

Learning Three Aspects of Word Knowledge

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Abstract

A number of studies have demonstrated that vocabulary acquisition is achievable through reading, but the gains are relatively small, and this is most likely due to the nature of the tests and the studies themselves. Further research is needed to measure and control constructs that appear to fundamentally influence incidental vocabulary learning through reading. This case study investigates the influence of a word's frequency of occurrence and part of speech on its rate of incidental vocabulary learning through extensive reading (ER). Three advanced Japanese EFL learners read four graded readers over a four-week period. Pre- and post-tests were administered to assess the rate of word pick-up from the ER activity. The results suggest that ER contributed not only to learning new words but also enhanced knowledge of words that were partially known. Moreover, less frequent words showed a greater pick-up rate, and that nouns were learned more than verbs.

Key words: extensive reading, vocabulary, frequency of occurrence,

To be proficient in English, non-native speakers need to build a sizeable mental lexicon. Direct instruction and explicit learning is customarily advocated as the method to learn the first couple thousand most frequent words in English, but a number of studies point out that explicit learning needs to be offset with incidental learning to help consolidate several aspects of word knowledge associated with knowing a word (Nation, 2001).

Incidental vocabulary learning occurs as a by-product of listening and reading (Coady & Huckin, 1997), and non-native learners need to exploit both channels.

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Beyond teacher talk, which is often controlled and methodical, there is a dearth of lexically controlled oral texts, and so this channel has remained fundamentally underexploited. On the other hand, graded readers offer a wide assortment of lexically control written texts, from starter to advanced readers, and reading them is considered to facilitate vocabulary learning (Day & Bamford, 2002). The caveat of incidental vocabulary acquisition through reading is that it is a time-consuming and unpredictable process as Paribkht and Wesche (1997) indicate, ‘there is no way to predict which words will be learned, when nor to what degree (p. 174).’

To improve the likelihood of incidental vocabulary learning of new words, researchers argue that a 98–99% (Laufer, 2010) lexical coverage rate of the text is needed to provide enough co-text and context support to allow attempts to infer the meaning of the 1% or 2% of unknown words. Below this lexical threshold, inferring the meaning of an unknown word may be unsuccessful, and even if it is successful, it is likely that it will not be retained beyond its immediate encounter (Rieder, 2003).

In addition to the lexical coverage rate of a text, researchers indicate a word’s frequency of occurrence influences its acquisition. Researchers have however reported various estimates on the number of times it takes to facilitate vocabulary acquisition through reading. The disparity of estimates, from 6 to 30 exposures (Saragi, et al. 1978; Horst et al. 1998; Rott, 1999; Waring & Takaki, 2003), not only reflects the different experiment conditions in which this construct was measured, but it also illustrates the complex process of vocabulary acquisition. To further contribute to our understanding of the nature of incidental vocabulary acquisition through reading, this study investigates the effects of a word’s frequency of occurrence, and part of speech (nouns and verbs) on learning three different aspects of vocabulary knowledge (spelling, meaning and grammatical collocation).

Research Questions

This case study investigated whether extensive reading contributes to learning a word’s spelling, meaning and grammatical collocation. Since the participants would meet words through printed text, it was assumed that it would affect their spelling knowledge. As some English grapheme-phoneme connections seem to be problematic for Japanese EFL learners (Koda, 1998), a spelling test would reveal if reading contributed to incidental learning of the correct grapheme-phoneme connections to override routine production of spelling mistakes. The meaning test is viewed as the standard indicator of a language learner’s knowledge of a word, and it is often taken to indicate acquisition of a word; however, it is one aspect of word knowledge out of several aspects of word knowledges that needs to be tested to

reveal a non-native speaker's mastery of a word (Nation, 2001). The collocation test is not typically used as an indicator of vocabulary acquisition, although it is an aspect of knowing a word, it would reveal the test takers knowledge of how a word is used in combination with other words.

The case study asked the following research questions:

1. How does extensive reading contribute to learning a word's spelling, meaning and grammatical collocation?
2. Are these three aspects of word knowledge learned at different incremental rates?
3. Does word frequency influence learning these three word knowledges?
4. Does the word class of the target words affect improvements in the three word knowledges?

