

The Effects of Word Frequency and Contextual Types on Vocabulary Acquisition from Extensive Reading: A Case Study

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Abstract—L1 research has indicated that learners acquire most of their vocabulary by means of incidental learning, in which the learners learn different aspects of lexical knowledge through repeated exposures as well as the surrounding contextual information of the unfamiliar words. However, L2 learners are at a disadvantage of this incidental learning due to their limited opportunities to repeatedly encounter the same target words in different contexts. As a result, researchers encourage L2 learners to use extensive reading as a route to promote and complement their vocabulary learning. This case study investigated the effects of word exposures and contextual richness on the acquisition of different aspects of vocabulary knowledge from extensive reading. Three aspects of knowledge are examined: orthography, form-meaning connection, and grammatical functions. The results indicated that word frequency affected more on orthographical knowledge than on the other two aspects, whereas contextual richness had a greater impact on form-meaning connections and grammatical functions. Pedagogical implications and suggestions for future studies are suggested.

Index Terms—word frequency, contextual types, vocabulary acquisition

I. Introduction

The study of L2 vocabulary has generated wide interest in L2 acquisition theory and research since the 1990s. A specific area that has received much attention in vocabulary acquisition is learning through reading and inferring word meanings from context (Chern, 1993; Haynes, 1993; Huckin & Bloch, 1993; Paribakht & Wesche, 1999; Rott, 1999). It is suggested that most L1 vocabulary learning may take place incidentally and mainly in the course of L1 reading comprehension (Nagy, Herman, & Anderson, 1985; Nagy, Anderson, & Herman, 1987). Despite evidence for the effectiveness of incidental vocabulary learning in L1 acquisition, there has been a debate regarding the extent to which incidental learning contributes to L2 vocabulary acquisition. This has been mainly because of the L2 learners' limited exposure to enriching incidental vocabulary learning opportunities (Horst, Cobb, & Meara, 1998). However, this drawback of limited exposures to the words can be supplemented by an extensive reading program in which the L2 learners are able to gain vocabulary knowledge incrementally with repeated encounters of words in different contexts (Pigada & Schmitt, 2006; Webb, 2007, 2008; Pellicer-Sanchez & Schmitt, 2010). Research has indicated that L2 learners benefit from extensive reading not only in their sight vocabulary (Coady, 1997; Nation & Coady, 1988; Horst, 2005; Parry, 1993, 1997) but also in opportunities to encounter the words in different context use (Thornbury, 2002; Pigada & Schmitt, 2006). That is, L2 learners can not only strengthen the form and meaning mappings but also increase the likelihood of gaining the usage of word collocations through contextualized input. As claimed by Nation (2001), "the use of reading and other input sources may be the only practical options for out of class development for some learners" (p. 155), especially in EFL contexts. The present study aimed to investigate the effects of word frequency and contextual information on L2 learners' incidental vocabulary acquisition.

II. Literature Review

A. *The Relationship between L2 Reading and Vocabulary Learning*

Though it is widely acknowledged that reading is a valuable source of vocabulary acquisition for L1 learners, L2 researchers have not reached any consensus regarding the same issue. As a proponent of incidental vocabulary acquisition, Krashen (1989) proposed an Input Hypothesis to acknowledge the importance of comprehensible input in L2 vocabulary acquisition. Krashen (1989, 1993) also advocates 'free voluntary reading' as the main route for acquiring new vocabulary. As claimed, "the best hypothesis is that competence in spelling and vocabulary is most efficiently attained by comprehensible input in the form of reading, a position argued by several others (Krashen, 1989, p. 440)." However, other researchers hold different views from those made by Krashen. First, as claimed by Grabe and Stoller (2002), much of the naturally written text is not comprehensible for most L2 learners due to their limited sight vocabulary size. Second, studies on incidental vocabulary acquisition through reading usually asked participants to read only a text or a short passage and then tested learners on selected words (Day, Omura, & Hiramatsu, 1991; Dupuy & Krashen, 1993; Pitts, White, & Krashen, 1989). This procedure of testing is criticized to be unable to reflect the natural extensive reading process—in which the words are encountered repeatedly in different contexts and the words are

