Second Language Incidental Vocabulary Acquisition through Reading and Listening

by

Sarvenaz Hatami

A thesis submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Studies in Teaching and Learning English as a Second Language

Department of Educational Psychology
University of Alberta

© Sarvenaz Hatami, 2015

Abstract

This dissertation presents research on second language (L2) incidental vocabulary acquisition through reading and listening. Data for this research were collected in the EFL context of Iran, from Iranian undergraduate students, at an intermediate level of EFL proficiency, who were majoring in engineering at a prestigious university. The dissertation consists of three papers, each focusing on a different aspect of L2 incidental vocabulary acquisition from input, as described below.

First Paper: The Differential Impact of Reading and Listening on L2 Incidental Acquisition of Different Aspects of Word Knowledge

This study compares the impact of L2 reading and listening on the incidental acquisition and retention of five aspects of vocabulary knowledge (i.e., spoken form, written form, part of speech, syntagmatic association, and form-meaning connection). It also examines the relationship between frequency of word occurrence and vocabulary acquisition through reading versus listening. The participants were 139 intermediate-level EFL learners, who were assigned to two experimental groups (i.e., reading and listening) and one control group. The experimental groups were exposed to the same text containing 16 target words (replaced by 16 non-words). The results on the immediate post-test revealed that readers scored higher than listeners on all five aspects of word knowledge. Retention scores on the delayed post-test were also higher for readers, but listeners appeared to forget less within three weeks. Effects of frequency of occurrence were found to be smaller in listening than in reading.

Second Paper: The Role of Perceptual Learning Style Matching in L2 Incidental Vocabulary Acquisition through Reading

This study investigates whether there is any difference in L2 incidental vocabulary acquisition and retention through reading when learners' perceptual learning style preference is matched to their input mode, mismatched to their input mode, or mixed. The participants were 108 intermediate-level EFL learners. Based on their perceptual learning style preferences (visual, auditory, kinaesthetic/tactile, mixed), they were divided into a reading group (consisting of three subgroups: Matched, Mismatched, Mixed) and a control group. The reading group read a graded reader containing 16 target words and then completed immediate and delayed (three weeks later) vocabulary post-tests. The findings revealed no significant differences between the three reading subgroups in terms of incidental vocabulary acquisition and retention.

Third Paper: The Impact of Learner-related Variables on L2 Incidental Vocabulary Acquisition through Listening

This study explores the impact of five learner-related variables on L2 incidental word learning from listening. These variables were gender, L2 vocabulary size, amount of L2 listening (for academic purposes and pleasure), level of enjoyment, and (self-reported) level of comprehension. The participants were 99 intermediate-level EFL learners, who were randomly assigned to a listening group and a control group. Sixteen target words were chosen in a graded reader and were then replaced by 16 English-like non-words. The participants listened to the graded reader and completed a vocabulary post-test immediately after the listening session. The post-test measured participants' knowledge of five different dimensions of word knowledge (i.e., spoken form, written form, part of speech, syntagmatic association, and form-meaning connection). The findings revealed that while gender and amount of L2 listening appear to have no impact on incidental vocabulary gains from listening, L2 vocabulary size, level of enjoyment, and level of comprehension are important facilitating factors.

Preface

This dissertation is an original work by Sarvenaz Hatami. The research project, of which this dissertation is a part, received research ethics approval from the University of Alberta Research Ethics Board, Study Title "The Differential Impact of Reading and Listening on L2 Incidental Vocabulary Acquisition: Do Perceptual Learning Styles Make a Difference?", Study ID Pro00046346, 04/04/2014.

This dissertation is dedicated with love to

my mom and dad.

Acknowledgements

I cannot express how thankful I am to my PhD supervisor, Dr. Marian Rossiter, whom I deeply respect and admire. She is an ideal supervisor who has taught me what it means to be a true academic. I had an incredibly smooth and productive five years during my PhD program and I truly owe this to Marian, her knowledge, wisdom, dedication, and ongoing support. I am also greatly indebted to Dr. Marilyn Abbott, who has an unusually kind heart, and who has been a tremendous source of knowledge, support, and encouragement for me during these years. I am extremely grateful to Dr. Tracey Derwing for being my source of insight and inspiration and for providing me with valuable academic guidance over the years. I would like to specially thank Tracey for doing the audio-recording for the listening group in this research, with her beautiful voice and quintessentially Canadian accent. Without the invaluable help and feedback from the members of my supervisory committee - Drs. Rossiter, Abbott, and Derwing - on each and every page of this dissertation, this work would never be what it is today. I would also like to thank Dr. Leila Ranta for providing me with learning opportunities during my PhD program and for generously funding me to attend conferences.

I am grateful to the *Language Learning* journal for the *Language Learning Dissertation Grant,* which I used as incentive for recruitment of the participants in this study. This research would not have been possible without the cooperation of instructors and participation of students at Isfahan University of Technology (IUT). I would like express my gratitude to Dr. Gholam Reza Zarei, the Director of the English Language Center at IUT for his kindness and cooperation, to the instructors at IUT who allowed me to interrupt their classes, and to the intelligent and studious students who participated in this research.

I also wish to thank Dr. Mohammad R. Sabzalian at IUT for his advice on research design and statistics before I collect data for this research and Dr. Amin Mousavi for his statistical guidance as I was analyzing the data. I will not forget Amin's extreme helpfulness and excellent advice during this process.

Also, special thanks to all my wonderful Persian and Canadian friends who responded to the non-word questionnaire. I am also grateful to my cousin, Afshin, for pilot testing the materials and instruments and providing feedback on the translations.

I would like to express my appreciation to my two brothers, Saba and Sepehr, for always being there for me. Special thanks to Sepehr, whom I deeply love, and who has been so caring and supportive over the years. And finally, my deepest gratitude goes to the best gifts of my life, my beloved parents, Mahindokht and Bijan, for their unconditional love and deep understanding throughout my life. Thanks for the immense and invaluable help with the data collection and data entry. Thanks for always sharing my anxiety and providing me with guidance and enthusiastic support. I love you beyond words.

Table of Contents

List of Tables

List of Figures

1. Introduction

In the field of second language acquisition (SLA), a traditional distinction has been made between *incidental* and *intentional* learning (Ellis, 1994). Incidental vocabulary acquisition occurs when students learn vocabulary without the intention of doing so or as a by-product of some other activity (Richards & Schmidt, 2002). Intentional vocabulary learning, on the other hand, occurs when learners deliberately decide to acquire specific vocabulary items and focus their primary attention on this learning (Nation & Webb, 2011). As far as efficiency is concerned, intentional vocabulary learning almost always, within a set period of time, leads to larger gains and higher retention rates than incidental vocabulary learning (Horst, 2005; Nation & Webb, 2011). However, to achieve higher levels of proficiency in a second language (L2), class time is simply far too limited to allow the intentional acquisition of all the words that need to be mastered (Horst, 2005); a significant amount of the required vocabulary has to be learnt incidentally and independently (Ellis, 1994; Horst, 2005).

Moreover, according to N. Ellis (1995), knowledge of vocabulary is both implicit and explicit. Word forms and regularities of the surface form of language are learned implicitly as a result of frequent exposure. This learning takes place through several specialized input and output lexicons (e.g., auditory input lexicon, speech output lexicon, visual input lexicon, spelling output lexicon). "Like other sensory or motor skill systems, these [lexicons] do [such learning] automatically and they are tuned by practice" (p. 122), that is, "by frequency, recency, and context of exposure" (p. 104). In other words, the more a language pattern is repeated, the faster input lexicons can recognize it, and output lexicons can produce it. In contrast, acquiring the meaning of words requires an explicit learning process, as it is "heavily affected by depth of processing and elaborative integration with semantic and conceptual knowledge" (p. 123).

Indeed, it is possible for learners to develop explicit knowledge of word forms and implicit knowledge of word meanings (e.g., connotational meanings); however, "knowledge of linguistic form is primarily implicit while knowledge of lexical meaning is essentially conscious and explicit" (Ellis, 2009, p. 348). Hence, the intentional and incidental approaches to word learning are not opposing or competing, but complementary, as each one plays a distinct role, but also reinforces the effectiveness of the other (Nation, 2013). For these reasons, incidental vocabulary acquisition is an essential component of any well-balanced L2 (vocabulary) learning program (Laufer, 2003; Nation, 2007; Nation & Webb, 2011; Schmitt, 2008).

Because of the important role of incidental word learning in L2 acquisition, this dissertation is focused on L2 incidental vocabulary acquisition through input, that is, vocabulary acquisition as a by-product of learners' engagement in a reading or listening activity. L2 research has shown that extensive exposure to textual and aural input leads to incidental vocabulary gains: "if learners do a lot of reading and listening, there will be considerable cumulative enrichment of partially known words as well as the establishment of certain new words in their lexicons" (Brown, Waring, & Donkaewbua, 2008, p. 158). Hence, the three papers in this dissertation are dedicated to L2 incidental word learning from reading and listening. The first paper addresses the comparative effects of reading and listening on L2 incidental vocabulary acquisition; the second focuses on the role of perceptual learning style matching in L2 incidental vocabulary acquisition through reading; and the third paper explores the impact of a number of learner-related variables on L2 incidental vocabulary acquisition through listening.

The research that led to these three papers was conducted in the EFL context of Iran, with 139 Iranian undergraduate students who were majoring in engineering at a prestigious university. The participants were at an intermediate level of EFL proficiency. They were assigned to three

groups: reading, listening, and control. The reading group read a graded reader containing 16 target words; the listening group listened to the same graded reader; and the control group did not receive any written or spoken input. All participants completed a language background questionnaire, a test of receptive English vocabulary size, a perceptual learning style questionnaire, as well as immediate and delayed vocabulary post-tests.

It should be noted that although this study was conducted in the EFL context of Iran, many of the findings of this research have implications for all L2 learners, regardless of their context. What follows is a short introduction to each of the three papers in this dissertation.

The Differential Impact of Reading and Listening on L2 Incidental Acquisition of Different Aspects of Word Knowledge

A significant number of L2 studies have examined incidental vocabulary gains from reading (e.g., Horst, Cobb, & Meara, 1998; Paribakht & Wesche, 1999; Pigada & Schmitt, 2006; Waring & Takaki, 2003), as well as the word-, text-, task-, or learner-related factors that affect this process (e.g., Elgort & Warren, 2014; Horiba & Fukaya, 2015; Kweon & Kim, 2008; Paribakht, 2005; Pichette, de Serres, & Lafontaine, 2012; Pulido, 2003; Vidal, 2011; Webb, 2008). On the other hand, L2 studies that have examined incidental vocabulary gains from listening and the variables that influence this complex process are significantly smaller in number (Brown et al., 2008; Chang, 2012; R. Ellis, 1995; van Zeeland & Schmitt, 2013a; Vidal, 2003, 2011). Reading appears to be a more "ideal medium" for word learning (N. Ellis, 1995); it provides the reader with the opportunity to control the rate of information, dwell upon words, and backtrack when needed, as opposed to listening which requires real-time processing (Vidal, 2011). This important difference between the two input modes might be the reason why reading

is a richer area of research than listening in terms of incidental vocabulary acquisition (Eckerth & Tavakoli, 2012).

Even more limited than L2 studies on incidental word learning from listening are L2 studies that have examined the differential impact of reading and listening on incidental vocabulary gains. This is an issue "of vital importance as it can help determine how much reading or listening (and what type) needs to be done in foreign language learning" (Brown et al., 2008, p. 139). In fact, to date, only two studies have addressed this important issue (i.e., Brown et al., 2008; Vidal, 2011). These two studies have generally shown that although both modes of input result in incidental vocabulary acquisition, reading is a more effective source than listening. However, when measuring incidental vocabulary gains, Brown et al. measured vocabulary knowledge only in terms of form-meaning connection, and Vidal used a developmental scale (i.e., Vocabulary Knowledge Scale, developed by Wesche & Paribakht, 1996). None of these studies have used the *dimensions approach* when comparing the effects of reading and listening on incidental vocabulary acquisition. According to Nation and Webb (2011), the dimensions approach is the most effective way to measure vocabulary depth. In this approach, the different dimensions of word knowledge are isolated, and the degree to which each of these dimensions has been acquired is measured and quantified (Read, 1997). There is great value in investigating the differential impact of reading and listening on incidental word learning using the dimensions approach because, although reading has generally been shown to be a more effective input mode than listening for incidental word learning, there may be certain aspects of word knowledge that are more effectively acquired through listening. In the first paper of this dissertation, therefore, using the dimensions approach, I examined the differential impact of reading and listening on L2 incidental vocabulary acquisition. In other words, I compared the

effect of reading and listening on the L2 acquisition and retention of five different dimensions of word knowledge, that is, spoken form, written form, part of speech, syntagmatic association, and form-meaning connection.

The Role of Perceptual Learning Style Matching in L2 Incidental Vocabulary Acquisition through Reading

As noted above, there is a substantial amount of L2 research that has examined incidental vocabulary gains from reading, as well as the factors that influence this process. Some of the factors examined in previous research are word-related (e.g., frequency of occurrence, concreteness, word class). Other factors that have been studied are text/context-related (e.g., degree of informativeness of context). Several learner- or reader-related variables have also been investigated (e.g., L2 proficiency, learner strategies, topic familiarity, age of L2 acquisition, gender, text comprehension, degree of enjoyment, reading goal). Surprisingly, however, to date, the potential role of learning style in L2 incidental word learning from reading has not been addressed. Indeed, learning styles in general, and perceptual learning styles (i.e., visual, auditory, kinaesthetic, tactile) in particular, might be playing an important role in L2 incidental vocabulary learning. As Oxford and Crookall (1990) state, "cultural and ethnic differences in learning styles may be very important and should be considered in understanding how people learn vocabulary. Sensory preferences, such as visual, aural, tactile, and kinesthetic should be assessed" (p. 25).

Researchers and practitioners generally agree that individuals have distinct learning styles; that is, they differ in their "natural, habitual, and preferred way(s) of absorbing, processing, and retaining new information and skills" (Reid, 1995, p. viii). However, there is confusion and lack of consensus among researchers regarding whether or not tailoring instruction to learners' individual learning styles can enhance learning outcomes (Pashler, McDaniel,

Rohrer, & Bjork, 2009). This ambiguous situation regarding the educational implications of learning styles also applies to L2 vocabulary learning. A few L2 studies have investigated the impact of perceptual learning style matching on L2 vocabulary learning (e.g., Kassaian, 2007; Pouwels, 1992; Tight, 2010; Wu, 2014). These studies have reported a range of different findings; some have shown evidence in favour of style matching for vocabulary learning, while others have failed to show such benefit. No general conclusions can be drawn from the existing L2 studies on the relationship between perceptual learning styles and vocabulary learning (Tight, 2010), and thus, further research is needed.

Moreover, to date, the studies that have examined the effect of perceptual learning style matching on L2 vocabulary learning have exclusively focused on *intentional* word learning. There is indeed a lack of research on the relationship between perceptual learning styles and the *incidental* acquisition of L2 vocabulary. To address these gaps, in the second paper of this dissertation, I investigated the role the match/mismatch between learners' perceptual learning style and input mode plays in the incidental acquisition and retention of vocabulary through reading.

The Impact of Learner-related Variables on L2 Incidental Vocabulary Acquisition through Listening

As previously mentioned, L2 research on incidental vocabulary acquisition from listening is limited. More than twenty years ago, Ellis (1994) emphasized that very little attention has been paid to this area of investigation. Surprisingly, today, this gap in the literature still exists. Only a few studies have examined incidental vocabulary gains from listening and the factors that could play a role in this process (Brown et al., 2008; Chang, 2012; van Zeeland & Schmitt, 2013a; Vidal, 2003, 2011). A number of word-related factors have been examined in previous research,

such as frequency of word occurrence (Brown et al., 2008; van Zeeland & Schmitt, 2013a; Vidal, 2003, 2011), predictability from word form and parts (i.e., unpredictable, deceptively transparent, morphologically predictable, similar to L1), word type (i.e., low-frequency, technical, academic), type of elaboration (i.e., explicit, implicit, no elaboration) (Vidal, 2003, 2011), part of speech, and concreteness (van Zeeland & Schmitt, 2013a). Yet, the listener-related variables examined thus far are very few; these variables include L2 proficiency, listening comprehension, and metacognitive listening awareness (Chang, 2012; Vidal, 2003).

Because listening has been shown to be a less effective source of input than reading for L2 incidental vocabulary gains (Brown et al., 2008; Vidal, 2011), exploring variables that might facilitate this process and contribute to its success would be extremely valuable, particularly learner-related variables, which to date have been examined to a very limited extent. In the third paper of this dissertation, therefore, I explored the impact of five learner-related variables on L2 incidental word learning from listening: gender, L2 vocabulary size, amount of L2 listening (for academic purposes and pleasure), level of enjoyment, and (self-reported) level of comprehension.

In sum, the purpose of this dissertation is to shed more light on the nature of L2 incidental vocabulary acquisition and retention from input. By providing a richer description of incidental vocabulary gains, this research provides a clearer picture of the comparative effects of the two input modes of reading and listening on L2 incidental vocabulary acquisition. In addition, this study explores, for the first time, the role of learning style matching in L2 incidental vocabulary acquisition from reading. Finally, an important objective of this study is to add to the small body of research on L2 incidental vocabulary acquisition from listening and the learner-related factors that might contribute to this complex process.

