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Habits and rabbits: word associations and the L2 lexicon

Abstract

Word associations have traditionally been used in linguistic research as a means of accessing information about the organisation of the mental lexicon. A number of important studies have revealed differences in word association behaviour in the L1 and the L2, but have failed to find consistent behaviour patterns. The study reported here suggests that this failure might be due to two factors, the choice of stimulus words and the categorisation of responses, which impose artificial constraints on both association behaviour and the exploration of response types. In order to move the investigation into L2 word associations forward, this study compares native speaker responses to a specific set of stimuli with those of advanced non native speakers. The types of association response made by each group of subjects are investigated by means of a retrospective interview, and patterns in response types are mapped. This results in a new method of categorising word association responses, and provides a more precise insight into the differences between L1 and L2 association patterns.

1. Introduction

1. 1 Background

Although traditionally used to explore psychological behaviour patterns, word associations have a number of interesting linguistic characteristics which have repeatedly brought them to the attention of those investigating the L2 lexicon. Meara (1996) has described vocabulary knowledge as consisting of three dimensions: size (or breadth), depth, and accessibility, or organization. Word association tasks have been used in attempts to measure all three of these dimensions: for example, Meara and Fitzpatrick's Lex30 word association test (2000) addresses vocabulary size and Read's word associates test (1989, 2000) investigates depth of vocabulary knowledge. However, the studies of interest to us here are those which investigate the properties of the links between, and hence the organization of, words in the L2 lexicon.

Underlying studies such as those by Riegel and Zivian (1972), Politzer (1978), Sökmen (1993), Söderman (1993), Schmitt (1998), Wolter (2001) and Orita (2002) is a belief that word association patterns can inform us in some way about L2 acquisition and storage. Our problem lies in the fact that the precise information to be gleaned from the associations is elusive; most studies indicate that native speaker associations are surprisingly predictable, but seem to differ fundamentally from those of non native speakers (e.g. Riegel and Zivian 1972, Meara 1978 and 1983). It is this difference which has encouraged the use of word association tasks as a means to investigate the structure of the L2 lexicon, but the exact nature of these differences between L1 and L2 is often difficult to identify and in any case varies in strength from

study to study. It is perhaps useful to observe some of the broad similarities which have emerged from previous studies before we attempt to discover why so many investigations in this area have reached something of a dead end.

The properties of an association can be categorized in a number of ways, but most studies use some variation of the syntagmatic/paradigmatic/clang distinction. Syntagmatic associations are those commonly found in the same sentence or phrase as the stimulus word in a text, paradigmatic associations are between words from the same word class and with related meanings, and clang associations are words with phonological similarities to the stimulus word. Söderman (1993) and Politzer (1978) have attempted to show that L2 acquisition mirrors first language acquisition in that association preferences systematically shift from syntagmatic to paradigmatic. They go some way towards showing this to be the case, but while the type of associations made might become more native-speaker-like, the actual response items produced do not become more predictable, often still differing hugely from those produced by native speakers (Riegel and Zivian 1972, Sökmen 1993). Riegel and Zivian also find that non native speakers not only produce different response items from native speakers, but that they produce a greater variety of response items too. Lastly, evidence suggests that clang responses occur rarely if at all in adult native speakers, and occur much more frequently in less proficient non native speakers than in proficient ones. As proficiency increases associations seem to be based increasingly on semantic or syntactic links and less on phonological or orthographic ones (Meara 1983).

From the above evidence we might propose that as L2 users move towards more native-speaker-like language, many of their syntagmatic associations will be replaced with paradigmatic ones, clang responses will disappear, and actual response items will be more similar to those given by native speakers. However, Kruse et al (1987) claim to show that this is not the case. They challenge the assumption that word association tasks can be used as a measure of nativeness, and investigate whether they hold any value at all as a measure of non native speaker proficiency. They conclude that there are a number of reasons why using word association tasks in this way might be unreliable. Firstly, many responses are culture-specific (the example of *apple – gravity* is given). This suggests that observed differences in the response patterns of native and non-native speakers might have as much to do with cultural awareness as with proficiency level. Secondly, they protest that the move towards more paradigmatic responses as proficiency increases is not such a straightforward process as Politzer (1978), for example, had suggested. Their own experimental study finds no clear distinction between behaviour of native speakers and non-native speakers, and no clear correlation between association test results and proficiency measures. This is surprising in the context of the patterns and trends which other researchers claim to have noticed in word association behaviour. Indeed, the authors conclude that "contrary to the expectations raised by earlier studies, we find that word association tests do not show much promise for the specific role created for them in L2 research" (Kruse et al 1987: 153).

To an extent the discouraging conclusions of the Kruse et al (1987) study warn other researchers in the field of the possibility that their investigations are headed towards a dead end. However, despite Kruse et al's assertion that there are no useful association

patterns emerging from L2 experiments, the tenacity with which other researchers have clung to possible applications of word association tasks in an L2 context implies that the true potential of these tasks is unrealised rather than non-existent. In an attempt to explore the potential of these tasks, the study described here aims to remove some of the obstacles to progress in this area by identifying, and then addressing, specific assumptions and weaknesses which have been problematic in previous studies. The three main areas of concern here are the choice of stimulus words in word association tasks, the degree to which the subject's stimulus-response link is communicated and understood, and the way in which responses are categorised.

1.2 Stimulus words

A recurring observation in both the L1 and L2 word association literature is that association responses are in some way influenced or even determined by certain characteristics of the stimulus word. Stimuli from different word classes tend to prompt certain kinds of association, with nouns often prompting nouns, adjectives often prompting nouns and verbs prompting verbs, etc. (see Deese 1962 and Sőkmen 1993). Again, though, some of the findings in this area are contradictory, and it seems possible that there are differences in the behaviour of native speakers and non-native speakers. There are also claims that more frequent vocabulary items tend to have more predictable responses (Meara 1983), which is not especially helpful when we are investigating *differences* between subjects' responses. It is clear, then, that any list of stimulus items must be selected with care. Meara (1983), Schmitt (1998) and

Wolter (2001) consider it problematic that so many studies use the 100 words from the Kent-Rosanoff list (1910), largely because, as Deese observes, “these words are of very high frequency of usage, and they are almost entirely from two grammatical classes, adjectives and nouns” (1962: 79). The Kent Rosanoff list has been used often not so much because of the frequency of items, but because the response norms are well-established. However, several studies compile lists of stimulus words solely on the basis of their frequency. Studies which include subjects at lower proficiency use high-frequency stimulus items to maximise the chance of subjects knowing the stimulus word.