Methods

Reading materials

Since extensive reading implies that readers read pleasurable and easy texts, a number of steps were taken to ensure that the participants were able to understand at least 95% of the running words, and that the texts were interesting to read. Although the participants received a score of 815 or higher on the TOEIC test, it was decided that graded readers would offer better conditions that would allow opportunities for fluent reading than reading authentic texts. To ensure that the participants would read texts that they found interesting, they were asked to choose four texts from a selection of 15 graded readers. The participants agreed on four texts: *Brave New World*, *The Beach*, *The Women in White* and *The Runaway Jury*. Since these texts are published by Penguin Readers, the participants took the Penguin Readers placement test to confirm that the texts were of the appropriate lexical level. The participants in this case study are advanced EFL learners, so they took the Penguin Readers placement test level 6, which is composed of two parts, A and B. Their scores are presented in Table 1.0, which indicates that they are able to

Table 1.0

	Time of completion	Difficulty level scale*	Score: A/B%
Participant A	15 min.	2	83/93
Participant B	22 min.	2-3	86/90
Participant C	17 min.	2	90/93

*The difficulty scale was based on a 5 point scale

read advanced graded readers with a high degree of lexical and grammatical proficiency.

To further ensure that the texts were suitable for the participants, they were asked to read the first two pages of each text. When it was confirmed that they knew at least 95% of the running words, it was decided that they could finish reading one text a week.

Participants

Three advanced Japanese EFL learners volunteered to participate in this case study. They studied English in university and in English speaking countries. Participant A is a 29 year-old Japanese male who spent a year studying English in a vocational college in Canada and scored 815 on the TOEIC test. Participant B is a 30 year-old Japanese female who also spent a year studying English in Canada and scored 830 on the TOEIC test, while participant C, a 30 year-old Japanese female, spent time working in the USA and scored 910 on the TOEIC test. At the time of this study, all three participants were living and working in Japan, and they continued to study English by taking private English lessons.

Target words

A wordlist was created based on all the words occurring in the four texts, which was done using a software program called *WordSmith*. In order to get reasonably reliable data, a relatively large number of words were selected as target words: 120 nouns, 120 verbs and 120 adjectives. The 360 target words were chosen according to frequency bands of 1, 2–3, 4–5, 6–10, 11+ and 20+. Each frequency band contains 10 nouns, 10 verbs and 10 adjectives.

Vocabulary tests

The first test administered to the participants was the spelling test. The participants were instructed to spell the words they heard pronounced aloud by the researcher. To avoid making hasty spelling mistakes, the participants were told that they could ask for the target words to be repeated as many times as they felt necessary, no time limit was set, and the participants could take as many breaks as they wished.

Two days following the spelling test, the meaning and collocation tests were administered to the participants. The meaning test was based on a self-report checklist format used by Horst (2005). The participants were presented with three options: a Y (yes, I know this word) option; a N (no, I don't know this word) option; and a NS (I have an idea about the meaning of this word, but I am not sure) option. Horst states that the function of the NS option is to allow the participants to demonstrate partial knowledge of a word's meaning. To avoid making false

assumptions, the participants were asked to honestly answer the questions, and they were instructed that if they were unsure about a word, they should check the NS option rather than the Y option.

Following the meaning test, the participants were given the collocation test. This test consisted of 360 target words organized by their word class (nouns, verbs and adjectives). The participants were instructed to form grammatical collocation combinations with those target words. This meant constructing noun + preposition combinations (for example, apathy *towards*), verb + preposition combinations (for example, depend *on*) and adjective + preposition combinations (for example, afraid *of*). In most cases, more than one answer is possible.

