Exploring Mental Word Association in L2

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Module 3 Assessment Task
LX/10/02

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

Table of Contents

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1. INTRODUCTION

L2 word-association tests are used as research tools to analyze how learners organize vocabulary that they have learnt, as well as to explore information about how the mental lexicon develops over time (Fitzpatrick, 2007:319). Similarly, the aim of this paper is to examine mental links through word-association and explore how L2 learners store vocabulary and retrieve it from their mental lexicon.

By evaluating a word-association test taken by non-native English speakers, I will analyze the results to discuss how L2 learners of English make mental links between words they have learnt, and to talk about the patterns that are created when retrieving vocabulary from their mental lexicon. Also, I will discuss phonological responses and if the lower-level participants made mental links this way. In addition, I will talk about how McCarthy (1990) categorizes responses and if the replies from my word-association test confirm his labels. Lastly, through this analysis, I will explore how the English background and contact with the L1 community may influence responses.

2. THE DEVELOPMENT OF WORD-ASSOCIATION TESTS

Word-association tests were originally created to examine the L1, though in the 1960s Lambert and Rawlings expanded the research to explore bilingualism (1969, cited in Fitzpatrick 2007:320). Shortly after that, Riegal and Zivian began studying intra- and inter- lingual associations (1972, cited in Fitzpatrick 2007:320).

Nowadays, researchers study both native and non-native speakers to examine the mental lexicon. For instance, there have been studies to explore how word class influences word-association (Nissen and Henriksen, 2006), whether or not native-speakers respond predictably (Fitzpatrick, 2007), the quantitive and qualitive features of the mental lexicon (Zareva, 2007), and a comparison of the L1 and L2 mental lexicon (Wolter, 2001). Even though there has been much research conducted to explore how the mental lexicon works, there is no regularity in the results, therefore no one can come to an agreement as to how word-association patterns are understood (Fitzpatrick, 2007:320).

2.1 WAYS TO ADMINISTER A TEST

In addition to a variety of research projects that have been administered, there is also a range of ways to dispense a word-association test. A written – written test, an oral – aural test, an oral – written test, an aural – written test, are just some ways in which a test can be given out (Wolter, 2001:49).

Wolter selected to use the oral – aural method because he felt this approach provided more subconscious connections by removing any visual interaction (2001:50). Nissen and Henriksen administered their test in writing "for administrative and practical reasons" (2006:392). Capco and Tucker (1971) used an oral method while Fitzpatrick (2007) preferred the written method. A variety of methods have been used to collect data, however, there has been little research done to determine which method provides better-quality information (Wolter, 2001:49, Nissen and Henriksen, 2006:392).

[4]

2.2 WAYS TO TAKE A TEST

There can also be many ways a word-association test is performed. Fitzpatrick (2007) instructed her participants to write down the first word they think of in order to study the predictability of native-speakers ' responses. Greidanus and Nienhuis (2001) provided six association words and instructed that the participants choose three, with the purpose of studying semantic and syntagmatic aspects of word knowledge. Nissen and Henriksen (2006) asked their participants to provide two associations per prompt word with reasoning that two responses would produce more information to analyze. It seems the decision for choosing one over the other is influenced by what kind of research is being conducted.

3. TYPES OF ASSOCIATIONS

Carter believes word association responses can be categorized as two main classes: paradigmatic and syntagmatic (1998:198). Throughout the rest of the paper, these responses will be defined based on the description that Wolter refers to in his paper.

> "Paradigmatic responses are words from the same word class as the prompt word, and, as such, could presumably perform the same grammatical function within a given sentence. There are four main types of paradigmatic responses, including coordinates, superordinates, subordinates, and synonyms. Syntagmatic responses, by contrast, bear a sequential or collocational relationship to the prompt word and, as such, are usually from a different word class than the prompt word" (2001:43).

According to the above quote, the paradigmatic class can include a coordinate response, meaning that words come from the same word class or a group of semantically related words that are "…[clustered] into patterns of reference usually related to a single topic" (Carter, 1998:53), a super- and sub- ordinate response, which has "…a relationship

[5]

existing between specific and general lexical items in that the meaning of the specific item is included in, and by, the meaning of the more general item" (Carter, 1998:21), and a synonym response, signifying "…two or more words have the same meaning" (McCarthy, 1990:16).