The number of stimulus items given, and the number of responses requested, varies hugely from one study to another. Those using the Kent Rosanoff list often include all 100 stimulus words. Kruse et al (1987) on the other hand use only 12, and Ruke-Dravina (1971) uses just four. Given that some words have very strong primary response norms, caution is necessary in any attempt to extrapolate behaviour patterns from such a small sample of items. Many studies ask for just one response per item, but others (Kruse et al 1987) ask for up to 10. The danger here is that each response in the list acts as a stimulus for the next response, and so on, resulting in an association chain rather than a collection of associations.

Given that word association study findings can be influenced by the frequency and class of stimulus words, the number of stimulus words and the number of responses requested, it is imperative that lists of stimulus words are compiled in a principled manner.

1.3 Understanding the link between stimulus words and subjects' response

One of the difficulties encountered by researchers attempting to categorise word association responses after the word association task has been completed is that this often necessitates second guessing the subject's response process. Some researchers try to address this by using a team of category "judges" (Wolter 2001), or by using a "dustbin" category for "unclear cases" (Yokowawa et al 2002). Some association pairs words are particularly likely to give rise to such a lack of clarity. For example the study described here included the stimulus word *partnership*, to which a popular response was *business*. How to categorise this response is clearly problematic; it could be a collocation (syntagmatic) response, as in *they have a business partnership*, or a synonymous (paradigmatic) response, as in *the partnership/business went bankrupt*. Data from an earlier study (Meara and Fitzpatrick 2000), which asked for three responses per cue word, saw a subject respond to the stimulus word *habit* with *red eyes, grass, big ears*; only with the third response did the researcher realise that the responses were not linked to *habit* (in the context of a drug-taking habit, for example) but rather that the cue had been mistaken for *rabbit*. In other cases the link between stimulus and response might not be clear at all to the researcher – word association tasks were, after all, originally used in the field of psychology to expose individual idiosyncrasies. In the context of second language acquisition research an unusual response might also, of course, be due to incomplete or inaccurate understanding of the stimulus or response words, or to a random word retrieval in order to make any response at all (Meara 1984). In examples from the study described in this paper, we see the stimulus *manual* prompting *vacuum cleaner*, and *liberal*

prompting *inaccurate*. These responses seem to show no clear connection to their cue until we hear that in the first case the subject had been looking for the *manual* to the broken *vacuum cleaner* in her house that morning, and in the second case the subject enjoyed arguing against a *liberal* interpretation of the bible because she felt that this was *inaccurate*.

An obvious solution to the problem described above is to conduct a retrospective interview with each subject, asking them to explain the link between the stimulus word and their response. Although this is clearly a time-consuming procedure, it would minimise the effects of subjectivity or ignorance on the part of the researcher, ensuring that response items are neither assigned to categories inaccurately, nor "wasted" by being assigned to a "dustbin" or "other" category.

1.4 Categorisation of responses

Studies investigating word association responses in non-native speakers tend to measure their subjects' responses in one of two ways. The first method uses lists of native speaker word association norms (such as the Edinburgh Associative Thesaurus (Kiss et al 1973), the Kent-Rosanoff lists (Postman and Keppel 1970)), and compares the actual lexical items which are produced in response to each stimulus word in an attempt to determine how "native-speaker-like" the responses are. The second method categorises not according to the actual response word, but according to the association type; typically this categorisation will use the conventional categories of paradigmatic, syntagmatic and clang associations, or some variation on these. Using

the first of these methods is problematic because in the case of most stimulus words (especially, it seems, less frequent ones), native speakers' responses vary so much that it is difficult to identify a response as native-speaker-like or otherwise (see Schmitt 1998). Using the categories of paradigmatic, syntagmatic and clang association, though, is also unsatisfactory in that it imposes artificial constraints on the exploration of response types. This happens for a number of reasons. Firstly, the contents of these categories are difficult to define in absolute terms and are therefore open to different interpretations; we hear that "a syntagmatic response …*as a rule* belongs to a form class different from the stimulus……a paradigmatic association *generally* belongs to the same form class…" (Sőderman 1992: 157), and "there are always some responses that may quite reasonably (and accurately) be classified in more than one category" (Wolter 2001: 52). Meara concludes that "I have always found that this distinction is very difficult to work in practice, especially when you cannot refer back to the testee for elucidation" (1983: 30).

The second constraint imposed by restriction of responses to these three categories is that they do not account for all possible response types. Testament to this is the inclusion of an "other" category in many studies (e.g. Orita 2002, Wolter 2001, Sőderman 1993). Wolter includes these "other" responses in the "clang" category, which is not problematic in a study which focuses on syntagmatic and paradigmatic responses, but which may mask characteristics of both the genuine clang responses and of these less predictable other responses in a study with a broader focus. This restraint has been addressed in a number of cases by developing a new set of categories (e.g. Sőkmen 1993), although in some cases (e.g. Yokokawa 2002) the "other" category is still deemed necessary.

