

**What We Can Learn From the  
Word Association of L2 Learners**

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&  
Lexis

LX/04/02:  
Following task 123 on page 152 of McCarthy (1990 *Vocabulary* OUP), explore the  
relationship between word-association and learners' lexical development.

# **What We Can Learn From the Word Association of L2 Learners**

## **1.0 Introduction**

It goes without saying that an increasing command of L2 vocabulary is vital to the attainment of higher L2 proficiency. Language students often spend hours memorizing new items of vocabulary, and likewise we, as language educators, often put many hours into thought and preparation with the hopes that our students will benefit from our vocabulary instruction. A basic understanding of how the L2 lexicon is organized could lead us to more practical and efficient ways of presenting L2 vocabulary.

Since researchers obviously cannot peer directly into our minds and see how words are organized, they must find other ways to gather data from which they can build theoretical maps. This kind of data has in fact been gathered from research into tongue slips and word searches of those both with and without speech disorders, as well as psycholinguistic experiments in which the situation, input, and task is carefully controlled. Word association research falls into this category and will henceforth be the focus of this essay.

Background information on the theory behind word association research and a typology of word associations will be followed by a description of a small-scale word association experiment conducted as per the task laid out in McCarthy (1990:152). An analysis of the data gathered will then proceed. Finally, the essay will conclude with a discussion of how the knowledge gained from this type of research may be put to practical use.

## **2.0 Semantic network theory**

In a typical word association experiment, subjects are presented with a word and asked to respond with the first word which comes to mind. The responses are then analyzed to see if patterns result.

Data from numerous experiments has show that there are fairly consistent relationships between prompt and response words, and that people tend to respond in consistent ways, even when the response words differ. (McCarthy 1990:39) As

Aitchison explains, “People almost always select items from the semantic ‘field’ of the original word. ... suggesting that clusters of words relating to the same topic are stored together.” (Aitchison 1994:83).

It seems clear then that within the mental lexicon there are connections between words, and that these connections are mainly semantic in nature. This is the semantic network theory which underlies word association research. Next let’s examine the main categories of word association responses.

### **3.0 A typology of word association responses**

There are three main types of word association responses: syntagmatic, paradigmatic, and clang responses. Each describes a different relationship between the prompt and response words. Syntagmatic and paradigmatic responses are types of semantic associations, whereas clang responses show phonological similarities to the prompt words but lack any semantic relationship.

#### **3.1 Syntagmatic responses**

When the response word can occur either before or after the prompt word, it is classified as a syntagmatic response. In other words, syntagmatic responses describe a left-to-right, horizontal relationship between prompt and response. They are commonly referred to as collocations.

Collocations refer to the tendency of some words to occur regularly with others. Some words are more restricted in the company they keep, whereas others are more open. For most collocations, the response word is usually a word from a different word class than the prompt word. (Aitchison 1994:84). Multi-word items are the most extreme examples of collocation. (Schmitt and McCarthy 1997:43) Types of multi-word items include compounds (“*butterfly net*”, “*the United States*”), phrasal verbs (“*give up*”, “*put away*”), idioms (“*kick the bucket*”, “*take a rain-check*”), fixed phrases (“*Thank you very much*” “*Good night*”), pre-fabs (“*as a matter of fact*”, “*it goes without saying*”), and proverbs (“*When the cat’s away...*” “*A penny saved..*”).

### **3.2 Paradigmatic responses**

Paradigmatic responses are those which can potentially replace the prompt word. As a possible alternative, it's relationship to the prompt word is a vertical one.

(McCarthy 1990:16) Paradigmatic responses can be subdivided into the following types: co-ordination, superordination, and synonymy.

#### **3.2.1 Co-ordination**

Co-ordination occurs when the response word is on the same level of detail as the prompt word. This would include opposites ("*open/close*") and items which occur in pairs ("*brothers and sisters*"). Naturally, the response word is always of the same word class as the prompt word. (McCarthy 1990:40) Aitchison notes that co-ordination is the most frequent type of word association response among native-speaker adults. (Aitchison 1994:83).

