

Incidental Vocabulary Learning from Extensive Reading: Directions for Future Research

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Introduction

Vocabulary learning from incidental exposure in reading is a major means by which native speakers expand their vocabulary knowledge (Jenkins, Stein, and Wysocki, 1984; Nagy, Herman, and Anderson, 1985). In the last twenty-five years, a number of studies with non-native speakers has confirmed the widespread assumption that second/foreign (L2) learners can also acquire vocabulary incidentally through reading (Horst, 2005; Pellicer-Sanchez & Schmitt, 2010).

Incidental word learning gains have been small in comparison to gains from intentional learning. Indeed, recent research has questioned the extent to which incidental word learning from reading is a viable approach for building L2 learners' lexicons (Laufer, 2001; 2003; Cobb, 2007). Reviewing a number of studies of intentional vocabulary learning, Laufer (2005) presented a strong case for explicit learning through meaning-based tasks, which she claimed had led to 33%-86% of the words being learned in the studies examined. Conversely, initial studies of L2 vocabulary acquisition from incidental exposure in reading found very low pick-up rates, with about one word being correctly identified out of every 12 words tested (Horst, Cobb & Meara, 1998). More recent studies of incidental learning have shown larger vocabulary gains, but as yet have been unable to match

the gains found in intentional learning studies (Schmitt, 2008).

Most incidental learning studies have only measured *unknown* words or a proportion of *unknown* words (e.g. Horst, 2005; 2009; Waring and Takaki, 2003). Other than Pigada & Schmitt (2006) and Pellicer-Sanchez & Schmitt (2010), virtually all the learning-from-context studies since the 1980s have been concerned with the acquisition of unknown words (see, e.g., Horst, 2005 for an overview). Consequently, several studies have concluded that much learning had been left unmeasured, leading Horst et al. (1998: 219) to claim that, "studies should test much larger numbers of potentially learnable words in order to ensure that subjects have ample opportunity to demonstrate incidental gains." In addition, it still remains to be determined to what degree high-frequency words, i.e., those in the first 1,000-2,000 word families, have been enhanced, enriched or consolidated in extensive reading (ER) programs. Moreover, both unknown and partially known words need to be considered in order to more accurately assess vocabulary gains from ER.

Thus, there is a need for more rigorously controlled studies of incidental vocabulary learning. Moreover, with the exceptions of Horst (2005; 2009), no other studies of incidental vocabulary learning have identified and assessed knowledge of words available for learning in an entire ER program. New studies may fill these gaps in the research and show that much larger learning gains are made through ER than has hitherto been shown to occur.

Literature Review

Incidental vocabulary learning from ER

As mentioned, initial studies of vocabulary learning from incidental exposure in reading found disappointingly low pick-up rates. However, these early studies had a number of procedural limitations. As shown in Table 1, these limitations included: (a) small numbers of target words, e.g., the 12 Dutch words in Hulstijn (1992); (b) inadequate control of text difficulty, e.g., the two chapters of *A Clockwork Orange* in Pitts et al. (1989); (c) very small amounts of reading, e.g., the 907-word passage in Hulstijn (1992); (d) insensitive measurement instruments, e.g., the multiple-choice tests in Pitts et al. (1989); and (e) no delayed posttests, e.g., Day et al. (1991).

Table 1. Vocabulary gains from incidental learning through extensive reading.

Study	No. of participants	Text length & time on task	Text Type	No. of words tested & type of test used	Mean no. of words learned %
Pitts, White and Krashen (1989) Experiment 1	35 ESL learners	6,700 words 60 mins.	Two chapters of the unsimplified novel <i>A Clockwork Orange</i>	30 <i>nadsat</i> words MC test	6.4%
Pitts, White and Krashen (1989) Experiment 2	16 ESL learners	6,700 words 40 mins.	Two chapters of the unsimplified novel <i>A Clockwork Orange</i> , plus two scenes of the video	28 <i>nadsat</i> words. MC test	9%