Perhaps the most important restraint of using only the three categories paradigmatic, syntagmatic and clang, is that they do not allow us a very precise method of categorisation. Inside each of these categories are several potential subcategories which might reveal important native/non-native speaker differences. For example the syntagmatic category includes words which collocate consecutively and those which collocate in a phrase, responses which usually occur before the stimulus word in a sentence and those which usually occur after it. Given that so many L2 studies indicate that there is some kind of clang>paradigmatic>syntagmatic shift with increasing proficiency, but that the exact nature or reliability of this shift is difficult to identify, it would seem reasonable to explore what is actually happening *inside* these conventional classifications – whether a certain *kind* of paradigmatic or syntagmatic response is favoured by native rather than non-native speakers, for example. The rather broad conventional categories, then, must be further divided into set of subcategories in order to get a more detailed picture of the kinds of association being produced.

1.5 Background summary

It seems that a lot of the confusing evidence from previous studies of L2 word association behaviour may be due to unprincipled selection of stimulus words and methods of broad categorisation which mask more subtle behaviour patterns. In addition to this, a lack of reference back to the subjects themselves for information about association processes results in data being relegated to a dustbin category and so "wasted", or, in many cases, mis-classified. The study described below attempts to

move the investigation into L2 word association behaviour forward by using new techniques for gathering and processing data which address these difficulties.

2. The Study

2.1 Aims

The research aims addressed in this study are as follows:

- to compare types of native and non-native word association responses to a list of 60 stimulus words from the Academic Word List (Coxhead 2000) by using a new method of response categorisation
- to assess how comprehensive and inclusive the new method of response categorisation is in the light of the responses produced in this study
- to use the new categories of association to identify precise areas of difference between native and non-native responses
- to use the new categories of association to identify differences between proficient and less proficient non native speakers

2.2 Subjects

The study focused on two sets of subjects, 40 native speakers of English and 40 non-native speakers. As the selected stimulus words were all from the Academic Word List, subjects were chosen on the basis that they have experience of working with academic English, at undergraduate and/or postgraduate level. Non-native speaker subjects had all gained entry to university undergraduate, postgraduate or pre-sessional programmes in the University of Wales, Swansea, and can therefore be assumed to have a level of English equivalent to or higher than IELTS 5.5 (the minimum entry level for pre-sessional students). In a pre-test to the experiment, the receptive vocabulary of these non-native speaker subjects was measured using the

Eurocentres Vocabulary Size Test (Meara and Jones 1990), a quickly administered yes/no test which calculates the size of the receptive vocabulary of learners. The score data obtained in this test, shown in table 1, results in a mean score of 6614, which equates approximately with an IELTS score of 6.6. The maximum possible score on this test is 10000.

Table 1: EVST scores (i.e. estimated receptive vocabulary size) of nns subjects

N	Mean	Min	Max	sd
40	6614	3550	9900	1660

2.3 Materials: the stimulus words

As described above in section 1.2, the selection of stimulus words can be problematic. In this study we address these problems by using words of varying frequency and word class, but excluding very high-frequency items. We also avoid concrete nouns, which tend to produce predictable responses and which are more likely to share a conceptual representation in the L1 and L2 (Kroll and de Groot 1997). The items we used are all from the Academic Word List (Coxhead 2000). The AWL automatically excludes the 2000 most frequently occurring words in English, thus addressing the problems associated with very frequent stimulus items. Six items were randomly selected from each of the 10 frequency sublists of the AWL described in table 2, giving a list of 60 items. The distribution of these items in terms of word class, which can be seen in table 3, is broadly representative of the word class distribution across the whole AWL.

Table 2: coverage of words in the academic word list (Coxhead 2000)

AWL sublist	Coverage of the Academic Corpus (%)	Pages per repetition in the Academic Corpus
1 (60 families)	3.6%	4
2 (60 families)	1.8%	8
3 (60 families)	1.2%	12
4 (60 families)	0.9%	15
5 (60 families)	0.8%	19
6 (60 families)	0.6%	24
7 (60 families)	0.5%	30
8 (60 families)	0.3%	49
9 (60 families)	0.2%	67
10 (30 families)	0.1%	82

Table 3: Stimulus items by word class

Word class	
Noun	30
Adjective	13
Verb	9
Preposition	2
Conjunction	1
Adverb	1
Adjective or noun (eg *manual*)	3
Verb or noun *(transfer*)	1

The detailed nature of the process to be used for categorising responses demanded that we obtain as many stimulus-response pairs as possible from each subject. However, because the study design entailed interviewing each subject about their responses, the number of stimulus items was for practical reasons limited to 60. More than 60 association items would have been impractical for subjects in terms of time taken and effects of fatigue/boredom. One response only was requested per stimulus item; we were interested in the association of the primary response only, and wanted to avoid any chaining effects. The list of stimulus items can be seen in table 4.

Table 4: Stimulus items used in word association task

1	consistent	31	brief
2	environment	32	estate
3	income	33	incentive
4	method	34	lecture
5	response	35	rational
6	variables	36	utility
7	commission	37	confirmed
8	cultural	38	eliminate
9	injury	39	hierarchical
10	positive	40	paradigm
11	resources	41	somewhat
12	transfer	42	voluntary
13	contribution	43	chart
14	dominant	44	detected
15	instance	45	implicit
16	partnership	46	paragraph
17	sequence	47	schedule
18	volume	48	visual
19	commitment	49	coincide
20	emerged	50	distorted
21	integration	51	manual
22	overall	52	portion
23	regime	53	scenario
24	undertaken	54	vision
25	conflict	55	colleagues
26	equivalent	56	encountered
27	liberal	57	intrinsic
28	objective	58	notwithstanding
29	stability	59	posed
30	whereas	60	whereby

2.4 Procedure: gathering data

In the first stage of the procedure, each subject was asked to complete the 60-item word association task, with the instruction “please write down the first word you think of when you read each of the words listed”. Subjects were not given time constraints for this task, but the task did take place in a controlled environment with no access to dictionaries or other texts. Most subjects completed the task within 15 minutes. The second stage of the procedure took the form of an interview with the subject, in which

the subject was asked why they thought they had given each response. These interviews took place immediately after the subject had completed the association task, and interviews were recorded for later reference.