On the other hand, the syntagmatic class can incorporate a collocational response. A collocation can be described as a marriage contract between words, implying that the words have a special bond and are usually seen and spoken together (McCarthy, 1990:12).

I have used the Bank of English corpus, designed by the University of Birmingham, to determine how strongly the words collocate. I have based the strength of the collocation on the t-score of the two words produced. Hunston describes how the t-score is determined by stating that it,

> "…depend[s] on two calculations: how many instances of the co-occurring word are found in the designated span of the node word (the Observed), and how many instances might be expected in that span, given the frequency of the co-occurring word in the corpus as a whole (the Expected). In addition, the t-score uses a calculation of standard deviation, which takes into account the probability of co-occurrence of the node and its collocate and the number of tokens in the designated span in all lines" (2002:70).

The strength of the t-score will help determine how frequently the two words co-occur, thus allowing me to correctly term and analyze the responses as collocates. Hunston adds that, "a t-score of 2 or higher is normally taken to be significant" (2002:72). Therefore,

the t-score of 2 will be considered a weak collocation while anything above 10 will be measured as a strong collocation.[1]

Two other types of responses that will be discussed are phonological, also referred to as clang responses and analytic replies. Responses are classified as phonological when there is a phonetic resemblance to the prompt word (Wolter, 2001:52). Analytic responses represent characteristics used in a dictionary definition (Greidanus and Nienhuis, 2001: 570).

3.1 MCCARTHY'S CATEGORIES OF RESPONSES

Similarly, McCarthy (1990:39 – 40) characterizes word-association responses as follows.

(a). Coordination Responses: words that are on the same level of detail, which includes opposites.

(b). Collocational Links: the prompt word gives a response that collocates frequently.

(c). Superordination Associations: a superordinate is given particularly where the superordinate is a frequent label.

(d). Synonymy: the prompt word elicits a synonym.

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[1] All statistical data is taken from the Bank of English corpus, which is jointly owned by HarperCollins Publishers and the University of Birmingham. All searches were carried out within a nine-word span. The corpus currently stands at 450 million words.

He does not include paradigmatic or syntagmatic responses, but uses more specific classifications to categorize word-association responses. I will be referring back to all of these types of responses throughout the paper.

4. METHOD

I created a word-association to examine the ways in which non-native speakers of English retrieve vocabulary from their mental lexicons and make connections between words.

4.1 PARTICIPANTS

The participants for this study consisted of 4 women and 3 men ages 27 to 60 years old. They are all speakers of English as a second language who have been taught English in a school setting. The length of learning English in a school environment and having contact with the L1 varies from participant to participant considerably. Being that this is such a small group of participants, this study does not set out to establish any generalizations, but rather to analyze and compare the participants' responses as individuals and as a group.

4.2 PROCESS

The first decision to make was how this test would be distributed. Originally, I thought of devising an oral test. However, this would be extremely difficult seeing as though the participants are from four different countries. I wanted to make sure that each participant

would be going through the exact same process as the others. As a result, I created a written word-association test.

First, the participants filled out a questionnaire so that I could acquire some information about their English language background (see Appendix A). This was not only to give me an idea about their experience with the L2, but also a way to determine their levels of English.

Next, the task was to select six to eight words to make up the word-association test. I followed the task outlined by McCarthy (see Appendix B), which required that the prompt words had to consist of at least one grammar/function word, one or two items from everyday life, a low-frequency word, and a mix of word-classes. For the grammar/function word, I choose the preposition *in*. The two words I selected from everyday life were *chair* and *door*. The low-frequency word was *neighbor*. The mix of word-classes consisted of the verb *buy*, the adjective *small*, and the noun *tomato*. The decision to pick well-known words was to guarantee that each participant would understand, without any further explanation.