Day, Omura and Hiramatsu (1991) Experiment 1	89 High-school EFL learners	1,032 words 30 mins.	Simplified short story, <i>Mystery of the African Mask</i>	17 English words MC test	6%
Day, Omura and Hiramatsu (1991) Experiment 2	200 university EFL learners	1,032 words 30 mins.	Simplified short story, <i>Mystery of the African Mask</i>	17 English words MC test	18%
Hulstijn (1992) exp.1	65 Dutch learners	907 words ? mins.	Simplified non-fiction passage	12 Dutch words. State the meaning test	7.6%
Dupuy and Krashen (1993)	42 French learners	15 pages ? words 40 mins.	French text plus video, unsimplified drama	30 French words. MC test	22%
Horst, Cobb and Meara (1998)	34 EFL learners	21,232 words 360 mins.	Graded reader version of <i>The Mayor of Casterbridge</i>	45 English words MC test Word-association test	20% (MC test) 16% (Word- assoc. test)
Zahar, Cobb and Spada (2001)	144 High-school ESL learners	2,383 words 50 mins.	Graded reader of version of <i>The Golden Fleece</i>	30 English words Match the meaning test	7.8%
Waring and Takaki (2003)	15 EFL learners	5,872 words 56 mins.	Graded reader version of <i>A Little Princess</i>	25 disguised English words. Word-form recog. test, MC test, Translation test	61% (Word-form) 47% (MC) 18% (Trans.) (Immediate posttest scores)
Horst (2005)	21 ESL learners	10.52 books on average Six weeks	Graded-reader library of 70 titles	100 English words. Self-report checklist; VKS (35 words)	50% (Self-report) 51.4% (VKS)
Pigada and Schmitt (2006)	One learner of French	30,000 words 360 mins.	Four French graded readers	133 French words Interview	65.4% (Partial-word knowledge enhancement)

Brown, Waring and Donkaewbua (2008)	35 EFL learners	16,702 words 180 mins.	Three graded readers	28 disguised English words. MC test. Translation test	48% (MC) 16% (Trans.) (Immediate posttest scores for reading +listening)
Kweon and Kim (2008)	12 EFL learners	134,013 words 20-30 hours	Three unsimplified teen novels	367 English words Self-report checklist VKS (32 words)	29% (n.) 17% (v.) 18% (adj.) (Checklist at immediate posttest) ?%VKS
Al Homoud and Schmitt (2009)	70 EFL learners	31,500-162,000 words. 10 weeks	Graded-reader library of 150 titles	60 English words VLT	16%
Horst (2009)	29 ESL learners	Three books on average Five weeks	Graded-reader library of 60 titles	300 English words. Self-report checklist VKS (five words)	49% (Self-report) 35% (VKS) (Immediate posttest scores)
Pellicer-Sanchez & Schmitt (2010)	20 EFL learners	67,000 words Four weeks	Unsimplified English novel, <i>Things Fall Apart</i>	34 African words MC test Interview	14%-43% (Partial-word knowledge enhancement)

MC = Multiple Choice (Adapted from Waring and Takaki, 2003; Horst 2005)

More recent studies which have addressed some or all of these weaknesses have found larger gains. In their (1998) study, Horst et al., found that their Omani participants learned about one new word out of every five words tested, and that this learning persisted over a period of 10 days. Waring and Takaki (2003) found incidental vocabulary learning in terms of recognition of word form, and recognition of meaning in a multiple-choice test, but considerably less when required to produce the meaning in a translation task. Their Japanese participants recognized the meanings of 10.6 out of 25 words on an immediate multiple-choice test, and were able to provide a translation for 4.6 out of 25 words.

In her (2005) study, Horst scanned the graded readers in her ER program so that they could be processed using a version of the Range software (Nation and Heatley, 1996). After sitting a 100 item self-report pre-test, her 21 adult ESL participants engaged in ER over a six-week period. At the end of the six weeks, each participant was given an individualised posttest of the same size and format as the pre-test using words at the 1,001-2,000 level and lower frequency words which were randomly selected from four of the books that a participant had read.

Considerable learning was found. The results suggested that 17 participants learned over half of the unfamiliar, lower frequency words they encountered in the graded readers (four participants did not complete the study). These 17 participants also appeared to have acquired knowledge of over half of the unknown 1,001 – 2,000 level words they encountered. However, because there was no control group, it could not be ruled out that there was a role for other sources of exposure in learning these more common words. As a check on reported learning gains, participants were asked to complete a second individualised measure based on Wesche and Paribakht's Vocabulary Knowledge Scale (1996). Of the 35 lower frequency words tested, there was evidence of new, full or partial knowledge in 18 instances, or 51%.

In a follow up study, Horst (2009) replicated much of her (2005) design when she examined the incidental vocabulary gains of 47 adult ESL participants who had engaged in a five-week ER program with 60 graded-reader titles. However, this time Horst included a control group, designed a 300-item self-report test, and measured incidental learning of lower frequency words only.