2.5 Procedure: categorising responses

In order to categorise associations accurately and precisely, for this study we formulated a new set of categories and subcategories for responses. These categories were arrived at on the basis of three sets of information. Firstly, we considered the advantages and disadvantages of the categorisation used in previous word association studies and decided that while it might be useful to have a broad three-way categorisation, these categories could be defined in more user-friendly terms, and must be further divided into sets of sub-categories. Secondly, we examined response data from previous studies (Meara and Fitzpatrick 2000) in order to determine a set of categories which would be inclusive of every response type identified. Thirdly, we considered suggestions as to the constituent aspects of word knowledge as these might indicate potential reasons for association. The most useful model here was from Nation (2001: 27), who lists nine features of word knowledge under the broad headings of "form", "meaning" and "use". We used this as a basis for identifying three main categories of association: meaning-based association (similar to the paradigmatic classification and taking in most of Nation's "meaning" category), position-based association (similar to syntagmatic and with features in common with Nation's "use" category) and form-based association (similar to the clang category, but including orthographic as well as phonological associations, and overlapping

Nation's "form" category). In addition, a category of "erratic association" included responses which were based on false cognates, or for which a link could not be identified even by the subject themselves. Each category contained a number of subcategories, again informed by the background studies and models outlined above, which are defined in table 5.

Table 5: Categories and subcategories used to classify word association responses (x = stimulus word, y = response word)

Category	Subcategory	Definition
Meaning-based association	Defining synonym	x means the same as y
	Specific synonym	x can mean y in some specific contexts
	Hierarchical/lexical set relationship	x and y are in the same lexical set or are coordinates or have a meronymous or superordinate relationship
	Quality association	y is a quality or x or x is a quality of y
	Context association	y gives a conceptual context for x
	Conceptual association	x and y have some other conceptual link
Position-based association	Consecutive xy collocation	y follows x directly, or with only an article between them (includes compounds)
	Consecutive yx collocation	y precedes x directly, or with only an article between them (includes compounds)
	Phrasal xy collocation	y follows x in a phrase but with a word (other than an article) or words between them
	Phrasal yx collocation	y precedes x in a phrase but with a word (other than an article) or words between them
	Different word class collocation	y collocates with x + affix
Form-based association	Derivational affix difference	y is x plus or minus derivational affix
	Inflectional affix difference	y is x plus or minus inflectional affix
	Similar form only	y looks or sounds similar to x but has no clear meaning link
	Similar form association	y is an associate of a word with a similar form to x
Erratic association	False cognate	y is related to a false cognate of x in the L1
	No link	y has no decipherable link to x

Subjects' responses were classified according to the categories in table 5. This classification was made according to information given by the subject at interview stage, and therefore refers to the subject's own perspective of the link between words rather than to any external referent. For example, in several cases the stimulus word *environment* prompted the response *pollution*. When at the interview stage a subject explained *"well, you talk about environmental pollution"*, the response was classified as "different word class collocation". When the subject explained *"when I think about the environment I think about pollution"*, the response was classified as "conceptual association".

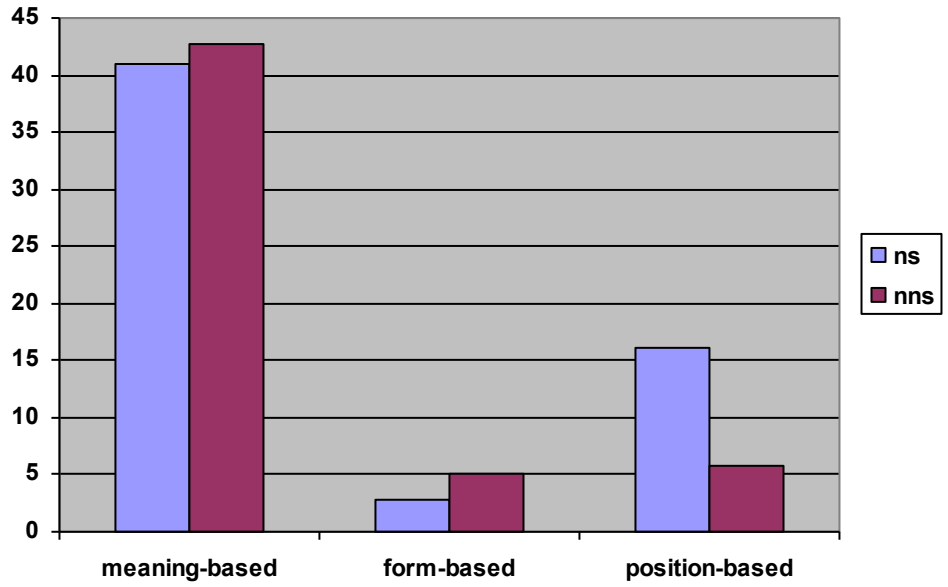
2.6 Results

Data from the experiment was processed in order to give two sets of results. The first set of results compares the responses of native speaker and non native speaker subjects in each of the categories in table 5. The second set of results investigates the relationship between association behaviour and language proficiency in non native speaker subjects.

2.6.1 Comparison of native speaker and non native speaker responses

The mean number of responses in each of the three main category groups was calculated for native and non-native speaker subjects. Figure 1 illustrates that both groups show a clear preference for meaning-based responses. Non-native speakers gave more form-based responses than the native speaker group, but the biggest difference between the two groups was in position-based responses; native speakers gave more than twice as many position-based responses as non-native speakers.