gained incrementally. Third, there is a distinction between correct guessing of word meaning and retention of its meaning along with other aspects of lexical knowledge acquisition (de Bot, K., Paribakht, T. S., & Wesche, M. B., 1997; Mondria & Wit-de Boer, 1991). That is, learners may comprehend the meaning of the word during the reading process but they have difficulty retaining its meaning after a specific period of time. De Bot et al (1997) argued that a word surrounded by rich contextual cues is often easily comprehended, but this may result in less attention. This happens because of insufficient processing of the word and its properties, in particular with single exposure words. Based on the above concerns, L2 researchers suggest learners focusing on extensive reading to acquire vocabulary knowledge as a supplement beyond their language courses. As defined by Grabe and Stoller (2002), extensive reading is “reading that exposes learners to large quantities of material within their linguistic competence” (p. 259). Graded readers, imposed with controlled vocabulary and syntactical structures, are considered to be a suitable source, in particular for low- to intermediate-level students, in an extensive reading program. Nation (2001) suggests that 95% text coverage is the minimum threshold for vocabulary learning to occur. Nation and Wang (1999) further suggest that the 95% threshold level can be satisfied if learners select simplified materials on an appropriate level. However, a lack of consensus still remains on some basic questions regarding the contribution of reading to L2 vocabulary acquisition. One is the number of word to be encountered for varied aspects of knowledge to be learned, and the other concerns the types of contexts that are conducive to word learning.

B. What Does Knowing a “Word” Mean

From the perspective of “learning burden” by Nation (2001, p. 24), there are more than the aspects of word’s form and its meaning for a word to be acquired. In Nation’s (2001) words, “the more a word represents patterns and knowledge that learners are already familiar with, the lighter its burden” (p. 24). That is, learners are expected to exert less depth of processing for the words with which they are already familiar. As a result, they can pay more attention to the unfamiliar aspects of the word, which can enhance the subsequent vocabulary learning. For example, it is easier for an English learner of French to know the word *controverse* (controversial in English) than an English learner of Chinese, in that the former can refer to knowledge of cognates for information. Nation characterizes knowing a word as involving its form, meaning, and function (use). He further classifies the three items into nine subcategories. Table 1 is simplified and adapted from the different aspects of Nation’s (2001) framework.

TABLE 1.
DIFFERENT ASPECTS OF KNOWING A WORD

Meaning	Form and meaning	Is the word a loan word in L1?
	Concepts and referents	Is there an L1 word with roughly the same meaning? Does the word fall into the same structure as an L1 word with a similar meaning?
	Associations	
Form	Spoken form	Can the learners repeat the word accurately when they hear it? Can the learners write the word correctly when they hear it?
	Written form	Can the learners identify known affixes in the word?
	Word parts	
Use	Grammatical functions	Does the word fit into predictable grammar patterns? Does the word have the same collocations as an L1 word of similar meaning?
	Collocations	Does the word have the same restrictions on its use as an L1 word of similar meaning?
	Constraints on use	

Nagy et al. (1985) have pointed out that vocabulary learning is a gradual process because bits of information are accumulated upon each encounter of the word. Thus, it makes sense to distinguish partial knowledge from full knowledge in the process of vocabulary acquisition. In other words, the learner’s knowledge of certain lexical items can move from mere word recognition, through different degrees of partial knowledge, toward precise comprehension. One major aspect examined in the present study was the number of encounters required for different aspects of vocabulary knowledge acquisition, that is, orthography, form-meaning connections, and grammatical functions.

C. The Effect of Word Frequency on Vocabulary Acquisition

Two corpus-based studies investigated the potential contribution of graded readers to vocabulary learning by examining word frequency (Nation & Wang, 1999; Wodinsky & Nation, 1988). The results indicated that graded readers can be an important source of vocabulary learning for second language learners, but the researchers suggested that the findings should be followed by experimental research to testify the results. An L2 original study demonstrating vocabulary gains from extensive reading was conducted by Saragi, Nation, and Meister (1978), who found substantial amount of vocabulary learning by English learners of Russian with a learning rate of 76%. They also suggested that “the minimum numbers of repetitions for words to be learned in a reader should be somewhere around 10” (p. 76). Horst, Cobb, and Meara (1998) replicated the study of Saragi et al.’s study and 34 L2 learners read a simplified novel. Upon finishing the novel, participants were given a test focusing on word definitions by a multiple choice test, with a pick-up rate of about 1 out of every 5 new words. Their study also found that 8 exposures of the target words were essential for substantial learning to take place. Participants in Horst’s (2005) study showed some encouraging learning

results, with over half of the unfamiliar words being retained from reading the 20-page extracts of simplified readers.