2. The Differential Impact of Reading and Listening on L2 Incidental Acquisition of Different Aspects of Word Knowledge

Incidental vocabulary learning - the process of learning vocabulary without the intention of doing so or as a by-product of some other activity (Richards & Schmidt, 2002) - is known to be an effective way of acquiring vocabulary in the second language (L2) (Huckin & Coady, 1999). Brown, Waring, and Donkaewbua (2008) state that "if learners do a lot of reading and listening, there will be considerable cumulative enrichment of partially known words as well as the establishment of certain new words in their lexicons" (p. 158). Researchers therefore emphasize that incidental vocabulary acquisition is necessary for any well-balanced L2 vocabulary learning program (Nation, 2001; Schmitt, 2008).

A substantial amount of research has been conducted on the incidental acquisition of L2 vocabulary through reading (e.g., Elgort & Warren, 2014; Horst, Cobb, & Meara, 1998; Paribakht & Wesche, 1999; Pellicer-Sanchez & Schmitt, 2010; Pigada & Schmitt, 2006; Webb, 2007). However, the number of research studies on L2 incidental vocabulary acquisition through listening is limited (Brown et al., 2008; van Zeeland & Schmitt, 2013a; Vidal, 2003). Even more scarce are studies that have investigated the comparative effects of reading and listening on L2 incidental vocabulary acquisition, which is an issue "of vital importance as it can help determine how much reading or listening (and what type) needs to be done in foreign language learning" (Brown et al., 2008, p. 139).

The limited number of studies that have investigated the differential effects of reading and listening on L2 incidental vocabulary acquisition (i.e., Brown et al., 2008; Vidal, 2011) have generally found that although both modes of language input result in vocabulary gains, reading is a more efficient source for incidental vocabulary acquisition than listening. However, in these

studies, vocabulary gains have been measured in varying ways. Brown et al. (2008) measured incidental vocabulary acquisition exclusively in terms of meaning. Although meaning is the central aspect of word knowledge, knowing a word involves far more. As the authors themselves acknowledge, through the tests used in their study, they were not able to assess the full range of lexical knowledge gained from the language exposure; "such knowledge might include the noticing of lexical phrases, collocational and colligational patterns, new nuances of meanings, improved lexical access speed, and so on. It is probably here that the true benefit of reading and listening extensively occurs" (Brown et al., 2008, p. 158).

In a second study of the comparative effects of reading and listening on incidental vocabulary acquisition, in order to measure incidental vocabulary gains, Vidal (2011) used a depth of vocabulary knowledge measure, that is, a modified version of the Vocabulary Knowledge Scale (VKS) (see Wesche & Paribakht, 1996, for a description of the instrument). The VKS, a five-point scale starting at "I don't remember having seen this word before" and ending at "I can use this word in a sentence", exemplifies the *developmental* approach to conceptualizing and measuring depth of vocabulary knowledge. This approach, which represents the incremental nature of vocabulary learning, describes the acquisition of a lexical item along a continuum of mastery (Read, 1997).

Another approach to measuring depth of vocabulary knowledge is the *dimensions* or *components* approach (Read, 1997), which is referred to as "the most effective way to assess vocabulary depth" (Nation & Webb, 2011, p. 227). In a seminal article that laid the foundation for the dimensions approach, Richards (1976) identified seven aspects of vocabulary knowledge: word frequency, register, syntactic behaviour, form, semantic value, association, and conceptual meaning. Since then, several other scholars have attempted to describe what it means to know a

word (e.g., Henriksen, 1999; Nation, 2001; Read, 2004). In the *dimensions* or *components* approach, the different aspects of knowledge involved in knowing a lexical item are isolated, and the degree to which each of these aspects of word knowledge has been acquired is measured and quantified.

A number of incidental word learning studies have measured vocabulary gains using the dimensions approach. These studies have almost entirely focused on incidental vocabulary gains from reading (e.g., Chen & Truscott, 2010; Horst et al., 1998; Pellicer-Sanchez & Schmitt, 2010; Pigada & Schmitt, 2006; Webb, 2007). Van Zeeland and Schmitt's (2013a) study appears to be the only study that has used the dimensions approach to measure incidental vocabulary gains from listening. However, to date, no studies have been conducted to investigate the differential impact of reading and listening on various aspects of word knowledge. Investigating this question through the dimensions approach is valuable because, although reading has been shown to be a more effective input mode for the incidental acquisition of word *meaning* (Brown et al., 2008), there may be other aspects of word knowledge that are more effectively acquired through listening. To this end, the current study compares the impact of the two input modes of reading and listening on the incidental acquisition and retention of different aspects of vocabulary knowledge.

Literature Review

Incidental Vocabulary Acquisition

Incidental vocabulary acquisition from reading. As Horst et al. (1998) have reported in their review of the literature, early studies of incidental vocabulary acquisition from reading showed generally low vocabulary learning rates, that is, a rate of approximately one word correctly identified in every 12 words tested. However, these studies typically suffered from

various methodological flaws (Horst et al., 1998), "including very small amounts of reading, insensitive measurement instruments, inadequate control of text difficulty, small numbers of target words, and no delayed post-tests" (Schmitt, 2010, p. 29). Later studies that addressed some of these methodological issues have demonstrated wider learning and higher vocabulary pick-up rates from reading (e.g., Elgort & Warren, 2014; Horst et al., 1998; Pellicer-Sanchez & Schmitt, 2010; Pigada & Schmitt, 2006). For instance, in a study by Horst et al. (1998), 34 low-intermediate learners read a 109-page simplified novel over 10 days. They were then tested on their knowledge of the meanings of the target words through a multiple-choice test. The results showed a mean gain of about five words from the 23 words tested, that is, an average pick-up rate of about one new word in five, and this learning accumulated and persisted over a period of at least 10 days.

Waring and Takaki (2003) examined the rate at which vocabulary was learned by 15 intermediate level (and above) Japanese EFL learners from reading a graded reader. On average, the meaning of only one of the 25 target words was remembered after three months, which meant that the learners acquired only one new word from one hour of reading. These results led the authors to conclude that "ultimately learners do not learn a lot of *new* words from graded reading, but in fact graded reading helps to deepen and consolidate *already known* language" (Waring & Takaki, 2003, pp. 153-154).

Pigada and Schmitt (2006), in their comprehensive case study of vocabulary learning through extensive reading by a pre-intermediate level learner of French, found a pick-up rate of about one word in every 1.5 words tested. This impressive pick-up rate might have been due to the highly capable participant in the study as well as giving credit to partial knowledge of words through the informative one-on-one interview procedure. However, many of the gains reported

were in orthography, and thus, as the authors point out, the results of this study cannot be directly compared with previous studies that have exclusively focused on meaning.

Pellicer-Sanchez and Schmitt (2010) investigated incidental word learning from an authentic novel by 20 relatively advanced EFL learners. The authentic English novel used in the study (i.e., *Things Fall Apart*) consisted of some African lexical items, 34 of which were chosen as target words. After more than 10 exposures, meaning was recognized for 84% and recalled for 55% of the words, spelling was recognized for 76%, and word class was recalled for 63% of the words.

As evident from the brief review above, the reported vocabulary pick-up rates from reading vary considerably. In addition to learner-related factors, this variation could be attributed to differences in the nature of texts, target words, diversity and sensitivity of the measures, and the overall designs used in these studies.

Incidental vocabulary acquisition from listening. A number of L2 studies have attempted to investigate incidental vocabulary learning through listening (Brown et al., 2008; Chang, 2012; R. Ellis, 1995; van Zeeland & Schmitt, 2013a; Vidal, 2003, 2011). For instance, in a study by Vidal (2003), 116 Spanish EFL learners viewed three video-taped academic lectures (approximately 14-15 minutes in length) on the topic of tourism. Thirty-six target words (12 in each lecture) were chosen for the study. For the pre-test, immediate post-test, and delayed post-test (administered four weeks later), a modified version of the VKS was used to measure vocabulary knowledge. The results revealed a significant difference in vocabulary gains between *no lecture listening* and *lecture listening*, indicating that listening to academic lectures in EFL results in vocabulary growth.

Van Zeeland and Schmitt (2013a) used the dimensions approach to investigate L2 vocabulary learning and retention through listening. They measured three aspects of word knowledge, that is, form recognition, grammar recognition, and meaning recall, and found that participants gained knowledge of these three dimensions as follows: form (45.8% of the target words) > grammar (33.7%) > meaning (8.5%) immediately after listening, and form (25%) = grammar (24.6%) > meaning (7.5%) two weeks later. While knowledge of meaning was more difficult than form and grammar to develop, once developed, it appeared to be retained for longer. Overall, learners gained knowledge of 29% of the target words immediately after listening and retained knowledge of 19% of the words two weeks later.

While it appears that L2 listening can lead to vocabulary gains, this is a neglected area in SLA research and the studies conducted are too few in number to allow any general conclusions. Moreover, these studies have, for the most part, attempted to measure only one or two aspects of word knowledge. As van Zeeland and Schmitt (2013a) state:

> This lack of sensitive vocabulary knowledge assessment in listening studies is surprising. As learning gains from listening have found to be small, even significantly smaller than those from reading, the dimensions approach should serve particularly well in revealing the smallest increments in learning. (p. 611)

Incidental vocabulary acquisition from reading versus listening. Studies that have compared the effects of reading and listening on L2 incidental word learning are very small in number (i.e., Brown et al., 2008; Vidal, 2011). Brown et al. (2008) compared the impact of three input modes – reading, reading-while-listening, and listening – on the incidental vocabulary acquisition of 35 Japanese EFL learners with pre-intermediate or intermediate level proficiency. One post-test and two delayed post-tests (one week later and three months later), measuring

meaning recall and recognition of the target words, were administered. The results on the immediate meaning recognition test revealed considerable gains of 48% and 45% (of the 28 target words) for the reading-while-listening group and reading-only group, respectively, and 29% for the listening-only group. The results on the immediate meaning recall test were as follows: 16% and 15% for the reading-while-listening group and the reading-only group, respectively, and only 2% for the listening-only group. However, after three months, on average, when learners were tested for meaning recall, the meaning of only one of the 28 target words was retained by the reading-only and the reading-while-listening groups, and the meaning of none of the target words by the listening-only group.

Vidal (2011) also compared the effects of reading and listening on the incidental vocabulary acquisition and retention of 230 Spanish university EFL learners at four different levels of language proficiency. The participants were assigned to one of three groups: they either (1) read three academic passages, (2) watched three academic lectures, or (3) received no input (i.e., control group). Thirty-six target words were chosen (12 in each text). All three groups received pre-, post-, and delayed post-tests of their knowledge of the target words. For this purpose, a modified version of the VKS was used. The findings revealed that, on average, acquisition rates ranged from 19.38% to 37.69% for the reading group and from 7.08% to 28.35% for the listening group. The difference in gains between the readers and listeners decreased as the proficiency level of the learners increased. Similar trends were also observed for the retention of the target words. As the author notes, "low-proficiency listeners, had serious difficulties with the processing of speech and had to struggle for meaning in real time" (p. 244). Hence, when compared to the readers of the same proficiency level, "they made very small gains and showed greater losses of initial gains" (p. 244).

Frequency of occurrence of target words. Studies that have focused on incidental word learning through reading have generally found that the more frequently a word occurs in a text, the more likely it will be learned. Horst et al. (1998), for instance, found that the target words in their study needed to occur at least eight times for sizable learning gains to take place. In Waring and Takaki's (2003) study, the results appeared to suggest that in order for a learner to have a 50% chance of recognizing the word form or its meaning three months later, a word needed to be encountered at least eight times. However, there was only a 10% to 15% chance of recalling a word's meaning after three months, even if the word was met more than 18 times. The results of Pigada and Schmitt's (2006) study revealed that although there is no specific point at which the acquisition of meaning is guaranteed, by about 10 or more exposures there appear to be substantial learning gains. Yet, only when words were encountered 20 or more times was there a good possibility for all three aspects of word knowledge (i.e., spelling, meaning, grammatical features) to be acquired. In a study with 121 Japanese EFL learners, Webb (2007) investigated the impact of one, three, seven, and 10 encounters on five different aspects of word knowledge (i.e., orthography, meaning and form, paradigmatic association, syntagmatic association, and grammatical functions). The results revealed that each time the repetitions increased, at least one aspect of word knowledge was enhanced. Webb also found that unknown words needed to be met a minimum of 10 times in context for considerable vocabulary growth to occur, but to gain full mastery of a word, more than 10 repetitions might be necessary. Pellicer-Sanchez and Schmitt (2010) also found that with even a single exposure, there was sizeable learning in the recognition of word form and meaning but very little gain in the recall of word class or meaning. According to the authors, noticeable increase in gains began with 5-8 exposures and accelerated with 10-17 exposures.

In studies of L2 incidental vocabulary acquisition from listening, frequency of occurrence has also been shown to positively affect L2 vocabulary gains; however, the effect does not appear to be strong. In Vidal's (2003) study, the target words occurred 1, 2, 3, 4, 5, and 6 times in each lecture. Vocabulary gains from listening generally increased as the word was repeated more times, but overall, the effect of frequency of occurrence was not strong. Van Zeeland and Schmitt (2013a) also investigated the impact of frequency of occurrence (i.e., 3, 7, 11, or 15 times) on incidental vocabulary gains from listening. Frequency of occurrence did not appear to have an effect on the acquisition or retention (two weeks later) of any of the three vocabulary dimensions, except for the increase from 3 to 7 occurrences (and this effect was found for only form and grammar, not meaning).

In studies that have compared the impact of reading and listening on L2 incidental word learning, the effect of repetition on vocabulary gains in reading has been shown to be stronger than in listening. In Brown et al. (2008), four frequency bands were selected: 2-3, 7-9, 10-13, and 15-20 times. Brown and colleagues found that items with higher frequency of occurrence in the text were more likely to be learned and retained; however, learning was considerably slower through listening than through reading. Based on the results, the authors concluded "that there is little or no chance a new word will be picked up from listening unless the word is met considerably more than 20 times" (Brown et al., 2008, p. 153).

Vidal (2011) also attempted to investigate how the relationship between frequency of occurrence (1, 2, 3, 4, 5, and 6 times) and vocabulary learning compares between reading and listening. In both modes, vocabulary learning increased as word repetition increased; however, the effect of repetition was considerably stronger in reading. Moreover, in the reading condition,

the greatest increase in learning occurred between two and three repetitions, while in the listening condition, the greatest increase occurred between five and six repetitions.

As the above-mentioned studies clearly show and as Nation and Ming-tzu (1999) assert, "there is no set number of repetitions that will ensure learning" because "so many factors influence vocabulary learning from written [and spoken] text[s]" (p. 363). These factors can be related to the word, the text/context, the task, or the learner (Paribakht & Wesche, 1999).

From the review above, it appears that L2 incidental vocabulary acquisition is more effective through reading than listening. However, to date, no studies have measured various aspects of word knowledge when comparing the effects of reading and listening on incidental word learning. If other aspects of word knowledge are measured, different results regarding the effectiveness of these two input modes might emerge. The current study, therefore, seeks to answer the following research questions:

1. What is the differential impact of reading and listening on the L2 incidental acquisition of five aspects of word knowledge (i.e., spoken form, written form, part of speech, syntagmatic association, and form-meaning link) as measured by an immediate post-test?
2. What is the differential impact of reading and listening on the L2 retention of these five aspects of word knowledge as measured by a delayed post-test?
3. How does the relationship between frequency of occurrence and L2 incidental acquisition of these five aspects of word knowledge combined compare across reading and listening?

Method

Participants

The participants for this study were 139 undergraduate students from various majors studying at Isfahan University of Technology (IUT) - a high ranking, prestigious university in

Iran. They were 56 females and 83 males with an average age of 19.63 years (*SD* = 1.39; range = 18-25 years). The participants all shared the same L1, Farsi. None of the participants had ever resided in an English-speaking country. These participants had formally studied EFL for approximately seven years at middle and high school and were at intermediate levels of English language proficiency. This was confirmed by the director of the English Language Center at the university and also by their scores on the Vocabulary Levels Test (VLT; Schmitt, Schmitt, & Clapham, 2001). The mean scores (out of 30) on the 2,000, 3,000, and 5,000 word levels of the VLT were 22.91, 14.74, and 7.44, respectively. The VLT was administered to ensure that participants were at a proficiency level that allowed them to read or listen to the selected texts. Mastery of at least 50% of the 2000 word level was chosen as the minimum cut-off point for inclusion of participants.

The participants were then randomly assigned to two experimental groups, reading (*n* = 39) and listening (*n* = 51), and one control group (*n* = 49). This study began with 211 participants; however, 72 participants were excluded because of low scores on the VLT, absence, or their non-random assignment (this was intentionally done in order to answer a research question to be addressed in the second paper of this dissertation). For these reasons, the groups in the present study, despite random assignment, were not quite equal in size. All participants received cash incentives (equivalent to $10 CAD) for their participation in the study.