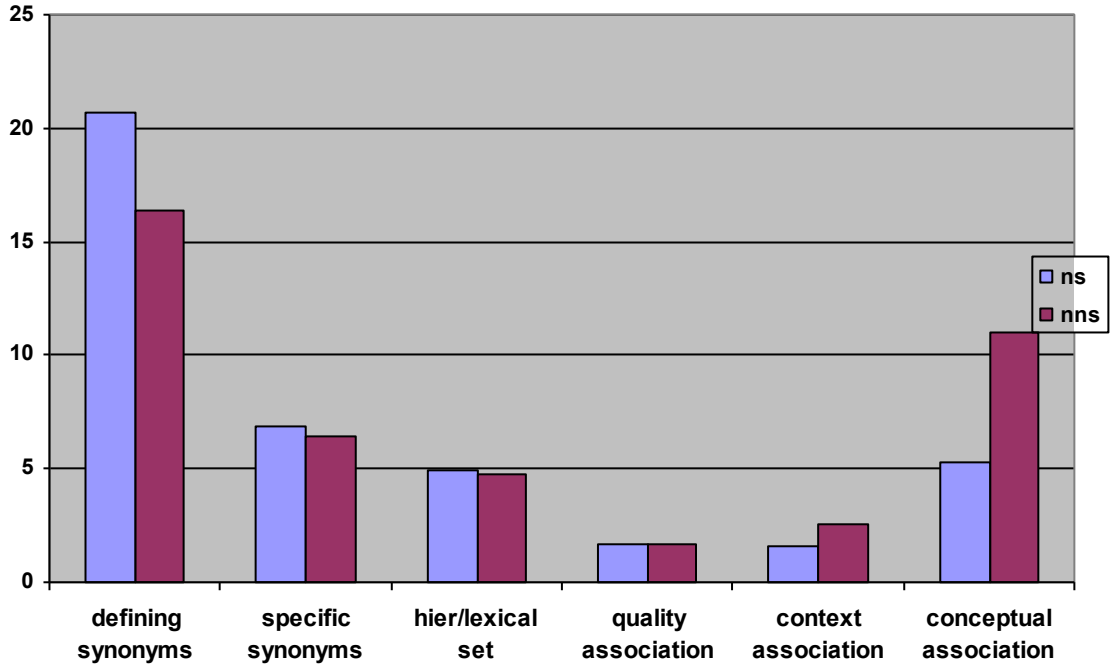
Figure 1: Mean number of responses given by subjects in each main category



The breakdown of responses in terms of sub-categories was then examined for the two subject groups. As we have seen, the majority of associations fell into the meaning-based category, and as figure 1 shows, the two groups produced approximately the same number of responses in this category (a mean of 41 responses for native speakers and 43 for non native speakers). However, figure 2 illustrates that the two groups did not show equal response-type preference through all the sub-categories of the meaning-based classification. More defining synonyms (responses which constitute a definition of the stimulus word, such as *confirmed>definite, overall>generally*) came from the native speaker group than the non native speaker group. The non native speaker group tended to make more associations which, though meaning-based, had a more vague conceptual relationship than synonymy, hierarchy, coordination or quality. These are found in two of our subcategories: associations of context (where *y* gives a context for *x*, as in *lecture > university*), and in the "conceptual associations" category, which includes association pairs such as *cultural>cathedral, stability>baby* and *visual>colour*. It is in this last category that we see the biggest difference between native and non native speaker response

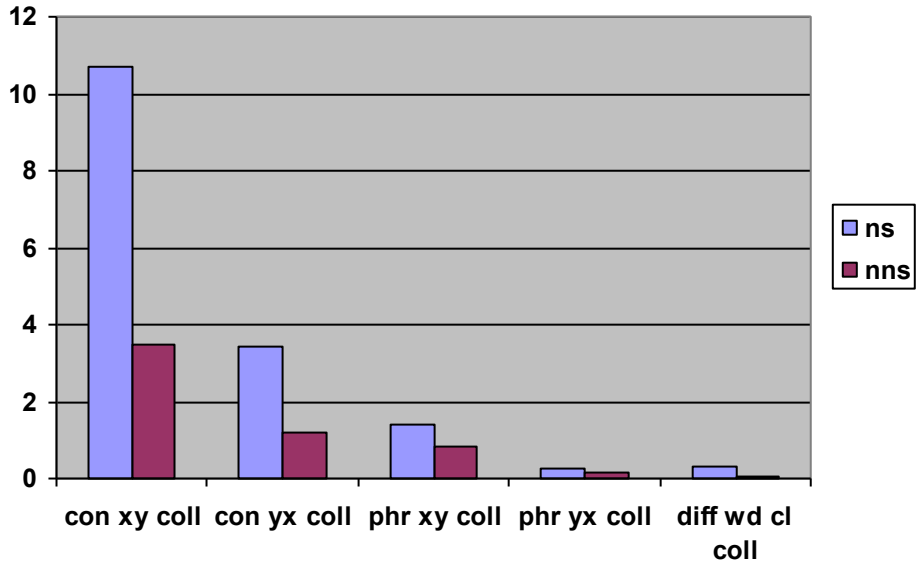
behaviour, with non native speakers providing more than twice as many of this response type than native speakers.

Figure 2: Mean number of responses given by subjects in subcategories of "meaning-based associations"



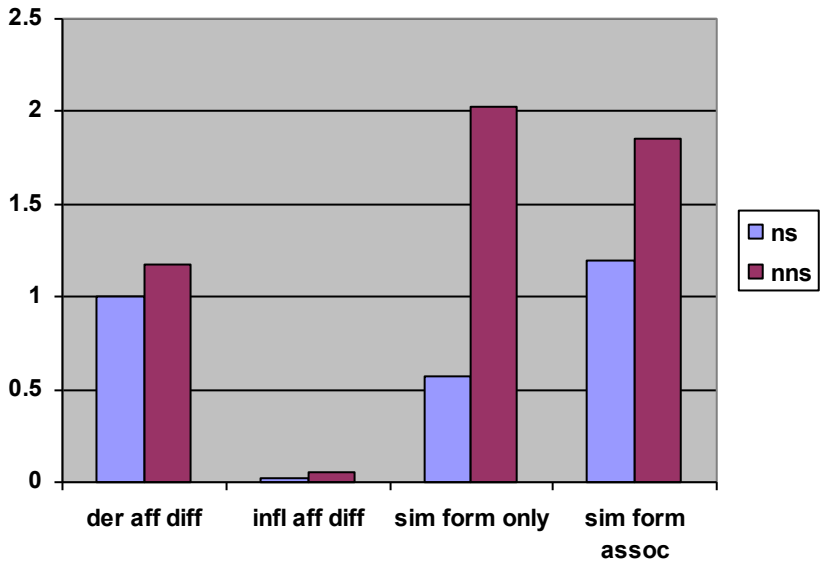
As we have seen in figure 1, the majority of the position-based responses (on average 16 as opposed to 6 per subject) were given by the native speaker group. Figure 3 shows that most of these responses were consecutive *xy* collocations (eg *visual>aid*) and that these, together with the *yx* collocations (eg *chart>pie*), constituted the biggest difference between native speaker and non native speaker responses. In all the subcategories of position-based responses, though, the number of native speaker responses was higher.