Test scoring

For the spelling test, the scoring was from 0–2 points. If the participants' spelling appeared completely wrong, it was given 0 points, if it was correct, 2 points, and if it was similar to the correct spelling, 1 point. For the collocation test, the scoring was from 0–2 points; no partial points were awarded. This was done because there are more than one correct collocation combinations that the participants could have answered correctly, and it would seem that an incorrect answer would indicate the possibility of guessing rather than an actual demonstration of collocation knowledge. For the meaning test, if the participants answered Y (yes, I know this word), they were awarded 2 points. If they answered NS (I have an idea about the meaning of this word, but I am not sure), they were awarded 1 point. If they answered N (No, I do not know this word), they were awarded 0 points.

Results

Pretest

The results of the spelling, meaning and collocation tests are presented in Figure 1.1, 1.2, and 1.3. The pre-test spelling results are illustrated in Figure 1.1, the meaning pre-test in Figure 1.2 and the collocation pre-test in Figure 1.3.

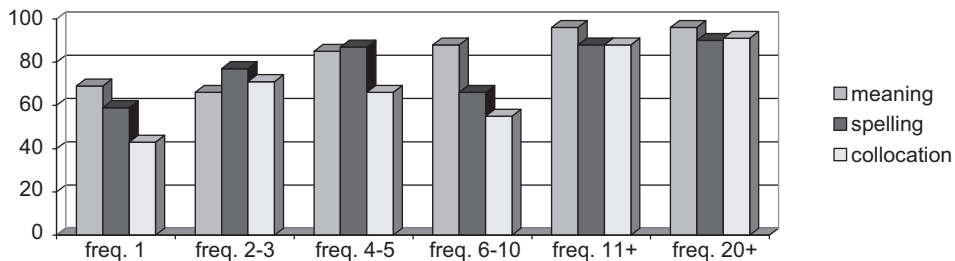


Figure 1.1 Spelling pre-test

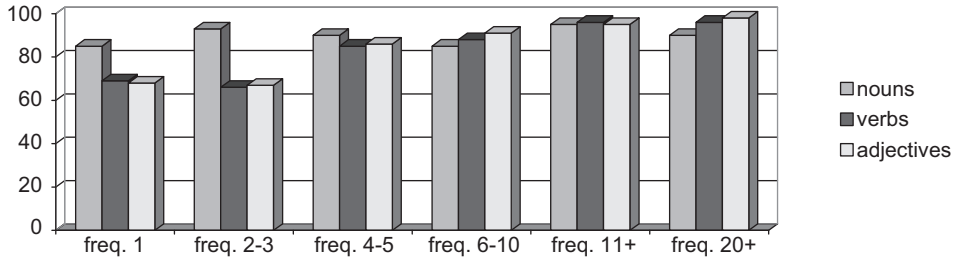


Figure 1.2 Meaning pre-test

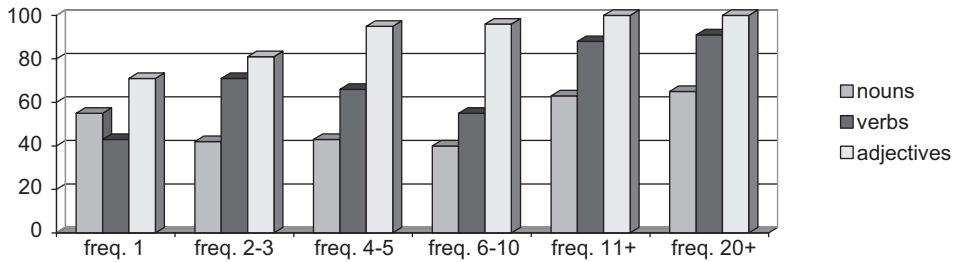


Figure 1.3 Collocation pre-test

Another way to interpret the pre-test results is to view them according to three parts of speech (nouns, verbs and adjectives), and this is illustrated in Figure 1.4, 1.5 and 1.6. The total possible score was 240 points on all three tests.