Allowing the participants to see only one word at a time while making sure they produced the first association they thought of was my main concern for how they were going to take the test. This had to be done with the least amount of distraction, which could easily cause them to alter their answers from what they originally thought of. I decided to make a PowerPoint presentation. Again, this was a way for each participant to

equally partake and complete the test. I have not discovered any other research projects that have used a PowerPoint program as the word-association test, thus I cannot compare their reasoning to mine.

4.3 TEST

The PowerPoint word-association test was e-mailed to each participant. The first page of the PowerPoint gave detailed instructions of how the test was to be taken, in addition to a short reassuring note that there were no right answers. I did not want the participants pressured into thinking that there was a "right" answer since this was labeled as a test. Looking for the correct answer could disrupt the objective of this test, to provide the first association

Once seeing the first prompt word, the participants were instructed to write down the first word they thought of. This process was repeated again until completing seven associations. Following the test, they were told to e-mail back the seven words they wrote down.

5. RESULTS

The chart below presents the participants' responses to the prompt words. The participants are labeled A – G with their responses listed below. Once the chart was organized, patterns in the participants' responses began to appear. Again, I acknowledge that this is a small number of subjects, therefore cannot make any conclusive theories about my findings, only theoretical observations.

[10]

Prompt Words	A	B	C	D	E	F	G
chair	desk	desk	desk	sit	desk	sit	table
in	out	out	out	out	out	out	out
buy	goods	supermarket	sell	pay	gift	money	sell
small	tiny	big	big	big	big	big	big
neighbor	love	close	stranger	noisy	house	misspelling	outsider
door	open	open	window	window	house	open	window
tomato	delicious	banana	apple	sour	vegetable	ketchup	apple

word-association test results

5.1 PATTERNS INSIDE THE RESPONSES

As you can see, some of the prompt words generated the same association. The prompt word *in* has all seven participants associating it with *out*. Similarly, the prompt word *small* is strongly associated with *big*. These are both antonyms showing that for these particular prompt words, opposites were triggered in the vocabulary lexicon.

On the other hand, the word *neighbor* produced seven different associations. The widely varying nature of the responses from each individual is a pattern in itself. This is not unexpected as *neighbor* is a lower-frequency word. In contrast, higher-frequency words, like *in*, *small*, and *chair*, generate more predictable answers (Fitzpatrick, 2007:323) and have more prominent opposites.

5.2 PATTERNS WITHIN THE PARTICIPANTS

There were also patterns within individuals. Participants C and G gave almost identical responses except for their association with *chair* and *neighbor*. The prompt word chair was associated with *desk* from participant C and *table* from participant G. The difference between responses seems minimal and even though *desk* and *table* are both coordinates and share the same word class, we should not necessarily assume that both participants had the same retrieval process for this word. A possible explanation for the variation in responses could be that one participant was thinking of home while the other was thinking of school, which could influence the context of the word.

In addition, individuals showed patterns within their own responses. Let us look at participant A from the chart above. The majority of her responses could be categorized as a syntagmatic structure. For example, *buy goods*, *love* thy *neighbor*, *open door / door open*, and even *delicious tomato* could be combined to make individual phrases. It seems that when participant A read the word, she tried to create or finish a phrase, which produced a pattern in her responses.

The participants also showed patterns within subgroups of the main group. Participants C, E, and G showed paradigmatic association patterns in their responses. Participants C and G associated *tomato* with *apple*, and depending on who you speak to, could be considered to be from the same word class of fruits. On the other hand, if one were to consider tomatoes to be a vegetable, then the response from participant E, *vegetable*, can also be from the same word class.

In contrast, the responses from participants B, D, and F showed similarities in that their responses were evenly spread out into syntagmatic and paradigmatic classes. Particularly, the responses from participants D and F were scrambled and unpredictable.

6. EVALUATION OF MENTAL LINKS

Here, I will go through each word discussing how the participants theoretically make mental links between the prompt words and their responses. These are only observations that I have made and are hypothetical ideas that cannot be expanded further without additional research.

6.1 CHAIR

The prompt word *chair* resulted in three different responses; *desk*, *table*, and *sit*. The associations *desk* and *table* suggest that the participants were making mental links with where you see a chair and what comes with a chair. A chair is seldom seen as a solo object, therefore the participants made a mental link involving items that accompany chairs.