#### **3.2.2 Superordination and subordination**

Superordination occurs when the response word is the more general under which the prompt word can be classified ("*red/color*", "*desk/furniture*"). The inverse, when the prompt word is the more general label, is called subordination. Alternate terms used for these relationships are "hypernyms" for the more general word and "hyponyms" for words at lower levels of the taxonomy. (Aitchison 1994:85)

#### **3.2.3 Synonymy**

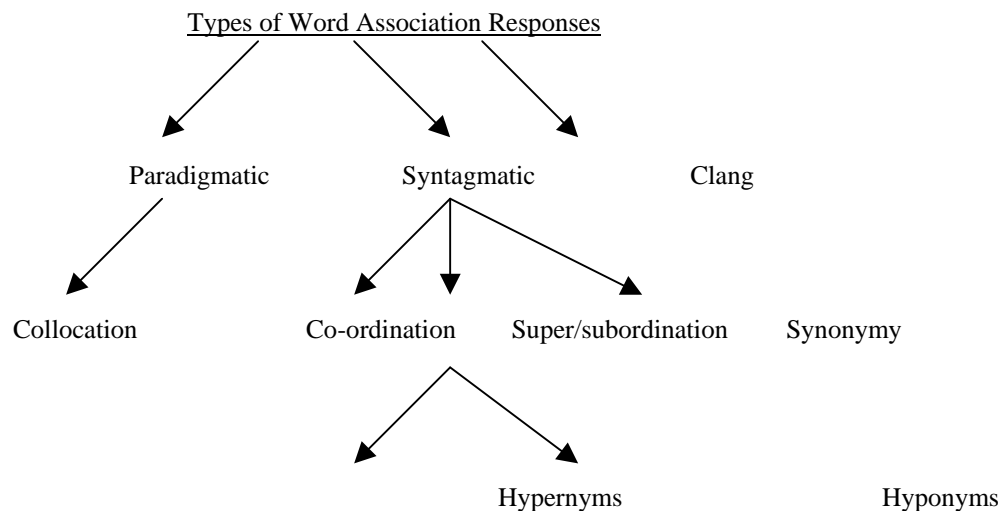
Synonymy occurs when the response word shares the same meaning as the prompt word ("*big/large*", "*very/extremely*"). In reality, it is questionable whether or not true synonyms, words whose meanings overlap 100%, really do exist. In any case, synonymy in the relative sense does have psychological validity, otherwise this type of response would not occur in word association data. (McCarthy 1990:17)

### **3.3 Clang responses**

Clang responses in word association tasks tend to surface when word meaning is unknown. They are more predominant in the word associations of young children whose mental lexicons are as yet immature. (Wolter 2001:43) Children have a smaller lexicon, subsequently a greater number of prompt words are unknown to

them. As a result, unknown prompt words produce phonetically similar responses.  
(Carter 1998:199)

The types of word association responses discussed thus far can be summarized below:



#### 4.0 Task 123 from McCarthy (1990:152)

The purpose of this essay is to fulfill the aim of Task 123 in McCarthy 1990:152, namely, “to explore the relationship between word association and learners’ lexical development”. The design and implementation of this task will be followed by a description and analysis of the data in line with the major questions set forth in the task.

#### 4.1 Specifications

The procedure specified in task 123 of McCarthy (1990:152) states that one should:

“1. Draw up a list of six to eight words to be used as stimuli in a simple word-association test. Try to vary the test items, to include:

- at least one grammar/function word (e.g. preposition, pronoun).
- one or two items from the everyday physical environment (e.g. ‘table, ‘car’).
- a relatively uncommon or low-frequency word but one which your students will nonetheless know.
- a mix of word-classes (e.g. noun, adjective, verb).

2. Deliver the test to the class, asking them to write down the very first word that occurs to them when each item is heard.
3. Gather in the results and see if any patterns emerge from the responses.”

Afterwards, the task specified that the results should be evaluated so as to answer the following three questions.

- “1. Does such a word association test tell you anything about how your learners are making mental links between words they have learned?
2. At lower levels, are phonological similarities playing an important role?
3. Do the results bear out the following characteristic types of responses:
  - a) co-ordination
  - b) collocation
  - c) superordination
  - d) synonymy”

Though not specified, native speakers of English were included in order to provide a basis for comparison.

## **4.2 Subjects**

The non-native speakers (NNS) were all adults taking private English lessons. Proficiency levels were judged based on my personal interactions with the participants rather than on standard test scores, and therefore may not accurately reflect their actual performance on a proficiency test, if one were given. However, since these individuals have been my students for at least a year, I feel that my informal assessments are valid for the purpose of this assignment. Whether or not proficiency level has an influence on this group’s results will be discussed later in this essay.

The native speaker (NS) participants include three who are professors in the English department of a private Japanese university, one who runs a private English school, a missionary, and a high school graduate. Since the words used for this task are high frequency core words, education level bears little or no influence on the NS results.

### 4.3 Procedure

Participants were asked to complete a written word association. They were instructed to read each word and to write the first English word which comes to mind. They were also reminded not to “think too hard” about each word, in an effort to come up with what they felt would be the “correct” response, since all responses were correct. It was felt that this admonition was especially necessary for the students due to cultural considerations, as Japanese culture, characterized as strong in uncertainty avoidance, places a high value on accuracy. (Brown 2000:190)

The words used in the task were chosen as specified in the assignment. They included a mix of word classes: two verbs (“*walk*” and “*drink*”), two nouns reflecting common items in the environment (“*car*” and “*table*”), one preposition (“*up*”), one adverb (“*very*”), and one adjective (“*big*”). There was also one word which could serve as either an adjective or as a noun (“*white*”). This however does not pose a problem in this task since the word meaning remains the same in both cases.