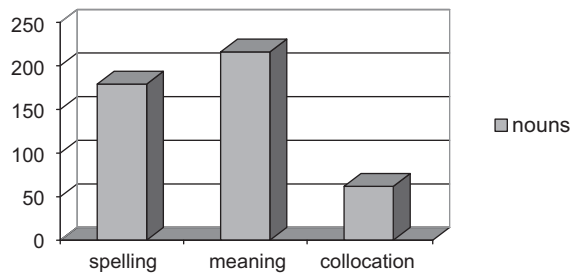


Figure 1.4 Pre-test target words by nouns

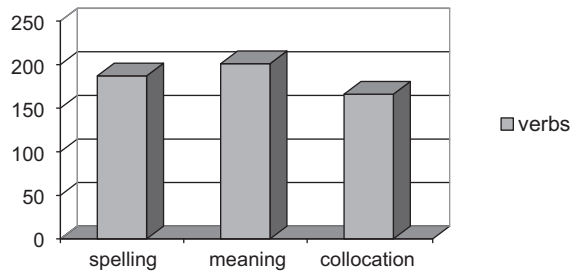


Figure 1.5 Pre-test target words by verbs

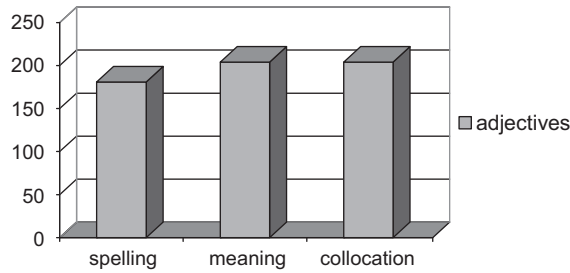


Figure 1.6 Pre-test target words by adjectives

Finally, the pre-test results can be plotted according to frequency bands, parts of speech and test type. This is illustrated in Figures 1.7, 1.8 and 1.9. Figure 1.7 reveals that knowledge of nouns was not normally distributed across the six frequency bands in all three tests. Figure 1.8 shows that the three word knowledges in the low to mid frequency bands were not normally distributed for verbs, but the participants appear to have hit a ceiling effect with high frequency verbs. For adjectives, Figure 1.9 illustrates knowledge of higher frequency words compared to lower frequency words.

