Word Association: Second Language Vocabulary Acquisition and Instruction

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In the field of second language (L2) acquisition, much effort has been given to grammar, phonology, and syntax rather than lexicon although L2 lexical learning is a basic and probably the most significant part of L2 acquisition. However, the situation is quickly changing. Some researchers have begun to focus their interests on L2 lexicon study from different perspectives such as L2 vocabulary development (Henriksen, 1999; Jiang, 2000, 2004), the importance of word-meaning awareness (Jullian, 2000), L2 word learning strategies (Laufer & Hulstijn, 2001; Nation, 1990), retention (Ellis & He, 1999; Newton, 1995), bilingual mental lexicon (Dong, Gui, & MacWhinney, 2005), and even gender differences in L2 vocabulary learning (Catalán, 2003). In recent years, researchers have realized that lexicon is the driving force in sentence production. Without vocabulary, one cannot express thoughts and communicate with others either textually or orally (Levelt, 1989). Vocabulary is also critical in comprehension because lexical information helps determine syntactical relationships (Altman, 1990, cited in Gass & Selinker, 2001).

The major task of second language lexical research is to discover how L2 learners acquire vocabulary. Word association is one means of measuring L2 vocabulary acquisition (e.g., see Finkbeiner & Nicol, 2003; Meara, 1978; Schmitt, 1998; Schmitt & Meara, 1997; Zhang, 2003) because it signifies a complete knowledge of lexicon (Nation, 1990). One important study, by Meara (1978), investigates the lexical associations produced by learners of French. The author found that learners tended to produce rather different associations from those of native speakers of French. For instance, native speakers (NSs) primarily give paradigmatic (e.g., the animal paradigm: *man—woman, boy, child, dog*) or syntagmatic association (e.g., the syntactic structure: *brush—teeth; hold—hands; bank*—robber) associations based on semantic factors. However, nonnative speakers (NNSs) tend to give responses based on phonological similarity known as clang responses. That is, NNSs may produce words such as *plafond* (*ceiling* in English) or *professeur* (*professor* in English) to the stimulus English word *profound*.

According to Meara, NSs' mental lexicon is mainly organized on semantic lines, and "words of similar meaning or words that have the same range of convenience are

stored in such a way that they readily evoke each other" (p. 208). In the case of L2 learners, however, the organization of mental lexicon is different because the semantic link is not well established. L2 mental lexicon has a close connection with the learners' first language (L1) and L2 learners may depend on L1 translation for L2 vocabulary acquisition. Therefore, Meara stated that L2 learners "make use of the form of words rather than their meaning" (p. 208). Gass and Selinker (2001) second Meara's claim and state that a possible interpretation of this phenomenon is that L2 learners have not constructed the network of relationships necessary for fluent word association in their L2. Zhang's (2003) English word association experiment at a Chinese university demonstrated that Chinese native speakers gave a number of clang responses as well as some random responses even though these Chinese participants were English-major advanced learners. Zhang's study results replicate Meara's claims.

Green and Meara (1987) examined visual processing strategies for letter searching in both L1 and L2, and found that all three groups of subjects (Spanish, Arabic, and Chinese) used visual search strategies remarkably similar to those used in their respective L1 when performing the task in their L2. This finding indicates that L2 learners, to some extent, utilize the orthographical cues in their L2 lexical processing. Schmitt and Meara (1997) tried to investigate word associations by Japanese learners of English, especially word associations and their relationship with verbal suffixes. Without surprise, the authors found that the ability of producing associations was related to suffix knowledge as well as the vocabulary size and the English proficiency of the learners.

Jiang's (2000) psychological model of L2 vocabulary acquisition gives a clear explanation of why these types of word association responses are found in L2 learners. According to his model, L2 vocabulary acquisition needs three stages: the formal stage when a lexical entry with formal (phonological and orthographical) specifications is established, the L1 lemma (semantics and syntax) mediation stage when the lemma information of the L1 counterpart is copied into the L2 lexical entry and mediates L2 word use, and the L2 integration stage when semantic, syntactic, morphological specifications are integrated into the lexical entry (p. 47). He further explains that "due to the practical constraints imposed on L2 learning, many L2 learners fossilize in their vocabulary acquisition during the second stage," and "the integration of the lexical entry becomes difficult" (p. 47). In this sense, L2 learners tend to learn a new word through paying attention to the form rather than to the content of the lexical entry.