### 5.0 Data and analysis

The results of the word association task are presented in Appendix I. NNS and NS results are tabulated in separate tables (Tables 1 and 2 of Appendix I, respectively), and the NNS are divided according to proficiency into lower and higher levels. Results have been categorized on three levels.

First, each response is labeled as either paradigmatic or syntagmatic. There were no clang associations. Secondly, under each response is its specific semantic classification, in this case either co-ordination, collocation, superordination, or synonymy. Finally, under the semantic classification other possible influences are noted in italics. These influences are listed as culture, encyclopedic, phonology, priming, and prototypes.

We will now discuss the findings so as to answer each question posed in McCarthy’s task 123. The questions will be answered in reverse order, hence the next section will deal with task question 3: “Do the results bear out the characteristic types of responses discussed in 3.2?”.

### 5.1 McCarthy's task question 3

The answer to the question is yes, just as previous word association results have borne out, the both the NNS and the NS gave responses that could be classified according to the types of responses discussed. Appendix II Table 1 lists each response type and the number of responses given for each type. NNS gave a total of 6 co-ordination responses, 39 collocation responses, 2 synonymy responses, and 1 superordination response. The NS gave a total of 27 co-ordination responses, 13 collocation responses, 8 synonymy responses, and 0 superordination responses.

It is clear that for NS, co-ordination was the most common response type, followed by collocation then synonymy. For the NNS, however, the inverse proved true, with collocation responses taking an overwhelming lead, followed by co-ordination, synonymy, and superordination. Appendix II Chart 1 gives a visual representation of this distribution.

Appendix II Table 2 shows the number of NS and NNS paradigmatic and syntagmatic responses. Among the NNS there were 8 paradigmatic and 32 syntagmatic responses, whereas among the NS there were 29 paradigmatic and 11 syntagmatic responses. This shows that the NNS favored syntagmatic associations, whereas NS favored paradigmatic associations. It's interesting to note that in Appendix II Chart 2, which gives a visual representation of this distribution, the NS and NNS bars appear to be mirror images.

This is the same result noted by Wolter in his own word association research where he compares the L2 and L1 mental lexicons. He found that, for prompt words which were well known, as is the case in this task, there was an "almost mirror-like effect between the two groups in the proportion of paradigmatic and syntagmatic responses." (Wolter 2001:58)

Next we will examine McCarthy's task question 2: "At lower levels, are phonological similarities playing an important role?"



## **5.2 McCarthy's task question 2**

Though there were some potential phonetic similarities noted among the NNS responses, there were not one which could be classified as a clang response. This is probably because even among the lower level NNS, the prompt words' basic meanings were all known. In hindsight it could be said that at least one lesser known word should have been chosen which would have posed a difficulty among the lower level NNS. This would have resulted in a better 'test' of McCarthy's question 2.

Next we will examine McCarthy's task question 1: "Does such a word association test tell you anything about how your learners are making mental links between words they have learned?"

## **5.3 McCarthy's task question 1**

As predicted, the data shows evidence that the NNS are making mental links based primarily on semantic information. There is evidence however that these semantic links differ in a systematic way from those of NS. This was the conclusion drawn by the researcher Meara in the Birbeck Vocabulary Project, a research project which gathered data from the word associations of NNS. (Carter 1998:199). Let's examine what some of these systematic differences may be, and what may be influencing these differences.

### **5.3.1 NNS tend to give syntagmatic responses**

As mentioned earlier, one significant finding is that the NNS tend to use a syntagmatic principle in their associations, whereas NS tend to use a paradigmatic principle. There could be a number of reasons for this.

Wolter raises the question of whether this NNS tendency toward syntagmatic responses could be due simply to having a smaller lexicon. (Wolter 2001:42). It could be that, though the prompt word is well-known, it's corresponding paradigmatic responses may be unknown or not known well enough to be available for productive use.

Another more plausible explanation, however, springs from evidence that vocabulary is first learned in chunks before being analyzed separately for meaning. (Schmitt and McCarthy 1997:42)

Close examination of the data reveals that both the above explanations may be a factor, at least for the prompt word “*very*”. The NNS response words yielded the following syntagmatic responses: “*big*”, “*good*”, “*glad*”, “*nice*”, and “*much*”. With the exception of “*big*”, these are all part of pre-fabricated, routine expressions. Moreover, the corresponding paradigmatic response “*extremely*”, found among the NS, is not as common, therefore the NNS may not have encountered this word enough times to actively produce it. The same argument can be made for the word “*really*”. It’s possible that NNS may have learned “*really*” in textbook conversations in the expression “*Oh, really?*”, rather than as a synonym for “*very*”.