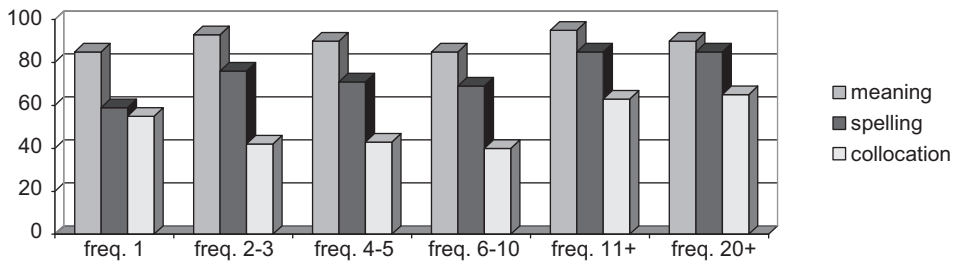


Figure 1.7 Pretest nouns

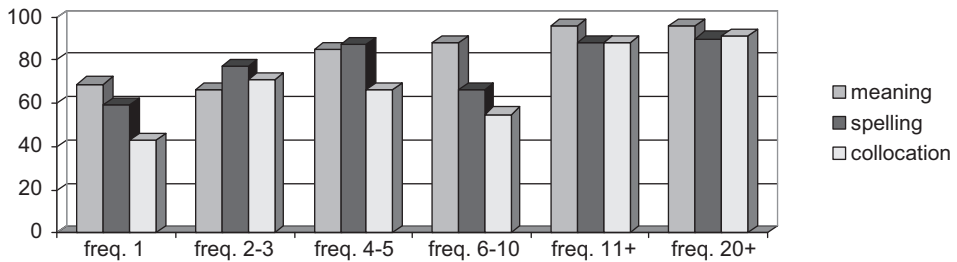


Figure 1.8 Pretest verbs

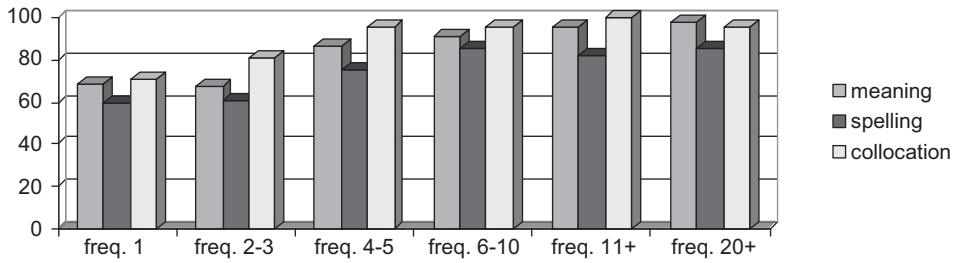


Figure 1.9 Pretest adjectives

These figures provide a good indication of the participants' knowledge of the target words before the start of the extensive reading activity. Overall, the pretests show that the participants have greater knowledge of higher frequency words than they do of lower frequency words, and that this is not equally distributed across the three word knowledges and the three parts of speech.

Posttest results

The post-test results indicate that the participants made vocabulary gains from reading four graded readers; however, the gains were not uniform across the three aspects of word knowledges and three parts of speech. Table 1.1, 1.2 and 1.3 compare the pre- and post-tests scores. Since the pre- and post-tests scores were not equally distributed, Wilcoxon Signed Ranks tests were used to show that the gains were statistically reliable.

Table 1.1 Scoring for nouns

Number of Occurrences	Spelling		Meaning		Collocation	
	T1	T2	T1	T2	T1	T2
1 a (20)	1.18 b 59.16 c	1.41 69.16	1.70 85.00	1.80 90.00	1.11 55.83	1.63 91.66
2-3 (20)	1.53 76.66	1.53 76.66	1.86 93.30	1.80 94.16	0.88 42.51	1.96 98.33
4-5 (20)	1.43 71.66	1.58 79.16	1.80 90.00	1.96 98.33	0.86 43.33	1.90 94.16
6-10 (20)	1.38 69.16	1.65 82.50	1.71 85.83	1.88 91.66	.833 40.01	1.96 98.33
10 + (20)	1.65 85.86	1.71 90.83	1.91 95.00	1.93 95.83	1.26 63.33	1.93 96.66
20 + (20)	1.70 85.00	1.66 88.33	1.80 90.00	1.98 99.16	1.31 65.83	1.86 98.33
All nouns (120)	1.49* 74.58*	1.59* 80.84*	1.79* 89.85*	1.87* 94.87*	1.04* 51.80*	1.87* 96.24*

a. number of target words in frequency category

b. mean score (max = 2)

c. percentage of possible points scored

*Wilcoxon Signed Ranks $p < .01$

Table 1.2 Scoring for verbs

Number of Occurrences	Spelling		Meaning		Collocation	
	T1	T2	T1	T2	T1	T2
1 a (20)	1.18 b 59.16 c	1.33 66.66	1.36 69.16	1.63 81.66	0.86 43.33	1.90 95.00
2-3 (20)	1.55 77.50	1.55 83.33	1.33 66.66	1.68 84.16	1.43 71.66	1.76 86.66
4-5 (20)	1.70 87.50	1.75 88.33	1.71 85.83	1.81 91.66	1.33 66.66	1.83 92.50
6-10 (20)	1.33 66.66	1.66 84.16	1.76 88.33	1.90 95.00	1.10 55.00	1.93 96.66
10 + (20)	1.76 88.33	1.78 89.16	1.93 96.66	2.00 100	1.76 88.33	2.00 100
20 + (20)	1.81 90.83	1.83 91.66	1.93 96.66	2.00 100	1.83 91.66	1.93 96.66
All verbs (120)	1.61 78.33	1.65* 83.88	1.67 83.77	1.83* 92.08	1.38 69.44	1.88* 94.58*

a. number of target words in frequency category

b. mean score (max = 2)