Huang and Liou (2007) selected 16 articles from the computer corpus of a local Chinese-English magazine in Taiwan (i.e., *Sinorama*) and used them to construct an online English extensive reading program, named as the *Textgrader*. The design was aimed to supplement two major difficulties L2 learners face in processing unsimplified texts: limited vocabulary knowledge and insufficient word exposures. The target words were highlighted in red and glossed with Chinese translations. The words were then highlighted in green with Chinese translations after the first encounter. To ensure repeated exposures of the target words, the computer searched for a text that not only contained the highest number of familiar words and the smallest number of target words, but one that also contained the highest number of words in the Exposed Word List. The 16 texts contained 233 target words, which had different numbers of occurrences from 1-2 times to 9 times the most. To specifically measure the target words with different numbers of occurrences, Huang and Liou divided them into five groups. The results showed that a certain degree of word knowledge was gained in all five groups, and the groups with words appearing the most frequently achieved the highest mean score. However, their study also suggested that an exposure amount of at least 15 times are required for learners to recall the word meanings in an online extensive reading environment.

Noticing that acquisition of word meaning was the focus of earlier studies, recent research has attempted to examine the effects of word frequency on varying aspects of vocabulary knowledge and obtained different results. For example, Pigada and Schmitt (2006) explored how a learner of French gained different aspects of vocabulary knowledge (i.e., spelling, meaning, and grammatical usage) by means of extensive reading. The exposures of the 133 target words ranged from 1 to more than 20 occurrences. The results indicated that there was the least gain with the knowledge of word meanings for words with single exposure, and spelling was the most strongly enhanced even with a small number of exposures. Their study also found that there was a noticeable increase for words with more than 10 occurrences. Webb (2007) examined 10 aspects of word knowledge by controlling the word exposures to 1, 3, 7 and 10 times. The results indicated that all knowledge aspects improved with increasing repetitions, but knowledge of meaning developed more slowly than other aspects. Another significant finding was that part of speech gained much better after 7 to 10 exposures, suggesting that 7 might be the threshold for this type of knowledge.

Replicating Webb's (2007) study, Chen and Truscott (2010) investigated the effect of repeated encounters (i.e., 1, 3, and 7) with target words on seven aspects of lexical knowledge and also the effect of L1 lexicalization on acquisition of word meaning. The results indicated that repetition facilitated vocabulary acquisition, in which grammatical function was retained better than receptive knowledge after a 2-week period. In particular, orthographic knowledge benefited from 3 exposures the most but grammatical function grew steadily with the increasing encounters. For semantic gains, acquisition took place with words between 3 and 7 exposures. The study also found that L2 words not lexicalized in learners' L1 posed more learning difficulty, even for words with repeated encounters up to 7 times.

Pellicer-Sanchez and Schmitt (2010) examined the degree to which advanced L2 learners acquire different lexical knowledge aspects from reading an authentic novel. Their study suggested that there appears to be a threshold level for frequency bandings in which learning rate accelerates from (5-8) to (10-17) exposures, and significant differences were found across all four knowledge aspects. In particular, words with more than 10 exposures were learned substantially than those with fewer exposures. Furthermore, words with more than 28 exposures were learned at a rate less than those from (5-8) to (10-17) occurrences. That is, the learning rates for words with too many exposures might be debilitated to a descending extent.

Previous studies examining the effect of word frequency on vocabulary learning demonstrated different results, ranging from 3 to 17 exposures for acquisition of varied aspects of word knowledge to take place. Further, Rott (1999) found a positive effect for frequency of exposure during L2 incidental reading and she partly attributed the students' gains to the rich contextual clues in the text. Her findings suggested that context plus repeated exposures may have an enhancing effect on word learning.