### **5.3.2 NNS tend to give a wider variety of responses**

Another tendency noted in Meara’s research is that the NNS tend to give a wider variety of responses than do NS. (Carter 1998:199) This was also the case in this particular study. Appendix III Table I shows that the NS gave a total of 25 different responses out of a possible 48, while the NNS gave 44 out of a possible 48 different responses. Notwithstanding, NS responses showed far more consistency. In this particular sample, there was a consistency rate of 66% among the NS, which drops sharply to 14.5% among the NNS. (Appendix III Table 1).

This again could be due to the NNS tendency to resort to syntagmatic associations, especially if paradigmatic ones are either unknown or weak. Often a larger variety of words can appear as collocations, especially for core words, hence a wider variety of responses.

Another factor could be that the NNS knowledge of the prompt words’ collocational behavior is less competent than that of native speakers. NS have much more extensive experience in the L1 and have had vastly greater opportunity to encounter words in multiple contexts, consequently their word knowledge is much deeper. NNS, however, often have had limited contact with words in the L2, especially those in an EFL environment such as Japan.

Semantic networks take time to develop. In fact, Aitchison points out that researchers into L1 development agree that there a general ‘lethargy of semantic development’. (Aitchison 1994:178) Perhaps the same could be said for L2 lexical development.

### **5.3.3 NNS consistently produced responses which never appear among NS**

Another interesting finding from the Birbeck Vocabulary Project is that “NNS consistently produced responses which never appear among NS”. (Carter 1998:179) Meara’s explanation for this was the NNS have more trouble identifying words.

The data in this task produced a similar finding with the NNS prompt/response pair “*big/elephant*”. Three of eight NNS produced this response, though it was never produced among the NS. This was not a case, as in Meara’s explanation, of the NNS having trouble identifying the prompt word. There is a clear and logical collocation association between the two words, however it is simply not a native-like association.

Appendix I Table 1 notes this particular response has a ‘prototype influence’. A more complete discussion of this phenomenon which was found among the NNS responses are discussed later in more detail.

Though this is not the case with the particular prompt/response pair “*big / elephant*”, cultural influences could potentially cause a response among NNS which differs consistent from NS, and hence should be taken into consideration where appropriate.

### **5.3.4 There are differences in responses based on proficiency level**

Appendix IV compares the NNS responses by proficiency level. Table 1 of Appendix IV notes that among the lower level NNS, all 24 responses were collocations. In contrast, among the higher level NNS there was more variety in types of associations. Specifically there were 15 collocations, 6 co-ordinates, 2 synonyms, and 1 superordinate. Appendix IV Table 2 shows the same data in terms of syntagmatic versus paradigmatic responses. Among the higher level NNS, there were more instances of paradigmatic responses (8) , even though the majority of responses were still syntagmatic (16). It seems that as proficiency level rises, NNS do tend to produce more paradigmatic responses. So it could be said that as proficiency rises,

the L2 lexicon may begin to approach an organization similar to that of the L1 lexicon.

This conclusion is further supported by the data in Appendix III. Here Table 2 shows that both lower and higher level groups gave roughly the same number of responses, and the consistency rate within each group was the same, 8%. However, when each group is compared separately to the NS group, the higher level NNS responses have a higher rate of consistency (29.1%) to the NS group than does the lower level NNS (4.1%).

In Appendix IV Table 1, the responses which were shared between the NS and NNS groups are noted with an asterisk, and in each case except for one the response was shared between a NS and a higher level NNS. The only exception was the response “*big*”, which is slightly questionable because of the priming effect which will be later discussed. This tends to give further support to the assertion that as proficiency levels increase, NNS word associations may begin to approach those of NS.

Aside from the semantic associations which McCarthy’s task seeks to investigate, the data gathered from this task showed evidence of other factors influencing word selection. We will hereafter refer to these as extra-linguistic influences.

## **6.0 Extra-linguistic Influences**

It is generally agreed that, within the network model of the lexicon, connections are not limited to semantic ones, nor are words connected only to other words. There are multiple connections which can be activated simultaneously along with semantic ones. Orthographic information, phonological information, personal experiences, beliefs, and accompanying emotions, one’s world view as influenced by one’s culture, encyclopedic knowledge, etc. are all examples of the myriad types of connections between words and words, between words and emotions, between words and concepts. Not all of these connections are such that they can be accurately measured by a word association test. Yet when examining the data, sometimes there are hints of extra-linguistic influences on word selection.