c. percentage of possible points scored

d. *Wilcoxon Signed Ranks $p < .01$

Table 1.3 Scoring for adjectives

Number of Occurrences	Spelling		Meaning		Collocation	
	T1	T2	T1	T2	T1	T2
1 a (20)	1.21 b 60.83 c	1.40 69.16	1.36 68.33	1.56 78.33	1.60 80.00	1.7 85.00
2-3 (20)	1.23 61.66	1.58 71.66	1.35 67.5	1.56 78.33	1.63 81.66	1.73 86.66
4-5 (20)	1.51 75.83	1.73 87.50	1.73 86.66	1.73 87.50	1.90 95.00	1.90 96.66
6-10 (20)	1.71 85.83	1.86 93.30	1.83 91.66	1.95 97.50	1.93 91.66	2.0 100
10 + (20)	1.65 82.50	1.78 89.16	1.90 95.00	1.93 96.66	2.0 100	1.93 96.66
20 + (20)	1.70 85.00	1.95 97.50	1.96 98.33	1.93 96.66	1.93 96.66	1.93 98.33
All adjectives (120)	1.50 75.27	1.71* 85.83*	1.68 84.58	1.72* 89.16*	1.80 90.27	1.87* 93.88*

a. number of target words in frequency category

b. mean score (max = 2)

c. percentage of possible points scored

d. *Wilcoxon Signed Ranks $p < .01$

To highlight the vocabulary gains on the post-test, pre-test items that were fully known were eliminated because there was no room for the participants to demonstrate lexical growth. Therefore, the words that increased in the posttest from 0 to 1, 0 to 2 or 1 to 2 were calculated to show the actual learning that occurred from the extensive reading activity. The participants mean scores are presented in Table 1.4.

Table 1.4 Percentage of words in which learning occurred

Freq.	Spelling			%	Meaning			%	Collocation			Total %
	A	B	C		A	B	C		A	B	C	
1	52.7	62.6	47.5	54	59.2	46.8	61.1	55	88.5	89.3	86.9	89.5%
2-3	43.2	69.8	78.2	63	46.8	75.4	60	60	83.3	65.3	33.3	60.6%
4-5	71.6	62.9	50	61	33.3	50	66.6	50	100	95.2	61.1	85.4%
6-10	61.5	77.2	86.6	75	66.6	70	66.6	67	66.6	96.6	66.6	76.6%
10+	69	72.2	83.3	74	50	83.3	0	44	66.6	66.6	33.3	55.5%
20+	47.2	72.2	58.3	59	33.3	66.6	33.3	44	22.2	66.6	33.3	40.7%

A = Participant A, B = Participant B, C = Participant B

Table 1.4 reveals that the participants improved in all three tests according to three parts of speech, and low scores in higher frequency bands seem to indicate a ceiling effect rather than a learning obstacle. Overall, the results suggest that the participants learned 107 (27.7%) target words in one aspect of word knowledge, 37 (10.3%) in two word knowledges and 5 (1.45%) in three word knowledges. This amounts to 149 words learned out of 360 words tested. The pick-up rate from reading four graded readers is 41.38% or about one word for every 2.4 words tested. This rate is less than what is reported in a similar study conducted by Pigada and Schmitt (2006), but it is a significant increase in vocabulary learning from reading than indicated by other studies.

Analysis of the data

The post-test results indicate that the participants improved in all aspects of word knowledge during the course of reading four graded readers. For spelling knowledge, the greatest gains (see Table 1.4) seem to occur in the mid to high frequency bands, and the least gains in the first frequency band. Interestingly, the word frequency band 20+ is the second lowest score for spelling knowledge. At first glance, this would seem to contradict the assumption that higher word frequency facilitates learning.

On the meaning test, the greatest improvement occurred in the mid-frequency bands. Other significant gains occurred in frequency band 1 and 2-3 rather than in higher frequency bands. The lowest scores occurred in higher frequency band.

For collocation knowledge, the greatest gains occurred in the first frequency band and the least in higher frequency bands.

The most likely reason for the least amount of gains occurring in higher frequency bands of the meaning and collocation tests is that the participants

demonstrated a high degree of knowledge of these word knowledges on the pretest, so there is little room for improvement. Therefore, it appears the participants reached a ceiling effect with the higher frequency target words.