Materials

Target words (TWs). Sixteen words in the text were chosen as TWs. The selected words were then replaced by 16 non-words that follow English phonological and orthographic patterns. To select these non-words, initially, 46 non-words from Meara's (2013) list of imaginary words were selected. From these 46, 16 were excluded based on the judgements of three professors of

Teaching English as a Second Language (TESL), for the following reasons: the non-words had irregular and confusing pronunciation and/or spelling, had real English words embedded in them, were very common English first names or surnames, or looked French. The remaining 30 non-words were then embedded in a questionnaire and administered to five native speakers of English (1 male, 4 females, mean age = 38 years) and five non-native speakers of English with Farsi as their L1 (4 males, 1 female, mean age = 29.8 years). The questionnaire required participants to judge the plausibility of each non-word as an English word (yes/no question), as well as the pronunciation and spelling difficulty of each non-word (using a 5-point scale; 1 = very easy, 5 = very difficult). Based on the responses, 16 non-words were chosen for this study, all of which shared the following characteristics: they were two syllables and five to six letters in length; they were rated as plausible English words by at least eight of the 10 judges; and the average spelling difficulty and pronunciation difficulty ratings for each were lower than 3. These steps were taken to ensure that the target words were largely equivalent in terms of learning difficulty.

Reading and listening material. *The Monkey's Paw*, an elementary level graded reader selected from the Oxford Bookworms series, was used for both the reading and the listening groups. Using the BNC-COCA-25 VocabProfile (available at www.lextutor.ca/vp/), any words beyond the first 1,000 word level were simplified. In addition, all proper nouns judged to be unfamiliar to the participants by the researcher (whose L1 is also Farsi) were changed to more familiar ones; for example, *Herbert* was changed to *Jack*. Four text frequency bands (FB) were chosen: 2-5 repetitions (i.e., FB1), 7-10 repetitions (i.e., FB2), 12-15 repetitions (i.e., FB3), and 17-20 repetitions (i.e., FB4). There were four TWs in each frequency band (see Appendix A for details): two nouns, one adjective, and one verb (only used in the past tense throughout the

story). The text contained 4231 words. If it can be safely assumed that participants recognized the meanings of all the words (from the 1,000 word level) in the story along with the proper nouns, then the known-word coverage amounted to 95.84%. Previous studies have shown that a lexical coverage of 95% to 98% is ideal for successful reading/listening comprehension and the inference of unknown words from context (Hu & Nation, 2000; Laufer & Ravenhorst-Kalovski, 2010; Stæhr, 2009; van Zeeland & Schmitt, 2013b).

For the listening experiment, the text was read aloud by a native speaker of Canadian English (a TESL professor), recorded on a CD, and later played for the listening group. The narration was produced at an average speech rate of 117.5 words per minute and had a duration time of 36 minutes. Following Vidal (2011), the reading group was given the same amount of time as the listening group to read the text (i.e., 36 minutes). This approach is based on Hirai's (1999) study in which he compared the listening rates and reading rates of Japanese EFL learners with varying proficiency levels. Hirai found that the optimal listening rates and reading rates are very similar for L2 learners.

Instruments

Language background questionnaire (LBQ). An LBQ (translated into Farsi) was administered to participants to collect demographic information (e.g., sex, age, native country, native language, other languages spoken and proficiency levels). Participants also reported whether or not they had lived in an English-speaking country, and how long they had studied English outside of school and university.

Vocabulary post-test. One of the most comprehensive frameworks explaining different aspects of word knowledge has been proposed by Nation (2001). In order to assess L2 incidental vocabulary acquisition and retention in this study, five aspects of word knowledge were chosen

from Nation's framework and measured using five recognition tests and one recall test (see Appendix B for examples of these tests). Laufer and Goldstein (2004) draw a distinction between recognition and recall. Recall refers to the ability to supply the form or meaning of a given word from memory (e.g., filling in a blank), whereas recognition refers to the ability to select the form or meaning of a given word among a set of options (e.g., multiple-choice test). According to the authors, "language learners who can recall the meaning of a given word can typically recognize the meaning among several options" and thus recall is "a more advanced degree of knowledge" than recognition (p. 408). The six tests used in this study assessed recognition of spoken form (Test1-SF), recognition of written form (Test2-WF), recall of meaning (Test3-Mg-Recall), recognition of part of speech (Test4-PS), recognition of syntagmatic association (Test5-SA), and recognition of meaning (Test6-Mg-Recog) (syntagmatic association exists when two words have a sequential relationship to one another [e.g., verb-noun pairs like *eat-food*], while paradigmatic association exists when two words belong to the same word class [e.g., verb-verb pairs like *eat-drink*] [Schmitt, 2010]). Since recall learning from reading and listening has been shown to be minute, recall was measured only for form-meaning link. The post-test in this study was based on the work of Webb (2005), Chen and Truscott (2010), and van Zeeland and Schmitt (2013a), with some additions and adjustments.

The vocabulary post-test was the same for both the experimental groups and the control group, in the form of a 12-page booklet; each of the six tests appeared on two consecutive pages, with eight (of the 16) TWs on one page and another eight on the next. The tests were sequenced so that any possible learning effect was avoided (Webb, 2005). Learners were instructed to avoid going back to revise answers, and supervision was provided to ensure this. All test instructions appeared in both English and Farsi. In scoring, each correct response in the multiple-choice tests

was awarded one point. For the meaning recall test, correct answers were given one point, and answers with a similar meaning were given half a point. For example, when the correct response was *bed*, if the participant responded *bed*, one point was given, and if they responded *bedroom*, half a point was given. Two raters scored the meaning recall test and an inter-rater reliability of 98% was achieved.

Procedures

Before the study was conducted, the materials and instruments were piloted with four Iranian EFL learners with characteristics similar to those of the target population. As a result, changes were made to some of the instructions and Farsi translations. For the actual experiment, data were collected over the course of three sessions, as outlined below:

Session 1. Following an explanation of the study, participants were invited to sign a consent form. If in agreement, they were then asked to complete the LBQ and the VLT. This session took approximately 50 minutes.

Session 2. In this session, which was held about two weeks after Session 1, participants were not informed of the vocabulary acquisition focus of the study, and thus the vocabulary post-test remained unannounced. They were told that the main purpose of this session was to either read or listen to a classic English novel and to try to understand it. The participants were then presented with the written or spoken texts. Immediately after all the readings or listenings were completed, the unannounced vocabulary post-test was administered. Participants were first provided with two practice examples for each of the six tests. They were then given as much time as they needed to complete the main tests. This second session took approximately 75 minutes.

Session 3. Three weeks after Session 2, the delayed post-test was administered, as, according to Schmitt (2010), "a delayed post-test of three weeks should be indicative of learning which is stable and durable" (p. 157). The delayed post-test was administered to measure retention of different aspects of word knowledge, and it consisted of the same series of vocabulary tests as the immediate post-test. This final session took approximately 30 minutes.

The control group completed all the above-mentioned procedures (i.e., consent form, LBQ, VLT, immediate post-test, and delayed post-test) at the same intervals; however, they were not exposed to the spoken or written texts.

Results

Before conducting the analyses for each research question, a one-way repeated measures MANOVA was run to see if the scores of the control group had significantly improved from the immediate post-test (Time_1) to the delayed post-test (Time_2). As the control group did not receive any treatment, a significant increase in their scores from Time_1 to Time_2 indicated that testing effects were present. In Table 2.1, the estimated means for the control group on the six tests at Time_1 and Time_2 are indicated. The results of the repeated measures MANOVA yielded a significant multivariate effect for Time, Wilks' $\lambda = .41$, $F(6, 41) = 10.01$, $p < .001$, partial $\eta^2 = .59$, power = 1.0. The results of the univariate ANOVAs indicated a significant increase in scores for the control group from Time_1 to Time_2 on Test1-SF, $F(1, 46) = 9.45$, $p = .004$, partial $\eta^2 = .17$, power = .85; Test2-WF, $F(1, 46) = 50.13$, $p < .001$, partial $\eta^2 = .52$, power = 1.0; Test4-PS, $F(1, 46) = 4.62$, $p = .037$, partial $\eta^2 = .09$, power = .56; and Test5-SA, $F(1, 46) = 8.21$, $p = .006$, partial $\eta^2 = .15$, power = .80. However, univariate results were non-significant for Test3-Mg-Recall, $F(1, 46) = 2.89$, $p = .096$, partial $\eta^2 = .06$, power = .38; and Test6-Mg-Recog, $F(1, 46) = .20$, $p = .660$, partial $\eta^2 = .004$, power = .07. Because testing effects

appeared to be present for Test1-SF, Test2-WF, Test4-PS, and Test5-SA, these four tests were eliminated from the data analysis conducted for the second research question in this study.

Table 2.1

Estimated Means for the Control Group at Time_1 and Time_2

Test	Time	*M*	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Test1-SF	1	4.36	.33	3.69	5.03
	2	5.43	.38	4.67	6.18
Test2-WF	1	4.55	.42	3.71	5.39
	2	7.75	.39	6.96	8.53
Test3-Mg-Recall	1	.00	.00	.00	.00
	2	.11	.06	-.02	.23
Test4-PS	1	3.32	.38	2.55	4.09
	2	4.23	.40	3.43	5.04
Test5-SA	1	1.62	.27	1.08	2.15
	2	2.32	.31	1.69	2.95
Test6-Mg-Recog	1	2.13	.26	1.61	2.65
	2	2.23	.30	1.64	2.83

Note. Time_1 = immediate post-test; Time_2 = delayed post-test.
The maximum possible score is 16.

Research Question 1

In Table 2.2, the data at the immediate post-test (Time_1) for tests 1 to 6 for the three groups (i.e., reading, listening, and control) are summarized. A one-way between-subjects MANOVA was run with Group (reading vs. listening vs. control) as the independent variable and the scores on tests 1 to 6 at Time_1 as the six dependent variables. The results revealed a significant multivariate effect for Group, Wilks' $\lambda = .33$, $F(12, 262) = 15.99$, $p < .001$, partial η^2

= .42, power = 1.0. Univariate tests also indicated a significant effect for Group on each of the six tests, as follows: Test1-SF, $F(2, 136) = 40.11$, $p < .001$; Test2-WF, $F(2, 136) = 75.27$, $p < .001$; Test3-Mg-Recall, $F(2, 136) = 27.21$, $p < .001$; Test4-PS, $F(2, 136) = 33.34$, $p < .001$; Test5-SA, $F(2, 136) = 50.13$, $p < .001$; and Test6-Mg-Recog, $F(2, 136) = 40.85$, $p < .001$. Follow-up post-hoc tests were performed; Tukey HSD was used in cases where Levene's values were greater than .05 and Games-Howell in all other cases (Gamst, Meyers, & Guarino, 2008). The results revealed that the control group was significantly different ($p < .001$) from the treatment groups (i.e., reading and listening) on all six tests at Time_1. The reading group and the listening group were also significantly different on all the tests (except Test1-SF, $p = .67$): Test2-WF ($p < .001$), Test3-Mg-Recall ($p = .005$), Test4-PS ($p < .001$), Test5-SA ($p < .001$), and Test6-Mg-Recog ($p = .007$). The largest mean difference between the reading group and listening group was found on Test2-WF (MD = 4.80), followed by Test5-SA (MD = 3.74), Test4-PS (MD = 2.84), Test6-Mg-Recog (MD = 2.70), Test3-Mg-Recall (MD = 1.26), and finally, Test1-SF (MD = .45) (see Figure 1.1).

Table 2.2

Descriptive Statistics for Tests 1 to 6 at Time_1

Test	Group	*n*	*M*	*SD*
Test1-SF	Control	49	4.33	2.30
	Listening	51	8.04	2.76
	Reading	39	8.49	2.26
Test2-WF	Control	49	4.51	2.90
	Listening	51	7.20	2.91
	Reading	39	12.00	2.74
Test3-Mg-Recall	Control	49	.00	.00
	Listening	51	.95	1.41

	Reading	39	2.21	2.08
Test4-PS	Control	49	3.35	2.63
	Listening	51	5.96	2.99
	Reading	39	8.80	3.76
Test5-SA	Control	49	1.69	1.83
	Listening	51	4.06	2.94
	Reading	39	7.80	3.66
Test6-Mg-Recog	Control	49	2.14	1.80
	Listening	51	5.92	3.80
	Reading	39	8.62	4.23

Note. The maximum possible score is 16.

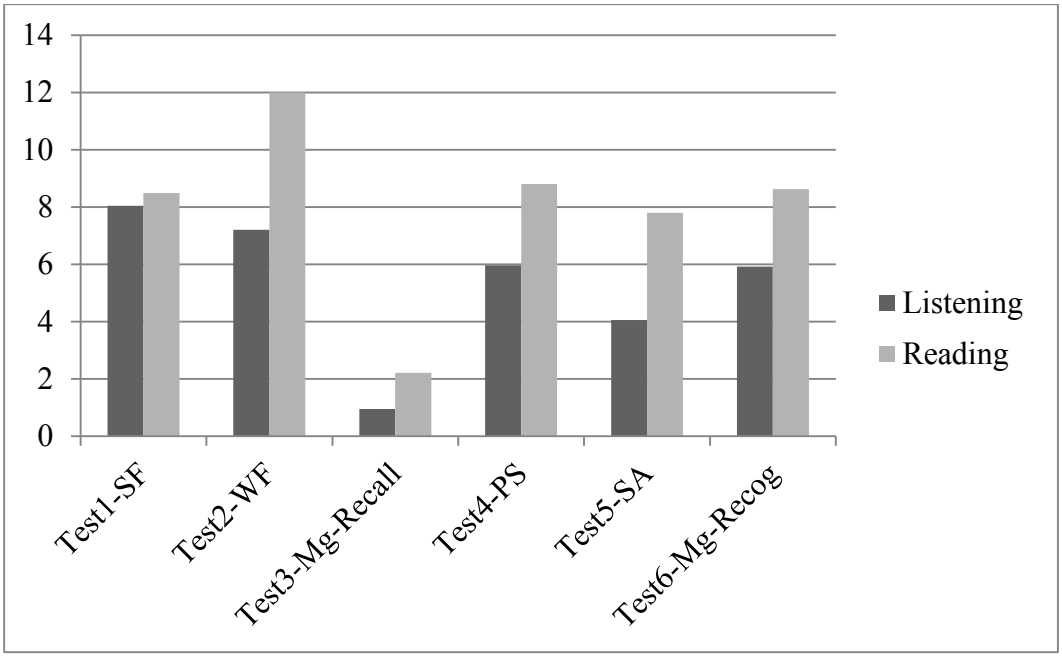

Figure 2.1 Differences between the reading and listening groups on Tests 1 to 6 at Time_1.

Research Question 2

As previously mentioned, because of the presence of testing effects for Test1-SF, Test2-WF, Test4-PS, and Test5-SA, these four tests were excluded from the analysis for this question. Therefore, retention was only examined for Test3-Mg-Recall and Test6-Mg-Recog. In other

words, while, for the first research question on *acquisition*, the differential impact of reading and listening was investigated on five aspects of word knowledge, for the second research question on *retention*, it was only possible to examine this impact on one aspect of word knowledge (i.e., meaning), but at two different levels (i.e., recognition and recall). In Table 2.3, the data at Time_1 and Time_2 for Test3-Mg-Recall and Test6-Mg-Recog are summarized. These data are also presented graphically in Figures 1.2 and 1.3.

Table 2.3

Descriptive Statistics for Test3-Mg-Recall and Test6-Mg-Recog at Time_1 and Time_2

Test	Time	Group	*n*	*M*	*SD*
Test3-Mg-Recall	1	Control	47	.00	.00
		Listening	47	.84	1.32
		Reading	37	2.14	2.03
	2	Control	47	.11	.43
		Listening	47	.84	1.21
		Reading	37	1.53	1.47
Test6-Mg-Recog	1	Control	47	2.13	1.77
		Listening	47	5.66	3.83
		Reading	37	8.46	4.29
	2	Control	47	2.23	2.04
		Listening	47	5.64	3.35
		Reading	37	7.27	4.36

Note. Time_1 = immediate post-test; Time_2 = delayed post-test.
The maximum possible score is 16.
Eight missing cases (the scores of two participants were outliers in this analysis and therefore excluded, and six participants did not complete the delayed post-test).

A mixed-design MANOVA was performed with Group (reading vs. listening vs. control) as the between subjects factor, Time (Time_1 vs. Time_2) as the within subjects factor, and the scores on Test3-Mg-Recall and Test6-Mg-Recog as the two dependent variables. The results

yielded significant multivariate effects for Group, Wilks' $\lambda = .63$, $F(4, 254) = 16.77$, $p < .001$, partial $\eta^2 = .21$, power = 1.0; Time, Wilks' $\lambda = .93$, $F(2, 127) = 4.56$, $p < .05$, partial $\eta^2 = .07$, power = .77; and the interaction between Group and Time, Wilks' $\lambda = .83$, $F(4, 254) = 6.13$, $p < .001$, partial $\eta^2 = .09$, power = .99. Univariate testing also found significant effects for Group ($p < .001$), Time ($p < .05$), and the interaction between Group and Time ($p < .05$) on each of the two tests. Simple effects analysis showed that for Test3-Mg-Recall and Test6-Mg-Recog, at both Time_1 and Time_2, the control group was significantly different from the treatment groups ($p < .05$). For Test3-Mg-Recall, the difference between the reading group and the listening group was statistically significant at both Time_1 ($p < .001$) and Time_2 ($p < .05$). For Test6-Mg-Recog, the difference between the reading group and listening group was significant at Time_1 ($p = .001$), but non-significant at Time_2 ($p = .08$).