L2 learners, adult learners in particular, tend to rely on their L1 vocabulary system because the meanings of L2 words are already established and stored in their minds. Thus, when learning L2 vocabulary, using L1 translation to comprehend the meanings of the L2 words seems easy to L2 learners because they only need to memorize their L1

counterparts. Hence, Jiang determines his claim that only when L2 learners reach the integration stage can they produce phonological, semantic, and syntactical word associations. The fact that L2 learners pay less attention to the meaning of L2 words may be a main cause of fossilization during the second stage. This can also be a possible reason why some studies (e.g., Meare, 1978; Schmitt & Meare, 1997; Zhang, 2003) report that L2 learners produce some phonological association responses and why word association is closely related to learners' L2 proficiency.

Although a number of studies have dealt with word association, and pointed out that clang (phonological) association is one type of response besides the paradigmatic and syntagmatic association, few studies, except Green and Meara's (1987), have explored whether L2 learners also produce other types of responses such as orthographical association (form-related responses). There is no study closely examining other possible types of responses by L1 learners either. Thus, this study aims to find out, first, whether L2 learners produce other types of responses. It hypothesizes that because of the L2 vocabulary acquisition stages, some significant differences between NSs and NNSs will be found with word association: paradigmatic responses (e.g. *doctor—nurse)* and syntagmatic responses (e.g. *doctor—white*) will occur most frequently with NSs whereas NNSs will produce both phonological and orthographical responses and some random responses with semantic responses being the most common. Second, the study aims to find out whether NSs will produce other types of responses besides the commonly known semantic responses, including paradigmatic and syntagmatic associations.

Method

Participants

A total of forty-six ($N = 46$) subjects chosen at the researcher's convenience from Indiana University of Pennsylvania (IUP) including 21 NSs and 25 NNSs participated in this quasi experiment (see Table 1). In the group of NSs, nine were male and 12 were female from different disciplines. They were working on their degree studies from bachelor to doctoral levels. Their ages varied from 20 to 59. In the group of NNSs, the total participants were 25, including 12 males and 13 females from different disciplines. The NNSs were from China ($n = 10$), Europe ($n = 3$), Korea ($n = 3$), Japan ($n = 3$), the Middle East ($n = 3$), Thailand ($n = 2$), and Indonesia ($n = 1$). Among them, three were undergraduate students and the rest were graduate students. The paper-based TOEFL scores of the NNSs ranged from 550 to 660 out of a total possible of 677. In addition, they displayed a range of 3 to 9 on a self-rating of English proficiency, with 1 representing minimum proficiency and 10 representing native-like proficiency. Their

ages varied from 22 to 51. All of the NNSs reported that they started learning English at the age of 11 to 14 years old and their average period of English learning was more than ten years. Their length of residency in the United States or other English-speaking countries ranged from 5 months to 4 years.

Table 1
Participants

Group	Age	Gender		Total Number
		Male	Female	*N* = 46
NSs	20-59	9	12	21
NNSs	22-51	12	13	25

Instrument and stimuli

A total of 51 stimuli (see Appendix 1), including three practice words (*moon, doctor, dark*) and 48 experimental words, were employed in this experiment. Each participant was asked to write down their first word response when seeing the stimulus word. Each stimulus word was presented for about 10 seconds so that the participants could have enough time to write down the first word which they associated with the stimulus. After data collection, the researcher randomly interviewed some NSs and NNSs in small groups in order to find out why they produced certain responses and to ensure the researcher correctly categorized their responses for further analysis.

The stimuli were a set of common words. The main criteria for choosing these stimulus words is that, first, the stimuli were common words that the participants would be familiar with; second, the stimuli would stimulate the participants to associate without difficulty. Also, some words were prepared purposefully to examine whether the participants would produce phonological/clang associations or orthographic/form-related associations. For example, the stimulus *fork* was chosen to see whether Korean participants would produce clang associations. In the Korean language system, since there is no voiceless fricative /*f*/, Koreans usually produce the voiceless bilabial /*p*/ instead of the voiceless fricative /*f*/. In this vein, when a Korean reads the stimulus *fork*, unconsciously he or she probably will be thinking the word *pork* due to the influence of Korean phonology. If so, then some possible responses

might be related to the word *pork* rather than to the word *fork.* At the same time, the stimulus *fork* may also stimulate some orthographical responses, such as the word *folk*. One specific stimulus worth mentioning is the stimulus word *flue*. The investigator intended to use the stimulus *flu*, but due to a typing mistake, the stimulus became *flue*, a new word to NNSs and unfamiliar or unusual to some of the NSs. Therefore, the responses to this stimulus would not be predictable.