Figure 3: Mean number of responses given by subjects in subcategories of "position-based associations"



Of our three main response categories, form-based associations was the least popular. Only 316 of the total number of responses given in the study were form-based, and the majority of these (204) were given by the non native speaker group. Figure 4 indicates that while "responses similar in form only" (eg *undertaken>undertaker, eradicate>estimate, utility>utensil*) were responsible for most of this difference, all the subcategories contain more non native speaker than native speaker responses. The majority of native speaker responses in the form-based category are "similar form associations". These arise from a kind of dual association, whereby the response is semantically related to an "invisible" link word which is similar in form to the stimulus word. Examples of this are the association pairs *undertaken>funeral* (link word = undertaker), *utility>finally* (link word = ultimately), *intrinsic>detailed* (link word = intricate).

Figure 4: Mean number of responses given by subjects in subcategories of "form-based associations"



Having gained an overall impression of native and non native speaker group behaviour, for each subcategory the difference was calculated between the mean number of native speaker and non native speaker responses for each word and these means were compared using a t-test analysis. This enables us to identify those categories in which there was a statistically significant difference between native and non native speaker responses. Tables 6 and 7 give the results of this analysis, first by category then by subcategory.

Table 6: Comparison of means by category

category	t	sig	group with higher mean
Meaning-based association	1.254	.215	nns
Position-based association	10.581**	.000	ns
Form-based association	2.940**	.005	nns

Table 7: Comparison of means by subcategory

Subcategory	t	Sig	group with higher mean
Defining synonym	3.754**	.000	ns
Specific synonym	.560	.578	ns
Hierarchical/lexical set relationship	.269	.789	ns
Quality association	.136	.892	ns
Context association	2.838**	.006	nns
Conceptual association	7.123**	.000	nns
Consecutive xy collocation	8.015**	.000	ns
Consecutive yx collocation	4.339**	.000	ns
Phrasal xy collocation	1.558	.124	ns
Phrasal yx collocation	1.158	.252	ns
Different word class collocation	1.744	.086	ns
Derivational affix difference	.680	.499	nns
Inflectional affix difference	.574	.568	nns
Similar form only	2.974**	.004	nns
Similar form association	1.188	.239	nns

This comparison allows us to note the following differences between native and non native speaker word association behaviour:

- Native speakers produce significantly more position-based associations and significantly fewer form-based associations than non native speakers.
- Native speakers produce significantly more defining synonyms and consecutive collocations than non-native speakers
- Non-native speakers produce significantly more association pairs which are similar in form only, or which are associated through context or a loose conceptual link.

2.6.2 Comparison of proficient and less proficient non native speaker responses

In order to determine whether a relationship exists between the proficiency level of a subject and their response type preferences, we compared the number of responses for each subject in each of our main and sub-categories with their proficiency level as estimated by the size of their receptive vocabulary (calculated by the yes/no test described above in section 2.2 (Meara and Jones 1990)). The results can be seen in tables 8 and 9.

Table 8: correlations between responses (main categories) and yes/no vocabulary test scores

	r	sig
meaning-based associations	.244	.129
position-based associations	.305	.055
form-based associations	-.088	.588

Table 9: correlations between responses (sub-categories) and yes/no vocabulary test scores

	r	sig
defining synonym	.237	.140
specific synonym	.198	.220
hier/lexical set relationship	.190	.241
quality association	-.187	.249
context association	.126	.439
conceptual association	.217	.179

consecutive xy collocation	.242	.133
consecutive yx collocation	.248	.122
phrasal xy collocation	.361*	.022
phrasal yx collocation	.241	.135
different word class coll.	-.008	.960
derivational affix difference	.126	.437
inflectional affix different	.256	.111
similar form only	-.015	.928
similar form associate	-.460**	.003

The results in table 8 show that there was no systematic relationship between responses in the three main categories and subjects' proficiency levels. Table 9 shows that only two of our sub-category response types relate to proficiency levels. The correlation between the number of phrasal collocation responses (eg *method>madness, detected>illness*) and proficiency levels is significant at $p<.05$, and indicates that more proficient subjects tended to produce more of this response type. A negative correlation, significant at $p<.01$, is found between proficiency level and responses in the "similar form association" category (*undertaken>funeral*, etc.). This indicates that the lower a subject's proficiency level, the more likely they are to give a response to a word which is similar in form but shares no meaning relationship with the stimulus word.

In section 2.6.1 we reported that there was a significant difference in the way native and non native speakers responded in respect of eight of our categories and

subcategories. Native speakers responded with more position-based associations, defining synonyms, and consecutive xy and yx collocations. Non native speakers produced more form-based associations, context-based associations, conceptual associations and responses which are similar in form only. In tables 8 and 9 we can see that in none of these categories is there a relationship between proficiency and response preference. This implies that while there might be some systematic patterns in the development of response behaviour as proficiency increases, there is no pattern of development towards native-speaker-like responses.