An examination of the data in Appendix I Tables 1 and 2 shows that some of the responses were influenced by encyclopedic knowledge, culture, priming, and prototype knowledge. Appendix V lists each prompt/response pair that has a potential for additional influence, along with its rationale.

### **6.1 The Influence of Culture**

In reality, both the prototype and cultural influences could be included under encyclopedic knowledge, as both are types of world knowledge, however interesting trends come by light by differentiating between them. One reason for noting specific cultural influence is that in this case this small-scale research task involves two groups from different cultures, and a response found in one group which is not found in another may potentially be the result of a cultural influence.

Thus culture could be one factor behind the inconsistency between NS and NNS at least for the prompt/response pair “*table/chair*”. Though culture does not explain every instance where NNS responses differ from NS, it cannot be totally discounted.

### **6.2 The Influence of Priming**

Semantic priming as defined by Zurif refers “to the finding that a lexical decision is faster for a target word when that word is immediately preceded by a meaningfully related word than when preceded by an unrelated word”. (Zurif 1995:389) That is to say, when a word’s meaning has been activated, words which are related to it are also activated to varying degrees. Therefore these words, being already partially activated, are at an advantage during the selection of subsequent words.

In this case, though slightly different from the above definition, priming is listed as a potential influence when the response to a prompt word is the same as a previously encountered prompt word. The rationale for this is that once the subject encounters a prompt word, that word’s meaning is activated. Thereafter that word may still contain traces of activation, thus raising the chances that for subsequent responses this word will be selected as a response.

There was only one response noted with a potential priming influence among the NS subjects. A possible reason for there being a larger number of priming influences

among the NNS could be that the word association task requires that the subjects retrieve words, and NNS have a comparatively smaller lexicon than do NS for active word production. Also, as word retrieval tasks in a L2 takes more mental processing than for L1, NNS are at a disadvantage as they are under more stress. (McCarthy 1990:42) Selecting a previously activated word may therefore be a conservation strategy. Of course, an entirely different explanation could be that the sample itself is too small, and that had there been a much larger number of NS subjects the priming influence would even out.

### 6.3 The Influence of Prototypes

Aside from priming and culture, a third influence that is noted is called the “prototype influence”. This occurred for the prompt words which were adjectives, namely “*big*” and “*white*”. In fact, there was some consistency among the NNS in that three out of six responded to “*big*” with “*elephant*”.

A prototype is defined as “a person or object which is considered (by many people) to be a typical of its class or group”. (Richards et. al. 1992: 298) As a word class, the meaning of adjectives are closely tied to the nouns which follow. For example, this is evident when we contrast the meanings of “*a rich cake*” with “*a rich man*”.

(Aitchison 1994:104). “*Big*” in and of itself gives no indication of actual size. A “*big shrimp*” is nowhere near the same size as “*a big dog*”, and “*a big lie*” does not even refer to physical size. However, there are items which most people will agree are typical examples of “*big*”, and “*elephant*” is one of them. “*Snow*” is also typical of something “*white*”, since snow is always white when it falls.

There were no noticeable prototype influences among the NS responses. There are various explanations for this. One is that the NS tend to rely more on an individual word’s conceptual meaning, since the L1 word and the concept have to a great extent been ‘learned’ at the same time in their early lives. Another explanation could be that it is an offshoot of the L2 learning process. There are various ways to teach adjectives such as “*big*” and “*white*”. One is of course direct translation, but another is by giving examples of things which most people agree are ‘good’ examples, i.e. “things which are big” and “things which are white”. Thus words such as “*elephant*”

and “*snow*” may subsequently have strong links to the adjective which they so well illustrate.

#### **6.4 The Influence of Encyclopedic Knowledge**

A fourth influence is encyclopedic knowledge which, as McCarthy explains, “relates words to the world, and brings in origins, causes, effects, histories, and contexts.” (McCarthy 1990: 41) Taken to an extreme, it could be said that a majority of the responses have some world knowledge influence. In this task, however, only those responses which stand out and can be specifically explained are marked as being encyclopedic.

#### **6.5 The Influence of Phonetics**

Finally, there were some potential phonetic influences noted, though none of them are clang responses. The influences among the two NNS responses both occurred as initial sounds, while the one NS response occurred at the word ending. In any case, these could also be explained as mere coincidences and so probably are not statistically relevant in this particular sample.

#### **6.6 Differences among NNS proficiency levels for extra-linguistic influences.**

One thing that is quite evident when looking at the table in Appendix V is that lower level NNS responses that show an extra-linguistic influence far outnumber higher level NNS and NS combined. So it seems that the lower level NNS are relying more heavily on these extra-linguistic factors, at least for this task.

This raises the question of why this should be the case. Could it be that for these words the semantic connections tend to be weaker for lower level NNS, thereby lending itself to influence from other factors? Or are these simply the result of an inadequate knowledge of the collocational behavior of the prompt words? To adequately answer this certainly would require further investigation among a much larger target group than is the scope of this task.