Procedure

Because it was hard to find a period of time available to all participants, the experiment was conducted in different classes before or after class time, at the IUP library, or at the participants' apartments with either only the NSs or the NNSs or both the NSs and the NNSs. The researcher first explained the purpose of the study to the participants, and then had them decide whether or not to participate in the experiment. After they signed the consent form, each participant was asked to fill out the demographic information (see Appendix 2) before the experiment. On the experiment sheet, places were provided for the three practice words, and each response word with corresponding numbers so that the participants could write down their responses with the help of the numbers (see Appendix 3).

The 51 stimuli were presented by the researcher using 51 white flashcards. The stimulus was printed in the middle of each flashcard using bold faced 72 font type. During the experiment, the researcher presented the stimuli one by one holding each flashcard for about 10 seconds in order to give the participants time to write down their responses. In order to help the participants be familiar with the process and guide them to respond in an appropriate way, the directions and three words were prepared for the participants to practice before the experiment started. The experiment lasted about 10 to 20 minutes depending on each participant's language proficiency. Needless to say, the group of NSs spent less time than the NNSs group in reading and responding. The NNSs needed at least 15 minutes to complete the experiment while the NSs took less than 10 minutes. Therefore, more often than not, the NSs needed to wait for the NNSs when they did the experiment together.

Data collection and analysis

The original convenience sample size was 53; however, after carefully reviewing the data, the researcher found that seven participants' responses were not valid due to one of the following reasons: 1) the participants made either an incomplete response or just copied the same stimulus as their response, 2) the participants provided incomplete or vague personal information (e.g., one participant marked that her native language was both Malaysian and English), 3) the participants gave either more than one response or

a phrase, not a one-word response, and 4) the participants' English proficiency was not high enough (e.g., the TOEFL scores were under 550). Thus, 46 out of 53 participants' responses were valid for categorization and further statistical analysis.

The word association responses by the 46 participants were classified into three types: 1) semantic association, including paradigmatic and syntagmatic associations, 2) nonsemantic associations, including clang (phonological-related) and orthographical (spelling-related) associations, and 3) random or other types of associations. Take the stimulus *pan* as an example, responses such as *cook, fry, egg*, or *kitchen* to the stimulus *pan* were categorized as the semantic type of association; however, if the responding words were *pen* or *pain*, they were labeled as the nonsemantic type of response; the third type, random or other association words, were those that had no connection with the stimulus word. For instance, it is hard to figure out what the connection was between the responding word *skill* not the word *skillet* to the stimulus *pan*. Some further interviews for the clarification of some responses helped the researcher categorize the responses accurately.

Because of the different numbers of participants in the two groups, the total number of the responses is different. The NNSs group produced 1200 (n = 48 x 25) responses and the NSs group produced 1008 (n = 48 x 21) responses. The data were interpreted and entered into the Statistical Package for Social Science program (SPSS 12.01 version for Windows). The independent samples *t*-test was used in order to get the results of the response types in each category as well as to compare the differences between the two groups.

Results and Discussion

The statistical results indicated that although the total number of responses produced by the group of NNSs was larger than the NSs group, the NSs produced more semantic associations and fewer nonsemantic and random or other types of associations than the NNSs did (see Figure 1).

Overall, both the NNS group (88.92%) and the NS group (98.12%) responded mainly with semantic associations. First, the NNS group produced 1067 semantic associations out of the total of 1200 while the NS group responded with 989 semantic associations out of the total of 1008. Second, the portions of nonsemantic and random or other types of responses by both NNSs and NSs were comparatively small. The NSs produced only 1.19% nonsemantic responses and 0.69% random/other types of responses. In contrast, the NNSs produced 7.73% and 2.75% nonsemantic and random/other types of responses respectively (see Figures 2 and 3).