3. Discussion

At first glance our results might seem to hold few surprises; broadly speaking both native and non native speakers demonstrate an overall preference for meaning-based responses, native speakers are the more likely of the two groups to produce position-based responses and non native speakers produce more form-based responses than native speakers. This is not so different from what has been revealed in previous studies. As in those studies, the exact nature of native/non native response preferences is still somewhat unclear, but our study has traced significant differences in association behaviour to six of the fifteen subcategories we analysed. We have also found some evidence to suggest that non native speakers' response behaviour changes as proficiency increases, but our findings do not support the idea that with increased proficiency, responses become more native-like.

The findings from this study leave us with a number of issues which deserve further exploration and discussion. Firstly we will look in more detail at the nature of the differences between native and non-native speaker responses. The two most interesting differences here are in the "collocation" categories, which are far preferred by native speakers, and inside the meaning-based category, where non native speakers tend to produce associations with very loose semantic connections with the stimulus word, rather than the defining synonyms preferred by native speakers. This will lead us to consider whether these differences are simply the result of comparing a "complete" with an "incomplete" lexicon, in which case non native speakers will move towards more native speaker-like behaviour as proficiency improves, or whether there is a more fundamental difference in the way words are associated in the L1 and L2. Lastly we will focus on the fact that even within our two groups, association behaviour is evidently idiosyncratic, and we will consider the aspects of word knowledge which seem to activate different associations in different individuals.

The biggest difference found between native and non native speaker responses was in the broad category of "position-based association" ($t = 10.581$ $p<.001$). This is not, of course, the response type preference of either group; position-based responses constitute only 27% of all native speaker and 11% of all non native speaker responses, but the difference revealed here between the two subject groups deserves further consideration. What our study does not reveal, is whether non native speaker subjects are *unable* to produce collocational responses to stimulus words, or whether they are simply *unwilling* to. Certainly the words produced through collocational association by native speakers do not seem to be harder, or less frequent, than the words they produce in other association categories, and they are likely to be known by the non

native speaker group we used. This suggests that the paucity of collocational response by non native speaker subjects is not caused by the absence of appropriate *items* in the mental lexicon, but by the absence, or weakness, of certain lexical *connections*. This of course could be empirically tested, by restricting association responses to collocation, in a similar procedure to that used by Riegel and his colleagues in their 1967 restricted associations study. The fact remains, though, that native speakers are far more likely to produce collocational responses than the non native group, and this challenges some of the assumptions previous studies have made about association behaviour. Sőderman, for example, attempts to show that non native speaker word association responses will develop in the same way as those of the young native speaker, in other words that there will be a shift from syntagmatic to paradigmatic responses. She is surprised when her proficient learners produce so many syntagmatic and her less proficient learners so many paradigmatic links, and puts this down to "the development of individual words in the lexicon" (1993: 16). There are other possible explanations here, though. Wray's model of the creation of the lexicon contrasts the holistic approach of the young L1 learner with the analytical approach of the adult L2 learner (2002: 207-208). The premise here is that the L1 lexicon by default will store language in chunks, or word strings, and that storage of individual words and morphemes certainly occurs, but as a result of subsequent analysis of these strings. This fits with our findings; the collocational responses from native speaker subjects might result from the activation of an unanalysed word string. Non native speakers, who, according to Wray, construct formulaic strings from single words and only then store them, have far fewer of these ready-made collocations available for activation. Wray's suggestion that the construction of the L1 and L2 lexicons is fundamentally different in this way explains why we see no correlation in our non native speaker

group between proficiency and collocational responses (the one correlation between proficiency and the subcategory of "phrasal xy collocations" is weak ($r = .361$ $p<.05$) and in any case based on just 33 responses). Although L2 users will construct word strings, mostly this seems to happen on-line and very few strings constructed in this way seem to then be stored as such – perhaps not enough to be noticed as proficiency increases.

The second biggest, and possibly most puzzling difference between subject groups lies in three subcategories of meaning-based associations. Here we found that native speakers were far more likely than non native speakers to produce responses which were defining synonyms ($t = 3.754$ $p<.001$). On the other hand, far more contextual associations ($t = 2.838$ $p<.01$) and loose conceptual associations ($t = 7.123$ $p<.001$) were produced by non native speakers. Of these three categories, the higher number of responses and the most significant difference between groups were found in the defining synonyms and loose conceptual association categories. A typical example of response behaviour here can be seen in Table 10.

Table 10: responses in the defining synonym and loose conceptual association categories for the stimulus word "contribution"

native speaker defining synonyms		native speaker loose conceptual assoc		non native speaker defining synonyms		non native speaker loose conceptual assoc	
donation	7	state	1	help	7	non profit	1
give	7	provision	1	give	2	voluntary	1
money	6			money	1	politics	1
input	2			gift	1	group	1
help	2			donation	1	father	1
part	1			sharing	1	cultural	1
gift	1			add	1	words	1
payment	1			payment	1	hero	1
						involved	1

						devote cause solve	1 1 1
	27		2		15		12

One way of explaining this difference in behaviour would be to suggest that all respondents would prefer to give the defining synonym response, but that non native speakers simply do not have the necessary vocabulary for this. However, when we analyse items produced in response to the cue "contribution" we find that those produced by non native speakers tended to be harder words (i.e. less frequent words) than those provided by native speakers. 63% of defining synonyms produced by native speakers are extremely frequent words (in the first 1000 band of Nation's word lists (Nation 1984)) whereas only 33% of the non native speakers' loose conceptual responses are. It seems, then, that we cannot explain away the difference in response behaviour with the claim that non native speakers simply produce easier words – the ones they know – and do not produce more exact synonyms because their vocabulary is too restricted. As with the collocation issue discussed above, we have to address the question of whether non native speakers are unable to or are unwilling to produce the same kind of responses as native speakers. Again, it would be possible to test this empirically by, for example, asking non native subjects for multiple responses to each stimulus word and observing whether the defining synonym responses are eventually produced. As with the collocation discussion above, it seems we are more influenced by the existence and strength of the *links* rather than of the *words* in the lexicon. If we work on the assumption that availability of lexical items is not the reason for the difference in our subject groups, we must look for another explanation. The comparative vagueness of non native speaker responses to word association cues has been noted in previous studies. Riegel commented that "the conceptual distinctions of

second languages are less clear than those of native speakers" (1967: 542), and Sőkmen found that "(second language) students develop word associations based on feelings, attitudes or strong memories" (1993: 140). This last comment is consistent with the fact that there is no homogeneity of response in the non native speaker "loose concept associations" listed in table 14; they are particular to each individual. This brings us back to one of the most persistent difficulties connected with using word association behaviour to explain the L2 lexicon; to what extent can we usefully refer to group behaviour patterns, and to what extent are word associations fundamentally individual?