#### **7.0 Implications for Vocabulary Teaching and Research**

Recent trends in English language teaching have increased focus on the role of lexical knowledge in language fluency. Therefore, knowing in what ways a learner’s lexical

knowledge differs from that of native speakers is important in designing effective language courses.

Research using word association tasks has shown that both the L1 and L2 mental lexicons are organized such that semantically related items are stored together. Consequently, vocabulary teaching methods which take into account the psychological process of integrating words into the lexicon via semantic relatedness should prove more effective than those which do not. (Amer 2002:1).

Practical examples of these methods are the use of word grids, componential analysis word grids, word webs and vocabulary networks. What is important is that not only does the teacher attempt to present the vocabulary in an organized fashion, but that the learners be required to put forth some cognitive effort to discover for themselves the relationships between words.

## **8.0 Conclusion**

In sum, it could be said that the relationship between a learner's word association knowledge and lexical development is much the same as that of native speakers. Just as native speakers pass through a stage where syntagmatic associations are first predominant, then shifts to a stage where paradigmatic associations dominate, L2 speakers seem to pass through similar stages as their proficiency and hence L2 lexicons develop.

A difference that remains between NS and advanced NNS is that NNS word associations even at advanced stages does not show evidence of switching completely over to paradigmatic associations. Another difference among the lower level NNS is that they seem to be making more use of extra-linguistic information when selecting words for this task.

As it stands, more research needs to be done on how the various kinds of word knowledge interrelate. Only then can a generally acceptable model of vocabulary acquisition be produced.





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## Appendix I - Word Association Results

### Abbreviations:

coll	collocation	ph	phonological influence	sg	syntagmatic
coor	co-ordination	pri	priming influence	syn	synonymy
cult	cultural influence	proto	prototype influence		
ency	encyclopedic influence	pg	paradigmatic		

**Table 1: Non-native Speaker Results by Type**

Level:	Lower Level			Higher Level		
Prompt	NNS1	NNS2	NNS3	NNS4	NNS5	NNS6
walk	shoes (sg) (coll)	down (sg) (coll)	take (sg) (coll)	by foot (sg) (syn)	for a walk (sg) (coll)	run (pg) (coor)
car	gasoline (sg) (coll)	race (sg) (coll)	ride (sg) (coll)	drive (sg) (coll)	accident (sg) (coll)	fast (sg) (coll)
up	mountain (sg) (coll) <i>*proto</i>	cloud (sg) (coll) <i>*proto</i>	stairs (sg) (coll) <i>*proto</i>	down (pg) (coor)	get up (sg) (coll)	down (pg) (coor)
drink	up (sg) (coll) <i>*pri</i>	beer (sg) (coll)	water (sg) (coll)	eat (pg) (coor)	sweet (sg) (coll)	tea (sg) (coll)
big	apple (sg) (coll) <i>*ency</i>	elephant (sg) (coll) <i>*proto</i>	elephant (sg) (coll) <i>*proto</i>	small (pg) (coor)	elephant (sg) (coll) <i>*proto</i>	bear (sg) (coll) <i>*ph</i>
very	much (sg) (coll)	good (sg) (coll)	big (sg) (coll) <i>*pri</i>	good (sg) (coll)	glad (sg) (coll)	nice (sg) (coll)
white	car (sg) (coll) <i>*cult, *pri</i>	wash (sg) (coll) <i>*cult, *ph</i>	snow (sg) (coll) <i>*proto</i>	color (pg) (super)	clean (pg) (syn) <i>*cult</i>	shirt (sg) (coll)
table	cloth (sg) (coll)	family (sg) (coll)	lunch (sg) (coll)	chair (pg) (coor)	round (sg) (coll)	dish (sg) (coll)

*\* denotes possible influences outside semantic associations.*

**Table 2: Native Speaker Results by Type**

Prompt	NS1	NS2	NS3	NS4	NS5	NS6
walk	run (pg) (coor)	run (pg) (coor)	run (pg) (coor)	dog (sg) (coll)	run (pg) (coor)	run (pg) (coor)
car	drive (sg) (coll)	zoom (sg) (coll)	travel (sg) (coll)	drive (sg) (coll)	drive (sg) (coll)	drive (sg) (coll)
up	down (pg) (coor)	down (pg) (coor)	down (pg) (coor)	down (pg) (coor)	down (pg) (coor)	down (pg) (coor)
big	little (pg) (coor)	little (pg) (coor)	small (pg) (coor)	wide (pg) (syn)	small (pg) (coor)	huge (pg) (syn)
drink	glass (pg) (coll)	eat (pg) (coor)	merry (sg) (coll) <i>*ency, *cult</i>	imbibe (pg) (syn)	eat (pg) (coor)	eat (pg) (coor)
very	angry (sg) (coll) <i>*ph</i>	extremely (pg) (syn)	big (sg) (coll) <i>*pri</i>	really (pg) (syn)	tall (sg) (coll)	extremely (pg) (syn)
white	purity (pg) (syn) <i>*cult</i>	black (pg) (coor)	black (pg) (coor)	pale (pg) (syn)	black (pg) (coor)	black (pg) (coor)
table	chair (pg) (coor) <i>*cult</i>	chair (pg) (coor) <i>*cult</i>	chair (pg) (coor) <i>*cult</i>	desk (pg) (coor)	ware (sg) (coll)	chair (pg) (coor) <i>*cult</i>