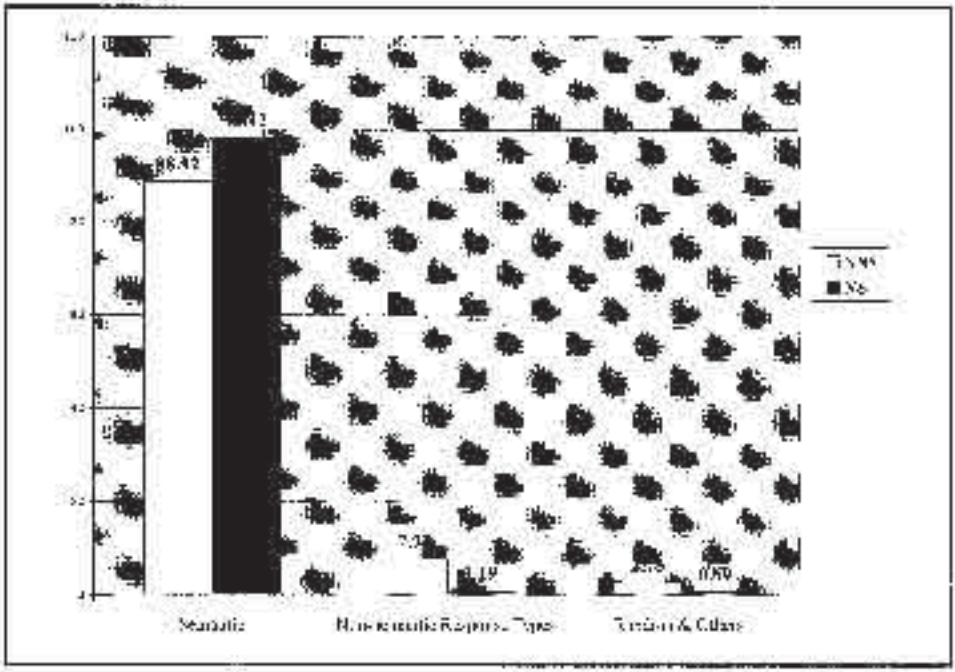

Figure 1: Percentage graph of word association types by NSs' and NNSs'