When the results were viewed according to the target words' part of speech, collocation knowledge of nouns showed the greatest gains in mid to low frequency bands followed by spelling knowledge of low frequency bands, and meaning knowledge improved in lower frequency bands.

For verbs, the most significant enhancement occurred in grammatical collocation knowledge in the first frequency band and in band 6–10. Spelling knowledge of verbs increased more in the lower frequency bands than in higher frequency bands, and meaning knowledge improved throughout the frequency band, but it increased greatly in lower frequency bands.

For adjectives, all three different aspects of word knowledge appeared to be enhanced in a rather normal distribution.

Discussion

The first research question asked whether extensive reading facilitates learning of a word's spelling, meaning and grammatical collocation. Pre- and post-test results showed that extensive reading contributed to learning these different aspects of word knowledge. The test results indicated a slight increase in the participants' learning of spelling and meaning knowledge but a significant improvement occurred with grammatical collocation.

Previous studies on incidental word learning from reading have shown relatively small gains in word knowledge. Horst et al. (1998) estimated that the general rate of incidental word learning from reading is one word in every twelve words tested. However, most of the studies reviewed by Horst et al. tested participants' vocabulary learning after reading short texts that offered limited opportunities to encounter new words.

Pigada and Schmitt (2006), on the other hand, found that learning new words is an incremental process, and that testing methods used in other studies were insensitive to measure partial word learning. Their study used sensitive measures to test for partial word knowledge, which found that their participant was able to learn about 1 word for every 1.5 words tested. This case study used testing methods similar to that of Pigada and Schmitt and reached nearly similar findings; the three participants in this study demonstrated a pick-up rate of one word out of every 2.4 words tested. However, Pigada and Schmitt indicated that their participant learned most vocabulary in the higher frequency bands, whereas in this study, the participants learned more words in the lower frequency bands. The most likely

reason for this discrepancy is that in Pigada and Schmitt's study the participant was a beginner language learner of French, while this case study's participants are advanced Japanese EFL learners. On the whole, this case study seems to have demonstrated that word learning is incremental, and that sensitive testing devices need to be used to measure these increments.

The second question asked whether extensive reading influenced the three aspects of word knowledge equally. The post-test scores indicate that the three word knowledges were not equally learned from extensive reading. Spelling knowledge was increased but not equally among the parts of speech and frequency of occurrence. The most significant gains occurred in frequency band 1, 4–5 and 6–10. The lack of gains in spelling knowledge of high frequency words could indicate that frequency of occurrence did not readily contribute to improving problematic grapheme-phoneme connections experienced by Japanese EFL learners.

The most significant increase in meaning knowledge occurred in frequency band 6–10 followed by 2–3, indicating a strong enhancement at the mid frequency level. Frequency band 1 also showed noticeable enhancement in learning, which could possibly be attributed to the rich context provided by the graded readers (Schouten-van Parreren, 1989; Huckin & Coady, 1999). The results seem to suggest that reading texts suited to the participants' grammatical and lexical level greatly contributed to incidental learning of a word's meaning (Nation, 1990).

The third question asked whether different word frequencies affected improvements in learning the three aspects of word knowledge. This was partially answered in the previous question. In short, there was no clear relationship between frequency and lexical enhancement. This observation corresponds with Pigada and Schmitt's (2006) research. The participants demonstrated that even after one meeting with a target word, they were able to learn its spelling, and conversely demonstrated that after several meetings with a target word they were not able to learn its spelling. For instance, one participant misspelled the word 'medicine' as *medisen*; however, after one encounter with this word, the participant spelled it correctly on the post-test. Conversely, the word 'plaintiff' occurred more than 20 times in the extensive reading activity, but one participant misspelled it as *plentive*. It is possible to argue that the participants' first language had a negative influence on mapping grapheme-phoneme correspondences of certain words that are complex for Japanese EFL learners to acquire. The Japanese syllabic system has the phoneme sound ə but does not have the phoneme sound ā. Consequently, the participants on more than one occasion, despite the word's frequency, misspelled a word containing the phoneme ā with the phoneme ə. Therefore, it seems reasonable to suspect that their English proficiency is affected by phonological deficits of some English phoneme sounds.