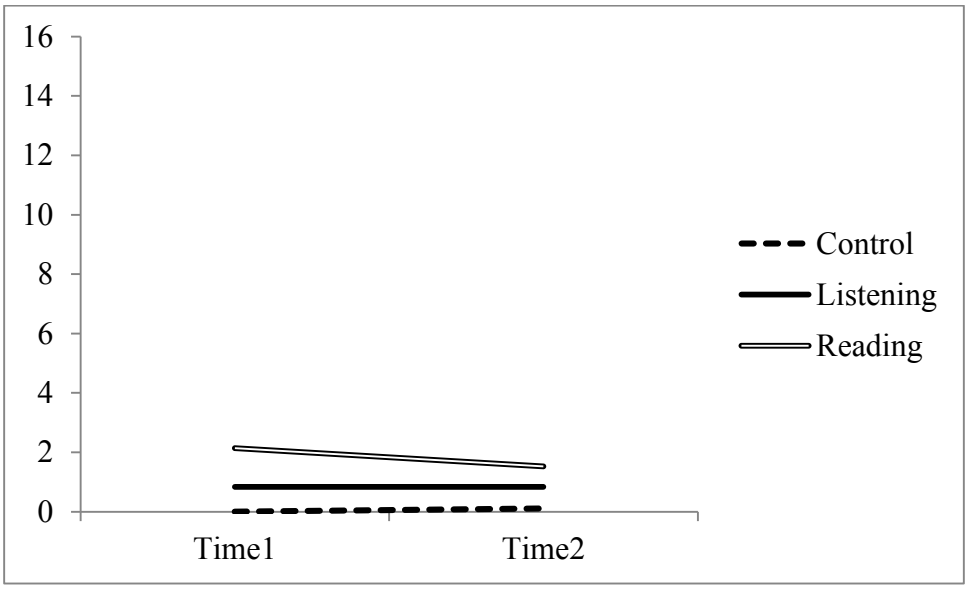

Figure 2.2 Mean scores on Test3-Mg-Recall at Time_1 and Time_2.

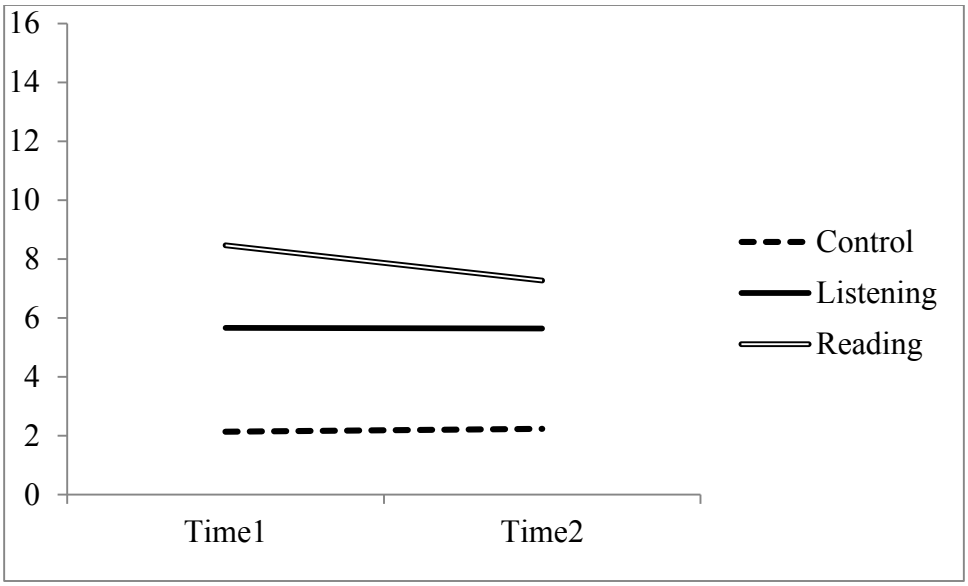

Figure 2.3 Mean scores on Test6-Mg-Recog at Time_1 and Time_2.

Research Question 3

In order to respond to this question, for each frequency band, the mean scores on the five recognition tests, that is, Test1-SP, Test2-WF, Test4-PS, Test5-SA, and Test6-Mg-Recog at Time_1 were calculated, subsequently added together, and averaged. Therefore one set of mean scores was obtained for each frequency band. Test3-Mg-Recall (i.e., the only recall test in this study) was excluded. In Table 2.4, the data for the four frequency bands at Time_1 are summarized.

Table 2.4

Descriptive Statistics for the Four Frequency Bands at Time_1

Frequency band	Group	*M*	*SD*
FB1 (2-5)	Control	.24	.15
	Listening	.36	.17
	Reading	.50	.17

FB2 (7-10)	Control	.19	.12
	Listening	.42	.19
	Reading	.58	.24
FB3 (12-15)	Control	.18	.12
	Listening	.40	.19
	Reading	.69	.17
FB4 (17-20)	Control	.18	.08
	Listening	.39	.22
	Reading	.60	.23

A mixed-design ANOVA was conducted with Group (reading vs. listening vs. control) as the between subjects factor, and Frequency Band (FB1 vs. FB2 vs. FB3 vs. FB4) as the within subjects factor, and the combined (and later averaged) mean scores on Test1-SP, Test2-WF, Test4-PS, Test5-SA, and Test6-Mg-Recog as the dependent variable. The results of the ANOVA (Huynh-Feldt correction applied) yielded a significant main effect for Group, $F(2, 129) = 80.51$, $p < .001$, partial $\eta^2 = .56$, power = 1.0; Frequency Band, $F(2.93, 378.17) = 6.33$, $p < .001$, partial $\eta^2 = .05$, power = .96; and a significant interaction effect between Group and Frequency Band, $F(5.86, 378.17) = 11.64$, $p < .001$, partial $\eta^2 = .15$, power = 1.0. Simple effects analysis indicated that for all four frequency bands, the control group was significantly different from the treatment groups ($p \leq .001$). For all four frequency bands, the reading group was also found to be significantly different from the listening group ($p < .001$). Moreover, in the listening group, no significant differences were found between any of the four frequency bands ($p > .05$), while in the reading group, significant differences ($p < .05$) were found between all frequency bands, except between FB2 and FB4 ($p > .05$).

Discussion and Conclusion

Vocabulary Acquisition

This study has shown that both L2 reading and listening are sources of incidental vocabulary learning. However, reading was found to be a more effective input mode than listening for the incidental acquisition of all the five aspects of word knowledge measured in this study. In other words, the reading group scored higher than the listening group on all the six tests measuring vocabulary acquisition, and the difference between the two groups was statistically significant on all the tests (except on recognition of spoken form). The largest difference between readers and listeners was in the incidental acquisition of written form, followed by syntagmatic association, part of speech, meaning recognition, meaning recall, and, finally, spoken form. The finding that reading was superior to listening for L2 incidental word learning is in line with findings from previous research (i.e., Brown et al., 2008; Vidal, 2011). This finding is largely due to the fact that in reading, "there is opportunity for the reader to study the context, to form hypotheses at leisure and cross-validate them ... The word is frozen in time on the page, whereas in speech it passes ephemerally" (N. Ellis, 1995, pp. 105-106). Moreover, the participants in this study, because of their EFL context and educational background, had received more exposure to and practice with written texts than spoken texts in English. They might, therefore, have failed to some extent to keep up with the flow of speech and to recognize the boundaries between spoken forms in connected speech (Brown et al., 2008).

For the reading group, the gains and order of acquisition of the different aspects and levels (recognition vs. recall) of word knowledge were as follows: written form (75% of the TWs) > part of speech (55%) > meaning recognition (54%) > spoken form (53%) > syntagmatic association (49%) > meaning recall (14%). It should be noted that the large and impressive recognition percentages are not equivalent to complete knowledge of a new word, "but rather reflect that [the recognition of] one or more aspects of knowledge had started to develop" (van

Zeeland & Schmitt, 2013a, p. 615). The gains for the reading group in this study support previous findings. For example, the readers' gains in meaning recognition and meaning recall were 45% and 15% in Brown et al. (2008), 42% and 18% in Waring and Takaki (2003), and 43% and 14% in Pellicer-Sanchez and Schmitt (2010), respectively (compared with 54% and 14% in this study). In Waring and Takaki, the written form recognition gains were 61% (compared with 75% here). One reason for the lower recognition rates in these studies (when compared to the present study) could be the presence of an *I don't know* option in the meaning recognition tests. An *I don't know* option often allows learners to simply opt out, without encouraging them to draw on their sub-conscious knowledge to make an informed guess (Nation, 2012); in the present study, an *I don't know* option was not provided in order to make the tests more sensitive.

For the listening group, the gains and relative order of acquisition were as follows: spoken form (50% of the TWs) > written form (45%) > part of speech (37.3%) > meaning recognition (37%) > syntagmatic association (25%) > meaning recall (6%). These gains also match findings from previous research to a great extent. In Brown et al.'s (2008) study, the listening group gains for meaning recognition and for meaning recall were 29% and 2%, respectively (compared with 37% and 6% in this study). In van Zeeland and Schmitt (2013a), spoken form was recognized for 45.8% of the TWs (compared with 50% here), grammar was recognized for 33.7% (compared with 37.3% here), and meaning was recalled for 8.5% (compared with 6% here). Again, one reason for the slightly lower recognition rates in these studies when compared with the current study could be the presence of an *I don't know* option in their recognition tests. In general, differences in gains (whether through reading or listening) among these studies could be due to a number of factors, including but certainly not limited to

differences in the texts and their lexical coverage rates, learning difficulty of the target words, tests used for measuring vocabulary gains, speech rates, as well as learner-related factors, such as L1 and proficiency level.

As can be seen, in both groups, the largest gains were in word form. On the other hand, the smallest gains were in meaning recall; after 36 minutes of exposure to a simplified text containing as many as 20 repetitions of the target words, meaning was recalled for only two words (out of 16) by the readers and for only one word by the listeners. Therefore, meaning recall appears to be the most difficult to acquire incidentally. This order of acquisition, that is, form (here, written form for the reading group and spoken form for the listening group) at the high end, and meaning (here, syntagmatic association and form-meaning link) at the low end has been documented in previous research on reading (Chen & Truscott, 2010; Pigada & Schmitt, 2006; Waring & Takaki, 2003; Webb, 2007) and listening (van Zeeland & Schmitt, 2013a). Thus, whether the input mode is written or spoken, the incidental acquisition of form precedes the incidental acquisition of meaning.

Vocabulary Retention

Readers and listeners were found to differ in terms of retention rates. As previously mentioned, it was possible to measure retention for only form-meaning link. After three weeks, the results showed that the listeners had retained almost all the knowledge of meaning (both recognition and recall) that they had initially acquired. This finding is congruent with van Zeeland and Schmitt (2013a), who also found that, contrary to knowledge of form and grammar (much of which was lost), knowledge of meaning was likely to be retained by listeners two weeks later. The readers in this study, on the other hand, lost some of their initial gains, but, even in their case, decay was relatively small. Readers lost 8% of their gains in meaning recognition,

and 3% of their gains in meaning recall. This interesting finding, that weeks after exposure, loss of vocabulary knowledge was greater for readers than listeners, has also been shown in previous research (i.e., Brown et al., 2008; Vidal, 2011). In this study, after three weeks, the difference in meaning recognition between the readers and listeners was no longer significant. As Vidal (2011) points out, "a plausible explanation for the listening subjects' higher retention of original gains could be found in the role of phonological memory in vocabulary acquisition" (p. 244). It appears that this is where the value of listening for the incidental learning of word meaning lies: what is gained, although limited, is well retained.

Frequency of Occurrence

Similar to previous studies, the data in this study also show that the more frequently words are met, the more likely they are to be acquired. This is especially true of words met in written texts. While in the reading group, there was a significant increase in gains from FB1 to FB2 and from FB2 to FB3 (but no increase in gains from FB3 to FB4), in the listening group, the difference in gains between the four frequency bands was not significant. It appears that for frequency of occurrence to have a significant impact on vocabulary gains through listening, far more than 20 occurrences are necessary. In Brown et al. (2008) also, no significant differences were found between the frequency bands for the listening group, which the authors attribute to floor effects. Thus, in this study, as documented in previous studies (i.e., Brown et al., 2008; van Zeeland & Schmitt, 2013a; Vidal, 2011), the effect of frequency of occurrence is smaller in listening than reading. This is supported by Vidal (2011), who found that while frequency of occurrence is the most important predictor of vocabulary gains through reading (when compared with three other factors, i.e., type of word, type of elaboration, and predictability from word form and parts), it is the least important predictor of gains through listening.

In this study, the greatest increase in gains for the listening group occurred between FB1 (2-5 occurrences) and FB2 (7-10 occurrences). Beyond FB2, frequency of occurrence appeared to have no impact on the immediate acquisition of word knowledge through listening. Similar results were found in van Zeeland and Schmitt (2013a); gains of word form and grammar occurred between 3 and 7 occurrences, yet beyond 7 and up to 15 occurrences, no further gains were observed. On the other hand, for the reading group in this study, the greatest increase in gains occurred between FB2 (7-10 occurrences) and FB3 (12-15 occurrences). This frequency threshold of 10+, which leads to substantially better learning of words through reading, has also been shown in Pellicer-Sanchez and Schmitt (2010), Pigada and Schmitt (2006), and Webb (2007).

Limitations and Suggestions for Future Research

There are a number of limitations to this study. Only one proficiency level (i.e., intermediate) was examined; however, the differential impact of reading and listening on L2 incidental vocabulary acquisition can vary with proficiency level (Vidal, 2011). Thus, it is worth exploring the research questions raised in this study at other proficiency levels. Moreover, in this study, because of practical constraints, written vocabulary post-tests were used for both the reading and listening groups. The mismatch between the listeners' mode of input and mode of measurement might have placed them at a disadvantage in terms of vocabulary scores. Finally, the research design and type of vocabulary post-test (i.e., mainly multiple-choice with numerous repetitions of the TWs throughout the test) used in this study did not allow retention rates to be measured for all aspects of word knowledge. Future research could benefit from employing a different research design (e.g., see the research design used in van Zeeland & Schmitt, 2013a) in order to more fully capture retention rates for different aspects of word knowledge.

3. The Role of Perceptual Learning Style Matching in L2 Incidental Vocabulary Acquisition through Reading

It is widely acknowledged that second language (L2) vocabulary learning is more effective in intentional learning contexts than in incidental learning conditions (Hulstijn & Laufer, 2001; Prince, 1996; Schmitt, 2008). However, for learners who wish to achieve higher levels of L2 proficiency, class time is far too limited to allow adequate opportunities for the intentional learning of the many words that need to be mastered; this is why learners also need to learn vocabulary incidentally and independently (Horst, 2005). While researchers and practitioners have become increasingly aware of the importance of incidental learning for L2 vocabulary development, as Chen and Truscott (2010) point out, "in many respects this incidental vocabulary learning is still poorly understood" (p. 693), and as a result, "it cannot be fully exploited by teachers and learners" (Pigada & Schmitt, 2006, p. 2). Therefore, any attempt to shed more light on the nature of L2 incidental vocabulary acquisition and the factors that could play a role in this process is of great value.

One neglected factor that might influence L2 incidental word learning is learning style. Individuals have distinct learning styles; that is, they differ in their "natural, habitual, and preferred way(s) of absorbing, processing, and retaining new information and skills" (Reid, 1995, p. viii). Although there is plenty of evidence that learning styles exist, there is lack of consensus as to whether or not and to what extent learning styles have any educational implications (Pashler, McDaniel, Rohrer, & Bjork, 2009). Advocates of learning styles assessment in instruction (e.g., Sternberg, Grigorenko, & Zhang, 2008) suggest that by assessing and identifying students' learning styles and matching them to teaching methods, better learning outcomes can be achieved. Critics of learning styles assessment (e.g., Willingham, 2005), on the

other hand, believe that learning styles have no educational implications, and that tailoring instruction to students' individual learning styles does not enhance learning (Hatami, 2013).

This ambiguous situation regarding the value of learning styles in educational practice also applies to the field of Second Language Acquisition (SLA) (Ellis, 2008), in general, and L2 vocabulary acquisition, in particular. As Tight (2010) states, "…in vocabulary acquisition, the evidence in favor of style matching is far from conclusive" (p. 800). Moreover, the few studies that have examined the impact of learning style matching on L2 vocabulary learning have focused solely on the intentional acquisition of vocabulary (e.g., Kassaian, 2007; Pouwels, 1992; Tight, 2010; Wu, 2014). It appears that no studies to date have investigated the impact of learning style matching on the incidental acquisition of L2 vocabulary. Yet the importance of examining this issue has been raised in previous research. For instance, in a study by Waring and Takaki (2003) on the rate at which vocabulary is acquired from reading a graded reader, it was found that learners with above average L2 proficiency in the group scored slightly higher on some of the tests measuring vocabulary gains from reading; however, not all learners at lower L2 proficiency levels performed below average on the vocabulary tests. The authors speculated that "the variation may be a result of the reading matching their preferred learning style rather than a manifestation of their ability. This of course warrants further investigation" (p. 152). The purpose of the current study therefore is to investigate the role the match/mismatch between learners' perceptual learning style and input mode plays in the incidental acquisition and retention of vocabulary through reading.