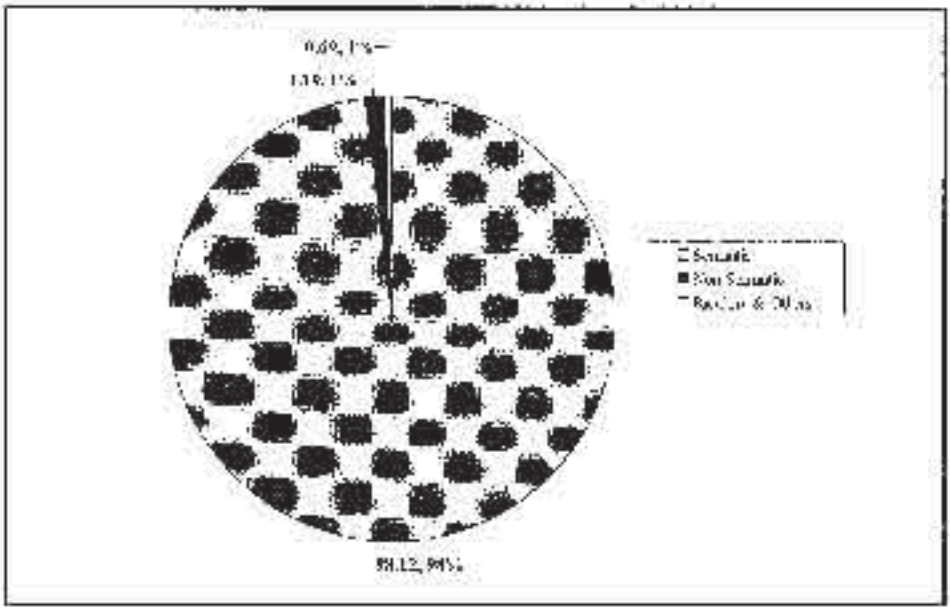

Figure 2: NSs' response types in percentage

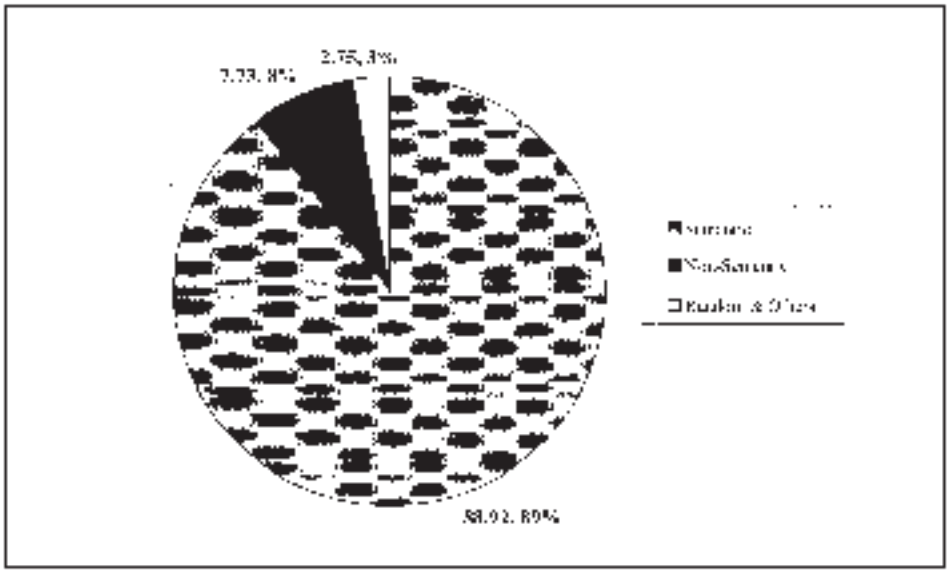

Figure 3: NNSs' response types in percentage

Furthermore, an independent samples *t*-test was conducted to compare the semantic responses produced by both the NS and the NNS groups. The results indicated that there was a significant difference between the two groups in producing the semantic type of responses in word association, t (26) = 5.136, p < .05 *(p* = .000). The NS group (M = 47.09, SD = 0.70) produced more semantic responses than the NNS group (M = 42.68, SD = 4.23). In addition, the independent samples *t*-test was also conducted in comparing the nonsemantic responses between the two groups and the statistical results indicated that there was a significant difference between the two groups' responses to the nonsemantic word associations, t (25) = 4.312, p < .05 (p = .000). The NSs produced much fewer nonsemantic responses (M = .571, SD = .507) than the NNSs (M = 4.00, SD = 3.94). Similarly, the independent samples *t*-test also found that the two groups were significantly different in producing random or other types of responses, t (32) = 3.046, p < .05 (p = .005). The NS group (M = .33, SD = .57) produced much fewer random or other types of responses than the NNS group (M = .32, SD = 1.49). The results (see Table 2) indicated that NSs mainly produced semantic word associations while NNSs produced other types of responses besides the semantic associations even though the semantic type of response occurred most often.

Table 2

Independent Samples t-test Results of the Three Types of Responses

Responding Types		Mean	Standard Derivation	*p-value
Semantic type	NSs	47.095	.7003	.000
	NNSs	42.681	4.230	
Nonsemantic type	NSs	.5714	.5071	.000
	NNSs	4.000	3.937	
Random/Other type	NSs	.333	.5774	.005
	NNSs	1.320	1.49	

*$p < .05$

Obviously, both NSs and NNSs produced the semantic type of responses to the stimuli even though the two groups also produced other types of responses. However, the study also found that NNSs who had high English proficiency indicated by TOEFL scores above 650 and who rated their proficiencies as near native-like could produce an equal amount of semantic associations as NSs. For instance, three advanced NNSs were found to be able to produce 46 or 47 semantic associations, which were equal to the amount of NSs' production of semantic associations. This finding is in line with Namei's (2004) claim that "responses of proficient learners are comparable to those native speakers" (p. 366). Similarly, based on the participants' TOEFL scores, their self-rated language proficiency scores, as well as the types of their responses, the researcher could easily notice that the vocabulary size seemed to be small for the less advanced learners.

Following this vein, if the vocabulary storage is not large enough, NNSs then tend to produce fewer semantic associations and more nonsemantic or random associations. In other words, NNSs are able to produce semantic associations if the stimulus is a common or familiar word to them; on the contrary, once the stimulus is unfamiliar or less frequently used, or the meaning of the stimulus is unknown, they may produce other types of responses. For example, the word *kiwi* could be an uncommon word to some NNSs; some responses to this word were *Hi-Fi*, *Hawaii* or even *kawa*, indicating that these NNSs did not know the exact meaning of *kiwi*. This finding supports the belief that word association is closely connected with learners' vocabulary size and language proficiency (Schmitt &

Meara, 1997) as well as their word knowledge and the frequency of the word use (Greidanus & Nienhui, 2001). That is, the more extensive vocabulary size and the higher proficiency the learner has, the more semantic association he or she produces.

The results also clearly indicated that culture and discipline as well as one's native language phonology could influence the participants to make different associative responses. Take the stimulus *commit* as an example. Most of the NNSs produced semantic associations such as *do* or *crime* as well as nonsemantic responses such as *committee*, while most of the NSs produced the word *marriage* because this association was culturally constructed as were the responses of *sweep* and *Santa Claus* to the stimulus *chimney*. Moreover, the researcher also noticed that the Japanese participants wrote *bitter* rather than *sweet* as their response to the stimulus *chocolate*. It was hard to understand whether Japanese chocolate tastes bitter or their culture believes that chocolate is bitter rather than sweet. Whatever the reason, this finding is indicative of cultural specificity, too. As for discipline-related word association, one student majoring in accounting semantically responded *gross* to the stimulus *net*, and computer science people associated the word *computer* with the stimulus words *bug* and *mouse*. These results demonstrated that the type of association sometimes is closely tied to people's cultural backgrounds and their academic fields.