On the other hand, the response *sit* demonstrates that the participants made mental links about what you do with a chair. Nelson points out that for children, "…the concept underlying the distinction…may be formed according to the functions or actions associated with the object" (1974, cited in Carter 1998:187). Even though this statement is referring to children, it might explain that when learning the word *chair* as a child, these participants associated the word with a function.

6.2 IN

As discussed earlier, the prompt word *in* was associated with *out* by all seven participants. They are opposites and have such a common association with each other, which suggests that the participants learnt the prepositions *in* and *out* together as opposites. They may have even learnt them together as a means to remember each word separately. At the beginning stages of learning, single words are learned as "paired associates" (Carter, 1998:193). *In* and *out* could have been learned this way. However, since this is such a strong association it is hard to say whether these theories are valid.

6.3 SMALL

Similarly, the prime association made with *small* was the opposite *big*. Again, participants most likely learned these two words simultaneously and remembered them as opposites. Again, since this is such a common association, it is hard to say confidently how participants made a mental link.

6.4 BUY

In contrast, the prompt word *buy* resulted in several responses by the participants. Two participants responded with the antonym *sell*, which suggests that these participants made a mental link between *buy* and its opposite. As mentioned before, participant A associated *buy* with *goods*. Using the Bank of English, these words produced a t-score of 22 determining that they are strong collocates. With such a high t-score, this could suggest that participant A learnt *buy* as a collocation with *goods*.

[14]

It would seem that participants B and E were making mental links through answering a question when they read the word *buy*. Participant B responded with *supermarket*, which could signify the 'where' part, while participant E responded with *gift*, indicating the 'what' bit. The words *buy* and *gift* also showed up with a t-score of 5.2 from the Bank of English suggesting that participant E could have made a collocational mental link.

Lastly, participants D and F replied with analytical responses. Associating *buy* with *pay* and *money* suggest that a mental link was made through how *buy* is literally defined.

6.5 NEIGHBOR

The prompt word *neighbor* provided seven different responses. The variety of responses could suggest that either the participants made different mental links when seeing the word or the range of responses could be connected to a few mental links.

Participants A and D gave responses with collocational value. Looking up both the American and British spellings on the Bank of English provided a slight difference in the t-score. As indicated, *love* appears on the list of collocates with a t-score of 9.6 (UK) and 6.2 (US). A potential source of this association could be the phrase 'love thy neighbor' or the qualities of a neighbor. According to the Bank of English, *noisy* does not collocate strongly with neighbor spelt the American way as it was presented on the test. However, when spelt the British way *noisy* appears on the list of collocates with a t-score of 4.1. The mental links of the participants to the word *neighbor* are related to collocation.

[15]

The majority of the responses represent how one attributes or qualifies neighbors. Qualities of a neighbor could include responses from participants B, C, and G being a *stranger*, being *close*, and being an *outsider*. This kind of association could be caused by past or present experiences or how one qualifies a neighbor.

In contrast, participant E responded with *house*, which suggests that she made a mental link between *neighbor* and where they live. She may have associated *neighbor* with an object rather than qualities of a person, which suggests that she made mental links with the physical attributes of neighbors rather than the abstract qualities.

Lastly, participant F responded with *misspelling*. This response shows that participant F has obviously been taught British English. The spelling of neighbor without a 'u' must have triggered his brain to notice that, this was misspelt. This demonstrates that spelling could cause a mental link between words, but I cannot expand on this idea without more evidence.

6.6 DOOR

The prompt word *door* showed three different responses. *Open* and *window* each had three responses while *house* was given one. *Open* collocates strongly with *door* with a t-score of 75, which suggests that the participants A, B, and F made collocational mental links.

Participants C, D, and G all associated *door* with *window*. These are coordinates, which indicate that the participants made a link between the same word class to retrieve a similar word. There are strong bonds between some coordinates, making it easy for the learner to pick out a word from a particular topic (Aitchinson, 1994:223). This could be applied here with *door* and *window*.