D. *The Role of Context on Vocabulary Learning*

The role of context has always been controversial to both L1 and L2 vocabulary acquisition. For example, Beck, McKeown, and McCaslin (1983) proposed that many authentic texts do not contain supportive information and sometimes are even misleading for L1 word learning purposes. However, Nagy and his colleagues (Nagy, Herman, & Anderson, 1985; Nagy & Herman, 1987) found that contexts are facilitative for L1 vocabulary learning. The conflicting contribution of context remains indecisive in L2 research as well.

Webb (2008) designed a study to investigate the effect of context (i.e., more informative vs. less informative) and word frequency on incidental vocabulary acquisition, with short contexts each containing a single target word. Four aspects of lexical knowledge were examined: recall of form, recognition of form, recall of meaning, and recognition of meaning. The findings indicate that the quality of the context rather than the number of encounters with target words may have a greater effect on gaining knowledge of word meaning. Instead, the number of encounters has a greater impact on knowledge of form. Webb concluded that these findings may provide a better explanation of why the number of exposures for meaning knowledge acquisition in previous research varied from word by word. These findings appeared to be contradictory with those in Pigada and Schmitt (2006), in which word spelling was the least affected by exposures. The reasons, however, could be attributed to the words in Pigada and Schmitt's (2006) study appeared in consistent contexts but those in Webb (2008) were in separate pieces of contexts without any connections among them,

thus debilitating the chances of word forms without sufficient exposures being paid attention to and acquired.

On the other hand, another line of L2 inquiry demonstrated different results from those in Webb's (2008) study. For example, Mondria and Wit-de Boer (1991) investigated the effects of sentence-based contexts on guessing and retention of words that appeared in a text with a range of contextual clues. The results showed that successful inferences in those contexts did not have a positive relationship with retention. Hu and Nassaji (2012) also found that ease of inferencing had a negative effect on word retention. De Bot and his colleagues (1997) argued that a word surrounded by rich contextual cues is often easily comprehended, but this may result in less retention. This happens because of insufficient processing of the word and its properties (Pulido, 2009; Bolger & Zapata, 2011). Zahar, Cobb, and Spada (2001) further suggested that for a word to be best learned, a potential mechanism is that "an unclear or semi-clear context opens up a learning need, or conceptual gap, which is then reactivated when the word is eventually meeting a clear context" (p. 556).

E. *The Present Study*

To date, previous research examining the relationship between word frequency and vocabulary learning of Taiwanese learners focused on word meanings only (e.g., Huang & Liou, 2007), rather than on varied aspects of word knowledge. Furthermore, few of them investigated the effect of context on the acquisition of vocabulary knowledge. The purpose of this case study is to fill in the gaps mentioned above by addressing the following research questions.

1. How does word occurrence affect the Taiwanese college learners' different aspects of word knowledge (i.e., orthography, form-meaning connection, and grammatical functions) from extensive reading?
2. How do the contextual types affect different aspects of word knowledge?

III. METHOD

A. *The Participant*

The participant in this case study was recruited from the college-level learners at a university of Technology. Prior to conducting the study, the participant was tested on her vocabulary knowledge by using Nation's 2000 Vocabulary Levels Test and the results indicated that she was a low-intermediate learner with a medium level of vocabulary knowledge (13 out of 18 words correct on the 2000 Levels Test). This participant was chosen because she was a well-motivated learner with great interests in learning English.

B. *The Readers*

Graded readers were used in this case study as they are designed in terms of controlled grammatical structures and vocabulary levels. Above all, the readers ensure that the target words are repeated several times so that participants will have opportunities to meet and retrieve the words in different contexts. The level of the readers was selected after determining the participant's vocabulary level. The participant picked up a reader randomly to decide the percentage of unknown words, and the appropriate level that contains around 95% familiar text coverage was used for the study. The four readers selected were *A Midsummer Night's Dream*, *The Tenant of Wildfell Hall*, *Casino Royale*, and *The Princess Diaries 3* by Macmillan Publishers. All four readers were at a pre-intermediate level. The number of words at this level, as indicated, is about 1,400 basic words. The participant was asked to read four graded readers during a period of 6 weeks once the difficulty level was determined, with approximate one reader per a week and half to finish a specific level. To ensure that the participant would not be able to check the words in the glossary, the readers were scanned onto a computer and re-printed without the glossaries. She was also asked to infer but not to look up the unfamiliar words in the reading process. The researcher met with the participant after she finished reading the four readers and gave her the posttest.