Apart from the cultural and discipline influences, NNSs' responses were influenced by their L1 phonology. For instance, two Korean participants responded *meat* and *dumpling* respectively to the word *fork*. Because some Koreans have difficulty telling the difference between the fricative labiodentals */f/* and the voiceless stop */p/,* thus, they produce these two sounds interchangeably. Due to the phonological influence of their native language, */fork/* might be pronounced as */pork/*. Thus, it is easy to figure out why these two Koreans associated *meat* or *dumpling* with *fork*. This analysis was later proved by the Korean participants through the interviews. Similarly, in the sound system of Chinese, there is no phonological counterpart to "*th*", thus some Chinese often produce the */s/* sound instead of the /θ/ or /∂/ sound in words with "*th*" letters. Following this vein, then the responding word *mouth* as an association to the stimulus *mouse* could be understood. Due to the influence of Chinese phonology, the word *mouth* is often mispronounced as */maus/*. Therefore, the word *eat* was found as the response to the stimulus *mouse.*

To identify whether the response was clang or orthographic was one of the questions of this study. It seemed hard to differentiate the two subtypes based on the responses. However, the fact that NNSs made associations depending on the word pronunciation and spelling was confirmed through the interviews. For example, the NNSs produced words such as *pain*, *pen*, *van*, and *ban* to the stimulus *pan*; *folk* to the stimulus *fork*; *nest* to the stimulus *net*; and *bag* or *beg* to the stimulus *bug*. All the

responses were minimal pairs with the given stimuli, and the spellings were also similar to each other in each pair. In this sense, it is hard to tell whether the response was clang or orthographic. Nonetheless, in some cases, it was easier to differentiate. For instance, the responding word *Chinese* to the stimulus *chimney*, or *dessert* to *desert* could be identified as orthographical, a form-related response whereas such responses as *sheep* to *sheet*, or *cheers* to *chairs*, or *kitchen* to *chicken* were probably phonological responses. Similarly, some NSs also made clang or orthographical responses. For example, the responding word *enough* to the stimulus *cough* was considered a phonological response while the responding word *cheerios* to the stimulus *cheers* was considered an orthographical response.

To differentiate between the two kinds of subtypes of responses is indeed complicated with certain responses such as the words *mouth* or *eat* to the stimulus *mouse*, and *industry* or *agriculture* to *industrious*. Apparently, *mouth* to *mouse* and *industry* to *industrious* were clang associations because they were minimal pairs. However, investigating such responses as *agriculture* to *industrious* and *eat* to *mouse*, the possible interpretation to their responses, determined through interviews, was that some of the participants just mistook the stimulus words *industrious* and *mouth* for the words *industry* and *mouse*. Thus, they produced *agriculture* and *eat* respectively. From this perspective, because the words *industrious* and *mouse* share similar forms of the words *industry* and *mouth*, the associations that the participants produced could be influenced by the stimulus words' orthography rather than their phonology. Moreover, the researcher believed that the word *industrious* might be unfamiliar to some NNSs and they simply thought the word *industrious* must have a connection with the word *industry*. These examples confirm that it is hard to neatly separate the clang from the orthographical associaton. It is a mystery whether they can be identified independently if another different set of stimuli were used.

Interestingly, both NNSs and NSs made nonsemantic or random types of responses to the stimulus word *flue*. A close examination of the responses of the NSs revealed that among the 21 NSs, three of them wrote the word *flu* as their response, which has the same phonological and a similar orthographical relation to the stimulus; another six wrote *cold*, *sick*, *fever* in responding to the stimulus word *flue*, responses which are closely associated with the word *flu*; two of them wrote *wow* and *hah* as their responses, which can only be categorized as the third type of response. Although many of the NSs wrote *fire* as the responding word, obviously the word *flue* is unfamiliar or strange to the NSs. Thus, they made various types of responses.

As for the responses by the NNSs, none of them made a semantic association including the few advanced learners whose TOEFL scores were above 660 out of 677. Moreover, none of them realized the word *flue* was not the word *flu*. They

misunderstood the word *flue* as *influenza*, and most responses were *sick*, *illness*, *cold*, as well as some random type of responses. One of them produced the word *music* as a response. The possible reason was that he might have mistaken *flue* for *flute*, the musical instrument. Therefore, based on all these responses, the study indicated that when producing association with an unfamiliar word, both NSs and NNSs tended to depend on phonological or orthographical clues rather than semantic clues because there was no semantic link stored in their brains. The result of word associations to the given word *flue* seconded a claim that NSs and NNSs may produce irregular or clang responses to low-frequency and unfamiliar words (e.g., Namei, 2004).