The single response of *house* from participant E could be connected to the larger picture of *door*. Again, she may have been making mental links of where you physically see a door rather than the abstract qualities or similarities.

6.7 TOMATO

The last prompt word, *tomato*, received some interesting responses. Participants B, C, and G responded with other types of fruits; *apple* and *banana*. For them, they consider tomatoes to be a fruit, therefore made a mental link with a coordination. The association of *apple* also showed links between the same physical characteristics like color and shape. *Banana* on the other hand did not. A potential explanation for this could be because in L1 of the participant, tomato and banana are both loan words from English. It is possible that loan words are stored together in her mental lexicon.

Unlike participants B, C, and G, who classified tomatoes as a fruit, participant E associated *tomato* with a different family. Vegetable is a super-ordinate hyponymy to tomato, meaning that tomato belongs to the vegetable class. This implies that participant E made a mental link between the specific item *tomato* and connected it to the more general item, *vegetable*.

[17]

The response from participant F, *ketchup*, collocates strongly with *tomato*. According to the Bank of English *tomato* and *ketchup* collocate with a t-score of 12 demonstrating that the mental link made here is a collocational.

Participants A and D responded with adjectives, which suggests that the replies *delicious* and *sour* are personal thoughts or opinions of how tomatoes taste. They made a mental link using their views. Carter points out that,

> "Although more research is required, it is reasonable to conclude that perceptual and functional criteria play an important part in early lexical acquisition, at least as far as reference to objects is concerned" (1998:188).

These responses imply that when the participants began learning English, perceptual criteria may have played a role in vocabulary acquisition.

7. PHONOLOGICAL LINKS

It was difficult for me to categorize the participants' levels of English because as I mentioned before, some participants have studied English in a classroom environment for years, while others have had plenty of experience speaking English outside of a controlled setting. Research shows that lower-level learners tend to give phonological responses, also known as clang responses, and that there is a syntagmatic – paradigmatic shift when a person develops their knowledge of a word because of language contact (Nissen and Henriksen, 2006:390). Additionally, a study by Wolter suggested that,

> "…a paradigmatic response is indicative of a higher degree of lexical or cognitive development than a syntagmatic response, which, in turn, is indicative of a higher level of development than a clang or nonsensical response" (2001:51).

The participant considered to be the lowest level learner has studied English the longest but has had little exposure to the L1 in a natural environment. She showed no phonological links in her responses.

Alternatively, the participant who has the least amount of formal English, but has had ample personal interaction with L1 speakers leading to a high level of communicative competence, responded with what might be considered a phonological answer. The prompt word *neighbor* elicited the response *stranger* from participants C. *Stranger* may be considered a clang response because of the ending sound and that it also has the same syllable count to *neighbor*. Furthermore, Wolter (2001:43) points out that previous research from Brown and Berko (1960), Ervin (1961), Entwisle (1966), and Palermo (1971) have all compared patterns of responses concluding that younger speakers produced more clang responses. Perhaps, because of the lack of formal education, participant C gave a phonological reply.

A possible explanation for the lack of phonological responses might be because this was a written test. If this were a speaking test, where the participants could hear the words spoken out loud, it may have created more clang responses. Again, further research must be done to examine this theory.

8. APPLYING MCCARTHY'S CATEGORIES

To a certain extent, McCarthy's characterizations of responses do coincide with the responses found in my test. The most frequently given answers in the test were

coordination responses, *chair – desk*, *in – out*, *door – window*, *small – big*, and *tomato – apple/banana*, which all belong to the same word or are opposites. Additionally, there were also a high number of collocational responses in the test, suggesting that the participants put phrases together when retrieving the words from their mental lexicon. There was also one superordination type of responses, which linked the prompt word *tomato* as the subordinate to the superordinate, *vegetable* and one synonym, *small – tiny*, that appeared in the results.

8.1 OVERSIMPLIFICATION

However, McCarthy believes that these characteristics are an oversimplification stating that native-speakers "…can say a lot more about a word than just what co-ordinates, collocates, and superordinates, or what synonym it has" (1990:40 – 41). This could also be true for non-native speakers based on the responses give by the participants.