C. *The Target Words*

Before the study began, 91 target words were selected from the glossary by the researcher, who decided that those words might be unknown to the participant based on her proficiency level. Then the participant was given a dictation test with the target words, pronounced in English, to measure her knowledge of orthography, and the words spelled correctly were excluded from the study. Then she was given a list of words, including 19 distracters, to evaluate her knowledge of form-meaning connection by providing a correct Chinese translation of the word. Knowledge of grammatical functions was assessed by asking the participant to construct a sentence. Those with correct Chinese translations and accurate grammatical functions were not included in this study. There were 63 words remaining for the post-test in the end.

D. *Instruments*

In this study, the participant was tested on her knowledge of orthography, form-meaning connections, and grammatical functions after she finished the four readers. The procedure and sequence of each measure in the posttest was described as follows. First, the participant was given a dictation test measuring her knowledge of spelling (i.e., orthography). Each target word was pronounced twice, and then she had to write it down on a blank piece of paper. Any incorrect spelling at the scoring procedure was considered to be wrong. Second, the participant was given a list of words,

including 19 distracters, to evaluate her knowledge of form-meaning connection. The correct answer had to be one that matched the context within the reader. Finally, using the target word on the list, she had to make a sentence to assess her knowledge of grammatical functions. Responses were considered appropriate if the word was used as the correct grammatical function in the sentences. The sequence was arranged to avoid any possibility of learning effect (Webb, 2007; Chen & Truscott, 2010). For example, the test of grammatical function and orthography was given prior to the test of form-meaning connection, from which the participant may have acquired the knowledge of form. The scoring measures were made by two raters, and the inter-rater reliability was .95.

IV. RESULTS AND DISCUSSION

For research question 1, “How does the frequency of word occurrence affect Taiwanese college learners’ different aspects of word knowledge (i.e., orthography, form-meaning connections, and grammatical functions) from extensive reading?” the target words were first divided into five frequency groups and the numbers of words distributed among the different frequency groups were calculated in Table 2. To fit the occurrences of the words appearing in the text, the distribution of different frequency bands was decided as below.

TABLE 2.
NUMBERS OF WORDS WITHIN FIVE FREQUENCY BANDS

	Frequency bands	Number of words
	1	17
	2-4	22
	5-8	17
	9-17	4
	18 or more	3
Total	5	63

Table 3 shows the percentage of learning outcomes with the target words in terms of the four aspects: no learning gains, orthography, form-meaning connections, and grammatical functions. All aspects were measured based on the frequencies of word occurrence. It is interesting to note that no matter how frequently the word occurred across the four readers, some of the words were not acquired at all (i.e., with the five frequency bands of 41%, 23%, 18%, 25%, and 33% respectively). On the other hand, the same extreme frequency effect took place with the aspect of knowledge of grammatical function as well (i.e., with the five frequency bands of 41%, 36%, 35%, 25%, 67%). The results also suggested that knowledge of orthography may occur prior to meaning, and knowledge of meaning is dependent on the form. Furthermore, the frequency bands between (2-4) and (5-8) appeared to be the strongest thresholds for the overall word learning.

TABLE 3.
LEARNING OUTCOMES DETERMINED BY KNOWLEDGE ASPECTS AND WORD FREQUENCY

Frequency of occurrence (the number of words)	no learning gains	orthography	form-meaning connection	grammatical functions
1 (17)	41%	12%	6%	41%
2-4 (22)	23%	23%	18%	36%
5-8 (17)	18%	26%	21%	35%
9-17 (4)	25%	0%	50%	25%
18 (3)	33%	0%	0%	67%
Mean number of words (Max =63)	17.08	11.52	10.55	23.85

A Kruskal-Wallis comparison was conducted between the frequency bands and word knowledge to examine if there were any differences among knowledge of orthography, form-meaning connections, and grammatical functions. However, the significant difference was found with only knowledge of orthography [$\chi^2 = 9.921, p < 0.05$]. This finding appeared to be partially consistent with those in Webb’s (2007, 2008) studies, in which the number of word encounters affected the learning of form rather than learning of meaning. However, it was surprising to see that some words with fewer repetitions were acquired better than those with more repetitions, indicating an inverse relationship between knowledge of orthography and repetitions. This finding also confirmed those in previous research (Pigada & Schmitt, 2006; Chen & Truscott, 2010), which suggested that the benefits come with the first few exposures for orthographic knowledge. It is possible that words with exposures between 2 to 8 facilitate knowledge of orthography to a sufficient degree, but too frequent repetitions may hamper the participant’s willingness to pay attention to the word and thus ignore it in the end (see Table 3).