Another type of response produced by the NNSs to the stimulus words that needs further examination are compound words such as *carpool* and *butterfly*. Some NNSs responded *car* or *pool* to the stimulus *carpool*, and *butter* or *fly* to the stimulus *butterfly*. Although the researcher classified the responses of *car* and *fly* as the semantic type because of the semantic connection to the stimulus words, and put the responding words *pool* and *butter* into the nonsemantic type, it was still hard to conclude whether the responses of *car* and *fly* were not influenced by the orthography and should be categorized as the nonsemantic type of response. Further investigation of the compound words is necessary because even the participants themselves were not able to clarify their answers.

In addition, an interesting finding which is beyond the researcher's expectation was that the NSs' second language might unconsciously influence their association. To be specific, some of the NSs produced the word *bread* to the stimulus *pan* which could be interpreted as the use of a pan to heat bread. However after the interviews, the researcher realized that the word *bread* means *pan* in Spanish, and they associated a translation with the stimulus. Another similar example was that one native speaker wrote a Spanish word *siesta* (*nap* in English) to the stimulus *sleep*. Unfortunately, these responses could only be classified as the third type of response not the first two types. That one's L2 may have an impact on word association is a new finding and worth further research.

Conclusion

The results confirm the hypothesis that NNSs produced more types of word association besides paradigmatic and syntagmatic associations and clang associations, and indicate that there is a significant difference between the NSs and the NNSs in all three types of association. Overall, the NSs produced more semantic associations than the NNSs, while the NNSs produced more nonsemantic and random or other types of associations than the NSs. In addition, there are other types of associations such as the orthographical association produced by the NNSs. The study clearly demonstrates that

first, lower level L2 learners gave fewer semantic but more nonsemantic and random associations than the higher level L2 learners. Second, one's native language phonology, culture, and academic discipline influence word association to some extent. Third, the NSs produce other types of association rather than semantic when facing unfamiliar words as the NNSs do. In other words, unfamiliar words evoke nonsemantic and/or random associations by both the NNSs and the NSs. Moreover, if native speakers have a second language, their associations may be influenced by their second language.

Undoubtedly, this study has some limitations such as the sample size of the participants, the choice of the stimuli, and the experimental environment (the NSs and the NNSs sometime were tested together). Due to these factors, the results might be inaccurate to some degree. However, the major findings confirm that L2 learners' vocabulary acquisition is different from that of L1 learners' because L2 learners need time to combine the form, phonology, and meanings of a word step by step in order to make an association with a given stimulus. This also indicates that L2 learners are in the continuum process of interlanguage development. Semantic development in L2 is a process of gradually mapping L1 meanings into the L2 and then gradually developing L2 meanings and meaning structures. That is, L2 learners have a word-knowledge continuum which L1 learners do not because they acquire a word mainly through meaning. However, the difference can be lessened over time with the increased proficiency of L2 learners (Coady, 1993).

Pedagogical Implications

This study offers some pedagogical implications in L2 vocabulary instruction. To begin with, instructors need to pay attention to the meaning instruction of L2 vocabulary. In other words, teaching words in isolation is not effective; teaching word form and word meaning together is appropriate and crucial in L2 vocabulary acquisition. Second, since the study found that L2 learners use phonological and orthographical cues in vocabulary acquisition (e.g., Koda, 1988, cited in Coady & Huckin, 1997; Green & Meara, 1987; Jiang, 2004; Zhang, 2003), L2 vocabulary instructors need to motivate the learners to associate the meanings of a new word to its spelling (orthographical form) and pronunciation. That is, when teaching vocabulary, instructors should teach the form, meaning, and pronunciation of a word together as a package rather than teaching only one aspect of the word. Activities such as recalling the form of the new word as well as listening to and reading aloud the new word might be helpful (Nation, 1990). Third, L2 learners should be allowed to acquire L2 vocabulary with the help of their L1 lexical knowledge because it is already established and stored in their brains. However, instructors must also realize that apart from the facilitative influence, using the L1 may be interruptive in L2 vocabulary acquisition. Thus, explicit vocabulary instruction

seems very significant. Fourth, because beginners or low-proficiency learners may store words in memory on the basis of sound and spelling rather than by association of meaning due to the limited extent of their vocabulary, teaching the relationship of sound and spelling seems important and necessary at the beginning level. Then, gradually teachers need to help learners improve other aspects of word knowledge with the increase of their language English proficiency. In addition, improving reading skills and learning vocabulary within a meaningful context are effective for learners' vocabulary building and growth.