Findings showed that 29 participants gained new knowledge of over half the unfamiliar, lower frequency words they encountered in their reading (18 participants formed a non-reading control group). Results from the second measure, an individualised knowledge demonstration test based on Wesche and Paribakht (1996), helped substantiate these gains. That is, the mean number of previously unknown words that were defined accurately amounted to 1.76 words in five, or 35%. This compares favourably with studies such as Horst, et al. (1998) in which participants could recognize about 20% of the new words they had met in their reading.

The fundamental concepts underlying Horst's (2005; 2009) studies of creating a word list for each graded reader, keeping a record of what participants read, and then testing participants on words they encountered while reading provides a useful methodological model for future research. As Nation & Webb (2010, ch.6) comment, "it is not difficult to see how such a study [Horst, 2005] could provide a wealth of data on the learning of vocabulary from extensive reading, including quantity of vocabulary learnt, the factors affecting vocabulary learning, and the effect of extensive reading on both previously met and new items."

How has vocabulary been measured in studies of incidental learning?

Many studies of incidental L2 vocabulary acquisition through reading have tended to measure knowledge of form and meaning, and ignore the other aspects of word knowledge. However, as shown in Table 2, knowledge of form and meaning is only one of nine aspects in Nation's (2001: 27) framework. Moreover, as both receptive and productive tests may be needed to determine full knowledge of a single aspect, it is likely that a very large number of previous studies measured only partial knowledge of a single

aspect. Thus, relying on a single receptive or productive test of form and meaning as evidence that target words are known has now become untenable (Nation & Webb, 2010; Pigada and Schmitt, 2006; Waring & Takaki, 2003; Webb, 2005).

Table 2. What is involved in knowing a word.

Form	spoken	R P	What does the word sound like? How is the word pronounced?
	written	R P	What does the word look like? How is the word written and spelled?
	word parts	R P	What parts are recognizable in this word? What word parts are needed to express the meaning?
Meaning	form and meaning	R P	What meaning does this word form signal? What word form can be used to express this meaning?
	concept and referents	R P	What is included in the concept? What items can the concept refer to?
	associations	R P	What other words does this make us think of? What other words could we use instead of this one?
Use	grammatical functions	R P	In what patterns does the word occur? In what patterns must we use this word?
	collocations	R P	What words or types of words occur with this one? What words or types of words must we use with this one?
	constraints on use (register, frequency ...)	R P	Where, when, and how often would we expect to meet this word? Where, when, and how often can we use this word?

In column 3, R = receptive knowledge, P = productive knowledge.
 (Taken from Nation, 2001)

A recent series of multi-aspect studies (Pellicer-Sanchez & Schmitt, 2010; Pigada and Schmitt, 2006; Schmitt, 1998; Schmitt and Meara, 1997; Webb, 2005; 2007), all of which measured vocabulary depth by isolating and measuring multiple aspects of knowledge, have made it possible to describe a larger range of learning, showing that reading tasks can enhance a variety of receptive and productive word knowledge aspects.

In a longitudinal study of incremental vocabulary learning, Schmitt (1998) measured participants' emerging knowledge of spelling, associations, grammatical information, and meaning. He used an innovative scoring system to measure different degrees of strength of knowledge of those aspects. Pigada and Schmitt's (2006) study of vocabulary learning through ER used a similar scoring procedure which allowed them to assess three degrees of knowledge (unknown, partially known, known) for three aspects of knowledge: written form, form and meaning, and grammatical functions.

Pellicer-Sanchez & Schmitt (2010) explored incidental vocabulary acquisition using a hybrid of Saragi, Nation & Meister's (1978) *A Clockwork Orange* experiment and a multi-aspect methodology. They used the authentic English novel *Things Fall Apart* and selected 34 target words from the Nigerian dialect words therein. Using a four-test battery that consisted of a recognition test of spelling, a recall test of word class, and both recognition and recall tests of meaning, the researchers demonstrated that incidental vocabulary learning from reading a novel ranged from 14%-43% of the 34 target words.

Thus, one of the main aims of future studies should be to design a comprehensive measurement battery that includes a range of sensitive receptive and productive tests capable of capturing small changes in multiple aspects of vocabulary knowledge for both unknown and partially known words that have been met in an ER program.

The use of interviews to assess vocabulary gains

A good means of measuring vocabulary gains is through interviews.