Literature Review

Factors Affecting L2 Incidental Vocabulary Acquisition through Reading

Previous studies have investigated a range of factors that influence L2 incidental vocabulary acquisition through reading. These factors are related to the word, the text/context, the task, or the learner (Paribakht & Wesche, 1999). For instance, a word-related variable that has been widely studied is frequency of occurrence. Studies have generally found that the more frequently a word occurs in a text, the more likely it will be learned (e.g., Brown, Waring, & Donkaewbua, 2008; Hatami, 2015a; Horst, Cobb, & Meara, 1998; Pigada & Schmitt, 2006; Vidal, 2011; Waring & Takaki, 2003). First language (L1) lexicalization is another word-related factor that has been investigated. Paribakht (2005) and Chen and Truscott (2010) both found that the meanings of non-lexicalized words (i.e., L2 words with no L1 translation equivalent) are more difficult to infer and learn than lexicalized ones. Other features related to the word include word type (i.e., high-frequency, academic, technical, or low-frequency) and predictability from word form and parts (Vidal, 2011); word concreteness (Pichette, de Serres, & Lafontaine, 2012); and word class (Kweon & Kim, 2008).

A number of studies have examined the role of text- and context-related factors in the incidental acquisition of L2 vocabulary from reading. For example, Webb (2008) investigated the impact of the degree of informativeness of the context and showed that the presence of more contextual clues resulted in greater vocabulary gains from reading. Similarly, Vidal (2011) found that L2 readers made greater vocabulary gains for explicitly elaborated words (i.e., words accompanied by definitions, descriptions, naming and questioning statements) than for words elaborated implicitly.

The nature of the task has also been shown to affect L2 incidental word learning from reading (Hulstijn & Laufer, 2001; Paribakht & Wesche, 1999). Paribakht and Wesche used two different tasks – responding to specific comprehension questions and orally summarizing each

paragraph – and found that each of these tasks made different words salient to the learners, and that learners attended to more unknown words during the summary task than the question task.

Finally, studies have attempted to examine the role of various learner- or reader-related variables in L2 incidental word learning. Some researchers have studied the role of learners' L2 proficiency (Horiba & Fukaya, 2015; Vidal, 2011), or more specifically, the role of L2 lexical proficiency (Elgort & Warren, 2014; Horst et al., 1998) and L2 reading proficiency (Pulido, 2003). These studies have generally shown that the higher the learners' linguistic proficiency, the greater their incidental vocabulary gains. Other studies have focused on the strategies learners use when encountering new L2 words during reading (Elgort & Warren, 2014; Fraser, 1999; Paribakht & Wesche, 1999). For example, Fraser found that the learners in her study – eight Francophone university students enrolled in an intermediate-level ESL course – used productive strategies (i.e., consulting and inferencing) more frequently than unproductive ones (i.e., ignoring or not paying attention). Paribakht and Wesche found that their learners – 10 university students from a variety of L1 backgrounds in an intermediate-level ESL course – ignored more than half of the unknown words they encountered; however, for those words they attended to, inferencing was the main strategy used. Topic familiarity is another learner-related factor that has been studied (Horiba & Fukaya, 2015; Pulido, 2003). Horiba and Fukaya found that topic familiarity facilitated learning of the content of the text as well as the new words in the text. Other learner-related variables that have been shown to play a role in L2 incidental word learning during reading include age of L2 acquisition, gender, text comprehension, degree of enjoyment (Elgort & Warren, 2014), and reading goal (Horiba & Fukaya, 2015).

As can be seen from the brief review above, numerous factors affecting L2 incidental word learning during reading have previously been examined. Surprisingly, however, it appears

that the potential role of learning style matching in this complex process has not yet been addressed.

Learning Styles

Despite the body of research on the role of learning styles in L2 acquisition, the current picture is rather confusing and controversial. This is due to a number of issues, in particular "too many labels purporting to being different styles, the use of ineffective assessment methods, and the lack of a clear distinction between style and other constructs such as intelligence and personality" (Riding, 2000, p. 365). Nevertheless, as Dörnyei and Ryan (2015) point out,

> There is something genuinely appealing about the notion and, what is more, this intuitive appeal tends to resonate strongly with the classroom experience of educational practitioners...The hope underpinning much research into styles is that the current state of confusion is merely due to our insufficient knowledge rather than the scientific inadequacy of the concept. (p. 107)

Learning style models and measures. The first widely used instrument in the L2 context was the Perceptual Learning Style Preference Questionnaire (PLSPQ) developed by Reid (1995; originally developed in 1984). In this user-friendly measure, Reid distinguishes four perceptual learning styles (visual, auditory, kinaesthetic, and tactile) and two social learning styles (group learning preference and individual learning preference). Learners are asked to self-assess their behavioural preferences on a 5-point scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). However, while the PLSPQ has been primarily designed for ESL learners, it is not L2-specific, meaning that the items in the questionnaire do not mention any particular subject matter (Dörnyei & Ryan, 2015). The reliability estimates (Cronbach's alpha) for the perceptual learning style scales used in the PLSPQ have been reported to be quite low, as

follows: .53 (visual scale); .48 (auditory scale); .69 (kinaesthetic scale); and .59 (tactile scale) (Wintergerst, DeCapua, & Itzen, 2001).

Another user-friendly learning style inventory widely used in SLA research is Oxford's (1993) Style Analysis Survey (SAS). Although the SAS has been primarily used in the L2 context, the items themselves, similar to the PLSPQ, are not L2-specific (Dörnyei & Ryan, 2015). The SAS covers five style dimensions: (1) how one uses his/her physical senses for study and work (visual, auditory, hands-on); (2) how one deals with other people (extrovert vs. introvert); (3) how one handles possibilities (intuitive-random vs. concrete-sequential); (4) how one approaches tasks (closure-oriented vs. open); and (5) how one deals with ideas (global vs. analytic). Respondents mark their answers on a 4-point scale ranging from 1 (*never*) to 4 (*always*). The reliability for the visual/auditory/hands-on dimension in the SAS has been reported to be .76 (Carson & Longhini, 2002).

Subsequently, the Learning Style Survey (LSS) was developed by Cohen, Oxford, and Chi (2001). The LSS is an expanded and refined version of the SAS (Dörnyei & Ryan, 2015) in that it covers additional style dimensions (11 instead of 5), the rating scale has been expanded (from a 4-point scale to a 5-point scale), and most importantly, it is "developed with an interest in those style dimensions that seem to have the most relevance to language learning" (Cohen & Weaver, 2005, p. 10). The test-retest reliability of Part 1 of the survey, which targets perceptual preferences (i.e., visual, auditory, and tactile/kinaesthetic) has been reported to be .74 (Tight, 2010).

The E&L model developed by Ehrman and Leaver (2003) also specifically addresses styles in language learning and aims to enhance the effectiveness of intensive language training. The E&L model consists of a superordinate construct called *synopsis-ectasis* which refers to "the

degree of conscious control of learning desired or needed" (Ehrman & Leaver, 2003, p. 395). Ehrman and Leaver developed an instrument in which the synopsis-ectasis distinction is reflected in ten subscales, with three items for each subscale. However, the instrument has not been widely used since its creation, which might be due to its limited availability or complicated interpretation of results (Dörnyei & Ryan, 2015).

In sum, numerous learning style models and measures exist, each consisting of various dimensions. However, one dimension common to most models (Tight, 2010) and familiar to most language teachers and many language learners (Dörnyei & Ryan, 2015) is the sensory/perceptual learning style dimension.

Perceptual learning styles. In the SLA context and the language classroom, the most relevant perceptual modalities tend to be sight, hearing, and touch (Tight, 2010). Students have a preference for the perceptual modality through which they take in new information (Dörnyei & Ryan, 2015). This preferred, dominant modality is known as the individual's sensory preference or perceptual learning style. The following is a description of perceptual preference types.

Visual learners prefer to receive and absorb new information through sight, for example, by reading written texts, seeing pictures, diagrams, and graphs, watching videos, looking at objects, taking notes, and visualizing images. *Auditory learners* prefer to receive and learn new information through hearing, for example, by hearing spoken words, listening to oral explanations, lectures, and audiotapes, and participating in conversations and class discussions. *Kinaesthetic* and *tactile learners* are often grouped together because they have style preferences that are related, yet not identical. Kinaesthetic learners prefer to receive and learn new information through body experience and movement, while tactile learners have a general

preference for learning through touching, hands-on tasks, and manipulation of objects (Dörnyei & Ryan, 2015; Reid, 1998).

The presence of one perceptual learning style preference does not exclude another. In fact, some individuals have mixed modality preferences; these learners are likely to be more successful because they can more easily adapt themselves to the learning situation and process input, regardless of the mode in which it is presented (Dörnyei & Ryan, 2015; Kinsella, 1995).

The prevalence of different perceptual learning styles in diverse cultures and contexts has been examined by numerous researchers. According to Oxford (1995), in North America, the most common perceptual modality preference (i.e., for 50% to 80% of the population) is visual. However, when Reid (1987), using the PLSPQ, attempted to identify the perceptual learning style preferences of 1,388 college students from across the United States, 154 of whom were native speakers of English and the rest ESL students from a range of L1 backgrounds, she found that kinesthetic and tactile learning styles were very popular. On the other hand, Lincoln and Rademacher (2006), using the VARK Questionnaire, assessed the learning styles of 69 adult ESL students from 17 different countries of origin (but mostly from Latin America) in Arkansas, United States, and found that most were auditory learners (20%), followed by kinaesthetic (15%), and visual (4%), and 15% had mixed preferences.

Studies in EFL contexts have also reported varying findings. For instance, Seifoori and Zarei (2011) used the PLSPQ to assess the perceptual learning styles of 94 university-level Iranian EFL learners majoring in English, and found the kinaesthetic learning style to be the most frequent, followed by auditory, visual, and tactile. Mozayan, Ebrahimpourtaher, Hoominian, Khosravi, and Shamsi (2013) also used the PLSPQ to determine the perceptual learning styles of 107 Iranian EFL learners majoring in medical sciences. The results revealed

that the students' preferred learning styles were tactile and kinesthetic followed by visual and auditory. In another study by Naserieh and Anani Sarab (2013), the perceptual modality preferences of 138 Iranian graduate students majoring in either technical fields or social sciences were examined using the PLSPQ. The findings showed that learning styles were preferred in the following order: kinaesthetic, tactile, auditory, and visual.

The diversity in these findings and in those of many other studies not mentioned above is not surprising. Perceptual learning styles have been shown to be related to numerous factors. These factors include, but are not limited to, L1, country of origin, age, gender, L2 proficiency, academic performance, level of education, and field of study (Alireza & Abdullah, 2010; Lincoln & Rademacher, 2006; Park, 1997; Reid, 1987).

L2 Vocabulary Acquisition and Perceptual Learning Styles

The role of learning styles in L2 vocabulary learning appears to be an important one. According to Oxford and Crookall (1990), "cultural and ethnic differences in learning styles may be very important and should be considered in understanding how people learn vocabulary. Sensory preferences, such as visual, aural, tactile, and kinesthetic should be assessed" (p. 25). Hence, a number of L2 researchers have investigated the relationship between perceptual learning styles and (a) the intentional learning of vocabulary (e.g., Kassaian, 2007; Pouwels, 1992; Tight, 2010; Wu, 2014), or (b) the effectiveness of vocabulary annotations (Yeh & Wang, 2003), or (c) lexical inferencing abilities (Shen, 2010), and have reported a range of findings.

Tight (2010) investigated the acquisition and retention of 36 L2 Spanish words by 128 undergraduate students. After assessing the participants' perceptual learning styles (i.e., visual, auditory, tactile/kinaesthetic, and mixed) using the LSS, and administering a vocabulary pretest, the participants were presented with 12 words through the style matching condition, 12 words

through the style mismatching condition, and 12 words through the mixed modality condition. The results revealed that the mixed modality instruction was the most effective for both acquisition and retention. Moreover, although learners with different learning styles were found to be equally successful at L2 vocabulary acquisition, style matching led to significantly greater retention than style mismatching. Shen (2010) also, using the PLSPQ, investigated the impact of perceptual preference and social preference on the L2 lexical inferencing ability of 145 university students in Taiwan. On a lexical inferencing test, before receiving any training in inferencing strategies, the group learners outperformed the others, followed by individual learners, kinesthetic, tactile, auditory, and visual learners. However, after receiving explicit instruction of inferencing strategies as part of a 15-week reading course, auditory and visual learners showed greater gains on the lexical inferencing post-test. The author relates this benefit to the match between the teaching style and the students' learning style, since most of the instruction was geared to auditory and visual learners.

However, not all studies have shown style matching to be effective. For instance, Yeh and Wang (2003) examined the effectiveness of three types of vocabulary annotations (i.e., text annotation only, text plus picture, and text plus picture and sound) on L2 vocabulary acquisition among 82 university students in Taiwan. The authors further investigated whether learners with certain perceptual learning styles benefited more from a particular type of vocabulary annotation. Perceptual learning styles were assessed using a questionnaire developed by Kinsella (1995). The results revealed that the most effective type of annotation was the combination of text and picture. Perceptual learning styles did not seem to have a significant impact on the effectiveness of vocabulary annotations; participants generally preferred visual annotations to auditory ones. Kassaian (2007) also found that her participants – 66 university-level Iranian students –

regardless of having visual or auditory preferences, acquired and retained visually presented items better than aurally presented ones. The VAK learning styles test designed by Chislett and Chapman (2005) was used to assess perceptual learning styles.

As evident from the review above, and as Tight (2010) points out, no general conclusions can be drawn from the existing L2 studies on the relationship between perceptual learning styles and vocabulary learning. Moreover, these studies have thus far focused only on the explicit instruction and intentional acquisition of vocabulary. There is indeed a lack of research on the relationship between perceptual learning styles and the incidental acquisition of L2 vocabulary. The present study aims to address this gap by investigating the following research questions:

1. What are the perceptual learning style preferences of university-level Iranian EFL learners majoring in engineering?
2. What is the difference in L2 incidental vocabulary acquisition rates through reading, as measured by an immediate post-test, when learners' perceptual learning style is (a) matched to their input mode, (b) mismatched to their input mode, or (c) mixed?
3. What is the difference in L2 vocabulary retention rates through reading, as measured by a delayed post-test, when learners' perceptual learning style is (a) matched to their input mode, (b) mismatched to their input mode, or (c) mixed?

Method

Participants

The participants were 108 Iranian EFL learners (64 males and 44 females), who were all undergraduate engineering students at Isfahan University of Technology (IUT), a highly-ranked university in Iran. They all shared the same L1, Farsi, and ranged in age from 18 to 25 years (M = 19.69, SD = 1.44). They had formally studied English for at least seven years and none of them

had ever resided in an English-speaking country. They were at intermediate levels of English language proficiency; this was confirmed by the director of the English Language Center at the university and also by their scores on the Vocabulary Levels Test (VLT; Schmitt, Schmitt, & Clapham, 2001). Students were included in the study only if they had a minimum raw score of 15 out of 30 on the 2,000 word level of the VLT. This was to ensure that they would have little or no difficulty understanding the running words in the text that they had to read. All participants received cash incentives (equivalent to $10 CAD) for their participation in the study.

As previously mentioned, visual learners prefer to receive new information through sight, for example, by reading written texts (Dörnyei & Ryan, 2015; Reid, 1998). In this study, because the learners were given a reading task (see below for details), the visual learners were "matched" to the input mode (i.e., reading), while the auditory and kinaesthetic/tactile learners were "mismatched". The perceptual learning styles of the participants was determined using the LSS. There were only nine auditory and 12 kinaesthetic/tactile learners in the sample, and therefore, these participants were first assigned to the reading group to form the "mismatched" subgroup. The remaining 87 participants, who were either visual or mixed modality, were then randomly assigned to the reading group and the control group. Thus the reading group consisted of 21 auditory or kinaesthetic/tactile learners (i.e., Mismatched learners), 21 visual learners (i.e., Matched learners), and 19 mixed modality learners (i.e., Mixed learners), and the control group consisted of 30 visual learners and 17 mixed modality learners.

Materials

Target words (TWs). Sixteen words in the reading text (see below for details about the text) were chosen as TWs, and were then replaced by 16 non-words (see Appendix A). In order to ensure that the non-words looked like plausible English words and that they were all similar in

terms of learning difficulty, the following steps were taken. First, 46 non-words, all two-syllabic and five to six letters in length, were selected from Meara's (2013) list of imaginary words. Three professors of Teaching English as a Second Language (TESL) then judged each non-word regarding its plausibility as a real English word. Consequently, 16 of the non-words were excluded for the following reasons: they looked French, were common English names, had irregular pronunciation or spelling, or contained real English words. A questionnaire was then designed for the 30 remaining non-words, to explore the plausibility of each non-word as an English word through a yes/no question, and also the spelling and pronunciation difficulty of each non-word using a five-point scale (1 = *very easy*, 5 = *very difficult*). Based on the judgments of five Canadian native speakers of English (mean age = 38 years) and five Iranian non-native speakers of English (mean age = 29.8 years) who responded to the questionnaire, 16 non-words were selected for the study. These 16 non-words were rated as plausible English words by at least eight of the 10 respondents, and the average spelling and pronunciation difficulty for each was rated lower than 3.

Reading material. An elementary-level graded reader (i.e., *The Monkey's Paw*) from the Oxford Bookworms series was selected as reading material for the reading group. In order to further simplify the text, the proper nouns that the researcher (who is also a native Farsi speaker) thought might be unknown to the participants were changed to more recognized ones. Moreover, using the BNC-COCA-25 VocabProfile available at www.lextutor.ca, words beyond the 1,000 word level were either replaced with words from this level or excluded. This left a text of 4,231 words, and after the insertion of the non-words in the text, a 95.84% lexical coverage was obtained (if it can be safely assumed that participants recognized the meanings of all the words from the 1,000 frequency level in the story along with the proper nouns). Research on L2 reading

comprehension has shown that 95% to 98% lexical coverage provides adequate comprehension of written texts (Hu & Nation, 2000; Laufer & Ravenhorst-Kalovski, 2010).