It is self-evident that studies which have compared response items and response category preferences of native speakers and non native speakers are working on the basis that there are similarities in association behaviour within the two groups and differences between them. Indeed, many of the findings of these studies seem to show as much. Studies which compare L2 association behaviour with L2 proficiency in an attempt to find movement towards native-speaker-like behaviour, though, muddy the picture rather, by suggesting that L2 association patterns follow a continuum from "very un-native-like" to "quite native-like". The findings of our study do not support the idea of such a continuum; proficient subjects show no more signs of being native-like in their responses than those less proficient. There is some indication that more proficient subjects make more phrasal collocation associations, but, as mentioned above, the number of occurrences of this response type (33) makes this a less than reliable finding. A more significant correlation is the negative relationship between proficiency and responses which are to a word with a similar form to the stimulus (74 occurrences). Initially it seems that this can be easily explained: the L2 user has

simply misidentified the stimulus word. Meara found many examples of these "associations (which) illustrate some sort of phonological or orthographic confusion" in his study of L2 French learners (1984: 233). However, while it is clear from our findings that this type of response is more likely to be produced by non native speakers, there are 48 occurrences of them being produced by native speakers. This indicates that the "phonological or orthographic confusion" may not be caused simply by features of the learner interlanguage; the form of the word seems to have activation properties in the native speaker lexicon too. Form-based associations account for 5% of native speaker responses in our study, and although this is significantly less than the proportion of non native responses which were form-based (10%), still it seems to challenge Meara's claim that "the semantic links between words in the learner's mental lexicon are fairly tenuous ones, easily overridden by phonological similarities *in a way that is very uncharacteristic of native speakers*" (my emphasis) (1983: 32).

Our exploration of the apparent contradictions which this and previous studies have found in comparing L1 and L2 response preferences, can perhaps be moved forward by examining associations in terms of the aspects of word knowledge mentioned in section 2.5 above. We have so far referred to the existence, or otherwise, of a word in the learner lexicon. In fact, of course, a bundle of information is packed into the existence of each word, and might include awareness of syntactic patterns, usage constraints, register and connotation, for example, as well as basic knowledge of meaning and form. Following this model, we might assume that the "better" we know a word, the more complete the information in that word's "package". A word association task requiring spontaneous responses does not require testees to explore each word's package of information; rather, they use the first aspect of knowledge

which is activated to find their response word. As the findings of our study show, activation might happen within the form, meaning or position section of the word's information package, and indeed within subsections of these. We can assume that the word information packages of non native speakers will be less complete and therefore that the potential aspects for activation are limited. When a word first enters the L2 lexicon, its information package might only contain some knowledge of its form, and perhaps an awareness of the semantic context in which it was encountered. These are reflected in the "similar form" and "context association" categories in our study which were significantly more popular with non native than with native speaker subjects. If any association depends on the activation of a salient aspect of word knowledge, it follows that non native speaker responses will broadly differ from those of native speakers; but perhaps this is simply due to the stage of completeness of the "word information package" in the lexicon.

Table 11: native speaker responses in the three main association categories

	mean	minimum	maximum	sd
position-based associations	16	2	48	13.11
meaning-based associations	41	11	57	12.72
form-based associations	3	0	13	2.45

It still remains for us to explain, though, why the more "complete" word information packages in the L1 lexicon do not lead to particularly homogeneous responses. As

table 11 shows, there is a huge amount of variation in native speaker responses, with the number of position-based responses, for example, ranging from 2 to 48. The only realistic explanation here is that each individual lexicon – perhaps each individual lexical entry - has a salient feature. While in both native and non native speakers this is most likely to be a feature of the word's meaning, in both groups it is possible for a form- or position-based feature to be salient. The prominence of the feature to be activated by a word association task stimulus word, then, depends on two factors. Firstly, it depends on which aspects of knowledge of the stimulus word are contained in the lexicon. Secondly, it depends on the salience of particular features of the stimulus word, and as yet we have no evidence that this has any systematic cause. It is the first of these two factors which causes the systematic differences we have noted between non native speaker and native speaker response patterns. It is the second feature which confounds any application of word association techniques to measures of native-like behaviour in L2 users.

4: Conclusion

This study has moved forward our investigations into L2 word association behaviour both in terms of maximising the efficiency of data gathering, through a carefully chosen set of stimulus words and a supplementary interview stage, and in terms of processing that data in a meaningful and accurate way. The subcategories we used to classify responses reveal differences between native and non native speakers which the traditional classification techniques have masked. A clear example of this is the preponderance of defining synonym responses from native speakers as opposed to the

high number of loose conceptual responses from non native speakers. In many previous studies these both would have been grouped under the heading "paradigmatic responses" and no difference would be noted. Some categories, such as those which attracted very few responses, or where response behaviour was very similar, might be merged in future studies. Examples of these would be the derivational and inflectional affix differences, and the xy and yx collocation categories. However, by retaining a broad range of categories and by retaining the interview component of the experiment, we can ensure that very few responses are "wasted" (only 1% of answers given in our study had to be categorised as erratic) or wrongly categorised.

It is important that future studies investigate the similarities as well as the differences between L1 and L2 response patterns, and the differences as well as the similarities within each subject group. In this way a lexical model can be developed which accounts for the apparent contradictions evident in previous research findings. We believe that the methodology used in this study might prove a valuable tool in the move towards finding a solution to the puzzle of L2 word association behaviour.

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