Though improved gradually with word repetitions, form-meaning connection appeared to be the most difficultly acquired knowledge aspect (N = 10.55). This finding also confirmed those in previous studies (Chen & Truscott, 2010; Pellicer-Sanchez & Schmitt, 2010; Webb, 2007, 2008), in which semantic knowledge showed slow but steady development with increasing exposures.

As the best gained knowledge aspect, the pattern of grammatical functions was the most astonishing in that it declined with word frequency in the top four bands, with acquisition rates ranging from 41% to 25%. This pattern appeared to be contradictory with most of earlier research, which indicated that knowledge of grammatical functions

could be improved incrementally with increasing word exposures. One possibility that frequency had a negative effect on acquisition of grammatical functions in this study could be that the words with fewer exposures in this study inherited salient morphological features so that the participant might be able to easily recognize their parts of speeches and construct them in a sentence but vice versa for those words with more exposures.

To answer research question 2, “How do the contextual types affect different aspects of word knowledge?” the investigation was focused on the words within each of the four aspects: words without any learning gains, words with knowledge of orthography, words with form- meaning connection, and finally words with correct grammatical functions. First three words were picked up from each of the four aspects, with 12 words in total chosen for analyses. These 12 words were analyzed for their levels of contextual richness, adapted from both Beck et. al’s (1983) model of contextual support and Webb’s (2008) criteria on informative versus less informative contexts. The four levels are described as below:

1. Mis-directive contexts: The text contains misleading contextual clues (e.g., **Kidnapped** (shown as the subtitle within the text). The entrance to the Roi Galant was in a corner of the roulette room. The night club was small and dark. A band-guitar, piano and drums-was playing in a corner.).

2. Non-directive contexts: The text contains no direct information about the target word (e.g., “*Because they were working on that stupid computer program for the **carnival**,*” said Lilly).

3. General contexts: The text contains some information that may lead to partial knowledge of the target word’s meaning (e.g., When Annabella **flirts**, her husband becomes angry and she knows this).

4. Directive contexts: The text contains either implicit or explicit information that may lead to a good understanding of the target word’s meaning (e.g. He used the money to make bad **investments**. These **investments** are now worth nothing).

Then two raters assessed the contextual richness of these 12 words and categorized them into four groups in terms of their knowledge aspects (Table 4). Overall, only the local contexts containing the target words were selected for evaluation. The inter-rater reliability was .94.

TABLE 4.
THE FREQUENCY AND CONTEXTUAL RATINGS OF THE TWELVE WORDS WITHIN THE FOUR KNOWLEDGE ASPECTS

Words without learning gains	Frequency	Mean of richness ratings (S.D.)
carnival	18	2.2 (.48)
flirts	3	2 (.44)
vicar	5	2 (.50)
Words with correct orthographical knowledge		
suspect	4	2.75 (.43)
suspend	2	2 (.00)
tedious	2	2.4 (.20)
Words with correct form-meaning connection		
investment	2	4 (.00)
gloomy	5	3.8 (.32)
mocking	6	2.8 (.54)
Words with correct grammatical functions		
injure	3	4 (.00)
scandal	8	3.2 (.46)
permission	5	3.8 (.48)

A notable pattern in this table is that the first two categories (i.e., words without learning gains and with correct orthographical knowledge) appeared to have lower means than the bottom two (i.e., words with correct form-meaning connection and grammatical functions), indicating that contextual richness has a stronger impact on the latter. This finding also confirmed the previous one in which frequency affected more on knowledge of spelling than on the other two aspects.

Afterward, a textual analysis was done to further analyze and confirm the potential effects of different contextual types on the acquisition of varied knowledge aspects. Four words were picked up from each of the four aspects respectively: *carnival*, *suspect*, *investment*, and *injure*. The numbers within the parentheses indicated the word frequency in the texts.