Instruments

Language background questionnaire (LBQ). The LBQ, which was translated into Farsi, consisted of a range of questions about the participants' sex, age, native country, native language, other languages spoken and proficiency levels, length of residence in an English-speaking country, and hours per week of reading in Farsi and English for both study purposes and pleasure.

Learning Style Survey (LSS). The perceptual learning style of the learners in this study was assessed using the LSS developed by Cohen et al. (2001) (translated into Farsi by the researcher and another Farsi-English bilingual). As previously mentioned, this instrument is an improved version of Oxford's (1993) Style Analysis Survey (SAS). The LSS consists of 11 parts and 110 items; however, only Part 1 of the survey, which targets sensory/perceptual preferences and consists of 30 items (10 each for visual, auditory, and tactile/kinaesthetic modalities), was used in this study. Respondents self-report how often they perform a particular behavior associated with one of the three modalities, by circling one of the options on a 5-point rating scale (0 = *never*; 1 = *rarely*; 2 = *sometimes*; 3 = *often*; 4 = *always*). The instrument is user-friendly, is easy to score, and provides clear explanations about the results.

The points for the 10 items related to each perceptual learning style were totalled for each participant. The maximum possible score for each style was 40. The learning style for which the participant had the highest score was considered the participant's perceptual learning style only if there was at least a three-point difference between this learning style and another learning

style. If the difference was less than three points, the participant was considered to have a mixed modality preference.

Vocabulary post-test. Previous studies mentioned above that have investigated the relationship between perceptual learning styles and L2 vocabulary acquisition measured vocabulary gains exclusively in terms of meaning (e.g., Kassaian, 2007; Pouwels, 1992; Tight, 2010; Yeh & Wang, 2003). The only exception is Wu (2014), who measured word form, meaning, and usage, but in a rather unsystematic way. Although no sample of Wu's vocabulary test has been provided, based on the description of the sections of the test, it appears that the written form was measured at the level of recall, while the spoken form was measured at the level of recognition. Moreover, form-meaning connection was measured at the level of recall, but not recognition. It is also not clear how each of the sections in the test were scored.

In the current study, however, in order to measure L2 incidental vocabulary acquisition and retention, five aspects of word knowledge were chosen from Nation's (2001) comprehensive vocabulary knowledge framework. Measuring different aspects of word knowledge is "the most effective way to assess vocabulary depth" (Nation & Webb, 2011, p. 227). The vocabulary post-test in this study consisted of six tests overall: five recognition tests measuring spoken form, written form, part of speech, syntagmatic association, and form-meaning link, and one recall test measuring form-meaning link. These tests were adapted from the work of Webb (2005), Chen and Truscott (2010), and van Zeeland and Schmitt (2013a) (see Appendix B for examples).

Each of the six tests appeared on two consecutive pages; therefore, the post-test was 12 pages in total. Based on Webb (2005), the tests were ordered in such a way as to prevent any possible learning effects; for example, the recall test of form-meaning link was placed before its

recognition test. All test instructions were provided in both English and Farsi. As the participants completed the post-test, they were asked and supervised to not go back and change any answers.

On the recognition tests, each correct response was given one point. For the meaning recall test, again, each correct response was given one point, and each partially correct response was given half a point. For instance, if the correct response was *afraid*, and the learner had written *shocked*, half a point was awarded. The recall test was scored by the researcher and another rater, and an inter-rater reliability of 98% was reached.

Procedures

The materials and instruments were pilot-tested with four Iranian EFL learners, with characteristics similar to those of the target population. Some of the instructions and Farsi translations were revised accordingly. For the actual study, data collection took place in three sessions:

First session. In this session, which lasted an hour, participants were introduced to the study and invited to sign a consent form. Following this, the language background questionnaire (LBQ), the Learning Style Survey (LSS), and the Vocabulary Levels Test (VLT) were administered.

Second session. In this session, which was held two weeks after the first session and took approximately 75 minutes, the vocabulary focus of the study was not revealed to the participants; they were asked only to read and try to understand a classic English story (i.e., *The Monkey's Paw*). After the participants read the text for approximately 36 minutes (followed by a 5-minute break), the unexpected vocabulary post-test was administered to measure incidental vocabulary acquisition. Two practice examples for each of the six tests in the post-test were first presented. The participants were then given as much time as necessary to complete the post-test.

Third session. In this session, which was held three weeks after the second session and took approximately 30 minutes, the delayed post-test was administered to measure vocabulary retention. The three-week time interval was chosen between the two post-tests as it is considered sufficient time to demonstrate stable and durable learning (Schmitt, 2010). The delayed post-test was exactly the same as the immediate post-test.

The control group did not read the text (i.e., *The Monkey's Paw*); however, they completed all other procedures mentioned above, that is, they responded to the LBQ, LSS, VLT, and the immediate and delayed post-tests. The control group was included to make sure that taking the immediate post-test did not result in any learning of the target words, and consequently, did not affect the results on the delayed post-test.

Results

In order to ensure that there were no practice effects present, in other words, that scores on the delayed post-test were not affected by the immediate post-test, but were a direct result of the treatment, a repeated-measures *t*-test was performed. The *t*-test was run to compare the control group's scores on the immediate post-test (Time_1) with their scores on the delayed post-test (Time_2). The average of scores on the five recognition tests (i.e., tests of spoken form, written form, part of speech, syntagmatic association, and form-meaning link) was used as the dependent variable. The repeated-measures *t*-test revealed a significant increase in the scores of the control group on the recognition tests from Time_1 to Time_2, $t\,(45) = -6.26$, $p < .001$. Considering that the control group was not exposed to the reading material, the significant improvement in their scores suggests that practice effects had occurred. Therefore, scores on the recognition tests could not be used when addressing the third research question in this study (i.e., to investigate retention rates at Time_2). On the meaning recall test, however, all 47 members of

the control group scored zero at Time_1, and all but three members scored zero again at Time_2. Practice effects did not appear to be present for the meaning recall test, and therefore, only recall scores were used when answering the third research question in this study. In Table 3.1, descriptive statistics for the control group at Time_1 and Time_2 for word recognition and recall are presented.

Table 3.1

Descriptive Statistics for the Control Group

Test	Time	*M*	*SD*
Recognition	1	3.09	1.57
	2	4.35	1.85
Recall	1	.00	.00
	2	.11	.43

Note. Time_1 = immediate post-test; Time_2 = delayed post-test.
Recognition = scores on the five recognition tests combined. The maximum possible score is 16.
Recall = scores on recall test of form-meaning link. The maximum possible score is 16.

Research Question 1

What are the perceptual learning style preferences of university level Iranian EFL learners majoring in engineering? Of the 108 Iranian undergraduate students in this study, 51 (47%) had visual preference, 36 (33%) had mixed modality preference, 12 (11%) had kinaesthetic/tactile preference, and nine (8%) had auditory preference. Hence, the majority of the learners had a single modality preference, the most common of which was visual and the least common auditory.

Research Question 2

What is the difference in L2 incidental vocabulary acquisition rates through reading, as measured by an immediate post-test, when learners' perceptual learning style is (a) matched to their input mode, (b) mismatched to their input mode, or (c) mixed? In order to respond to this question, a one-way between-subjects MANOVA was conducted, with Group (Matched vs. Mismatched vs. Mixed) as the independent variable and two dependent variables: the average of scores on the five recognition tests and the scores on the recall test. Results obtained from the MANOVA showed a non-significant effect for Group, Wilks' $\lambda = .96$, $F\ (4, 110) = .52$, $p = .72$. In other words, no significant differences were found between the Matched, Mismatched, and Mixed groups' scores on the recognition tests or the recall test. The scores of the three groups at Time_1 have been summarized in Table 3.2.

Table 3.2

Scores of the Matched, Mismatched, and Mixed Groups on the Immediate Post-test

Test	Group	*n*	*M*	*SD*
Recognition	Matched	20	8.54	2.52
	Mismatched	20	9.26	2.60
	Mixed	19	9.77	3.08
Recall	Matched	20	1.80	1.95
	Mismatched	20	2.40	2.24
	Mixed	19	2.63	2.18

Note. Recognition = scores on the five recognition tests combined. The maximum possible score is 16.
Recall = scores on recall test of form-meaning link. The maximum possible score is 16.
Two missing cases (the scores of two participants were outliers in this analysis and therefore excluded).

On the recognition tests and the recall test, the Mixed learners scored highest, followed by the Mismatched learners and Matched learners. However, none of the differences between the groups were significant.

Research Question 3

What is the difference in L2 vocabulary retention rates through reading, as measured by a delayed post-test, when learners' perceptual learning style is (a) matched to their input mode, (b) mismatched to their input mode, or (c) mixed? As previously stated, because practice effects appeared to exist for the recognition tests, the recognition scores were not used in the data analysis conducted for this research question; only recall scores were used in the analysis. A mixed-design ANOVA was performed, with Group (Matched vs. Mismatched vs. Mixed) as the between-subjects factor, Time (Time_1 vs. Time_2) as the within-subjects factor, and the scores on the meaning recall test as the dependent variable. The results revealed a significant effect for Time, F (1, 52) = 11.7, $p < .05$, partial $\eta^2 = .18$, power = .92. However, the effects were non-significant for Group, F (2, 52) = .78, $p = .46$, and for the interaction between Time and Group, F (2, 52) = .05, $p = .96$. Thus, no significant differences were found between the Matched, Mismatched, and Mixed learners on the delayed recall test. The scores of the three groups at Time_1 and Time_2 on the recall test are shown in Table 3.3.

Table 3.3

Meaning Recall Scores of the Matched, Mismatched, and Mixed Groups on the Immediate and Delayed Post-tests

Time	Group	*n*	*M*	*SD*
1	Matched	20	1.80	1.95
	Mismatched	18	2.00	1.91
	Mixed	17	2.53	2.11

2	Matched	20	1.25	1.15
	Mismatched	18	1.42	1.69
	Mixed	17	1.85	1.76

Note. Time_1 = immediate post-test; Time_2 = delayed post-test.
The maximum possible score is 16.
Six missing cases (the scores of five participants were outliers in this analysis and therefore excluded, and one participant did not complete the delayed post-test).

Similar to the trend at Time_1, meaning recall scores at Time_2 were highest for Mixed learners, followed by Mismatched learners, and finally, Matched learners. However, none of these differences between the groups were statistically significant. The mean of each group was smaller at Time_2 compared with Time_1, indicating that some forgetting had occurred after three weeks. The largest mean difference (MD) between Time_1 and Time_2 was observed for Mixed learners (MD = .68), followed by Mismatched learners (MD = .58), and Matched learners (MD = .55); however, none of the mean differences for the individual groups from Time_1 to Time_2 were statistically significant.

Discussion and Conclusion

Research Question 1

Of the 108 Iranian engineering undergraduate students in this study, 33% had mixed modality preference, but the majority, that is, 67% of the participants had a single modality preference. All three categories of single modality preferences (i.e., visual, auditory, kinaesthetic/tactile) were found among the participants; however, by far, the most common single modality preference was visual. This does not appear to be consistent with previous findings for university-level Iranian EFL learners, which have often shown the kinaesthetic or tactile learning styles to be the most frequent (Mozayan et al., 2013; Naserieh & Anani Sarab, 2013; Seifoori & Zarei, 2011). In addition to the fact that these studies have used the PLSPQ to

assess perceptual learning styles (while the current study has used the LSS), a possible explanation for this inconsistency could be the participants' field of study. None of the studies mentioned above have specifically examined engineering students. Majoring in engineering and being visual have been shown to be related. For example, in a study of Iranian graduate students studying either engineering or political science in Malaysia, Alireza and Abdullah (2010) found visual learning to be a minor style among political science students, but a major style among the engineering students. As the authors point out, political science students "are involved with abstract ideas and more inclined toward hearing not seeing", while engineering students are mostly involved with "concrete and tangible statistics, formulas, and graphs...suggesting that they are more inclined to seeing things" (p. 39).

Another explanation for the highly visual participants in this study might be that the participants were recruited from a high-ranking, prestigious university, and were all academically successful students to be studying at this university. Academic success and having visual preferences have been shown to be related. For instance, in a comparative study of Chinese, Filipino, Korean, Vietnamese, and White students in secondary schools in California, United States, Park (1997) found that among high, middle, and low achievers, high achievers were the most visual and low achievers were the least visual.

Finally, considering the examination-oriented education system in Iran and the great emphasis that is placed on reading and learning from textbooks and on detailed note-taking in class (for all subjects including English), and also the scarcity of opportunities for in-class discussions and group work, it is not surprising that Iranian students are highly visual. As Rossi-Le (1995) states, the more exposure the language learner has to the written word, the more he or she feels comfortable learning visually (as cited in Oxford & Anderson, 1995). This may also

explain why the auditory learning style was the least common among the participants in this study and the least common or second to least common style in other studies conducted with Iranian EFL learners (e.g., Mozayan et al., 2013; Naserieh & Anani Sarab, 2013).

Research Questions 2 and 3

No differences were observed in terms of incidental vocabulary gains at both levels of recognition and recall, between 1) learners whose perceptual learning style was visual and therefore matched to their input mode; 2) learners whose perceptual learning style was either auditory or kinaesthetic/tactile and therefore mismatched to their input mode; and 3) learners who had mixed modality preference. With regard to retention rates three weeks later, again no differences were found between these three groups of learners at the recall level (retention rates at the recognition level could not be measured due to the presence of practice effects). These results suggest that perceptual learning style matching has no benefits for incidental word learning through reading. In other words, it appears that learners, regardless of their perceptual modality preference, are able to incidentally learn vocabulary from reading to the same extent. These findings support a number of previous studies (e.g., Kassaian, 2007; Wu, 2014; Yeh & Wang, 2003), which have shown that style matching does not enhance L2 vocabulary learning (although none of these studies have focused on *incidental* vocabulary learning).

The findings of this study, therefore, challenge the notion that learning can be enhanced when material is presented in one's preferred modality. In line with these findings, Kratzig and Arbuthnott's (2006) showed that individuals' memory efficiency is not limited by sensory modality, and they therefore concluded that focusing on perceptual modality preferences may be a wasted effort. In addition, as Willingham (2005) claims, most of what students learn is not particularly visual, auditory, or kinaesthetic information, but meaning-based. The initial

experience by which one learns a fact may be visual (e.g., looking at a picture) or auditory (e.g., hearing an explanation), but the resulting representation of that knowledge in the mind is usually neither visual nor auditory; rather, it is meaning-based. Hence, the teacher's "goal should be to find the content's best modality, not to search (in vain) for the students' best modality" (Willingham, 2005). With regard to L2 incidental word learning, therefore, it seems best to focus on the more effective input modality, rather than learners' preferred modality, and, in fact, studies have shown that reading is a more effective modality than listening for L2 incidental word learning (Brown et al., 2008; Hatami, 2015a; Vidal, 2011). It is fitting to end this discussion with the following quote from Dörnyei and Skehan (2003):

> It appears from a review of findings on style that such concepts may not deserve high research priority, but they have not been eliminated as potentially relevant second language linked measures. What is now needed is more evidence of educationally linked applications of such concepts. If such evidence is forthcoming, style concepts may become more central in SLA once again. (p. 607)

Limitations and Suggestions for Future Research

Several limitations of this study need to be considered. First, the design of the vocabulary post-test led to practice effects, and as a result, retention rates could not be accurately measured for recognition scores. This should be taken into account, as differences might have existed between the groups in the current study if retention rates had been more comprehensively measured. In Tight's (2010) study, for instance, benefits of style matching were found only for the retention of vocabulary knowledge (on the delayed post-test), and not its acquisition (on the immediate post-test). Second, in order to determine the perceptual learning styles of the learners in this study, a self-report questionnaire was used. Such instruments yield subjective judgments,

not objective measurements. Kratzig and Arbuthnott (2006) found that on learning style questionnaires, "participants did not engage in detailed analytic judgment of their learning histories, but, rather, the particular question prompted rapid retrieval of either general examples or previously formed opinions about preferences or abilities" (pp. 244-245). Thus, caution must be taken when interpreting the results of such instruments in SLA research. Finally, it might be worthwhile to address the research questions in this study for incidental word learning through L2 listening. In fact, the initial goal for this study was to have three groups – two experimental groups (reading and listening) and one control group. However, because there was an inadequate number of auditory learners in the recruited participants, the "matched" subgroup could not be formed for the listening group, and as a result, the listening group was excluded. A larger sample size might have provided sufficient auditory learners; however, such low number of auditory learners may not necessarily be found in other EFL or ESL contexts.

4. The Impact of Learner-related Variables on L2 Incidental Vocabulary Acquisition through Listening

Before the 1970s, listening was assumed to be a receptive language skill in which listeners passively assimilate messages from incoming speech (Morley, 1984, as cited in Murphy, 1991). Today, listening comprehension is described as a far more complex process, critical to second language (L2) acquisition, and the most difficult of the four language skills to learn (Vandergrift, 2004). Not unexpectedly, incidental vocabulary acquisition from listening is also a complex process involving many different factors. In his review essay on factors affecting the incidental acquisition of L2 vocabulary from oral input, Ellis (1994) emphasized that very little attention had been paid to this area of research. Surprisingly, after more than twenty years, the need for further study still exists. While there is a considerable amount of research on L2 incidental vocabulary acquisition through reading, research on L2 incidental vocabulary acquisition through listening is scarce (Brown, Waring, & Donkaewbua, 2008; van Zeeland & Schmitt, 2013a; Vidal, 2003). As a result, little is known about the development of vocabulary knowledge from L2 listening and the word-, text-, task-, and learner-related variables that play a role in this process. As Eckerth and Tavakoli (2012) note,

> The fact that readers seem to be in control of the pace of their reading, and can take time to notice unfamiliar words in the input may have made it a richer area of research than that based on aural input. (p. 228)

Nevertheless, the importance of L2 incidental vocabulary acquisition through listening cannot be underestimated, and children's sizeable vocabulary development in their first language (L1), before learning to read, attests to this (Ellis, 1994).