Pellicer-Sanchez & Schmitt's (2010) measurement procedure was a combination of multiple-choice test and a semi-structured one-to-one interview. The interviews were divided into five consecutive parts to cover four multi-aspect tests and an attitude survey. Pigada & Schmitt (2006) and Schmitt (1998) also used interviews in their studies, reporting that the procedure provided a rigorous and reliable means of determining learning. Moreover, interviews may be more sensitive to learning as they allow interaction with participants and the ability to probe further to confirm degrees of knowledge.

Lexical access speed

Measures of lexical access speed (LAS) provide a valuable means of determining L2 vocabulary knowledge (Segalowitz, Watson, & Segalowitz, 1995). LAS scores show how well a word is known by considering the time in milliseconds (ms) it takes a reader to recognize the word or make a simple decision about it. Educated L1 readers produce a baseline reaction time of 700 ms for high-frequency words, a time that rises slightly with frequency to the 10,000th word-family level, seldom surpassing 850 ms (Cobb, 2009). In a study of reading ability and word recognition speed, Shiotsu (2009) wanted to determine whether his more skilled Japanese university EFL readers and the less skilled ones differed in their visual recognition speed of four-letter, high-frequency words. Additionally, he wished to determine how fast the participants could access the meanings of high-frequency known words through synonym-or-antonym decision tasks. Shiotsu found that the more advanced L2 participants had more efficient word recognition skills. He also found that these more skilled readers were faster processors of meaning, whereas the less skilled ones were slower in accessing meaning, but not necessarily slower in the visual identification of existing word

forms. Shiotsu recommended that accurate and automatic word recognition be achieved by massive exposure to L2 words through reading.

Research has yet to examine whether words that are considered to be known can realize further LAS gains through ER. Moreover, by varying the sets of cue words (or stimuli), the sensitivity of lexical access measures may allow for other word knowledge aspects to be measured.

Needed research on incidental vocabulary learning through ER

There are several types of vocabulary learning that can occur through ER.

(a) Learners begin to learn the form and form-meaning connection of previously unmet words; (b) learners begin to learn other aspects of the form, meaning and use of previously unmet words; (c) learners strengthen their knowledge of the written form and form-meaning connection of previously met words; and (d) learners enrich their knowledge of previously met words by learning new aspects of their form, meaning and use.

Studies are needed which consider all four kinds of learning in order to capture the full range of vocabulary learning that can occur from ER. As alluded to earlier, there is a need for more studies like that done by Pigada and Schmitt (2006) to take account not only of the learning of unknown words, but also the strengthening and enriching of words that were partially known prior to reading. With studies like this, it is possible to get a fuller picture of the amount of incidental vocabulary learning that occurs during ER, and perhaps arrive at some quantification of it so that more accurate estimates can be made of the amount of reading that needs to be done to get adequate vocabulary growth (Nation & Webb, 2010).

Designing an incidental vocabulary learning study

Research Questions

In the proposed study, the use of corpora of graded readers will provide a means of determining incidental vocabulary learning from ER, and multi-aspect measurement will provide an indication of the depth of that learning. In addition, the use of paper-based tests, personal interviews, and LAS measures will provide a comprehensive means of assessing gains. This approach will help to explore the following questions:

1. (a) To what extent is knowledge of high-frequency words (the first 1,000-2,000) enhanced by reading 12/14/16/18 graded readers over 15-weeks?

(b) To what extent are the different aspects of word knowledge for high-frequency words learned through ER?

(c) Does LAS increase for high-frequency words encountered in the ER materials?

The first question focuses on incidental learning of high-frequency words. Proficiency tests of vocabulary size or vocabulary levels typically indicate that these words are known to participants. However, these tests only measure the aspect of form and meaning. Consequently, it may not be necessary to measure receptive knowledge of written form, and form and meaning, because these aspects are most likely to be known. Instead, aspects such as word parts, associations, and collocation will likely be the focus, as participants may only have partial knowledge of each of these. To

date, no studies have measured these aspects for the high-frequency words of English in ER texts. The final selection of aspects will be subject to the careful analysis of the graded-reader corpora. In addition, LAS gains for high-frequency words encountered in the ER treatment will be measured. Previous research has not fully examined the effects on word recognition speed of multiple encounters with high-frequency words during reading. The proposed research will endeavour to further the investigation in this area. By measuring gains in knowledge of high-frequency words, the proposed research may show that considerably more vocabulary learning occurs through ER than had previously been found.

2. (a) To what extent are lower frequency words (3,000-5,000 levels) learned by reading graded readers over 15 weeks?