As I stated before, there were plenty of prompt words that resulted in coordinate and collocate associations. However, not every response could be strictly categorized in this manner, specifically the responses that expressed personal feelings towards the prompt word.

Particularly, the prompt word *neighbor* provided difficultly trying to classify some of the responses based on these four categories. As discussed earlier, *neighbor* elicits seven different associations from the participants. To simply classify all of the responses as coordinates, collocates, superodinates, or synonyms, is an oversimplification of how L2

speakers make mental links with words they have learnt. McCarthy suggests that the mental lexicon should instead be looked at as a network of information that is so complex that associations sometimes cannot be classified. He states that,

> "…'webs' or 'nets' might be a better metaphor for how information is attached to words in the mental store, but the total model for the place of any word in the lexicon will have to be three-dimensional, with phonological nets crossing orthographic ones and criss-crossing semantic and encyclopaedic nets" (1990:41).

Thee metaphors remind us that there are vast and complicated means of how L2 speakers make mental links and how the retrieval process actually works.

9. FURTHER OBSERVATIONS

An explanation for the kinds of responses given by each individual may be influenced by where they are from, their culture, and their exposure to English. After analyzing the test results, I then looked back at the questionnaire that that each participant gave. There seemed to be patterns between responses from the participants and similarities in their English background or culture.

Participant A answered primarily with syntagmatic responses, which as I mentioned above tend to come from lower-level speakers. An explanation for the syntagmatic and collocational responses from participant A may be because when she grew up in Korea, the grammatical syllabus was popular. She never had a chance to study abroad to improve her communicative competence, thus due to a lack of contact with the L1 community, it seems that mental links are made through syntagmatic and collocational associations.

[21]

Participant C and G gave very comparable responses. They also have a similar English background and are both from Europe. Participant C is from Germany and participant G is from the Czech Republic. They both studied the least amount of time out of the seven participants, 8 years and 5 years respectively, but both use or used English in their occupation frequently to correspond with L1 speakers and non-native speakers of English. Their responses may suggest that culture and exposure to the L1 plays a significant role in word-associations. I do not have any concrete evidence to support this claim; however I thought it was interesting to note, and that further research must be administered in order to examine this topic further.

10. CONCLUSION

This paper and word-association test has looked into how L2 speakers make mental links when retrieving words from their mental lexicon. The participants displayed patterns in their responses as individuals, as subgroups, and as a whole group. Some participants were more inclined to make paradigmatic responses, while others leaned towards systematic responses. Some made mental links with coordinates and others with collocates. Regardless, according to my research, these seven participants showed patterns when associating words and made mental links when retrieving the vocabulary they have learnt.

Their level of English, how they were taught, or their contact with the L1 community could have influence on how they respond. However, this is only a small part of a larger study and much more research must be done to completely support these claims.

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Appendix A

Questionnaire

When answering these questions, please be as thorough and honest as possible. All you need to do is type your answers next to each question, save the document, and e-mail it back to me when you are finished. Please feel free to e-mail me with any questions you have. Thank you so much for your help!

Name:

Age:

Where are you from?

What do you do for a living?

Do you use English in your job? If so, for what purpose?

When did you begin studying English?

How long did you study English for?

Do you regard yourself as still learning English?

Did you / Do you enjoy studying English? Why or why not?

Why did you / do you study English?

Have you done any special programs abroad to improve your English? If so, where and what were they?

Appendix B

Aim
To explore the relationship between word-association and learners' lexical development.

Resources
A list of test items

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

-at least one grammar/function word (e.g. preposition, pronoun).
-one or two items from the everyday physical environment (e.g. 'table', 'car').
-a relatively uncommon or low-frequency word but one which your students will nonetheless know (this will depend upon the group's level: elementary-level students might require a word like 'drink', but an advanced group can probably cope with a word like 'surrender'; your own experience will tell you what is suitable).
-a mix of word-class (e.g. noun, adjective, verb).

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

Evaluation

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

McCarthy, M. (1990) Vocabulary. Oxord: OUP. p. 152