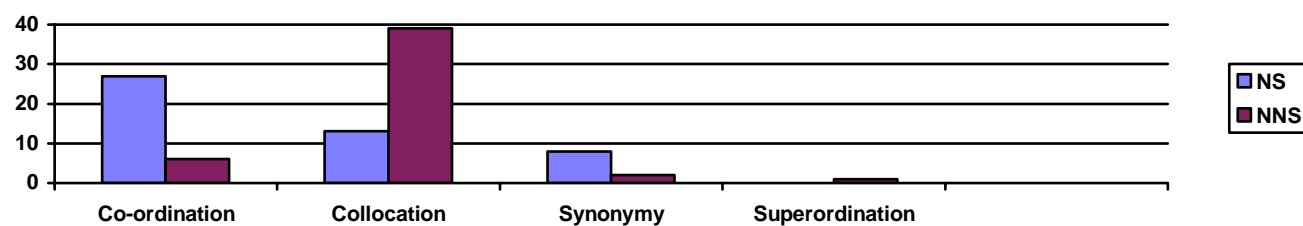
*\* denotes possible influences outside semantic associations.*

## Appendix II -Comparison of NS vs. NNS Responses by Type

**Table 1: Number of Response Types by Category (NS vs. NNS)**

	Co-ordination	Collocation	Synonymy	Superordination
NS	27	13	8	0
NNS	6	39	2	1

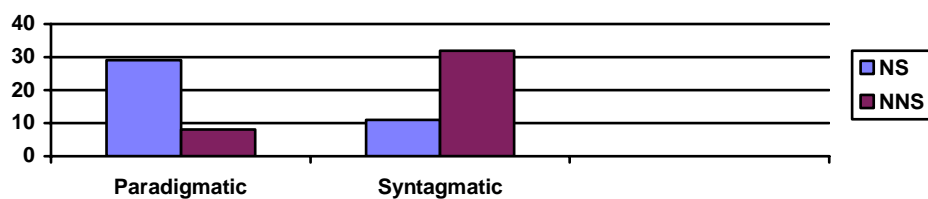
**Chart 1: Response Types by Category (NS vs. NNS)**



**Table 2: Paradigmatic vs. Syntagmatic Responses (NS vs. NNS)**

	Paradigmatic	Syntagmatic
NS	29	11
NNS	8	32

**Chart 2: Syntagmatic vs. Paradigmatic Response Types (NS vs. NNS)**



### Appendix III - Variety and Consistency of Responses

**Table 1: Comparison of NS to NNS responses**

Prompt	NS responses	NNS responses
<b>walk</b>	*run (5) dog	*run down take by foot for a walk shoes
<b>car</b>	*drive (4) zoom travel	*drive race ride accident fast gasoline
<b>up</b>	*down (6)	*down (2) cloud stairs get up mountain
<b>big</b>	*small (2) little (2) wide huge	*small elephant (3) bear apple
<b>drink</b>	*eat (3) glass merry imbibe	*eat beer water sweet tea up
<b>very</b>	*big angry extremely (2) really tall	*big good (2) glad nice much
<b>white</b>	purity black (4) pale	wash snow color clean shirt car
<b>table</b>	*chair (4) desk ware	*chair family lunch round dish cloth
<b># Different =</b>	25	44
<b># Repeated =</b>	32	7
<b># Possible =</b>	48	48
<b>Consistency =</b>	66% (32 ÷ 48)	14.5% (7 ÷ 48)
Total Consistency = 36.4% (35 ÷ 96) NNS to NS consistency = 16.6% (8 ÷ 48)		