The objective of this work, therefore, was to explore some of the learner-related variables that might contribute to L2 incidental word learning from listening. Studies have shown that listening is a less effective input mode than reading for L2 incidental word learning (Brown et al., 2008; Hatami, 2015a; Vidal, 2011). L2 Learners have also reported that listening is their least preferred input mode when compared to reading and reading-while-listening (Brown et al., 2008). In order to better understand and ultimately reduce the complications learners face in L2 incidental word learning from listening, more needs to be known about this complex process and the factors that contribute to its success.

The learner-related variables chosen for inclusion in the present study were gender, L2 vocabulary size, amount of L2 listening (for academic purposes and pleasure), level of enjoyment, and (self-reported) level of comprehension. L2 reading research has shown that these variables play a role in incidental word learning (e.g., Elgort & Warren, 2014); in the current study, the aim was to determine whether these learner-related variables also play a role in L2 incidental word learning from listening. Reading and listening, despite their differences, share important comprehension processes; for instance, they both involve decoding and interpretation using two basic knowledge sources: linguistic knowledge and world knowledge (Vandergrift & Baker, 2015). Because of such important similarities, and also because L2 listening research is limited, "it is common practice for listening researchers to use reading-based findings as their starting point" (van Zeeland, 2014, p. 1007).

In addition to evidence from L2 reading research, a number of listening studies, although not directly focused on incidental vocabulary acquisition, indirectly suggest that some of the learner-related variables chosen for this study might play a role in incidental word learning from listening. Regarding the role of gender, for instance, in a study on *intentional* word learning,

Kaushanskaya, Marian, and Yoo (2011) found that women outperformed men on phonologically-familiar novel words, but not on phonologically-unfamiliar novel words. Differences between males and females have also been reported in strategy use while listening in the L2 (Bacon, 1992). However, there are also studies which have failed to show any significant gender differences in L2 listening comprehension ability (e.g., Bacon, 1992; Feyten, 1991; Vandergrift, 2006) or strategy use (Vandergrift, 1997). Furthermore, L2 vocabulary size has been shown to be an important factor for successful L2 listening comprehension (Mecartty, 2000; Stæhr, 2009). And finally, enjoyment and L2 listening comprehension have been shown to be closely related (Ducker & Saunders, 2014).

Literature Review

L2 Incidental Vocabulary Acquisition

In SLA research, a distinction has traditionally been made between *intentional* and *incidental* learning (Ellis, 1994). Intentional vocabulary learning takes place when learners deliberately attempt to learn a particular lexical item and thus focus their primary attention on this learning. Incidental vocabulary learning, on the other hand, occurs when learners' primary attention is focused on communication (i.e., comprehending or conveying a message), but during this activity, lexical items are also picked up (Ellis, 1994; Nation & Webb, 2011). Indeed, intentional vocabulary learning is faster than incidental learning, consistently leading to the acquisition of a larger number of words and higher retention rates within a set amount of time (Horst, 2005; Nation & Webb, 2011). However, for learners who wish to function at high levels of L2 proficiency, there is simply not enough time to intentionally learn all the vocabulary they need to know (Horst, 2005). A large portion of it has to be acquired incidentally (Ellis, 1994), and this allows L2 learners to "build an ever larger mental lexicon - much as native speakers do

over a lifetime of [listening and] reading in their L1" (Horst, 2005, p. 356). The intentional and incidental learning of vocabulary therefore should not be seen as opposing each other; instead, "they are complementary activities, each one enhancing the learning that comes from the other" (Nation, 2001, p. 232).

L2 research has shown that both reading and listening can be a source of incidental word learning. However, while L2 incidental word learning through reading and the factors involved have been widely examined (see Hatami, 2015b, for a brief review of these factors), research on factors contributing to L2 incidental vocabulary acquisition through listening, particularly learner-related factors, is very limited.

Factors Affecting L2 Incidental Vocabulary Acquisition through Listening

A few studies have attempted to examine the variables that might play a role in L2 incidental vocabulary acquisition through listening (Brown et al., 2008; Chang, 2012; Hatami, 2015a; van Zeeland & Schmitt, 2013a; Vidal, 2003, 2011). The most widely researched variable is frequency of word occurrence. Studies have generally found that the impact of frequency of word occurrence on incidental vocabulary gains from L2 listening is not strong (Brown et al., 2008; Hatami, 2015a; van Zeeland & Schmitt, 2013a; Vidal, 2003, 2011). For instance, in a study of 35 university-level Japanese EFL learners with pre-intermediate or intermediate level proficiency, Brown et al. (2008) investigated the effect of frequency of word occurrence on L2 incidental vocabulary acquisition through listening. Four frequency bands were selected: target words appearing between 15-20 times; 10-13 times; 7-9 times; and 2-3 times. The results showed no significant difference in vocabulary gains between the frequency bands, which the authors attributed to floor effects. The authors thus concluded "that there is little or no chance a new word will be picked up from listening unless the word is met considerably more than 20 times"

(p. 153). Van Zeeland and Schmitt (2013a) examined the role of frequency of occurrence (i.e., 3, 7, 11, or 15 times) on the incidental acquisition and retention of three dimensions of word knowledge (i.e., form, grammar, meaning) through listening. Participants were 30 university-level ESL students at high-intermediate or advanced levels of L2 proficiency. Except for the increase from 3 to 7 occurrences (which was found only for word form and grammar, and not meaning), frequency of occurrence did not appear to have an effect on the acquisition of any of the three dimensions either immediately after listening or two weeks later. In another study with 139 university-level Iranian EFL learners at intermediate levels of L2 proficiency, Hatami (2015a) found similar results to Brown et al. and van Zeeland and Schmitt; vocabulary gains from listening between the four chosen frequency bands (i.e., target words appearing between 2-5 times; 7-10 times; 12-15 times; or 17-20 times) were not significantly different. It therefore appears that in listening, more repetitions are needed for frequency of occurrence to have an impact on word learning.

Several other variables, in addition to frequency of occurrence, have been explored. For instance, in a study on incidental word learning from academic listening with116 university-level Spanish EFL learners, Vidal (2003) investigated the impact of two learner-related variables (L2 proficiency and lecture comprehension) and four word-related variables: predictability from word form and parts (i.e., unpredictable, deceptively transparent, morphologically predictable, similar to Spanish), word type (i.e., low-frequency, technical, academic), type of elaboration (i.e., explicit, implicit, no elaboration), and frequency of occurrence (i.e., 1, 2, 3, 4, 5, and 6 occurrences). The findings revealed that both L2 proficiency and lecture comprehension impact the degree to which vocabulary is gained from academic listening: the higher the level of L2 proficiency and lecture comprehension, the greater the vocabulary gains. Moreover, all four

word-related variables were found to be predictors of vocabulary gains, but in the following order: predictability from word form and parts > word type > type of elaboration > frequency of occurrence. Vidal (2011) examined the same four word-related variables in another study with 230 Spanish university EFL learners at four different levels of language proficiency, and found that the variables predicted vocabulary gains through listening in exactly the same order as Vidal (2003).

Chang (2012) carried out a study with 172 Chinese university EFL learners at pre-intermediate to intermediate levels of language proficiency and investigated the impact of four different listening conditions on the participants' incidental vocabulary acquisition. The listening conditions included: (1) listening one time; (2) listening three times; (3) schema-raising training before listening three times; and (4) inferencing training before listening three times. The results revealed that while incidental word learning occurred in all four listening conditions, the three-time listening groups outperformed the one-time listening group. Therefore, repetition of the listening text had led to higher incidental vocabulary gains. Chang further examined the relationship between metacognitive listening awareness, listening comprehension, and incidental vocabulary acquisition, and found that they are related; however, the correlations were generally not strong.

Van Zeeland and Schmitt (2013a) explored frequency of word occurrence (mentioned above) and two other word-related variables: part of speech and concreteness. The findings revealed that learners gained a better knowledge of concrete than of abstract words, not only in terms of meaning but also of form and grammar. With regards to part of speech, generally, nouns were acquired more successfully than verbs, and verbs more successfully than adjectives.

As the above review indicates, the L2 studies that have explored the impact of certain variables on L2 incidental word learning from listening are too few in number to allow any general conclusions. Moreover, only a very limited number of learner-related variables have been examined in previous research. Therefore, attempts at establishing previous findings or exploring new variables would be worthwhile, and this is what this study set out to accomplish.

Depth of Vocabulary Knowledge

Meaning is the central aspect of word knowledge; however, there are many more aspects of knowing a word than simply linking form to meaning. The degree of knowledge of these various aspects is referred to as depth of vocabulary knowledge (Read, 1993). In other words, in contrast to size of vocabulary knowledge, which refers to the quantity or number of words known, depth of vocabulary knowledge refers to the quality of vocabulary knowledge, or how well a learner knows a given word (Nation, 2001; Read, 1993).

Depth of vocabulary knowledge can be conceptualized through two main approaches (Read, 2000; Schmitt, 2010). One is the *developmental* approach, which describes "the incremental acquisition of a word along a continuum of mastery" (Schmitt, 2010, p. 216). In this approach, depth of vocabulary knowledge is measured using scales. The Vocabulary Knowledge Scale (VKS) (Wesche & Paribakht, 1996), a five-point scale starting at "I don't remember having seen this word before" and ending at "I can use this word in a sentence", is the scale most widely used to measure depth of L2 vocabulary knowledge. However, such developmental scales have long been the subject of criticism; for instance, as Schmitt (2010) explains, the beginning and ending points of such scales are inevitably only approximations, and the appropriate number of stages they should consist of is currently unknown (see pp. 217-221).

An alternative approach to describing depth of vocabulary knowledge is "to try to spell out all that the learners should know about a word if they are to fully acquire it" (Read, 2000, p. 25). This approach has often been termed the *dimensions* or *components* approach (Read, 1997; Schmitt, 2010). Richards (1976) was one of the first scholars to outline various aspects of what is meant by knowing a lexical item: frequency, limitations on use (i.e., register), syntactic behaviour, form and derivations, network of associations, semantic value, and various meanings of the word. Other researchers have also attempted to describe what constitutes knowledge of a word (e.g., Henriksen, 1999; Nation, 1990, 2001; Schmitt, 2000). Nation (1990, 2001), for instance, building on Richards' approach identified nine different aspects of word knowledge that need to be acquired both receptively and productively in order to master a word. These nine aspects fall under three main categories: form, meaning, and use (see Table 4.1). To assess depth of vocabulary knowledge using the *dimensions* approach, different aspects of word knowledge have to be isolated and separately measured. This approach is the most effective way of measuring depth of vocabulary knowledge (Nation & Webb, 2011), because, as Schmitt (2010) states, "vocabulary knowledge is a complex construct, and any single measure of it will give only a very minimal impression of the overall lexical knowledge constellation" (p. 152).

Table 4.1

What Is Involved in Knowing a Word (Nation, 1990, 2001)

Form	**Meaning**	**Use**
Spoken form	Form-meaning connection	Grammatical functions
Written form	Concept and referents	Collocations
Word parts	Associations	Constraints on use (e.g., register, frequency)

While the dimensions approach has been used quite extensively in L2 reading studies on incidental word learning, only two of the L2 listening studies reviewed above have used the dimensions approach to measure incidental vocabulary gains (i.e., Hatami, 2015a; van Zeeland & Schmitt, 2013a). Van Zeeland and Schmitt measured three aspects of word knowledge: spoken form, part of speech (or grammar), and form-meaning connection, and Hatami (2015a) measured five aspects of word knowledge: spoken form, written form, part of speech, form-meaning connection, and syntagmatic association. Previous L2 listening studies reviewed above have either used a developmental scale (i.e., Chang, 2012; Vidal, 2003, 2011), or have only measured one or two aspects of word knowledge, that is, written form and/or form-meaning connection (i.e., Brown et al., 2008; Chang, 2012). As van Zeeland and Schmitt point out, since "learning gains from listening have been found to be small, even significantly smaller than those from reading, the dimensions approach should serve particularly well in revealing the smallest increments in learning" (p. 611). Therefore, in the present study, the dimensions approach was used to measure incidental vocabulary gains from listening.

The Present Study

In this study, I examined the impact of five learner-related variables on L2 incidental vocabulary acquisition through listening. The learner-related variables were gender, L2 vocabulary size, amount of L2 listening (for academic purposes and pleasure), level of enjoyment, and (self-reported) level of comprehension. Although word-, text-, and task-related variables can also play an important role in L2 incidental word learning from listening, the primary focus here was on variables related to the learner/listener.

Method

Participants

Ninety-nine undergraduate students (57 males, 42 females) majoring in engineering at Isfahan University of Technology (IUT) in Iran participated in this study. The participants ranged in age between 18 and 24 years (M = 19.58, SD = 1.36) and shared the same L1 (i.e., Farsi). They had all formally studied English for seven years at school (before entering university), and none had ever lived in an English-speaking country. Their English language proficiency was at the intermediate level; this was determined on the basis of their scores on the Vocabulary Levels Test (VLT) (Schmitt, Schmitt, & Clapham, 2001) and confirmed by the director of the English Language Center at IUT. The mean scores on the 2,000, 3,000, and 5,000 word levels of the VLT were 23.07, 15.13, and 7.43, respectively (maximum score = 30). Only participants with at least 50% mastery of the 2,000 word level were included in the study. This cut-off point was determined to ensure that participants had knowledge of the running words in the listening text and could therefore understand the text with little or no difficulty. None of the participants reported hearing difficulties. All participants received cash incentives (equivalent to $10 CAD) for their participation. The participants were randomly assigned to a listening group (n = 51) and a control group (n = 48).

Materials

Target words (TWs). For the purposes of this study, non-words were used, that is, words created by a complete change in the form of already known, common concepts (Waring & Takaki, 2003). An advantage of using non-words is that it excludes the need to pre-test the learners on their knowledge of the TWs. Besides being time-consuming, pre-tests can have the disadvantage of making learners aware of the vocabulary learning focus of the study. Moreover, pre-tests may not be sufficiently sensitive to measure the minute amounts of knowledge that learners might already have about a word (Nation & Webb, 2011).

Sixteen words in the listening text (see below for the description of the text) were chosen as TWs. The TWs were then substituted throughout the text with 16 non-words (see Appendix A). Several steps were taken to ensure that the non-words looked like plausible English words and were equivalent, as much as possible, in terms of learning difficulty. First, forty-six non-words, all two-syllabic and five or six letters in length, were chosen from Meara's (2013) list of imaginary words. Next, three TESL experts judged the non-words with regard to their plausibility as real English words. Consequently, 16 of the 46 non-words were excluded due to one of the following reasons: the non-word had irregular pronunciation and/or spelling, contained a real English word, was a popular English first/last name, or looked French. A questionnaire was then developed for the remaining 30 non-words and was administered to five native English speakers (mean age = 38 years) and five Iranian non-native English speakers (mean age = 29.8 years). The questionnaire asked the respondents, in a yes/no question, whether each non-word resembled a real English word. It also required the respondents to rate each non-word, on a scale of 1 to 5, in terms of its spelling and pronunciation difficulty (1 = *very easy*; 5 = *very difficult*). Based on the responses to the questionnaire, 16 of the non-words were selected to be used in the study. These 16 non-words were rated as plausible English words by at least eight of the 10 respondents to the questionnaire, and their average spelling difficulty and pronunciation difficulty were rated lower than 3 on the 5-point scale.

Listening material. The listening text chosen for this study was *The Monkey's Paw*, an elementary-level graded reader selected from the Oxford Bookworms series. To ensure that participants had knowledge of all the running words in the text, the text was further simplified. First, the researcher (a native Farsi speaker) changed the proper nouns which were thought to be unfamiliar to the participants to more familiar ones (e.g., *Herbert* was changed to *Jack*). In

addition, using the BNC-COCA-25 VocabProfile available at www.lextutor.ca/vp/, any words in the text that were beyond the 1,000 word-level were either substituted with words from this level or eliminated. The final text contained 4,231 words, and after inserting the non-words, a lexical coverage of 95.84% was reached. A lexical coverage of 95% to 98% has been established as ideal for successful listening comprehension (Stæhr, 2009; van Zeeland & Schmitt, 2013b).

The final version of the text with the inserted non-words was audio-recorded as it was read aloud by a TESL professor who was a native speaker of Canadian English. The duration of the narration was 36 minutes, with an average speech rate of 117.5 words per minute.

Instruments

Language background questionnaire (LBQ). The LBQ, translated into Farsi, was designed to collect a range of information about the participants. In addition to demographic information (i.e., gender, age, native country, native language, other languages spoken and proficiency levels in those languages), participants reported whether or not they had lived in an English-speaking country and how long they had studied English outside of school and university. Moreover, the participants were asked to estimate the amount of time that they spent in a typical week listening to English materials for academic purposes (e.g., lectures, language learning CDs) and for pleasure (e.g., movies, radio, audio books). The two purposes for listening were separated, in order to help learners more accurately calculate their amount of L2 listening in a typical week. Because of the EFL context of the learners and the very low possibility of learners engaging in English conversations, conversational listening was not included in the questionnaire.