(b) To what extent are the different aspects of word knowledge for lower frequency words learned through ER?

(c) Does LAS increase for lower frequency words encountered in the ER materials?

The second question focuses on less frequent words. Because form and meaning is the standard measurement of vocabulary learning, it will be useful to measure knowledge of this aspect. Moreover, results will provide a basis for comparison with other studies. It will also be useful to measure knowledge of written form because spelling is an aspect likely to be enhanced through encounters in context (Pigada & Schmitt 2006; and Webb 2005; 2007). As with high-frequency words, collocation will likely be measured because it is an aspect that may be influenced considerably by encounters in context, and there is a lack of research on learning

collocation (Nation & Webb, 2010; Webb & Kagimoto, 2009). As above, the final selection of aspects will be subject to the careful analysis of the graded-reader corpora. LAS gains for lower frequency words encountered in the ER treatment will be measured. Previous research has not fully examined the effects on word recognition speed of multiple encounters with lower frequency words during reading. The proposed research will endeavour to further the investigation in this area. Moreover, no studies have examined vocabulary learning through ER over extended periods. The proposed research thus has greater potential to demonstrate the effects of ER on vocabulary learning.

Methodology

Overview

To address these research questions, two studies will be conducted. First, a set of case studies will be carried out. Then, a larger experimental study with more participants will be undertaken, which will increase the generalisability of the results. With the case studies, a mixed-method approach using multi-aspect measures, interviews and LAS will be necessary to determine the extent to which target words move from one degree of knowledge to another (cf. Pigada & Schmitt, 2006). For the larger group, multi-aspect paper-based tests and LAS will be used because they will allow a larger number of target words to be measured (cf. Webb, 2005; 2007). In order to control for learning outside of the study, there will be a control group of matched-ability participants which takes the pre- and posttests, but does not complete the treatment. LAS assessment will involve the use of computer-adapted sets of lexical decision tasks which measure visual orthographic and lexical semantic processing gains (cf. Shiotsu,

2009).

Participants

The participants in the experimental and control groups of the main study will be Japanese students learning EFL at a university in Japan. Their English language competence will likely be in the pre-intermediate to intermediate range. This will be confirmed by TOEFL scores and the Vocabulary Levels Test (Schmitt, et al. 2001).

Case studies

The proposed research will include single-subject studies fitting the same participant profile as above. These case studies (CS) will complete the treatment before the large experimental group thereby informing the design of the experimental study. Following elements of the approach taken by Pellicer-Sanchez & Schmitt (2010), Pigada & Schmitt (2006) and Schmitt (1998), CS will undergo an interview procedure, which will comprise a test battery sensitive to small gains of different aspects of word knowledge. Thus, the acquisition of high and lower frequency target words encountered in 15 weeks of reading may be captured.

CS participants will be allowed to choose any 15 graded readers to read from a set of 60 titles. However, they will be required to make their 15 choices at the start of the treatment enabling the researcher to identify vocabulary that will occur in participants' reading. Separate corpora will be created for each participant from which individualised sets of target words will be selected for measurement procedures (Horst, 2005; 2009). These participants will be required to do ER independently outside of their

regular English lessons, and will be interviewed separately in weeks 1, 7 and 15 to determine degrees of word knowledge at the outset, mid- and post-treatment.

LAS measures will be given as pre- and posttests to CS, as well as to experimental and control groups in the larger study in order to determine gains made in word processing efficiency due to the ER treatments

Experimental Study

Analysis of the CS findings will inform the design of the experimental study. Four separate digital corpora will be built from sets of 12, 14, 16, and 18 graded-reader titles, and from which target words will be selected. This will enable the construction of a baseline pre-test of words from the default minimum set of 12 graded readers. Posttests will include all the pre-test items in the 12-reader set, as well as items from the extra two, four and six graded readers that some of participants will have managed to read. Thus, there will be four individualised post-tests based on the sets of graded readers that participants read in the 15-week treatment (cf. Horst, 2005; 2009). An alternative option that may be considered, and suggested by Nation and Webb (2010, ch.6), is for the pre-test to be larger than the individualised posttests by trying to cover all the 18 books on one composite test. Then, at posttest time, only the results from relevant parts of the pre-test would be used for each participant.

Materials

60 Oxford Bookworms (Stages 2, 3 & 4) graded-reader titles will be used in this research. The selected titles have been rated highly by the Edinburgh

Project on Extensive Reading (Hill, 2000). Indeed, Hill (2008: 200) regards Bookworms to be "the most consistent of all the series, in terms of language control, length and quality of story".