\* = NS to NNS shared responses  
( # ) = times repeated

**Table 2: Comparison of NNS Responses by Level**

Prompt	Lower Level Responses	Higher Level Responses
<b>walk</b>	shoes down take	*run by foot for a walk
<b>car</b>	gasoline race ride	*drive accident fast
<b>up</b>	mountain cloud stairs	*down (2) get up
<b>big</b>	apple **elephant (2)	*small **elephant bear
<b>drink</b>	up beer water	*eat sweet tea
<b>very</b>	*big **good much	glad **good nice
<b>white</b>	car wash snow	color clean shirt
<b>table</b>	cloth family lunch	*chair round dish
<b># Different =</b>	23	23
<b># Repeated =</b>	2	2
<b># Possible =</b>	24	24
<b>Consistency =</b>	8.3% (2 ÷ 24)	8.3% (2 ÷ 24)
Total consistency = 10.4% (5 ÷ 48) Higher to NS Consistency = 29.1% (7 ÷ 24) Lower to NS Consistency = 4.1% (1 ÷ 24)		

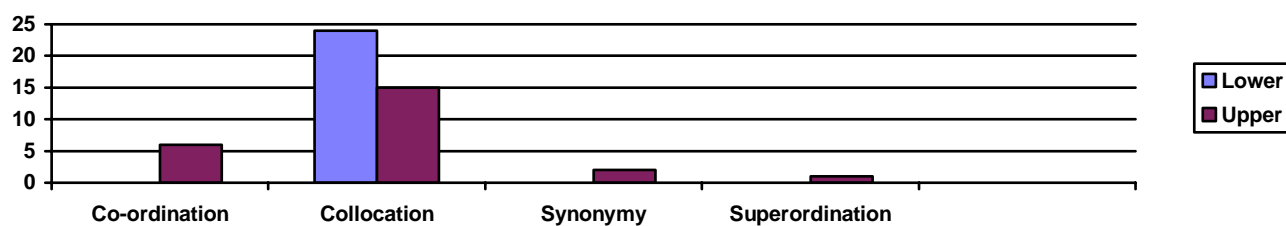
\*\* = Lower to Upper shared responses.  
( # ) = times repeated

## Appendix IV: Comparison of NNS Responses by Proficiency Level.

**Table 1: Number of Response Types by Category (NNS Lower vs. Upper)**

	Co-ordination	Collocation	Synonymy	Superordination
Lower	0	24	0	0
Upper	6	15	2	1

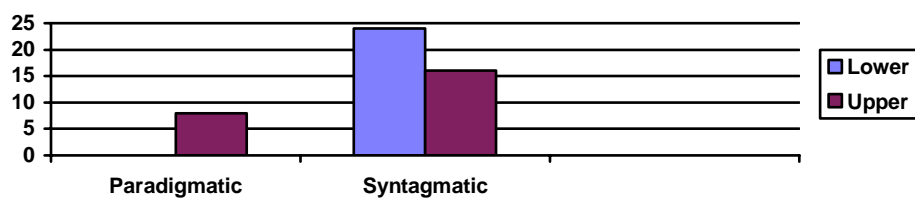
**Chart 1: Response Types by Category (NNS Lower vs. Upper)**



**Table 2: Number of Paradigmatic vs. Syntagmatic Responses (NNS Lower vs. Upper)**

	Paradigmatic	Syntagmatic
Lower	0	24
Upper	8	16

**Chart 2: Paradigmatic vs. Syntagmatic Responses (NNS Lower vs. Upper)**



## Appendix V - Other Influences on Responses

Source	Prompt/Response	Influence	Explanation
NNS LL	up / mountain	Prototype	A typically vertical structure with up/down dimensions.
NNS LL	up / cloud	Prototype	Clouds typically appear when looking up.
NNS LL	up / stairs	Prototype	A typically vertical structure with up/down dimensions.
NNS LL	drink / up	Priming	“Up” is the immediately preceding prompt word.
NNS LL	big / apple	Encyclopedic	Could have been referring to New York City.
NNS LL (2) NNS HL (1)	big / elephant	Prototype	Elephants are typically large.
NNS HL	big / bear	Phonetic	Shares the same initial consonant.
NNS LL	very / big	Priming	Response is the immediately preceding prompt word.
NNS LL	white / car	Culture Priming	There is a proliferation of white cars in Japan. Response is a previously encountered prompt word.
NNS LL	white / wash	Culture Phonetic	Japanese cultural obsession with cleanliness. Shares the same initial consonant.
NNS LL	white / snow	Prototype	Snow is typically white when it falls.
NNS HL	white / clean	Culture	Japanese cultural obsession with cleanliness.
NS	drink / merry	Encyclopedic	Origin in biblical quote <sup>1</sup>
NS	very / angry	Phonetic	Shares the same final consonant-vowel structure.
NS	very / big	Priming	Response is a previously encountered prompt word.
NS	white / purity	Culture	Association of white with sexual purity. “White wedding”
NS (4)	table / chair	Culture	Western tables typically come with chairs.

<sup>1</sup> Ecclesiastes 8:15 “A man hath no better thing under the sun than to eat, and to drink, and to be merry.”