Another reason why higher frequency words were moderately learned is because the participants could have had previous knowledge of those target words (Pigada & Schmitt, 2006). This could have resulted in a ceiling effect on further learning of these particular target words. Moreover, the participants could have found some of the low frequency words easier to learn. Huckin and Coady (1999) credit EFL learners' ability to learn low frequency words because of their saliency and reconcilability as a cognate and their morphology.

The research paper's fourth question asked whether the word class of the target words affected learning the three aspects of word knowledge. The post-test scores revealed aberrations in learning word knowledges from one word class to another. When the data was analyzed, adjectives in the 20+ frequency band showed a certain amount of attrition, which is noticeable in the meaning and collocation post-tests; however, increases in learning were demonstrated on the spelling test.

The target words that are verbs improved in all three aspects of word knowledge. From the pre-test to the post-test, the participants showed learning of verbs that occurred in frequency band 1, 4–5 and 6–10 on the grammatical collocation test. On the meaning test, the gains occurred mostly in frequency bands 1 and 2–3. Overall, on all three tests, the target words that are verbs showed steady improvements from ER.

Nouns, on the other hand, showed different degrees of learning on the three tests. The most significant gains in spelling of nouns occurred in the first frequency band, but this leveled off at the 2–3 frequency band, and little increase was recorded in the 20+ frequency band. The most significant increase occurred on the grammatical collocation test in nearly all frequency bands. This is strikingly more substantial than the learning demonstrated in grammatical collocation of verbs and adjectives. Other researchers have suggested that nouns are easier to learn because there is less conceptual effort needed to build an association of the L2 word with synonyms in the L1 (Kweon & Kim, 2008). Gentner (1982) reported that nouns are basic and more predictable than any other word class, whereas verbs are less structured, less predictable and matrix-like.

It is also noteworthy that the participants were able to correctly spell nouns that indicate their meaning for a couple of reasons. First, the participants are advanced Japanese EFL learners who have studied English extensively in Japan and in English speaking countries, and so they are familiar with a number of the target words used in the four graded readers. Second, a number of the target words are English loan words that have become part of the Japanese lexicon. To illustrate this, Nation (2001) states that 38% of the 2,000 words in the General Service List are loan words in Japanese.

Limitations

This case study cannot make any statistical generalizations about vocabulary learning from extensive reading. Moreover, the participants in this study are advanced Japanese EFL learners, and so it does not necessarily reflect the degree of vocabulary learning of beginner or intermediate EFL learners that commonly make up an EFL classroom in Japan.

This case study used four graded readers as its extensive reading activity, but future studies need to explore reading massive amount of texts in relation to incidental vocabulary acquisition. Furthermore, three aspects of word knowledge were measured, but mastery of a word requires learning several aspects of word knowledge, which also need to be measured. In addition, the participants' sharp improvement on the grammatical collocation test is dissimilar to the pick-up rate on the other tests, which possibly indicates that the grammatical collocation tests may not have been accurately measuring what it set out to measure, but rather it was testing something else. Finally, no delayed post-test was administered, and so no information is available to provide an account of how newly learned words are retained over time.

Conclusion

Knowing a word is a complex process that involves learning several different, but interrelated, types of word aspects. Vocabulary acquisition pedagogy has often centered on explicit instruction, but a growing body of literature is revealing that incidental vocabulary acquisition is responsible for a large portion of the words learned by language learners. This research paper explored whether an extensive reading activity is able to facilitate incidental vocabulary acquisition. This case study investigated the effects of frequency of occurrence and part of speech on learning a word's spelling, meaning and grammatical collocation. The results indicate that extensive reading contributed to improvements in these three aspects of word knowledge, and it reflects studies that have used a similar testing format. Nevertheless, it must be stressed that incidental vocabulary acquisition is not better than explicit learning, but that it complements efforts made through direct engagement with words, and that it is a very useful method to consolidate knowledge of words.

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