Instruments

The Vocabulary Levels Test (Schmitt et al., 2001) will confirm that Bookworms Stages 2, 3 and 4 (having 700, 1000, and 1400 headwords respectively) are within the participants' reading proficiency and that they have at least 95-98% coverage of the graded readers to allow reasonable comprehension of the text to occur (Laufer, 1989; Hu and Nation, 2000; Nation, 2001).

Measuring incidental learning will require tests sensitive to small gains in word knowledge. The instruments designed by, e.g., Webb (2005) were effective and will inform the proposed research. His measures clearly demonstrated receptive and productive knowledge, and five aspects of knowledge could be isolated. The tests did not require context, they were easy to understand, and quick to complete. Together, they formed a very comprehensive and effective test battery of vocabulary depth.

An interview procedure for CS will be designed to assess depth of vocabulary knowledge. Schmitt (1998) used interviews with different parts of it devoted to measuring four aspects of knowledge. He used scales and scoring systems that measured degrees of strength of knowledge for each aspect.

LAS measures

The proposed study will use computer-adapted sets of rapid same-or-

different lexical decision tasks to assess visual orthographic speed gains. It may also include rapid decision tasks to assess the word knowledge aspects of association (e.g., synonymy and hyponymy), and collocation. In such tasks, each participant will see a pair of vocabulary items on the computer screen and respond by pressing a key to indicate whether the two items are matched or unmatched. Thus, assessing the speed of visually identifying (high-frequency and lower frequency) target words, and accessing their lexical semantic meanings may prove feasible.

Participants' response times and accuracy will be recorded for each pair of items. These measures of LAS will be given as pre- and posttests to the CS, as well as to experimental and control groups in the larger study in order to determine gains made in word processing efficiency due to the ER treatments (Horst, 2009; Cobb, 2009; Segalowitz et al. 1995; Shiotsu, 2009).

Procedure

Once the CS have selected their 15 books, the researcher will create and then analyze the individual corpora using Range (Nation & Heatley, 2002). Target words in the books will be chosen on the basis of: (a) which word knowledge aspects can usefully be measured, and (b) their frequency-of-occurrence rate within the corpus. Then, having designed and trialled the measures, test batteries will be prepared as pre- and posttests.

A similar procedure will be followed in the experimental study. Multiple copies of the graded readers will be made available to the participants. Text files of the readers will be combined to create four electronic corpora, which will facilitate the selection of target words. By reading 12/14/16/18 graded readers in the ER program, participants may gain increased knowledge of

both high- and lower frequency words in the books. Knowledge of word parts, word families, word class, and collocation may be enhanced. It is also expected that spelling, form-meaning relationships and collocation of lower frequency words will be learned, too.

The large experimental group will have an ER program attached to their regular English course; the control group will not. Participants in the experimental group will be required to read independently at home at least 12 graded readers, thereby reading approximately 100,000 tokens each. After reading each book, CS and experimental group participants will do a 10 question comprehension test, and complete a reading log.

This study is a way to tap vocabulary learning that has often gone unmeasured. It is a way to test much larger numbers of potentially learnable words, ensuring that participants have ample opportunity to demonstrate incidental gains. In addition, it is a means of determining to what degree high-frequency words have been enhanced, enriched or consolidated in ER programs. Finally, it is a way to measure both unknown and partially known low-frequency words and thereby arrive at a more accurate assessment of vocabulary gains from ER.

Currently, the field of incidental vocabulary learning from reading is an encouraging one. Innovative methodologies have been used to better investigate vocabulary learning. These innovations include the use of sensitive multiple-choice tests such as those designed by Nagy, Herman and Anderson (1985). Also important has been the use of multiple tests of the same words, such as Waring and Takaki's (2003) word-form recognition, multiple-choice recognition, and receptive-recall translation tests. Pigada and Schmitt's (2006) scoring procedure, which allowed them to assess three

degrees of knowledge (unknown, partially known, known) for three aspects of knowledge: written form, form and meaning, and grammatical functions, has been equally ground-breaking. Moreover, the analysis of scanned texts to guide the design of tests (Horst, 2005; 2009), and Pellicer-Sanchez and Schmitt's (2010) combination of multiple-choice tests and semi-structured one-to-one interviews have further invigorated the investigation into the diverse factors affecting vocabulary learning. It is anticipated that the increased use of LAS measures to quantify partially known and known vocabulary will further advance the methodological repertoire of researchers.

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