More importantly, the study indicates that different learners apply different vocabulary learning strategies. For example, some L2 learners may find it difficult to differentiate words with similar forms or meanings; others, however, may be good at memorizing vocabulary through the means of semantic association. Instructors, thus, should realize the differences and determine appropriate strategies to meet the needs of the learners at different levels. To be specific, if learners tend to produce associations depending on the form of words, instructors should avoid teaching words with similar forms. Further, instructors need to be aware that for lower level learners in particular, teaching new words with similar or closely related meanings together can be problematic or dangerous (Nation, 1990; Tinkham, 1993) because vocabulary taught in semantic groups may confuse learners and hinder their vocabulary retention (Finkbeiner & Nicol, 2003; Folse, 2004).

However, once learners are familiar with the words, teachers may think of the semantic association as a mnemonic means to helping learners retain these words (Nation, 1990), and teach words in groups based on a theme or topic (Cohen, 1990). On the other hand, other learners, such as advanced L2 learners, may prefer to acquire and memorize new words through associating them with semantically similar words because word development is an incremental process, and new words are not learned independently from knowledge of other words, rather, they are "interrelated and heterogeneous" (Scott, 2005, p. 71). Thus, the appropriate way of teaching words is directly using the mnemonic technique to present semantic sets. Moreover, whatever strategies are used, direct and explicit vocabulary instruction is necessary to L2 learners besides incidental learning.

Although the study leaves some unsolved questions for further investigation, it shows how L1 and L2 mental lexicons are different and how L1 and L2 learners acquire vocabulary in different ways. In addition, the study reveals how individuals differ in their vocabulary acquisition. Thus, it is necessary for language instructors to bear these differences in mind and adapt appropriate strategies in their vocabulary instruction.

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About the Author

Lan Wang is a PhD candidate in the program of Composition & TESOL at Indiana University of Pennsylvania. She got her B.A. in China and M.A. in the U.S. She has almost 9 years EFL teaching experience and 2 years ESL and writing tutoring experience. Her research interests are SLA, L2 writing, and L2 speaking.

Appendix 1

Stimuli of Word Association Experiment

Part I: Words for practicing: 1) moon _____ 2) doctor _____ 3) dark _____

Part II: Words for experiment:

pan	dress	weather	bridge	kiwi	sheet	pillow	food
sink	chimney	nest	sword	carpool	frog	barrel	fork
basketball	principal	flue	mouse	industrious	light	jury	dessert
bug	web	sleep	soldier	hungry	commit	net	parking
butterfly	cheers	fish	needle	sandwich	horse	sauce	bitter
connect	quiet	cough	vote	calcium	kitchen	noise	camp

Appendix 2

Demographic Information of Participant

Put checkmarks or write down your answer in the spaces provided below.

1. Current Degree Program: _____ BA/BS _____ MA/MS ____ PhD ____ Other
2. Gender: ____ Male ___ Female
3. Age: _____
4. Native Language: _____

If your native language is not English, please continue answering the following questions.

5. TOEFL scores _____
6. At what age did you start learning English? _____
7. How long did you study English in school and college? _____ (years/month)
8. How long have you been in this country? _____ (year/month)
9. If you have been to other English-speaking countries, how long did you stay there?

_____ (year/month)

10. Rate your own English proficiency on the following scale by circling the numbers:

	minimal									near-native
Speaking	1	2	3	4	5	6	7	8	9	10
Listening	1	2	3	4	5	6	7	8	9	10
Reading	1	2	3	4	5	6	7	8	9	10
Writing	1	2	3	4	5	6	7	8	9	10

Appendix 3

Word Association Responding Sheet

Directions: Please write down the first word that comes into your mind in the given spaces one by one when you read the presented word. The researcher will leave 10 seconds after presenting each word so that you can write down what comes into your mind. The first 3 are for you to practice the procedure. The real experiment will consist of 48 words.

Practice: 1_____ 2_____ 3_____

Now the experiment begins:

1. _____	2. _____	3. _____	4. _____	5. _____
6. _____	7. _____	8. _____	9. _____	10. _____
11. _____	12. _____	13. _____	14. _____	15. _____
16._____	17. _____	18. _____	19. _____	20. _____
21. _____	22. _____	23. _____	24. _____	25. _____
26. _____	27. _____	28. _____	29. _____	30. _____
31. _____	32. _____	33. _____	34. _____	35. _____
36. _____	37. _____	38. _____	29. _____	40. _____
41. _____	42. _____	43. _____	44. _____	45. _____
46. _____	47. _____	48. _____		