The first word examined is *carnival*, which appeared 18 times in one reader but did not result in any aspect of knowledge being acquired at all. It is found that the word is mostly associated with the word *Winter*, and 13 associations appeared in the subtitles within the contexts, which were mostly categorized as either non-directive or general contexts. The bolded text types were those appearing in the subtitles.

Carnival (18)

1. **Friday, December 18th. Still at the Winter Carnival**

2. **Even Later on Friday, December 18th. Still at the Winter Carnival**

3. “*Because they were working on that stupid computer program for the **carnival**,*” said Lilly. “*Judith already has a boyfriend.*”

4. “*Then why did you behave in that weird way at the **carnival** today?*” he asked.

One possibility that there was no acquisition with this word was that the participant might have inferred it to be a

proper noun based on its position within the context (e.g., Winter Carnival) and thus did not pay special attention to it.

Next, a word with correct orthographical knowledge (*suspect*) was further checked, and it was found that there was only one directive context out of four, with the remaining three categorized as either nondirective or general contexts.

Suspect (4)

1. He says it's because he's busy studying for Finals, but I *suspect* something else.

2. But...well, I've *suspected* for a long time there was someone else. That's why you never wanted to kiss me.

3. "I first *suspected* it at the restaurant. And if I *suspected* it, so will other people. You don't want someone else to tell her."

Then a word with correct form-meaning connection (*investment*) was selected. It can be seen that the directive contexts clearly indicated that *investment* means something related to money and the money invested could come to nothing.

Investment (2)

1. He used the money to make bad *investments*. These *investments* are now worth nothing.

The final step was to screen one word with correct grammatical function: *injure*, and the directive contexts provided sufficient clues that *injure* refers to a verb meaning being hurt by external forces.

Injure (3)

1. Soon everyone had heard the news about Lawrence's fall. He was badly *injured* and lay in his bed for several days. People said that his pony had thrown him onto the ground. No one had seen us together on the road. So no one knew that I had hit him and *injured* him.

2. I am writing to tell you that Arthur is ill. He fell from his horse when he was drunk. He has *injured* his leg badly. He is not dying, but he has been in bed for many days.

In sum, the words without any learning gains and with correct orthographical knowledge were surrounded mostly by nondirective or general contexts, but those with correct form-meaning connection and grammatical function were more likely to appear in directive contexts.

V. CONCLUSION AND IMPLICATIONS

This study investigated whether word frequency and contextual richness affected the acquisition of different lexical knowledge aspects (i.e., orthography, form-meaning connections, and grammatical functions), and the results indicated that spelling of the word form was the only aspect with statistically significant difference among the varied facets of word knowledge. The results were consistent with those in previous studies, which suggested that repeated exposures of words affect more on orthographical knowledge than on other knowledge aspects (Chen & Truscott, 2010; Pellicer-Sanchez & Schmitt, 2010; Webb, 2007, 2008). Another coherent finding with earlier research was that the form-meaning connection, though with the lowest gains among the three aspects, still showed gradual development with increasing repetitions of the words. The most contradictory finding to other studies was that the acquisition of grammatical functions was negatively influenced by word frequency. That is, the more exposures of a word, the less likely it is to be acquired. All these findings point out to a consensus that lexical acquisition process is multifaceted and complex, and different factors might be mediating and interacting with one another.

The number of times required for learning a word from reading in previous research varied considerably, and the present study still left this question unanswered as frequency appeared to affect acquisition of varied aspects of word knowledge to different extents. In this respect Nation (2001) pointed out that "Repetition is only one of a number of factors affecting vocabulary learning and the correlations between repetitions and learning generally are only moderate (p. 81)." Different studies have demonstrated that the effect of frequency is negligible when the learner is not ready, when the form is not salient, when it requires explicit learning, or when it is processed in a different way (VanPatten, Williams, & Rott, 2004). Research on learning and memory has also shown that for repetition to be effective, it should be distributed across a period of time rather than massed together: the space between exposures should become larger, with initial repetitions being closer in time and later repetitions much further apart (Baddeley, 1999).

