are **size** and **organisation**, and I have described some simple attempts to develop measuring instruments that might be used to explore them. These two dimensions have the advantage that they are relatively independent of the items that contribute to them, and do not require a detailed understanding of the way individual lexical items function. The crucial idea is that lexical competence is probably not just the sum of speakers' knowledge of the items their lexicons contain. There might be some advantage to be gained from backpedalling on this item-based approach to lexical competence, and from considering lexical competence in terms of a small number of global properties, rather than an accumulation of attributes of individual words.

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