As to the effect of context on different aspects of word knowledge, the findings suggested that the contextual richness appeared to affect the acquisition of form-meaning connections and grammatical functions more. However, some recent research demonstrated that rich and informative context inhibits the chances of words being learned and retained as the learners could easily comprehend the text without paying special attention to the words (Pulido, 2009; Bolger & Zapata, 2011). The role of context on vocabulary learning still needs further exploration in studies which have to consider the effects of different types of context (e.g., context within authentic reading materials for native speakers vs. contrived context specifically designed for meaning-guessing practice for L2 learners).

This study was based on four graded readers of the same difficulty level, and it was found that even some of glosse words appeared only once out of the four readers and almost one-fourth (17.08/63) of the words were not acquired at all. Thus it was impractical to expect the learners to achieve the target words at a mastery level via the authentic incidental learning process in which the opportunities to meet repeated exposures of the unfamiliar words may take a very long time. Furthermore, some recent research has argued that noticing of a form is an essential step in vocabulary learning and effective learning additionally requires focused attention and elaborate processing (Hulstijn & Laufer, 2001; Laufer & Hulstijn, 2001; Peters, Hulstijn, Sercu, & Lutjeharms, 2009; Pulido, 2009; Schmidt, 1990). During reading, a learner

may be able to comprehend an unknown word with the help of the surrounding context but sometimes at the cost of not paying enough attention to the word itself. For an unfamiliar word to be acquired, it has been suggested that the word must not only be noticed and but also be processed to a sufficient degree (Fraser, 1999; Hu & Nassaji, 2012; Huckin & Bloch, 1993; Hulstijn, 2001). In other words, attention must be focused not only on the connection between the word form and its meaning but also how it is used in the context (de Bot et al., 1997). Researchers have argued that the more attention being paid to different features of a word, the more associations are made between the existing and new information and hence more retention and learning occurs (Fraser, 1999; Hulstijn & Laufer 2001; Laufer & Hulstijn, 2001; Rott, 2005, 2007; Rott & Williams, 2003). Unfortunately, the words in most graded readers were not made explicit by textual enhancements, such as bolding or highlighting. As a result the learners may not notice the target words and their awareness of the words is not being raised in the reading process. This debate leaves the editors of graded readers a dilemma of whether to highlight the words to draw learners' attention or leave the books clear to ensure the flow of reading not to be interrupted. Nonetheless, recently some series of graded readers (e.g., Oxford University Press' Dominoes) have started to do the former in their elementary level Readers that integrate an intensive reading approach into an extensive reading one.

Responding to the above mixed design in the graded readers, the results further suggested that the most feasible approach for L2 vocabulary acquisition may be to combine both explicit (i.e., intentional) and implicit (i.e., incidental) learning. Recent research supports this view by demonstrating that post-reading tasks, such as answering comprehension questions or text-based vocabulary exercises, consolidate and enhance knowledge of those words initially met during reading (Elgort, 2011; Min, 2008; Paribakht & Wesche, 1997; Pellicer-Sanchez & Schmitt, 2010; Peters, Hulstijn, Sercu, & Lutjeharms, 2009; Schmitt, 2008). As claimed by Peters et. al. (2009), "the low incidence of vocabulary acquisition through reading (input only) can be substantially boosted by techniques that make students *look up the meaning* of unknown words, *process* their form-meaning relationship *elaborately*, and process them *again* after reading (input plus)." (p. 145). Beyond employing a combined approach to complement learners' vocabulary learning, Walters (2004, 2006) suggested using specific strategy training to teach students infer meaning from context. The three types of strategy training include: general strategy, specific context clues, and practice opportunities with cloze exercises followed by feedback.

Based on the findings in this study, it is very likely that neither word frequency nor context plays an absolutely dominant role on vocabulary acquisition, and future research could investigate more specifically the interacting effects between word frequency, context, and other variables (e.g., participants' age, proficiency levels, and motivation), on word learning. Future studies could also examine whether a variety of orders with different contextual types (i.e., nondirective, general, and directive) would affect word learning to different degrees (Zahar et. al., 2001), and how learners pay different aspects of attention to the word, context, and other relevant clues could be examined by the think-aloud protocols in which they have to verbalize their thoughts during the reading process. The words in this study were randomly selected, and future research could pick up and arrange the words in terms of their types and features. Finally, as this is a case study with only one participant, the findings require replication with a larger sample size to draw more positive conclusions.

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