Vocabulary Levels Test (VLT). The VLT, originally developed by Nation (1983) and updated and validated by Schmitt et al. (2001), was used in this study to measure L2 vocabulary

size. The VLT, which is a test of receptive vocabulary knowledge, consists of four sections that represent four distinct word frequency levels (i.e., the 2000, 3000, 5000, and 10000 frequency levels) as well as a section for academic vocabulary. The reliability indices (Cronbach's alpha) for all five sections have been reported to be high: .92, .92, .92, .95, and .91, respectively (Schmitt et al., 2001). In this study, because the 10000 word level appeared to be beyond the vocabulary knowledge of the participants, only the sections related to the 2000, 3000, and 5000 word levels were administered. In scoring, each word correctly chosen was awarded one point. Because each section had 30 test items, and three sections were used in this study, the maximum possible score was 90.

Vocabulary post-test. To capture the vocabulary knowledge gained through listening, five dimensions of word knowledge were selected from the nine proposed by Nation (1990, 2001): spoken form, written form, part of speech, syntagmatic association, and form-meaning connection. All these five dimensions were measured at the level of recognition, and therefore, the vocabulary post-test consisted of five tests (see Appendix B). Originally, the post-test also included a recall test of form-meaning connection; however, that section of the post-test is not reported in this study. The post-test was adapted from the work of Webb (2005), Chen and Truscott (2010), and van Zeeland and Schmitt (2013a).

Each of the five tests appeared on two consecutive pages facing each other, with eight (of the 16) TWs on one page and another eight on the next. Moreover, on the back of the last page of the post-test, two 5-point scales were provided to measure learners' level of enjoyment from listening to the story and level of understanding of the story (see Appendix C). Following Webb (2005), the tests were sequenced so that any possibility of learning effect was avoided. For example, recognition of the written form preceded recognition of form-meaning connection

because the correct response to the former was provided in the latter. Instructions for all sections of the post-test appeared in both Farsi and English. Participants were asked to avoid making any changes to the answers they had provided in previous sections of the post-test, and, as they were taking the post-test, they were carefully supervised to ensure this. In scoring the five recognition tests, each correct answer was given one point.

Procedures

Before collecting data, the materials and instruments were piloted with four Iranian EFL learners with characteristics similar to those of the population under study, and, consequently, changes were made to some of the instructions and Farsi translations. Data were then collected during two sessions that were two weeks apart:

Session one. If they agreed to participate in the study, participants signed a consent form, after which they were asked to complete the LBQ and the VLT. This session lasted approximately 50 minutes.

Session two. Participants were told that the objective of this session was to listen to a classic English story and to try to understand it. They were not informed of the vocabulary focus of the study or the vocabulary post-test. However, immediately after they listened to *The Monkey's Paw* (played from a CD) the unannounced vocabulary post-test was administered. Before starting the full vocabulary post-test, participants were given two practice examples for each of the five tests. The researcher went through each of the practice examples with the participants and provided further clarification in Farsi, where needed. This session lasted approximately 75 minutes.

The control group completed all the above-mentioned procedures (i.e., the consent form, LBQ, VLT, and vocabulary post-test), but were not exposed to the listening text.

Results

In all the analyses reported below, word recognition was calculated by averaging the scores on the five recognition tests (i.e., recognition tests of spoken form, written form, part of speech, syntagmatic association, and form-meaning connection). Table 4.2 presents descriptive word recognition statistics for the listening group and the control group.

Table 4.2

Descriptive Statistics for Group Scores on the Vocabulary Post-test

Group	*N*	*M*	*SD*
Listening	51	6.24	2.56
Control	48	3.10	1.62

Note. The maximum possible score is 16.

Gender

In order to examine the impact of gender on L2 incidental word learning from listening, a two-way between-subjects ANOVA was conducted with group (listening vs. control) and gender (male vs. female) as the independent variables and recognition scores as the dependent variable. The results of the ANOVA yielded a significant main effect for group, $F(1, 95) = 48.72$, $p < .001$, partial $\eta^2 = .34$, power = 1.0. However, the effects were not significant for gender, $F(1, 95) = .05$, $p = .83$, and for the interaction between group and gender, $F(1, 95) = .68$, $p = .41$. Descriptive statistics are presented in Table 4.3.

Table 4.3 *Descriptive Statistics for Males and Females*

Group	Gender	*N*	*M*	*SD*
Listening	Male	28	6.44	2.63
	Female	23	5.98	2.50

Control	Male	29	2.99	1.80
	Female	19	3.26	1.31

Note. The maximum possible score on the vocabulary post-test is 16.

L2 Vocabulary Size

To investigate the effect of L2 vocabulary size on L2 incidental vocabulary acquisition through listening, the scores on the 2000, 3000, and 5000 word levels of the VLT were combined (M = 45.64, SD = 12.34, Range = 23-78, maximum score = 90). The mean was then used as the cut-point to divide the participants into two groups: those who scored at or above 45.64 were classified as having a "large" vocabulary size, and those who obtained scores below the mean were classified as having a "small" vocabulary size (see Table 4.4 for descriptive statistics). Next, a two-way between-subjects ANOVA was run with group (listening vs. control) and L2 vocabulary size (large vs. small) as the independent variables and recognition scores as the dependent variable. The ANOVA revealed a significant effect for group, $F(1, 94) = 62.60$, $p < .001$, partial $\eta^2 = .40$, power = 1.0; for L2 vocabulary size, $F(1, 94) = 9.05$, $p < .05$, partial $\eta^2 = .09$, power = .85; and for the interaction between group and L2 vocabulary size, $F(1, 94) = 8.55$, $p < .05$, partial $\eta^2 = .08$, power = .83. Simple effects analysis indicated a statistically significant difference between small and large vocabulary sizes in the listening group ($p < .001$), but not in the control group ($p = .95$).

Table 4.4

Descriptive Statistics for L2 Vocabulary Size

Group	L2 Vocabulary Size	*N*	*M*	*SD*
Listening	Large	23	7.43	2.27
	Small	27	5.07	2.20

Control	Large	24	3.12	1.68
	Small	24	3.08	1.59

Note. The maximum possible score on the vocabulary post-test is 16.
One missing case (a participant's score was an outlier in this analysis and therefore excluded).

Amount of L2 Listening

To examine the impact of the amount of L2 listening on incidental vocabulary gains, participants' number of hours of L2 academic listening in a typical week and number of hours of L2 pleasure listening in a typical week (as reported in their LBQs) were added together. The distribution was skewed, and thus, to divide the participants into two groups, the median (instead of the mean) was chosen as the cut-point (M = 2.95, Mdn = 2.5, SD = 2.32, Range = 0-10). Those whose number of hours of L2 listening in a typical week fell at or above 2.5 hours were classified as doing "large" amounts of L2 listening, and those whose number of hours of L2 listening in a typical week fell below the median were classified as doing "small" amounts of L2 listening (see Table 4.5 for descriptive statistics). A two-way between-subjects ANOVA was then performed with group (listening vs. control) and amount of L2 listening (large vs. small) as the independent variables and recognition scores as the dependent variable. The ANOVA yielded a significant main effect for group, $F(1, 89) = 50.39$, $p < .001$, partial $\eta^2 = .36$, power = 1.0. Yet, the effects were not significant for amount of L2 listening, $F(1, 89) = 2.89$, $p = .09$, and for the interaction between group and amount of L2 listening, $F(1, 89) = 1.13$, $p = .29$.

Table 4.5

Descriptive Statistics for Amount of L2 Listening

Group	Amount of L2 Listening	*N*	*M*	*SD*

Listening	Large	25	6.82	2.65
	Small	25	5.58	2.37
Control	Large	24	3.15	1.83
	Small	19	2.86	1.32

Note. The maximum possible score on the vocabulary post-test is 16.
Six missing cases (the scores of six participants were outliers in this analysis and therefore excluded).

Level of Enjoyment

To investigate the impact of level of enjoyment (experienced while listening to the story) on incidental vocabulary acquisition, the 5-point scale used in the study to measure level of enjoyment was collapsed into a 3-point scale (1 = *disagree*, 2 = *neutral*, 3 = *agree*). This was done in the following way: in response to the statement *I enjoyed the story,* if the participants marked 1 or 2 on the scale, it was regarded as "disagree"; if they marked 3, it was considered "neutral", and if they marked 4 or 5 on the scale, it was considered "agree" (see Table 4.6 for descriptive statistics). Next, a one-way between-subjects ANOVA was conducted with enjoyment (disagree vs. neutral vs. agree) as the independent variable and recognition scores as the dependent variable. The ANOVA yielded a significant main effect for enjoyment, $F(2, 45) = 4.55$, $p < .05$, partial $\eta^2 = .17$, power = .75. Tukey HSD revealed a statistically significant difference between "agree" and "disagree" ($p < .05$). However, the differences were not significant between "agree" and "neutral" ($p = .07$) and "disagree" and "neutral" ($p = .84$).

Table 4.6

Descriptive Statistics for Level of Enjoyment

Group	Enjoyed the Story	*N*	*M*	*SD*

	Disagree	12	4.92	2.14
Listening	Neutral	15	5.44	2.69
	Agree	21	7.29	2.35

Note. The maximum possible score on the vocabulary post-test is 16. Three missing cases (three participants did not provide data).

Level of Comprehension

To examine the impact of level of comprehension on incidental word learning from listening, similar to the previous section, the 5-point scale used in the study to measure level of comprehension was collapsed into a 3-point scale (1 = *disagree*, 2 = *neutral*, 3 = *agree*) in the following way: in response to the statement *I understood the story,* if the participants marked 1 or 2 on the scale, it was regarded as "disagree"; if they marked 3, it was considered "neutral", and if they marked 4 or 5 on the scale, it was considered "agree". Descriptive statistics are presented in Table 4.7. A one-way between-subjects ANOVA was conducted with comprehension (disagree vs. neutral vs. agree) as the independent variable and recognition scores as the dependent variable. The ANOVA yielded a significant main effect for comprehension, $F(2, 45) = 8.3$, $p < .05$, partial $\eta^2 = .27$, power = .95. Tukey HSD revealed a statistically significant difference between "agree" and "disagree" ($p < .05$), and between "agree" and "neutral" ($p < .05$), but a non-significant difference between "disagree" and "neutral" ($p = .91$).

Table 4.7

Descriptive Statistics for Level of Comprehension

Group	Understood the Story	*N*	*M*	*SD*
	Disagree	6	3.77	1.15
Listening	Neutral	8	4.28	1.68
	Agree	34	6.96	2.48

Note. The maximum possible score on the vocabulary post-test is 16.
Three missing cases (three participants did not provide data).

Discussion

Gender

In this study, males scored higher than females on the vocabulary post-test, but the difference between the two groups was not statistically significant. Hence, it appears that gender had no impact on L2 incidental word learning from listening. Kaushanskaya et al. (2011), in a study with 68 monolingual native speakers of English, found that women outperformed men when learning phonologically-familiar novel words (that followed L1 phonological structure), but they performed similar to men when learning phonologically-unfamiliar words (that diverged from L1 phonological structure). The authors attributed women's superiority in the former case to their greater reliance on L1 phonological knowledge during word learning. If this is accepted, it might explain why males and females in the present study did not differ significantly in terms of word learning from listening; they were learning new L2 (not L1) words, and thus, women's possibly greater reliance on native-language phonological knowledge did not contribute to any differences.

Moreover, since L2 listening comprehension influences L2 incidental vocabulary acquisition (Vidal, 2003), the lack of gender differences in this study is congruent with studies which have shown that gender does not play a significant role in L2 listening comprehension (e.g., Bacon, 1992; Feyten, 1991; Vandergrift, 2006) as well as studies that have found minimal differences between males and females regarding their self-reported strategy use while listening in the L2 (e.g., Vandergrift, 1997).

In sum, although females have been considered more successful foreign language learners than males and their greater success is hypothesized to be related to the interaction of

neurological, cognitive, affective, social, and educational factors (Rua, 2006), this superiority does not appear to apply to incidental word learning from listening.

L2 Vocabulary Size

In this study, learners with a larger L2 vocabulary scored significantly higher on the vocabulary post-test than learners with a smaller L2 vocabulary. L2 vocabulary size therefore impacts the incidental acquisition of L2 vocabulary through listening. One explanation for this finding is that L2 vocabulary knowledge contributes to L2 listening comprehension (Mecartty, 2000; Stæhr, 2009), and L2 listening comprehension appears to contribute to incidental vocabulary acquisition (Vidal, 2003). In other words, the greater one's L2 vocabulary size and, consequently, L2 proficiency (Stæhr, 2008), the greater the amount of L2 spoken input that can be successfully processed and understood (Vidal, 2003), and thus, the greater the likelihood of guessing the meanings of unknown words correctly, which is a key step on the road to learning them. Previous reading studies have also shown that L2 lexical proficiency is an important factor in L2 incidental word learning (Elgort & Warren, 2014; Tekmen & Daloğlu, 2006).

It should be noted that vocabulary size was measured in this study using the VLT and that the VLT measures knowledge of the written form of words, while listening requires the ability to recognize the spoken form of words (Stæhr, 2008). Thus, if in the current study, a test of phonological vocabulary size had been used (in which words are heard but not seen), such as ALex (Milton & Hopkins, 2005), vocabulary size might have played an even stronger role in L2 incidental vocabulary gains from listening (Stæhr, 2008).

Amount of L2 Listening

Although learners who reported more L2 listening in a typical week scored higher on the vocabulary post-test than learners who reported less L2 listening, the difference between the two

groups was not statistically significant. Hence, amount of L2 listening did not appear to have an impact on L2 incidental word learning from listening. This finding suggests that mere exposure to more L2 listening opportunities in an EFL context does not significantly enhance one's success in incidental vocabulary acquisition from listening. In addition to repeated practice, instruction and strategy training in L2 listening comprehension and the use of context are needed. As Vandergrift (2004) states, "students need to 'learn to listen' so that they can better 'listen to learn'" (p. 3). Considering that EFL education in Iranian formal schools and universities focuses heavily on the grammar-translation method and reading comprehension (Farhady, Hezaveh, & Hedayati, 2010; Kiany, Mahdavy, & Samar, 2011), it is not surprising if Iranian EFL learners lack the necessary skills and strategies to take full advantage of their L2 listening and incidental word learning opportunities. This situation exists not only in Iran, but also in other EFL contexts such as Japan (Nishino & Watanabe, 2008). Learners indeed need to "learn to listen" and learn to pay more attention to context, and, in fact, studies have shown improvements in listening comprehension as a result of L2 listening instruction (Goh & Taib, 2006; Vandergrift & Tafaghodtari, 2010) and improvements in incidental vocabulary acquisition from listening (in terms of word form recognition only) as a result of lexical inferencing training (Chang, 2012).

It should also be noted that retrospective reports of the amount of L2 listening in a typical week (as was the case in this study) may not be very reliable, and thus, these results should be interpreted with caution. Asking learners to keep a daily log or journal (see Ranta & Meckelborg, 2013) of their amount of L2 listening over a specified period of time might be a better option for collecting such data.

Level of Enjoyment

The degree that learners enjoy the text to which they listen appears to affect L2 incidental vocabulary gains. In this study, in response to the statement *I enjoyed the story,* those learners who rated "strongly agree" or "agree", scored significantly higher on the vocabulary post-test than those who rated "disagree" or "strongly disagree". This result aligns with findings from Ducker and Saunders' (2014) study with intermediate-level Japanese-speaking EFL learners, in which enjoyment and listening comprehension were found to be strongly related. L2 reading studies that have investigated the impact of enjoyment on incidental word learning (e.g., Elgort & Warren, 2014) have reported similar results. These findings suggest that to enhance L2 listening comprehension and incidental vocabulary gains, materials chosen for L2 listening should be interesting and enjoyable to the learners, which indicates the importance of learners self-selecting the topic and text they wish to listen to, where possible. Enjoying the listening material can be so facilitating that it might even compensate, to some extent, for the lack of adequate language proficiency (Waring, 2010).

Level of Comprehension

In response to the statement *I understood the story,* those learners who rated "strongly agree" or "agree", scored significantly higher on the vocabulary post-test than those who rated "neutral", "disagree", or "strongly disagree". Hence, level of comprehension impacts L2 incidental word learning from listening. This finding supports Vidal's (2003) study, in which she found that incidental vocabulary gains from academic listening appeared to be influenced by learners' degree of lecture comprehension: the higher the level of comprehension, the greater the vocabulary gains. Chang (2012) also found moderate correlations between L2 listening comprehension and incidental vocabulary acquisition. Similar results have also been reported in L2 reading studies (e.g., Elgort & Warren, 2014). These findings indicate the importance of

helping learners access texts that are at their appropriate level in order to ensure comprehension and, consequently, incidental vocabulary acquisition.

Limitations and Suggestions for Future Research

A few limitations of this study deserve consideration. First, retention of incidental vocabulary gains from listening was not addressed. Initially, this was one of the objectives of this study and, in fact, when collecting data, a delayed vocabulary post-test was administered three weeks after the treatment. However, when analyzing the data, it was revealed that the immediate post-test had impacted the scores on the delayed post-test. In other words, because of the presence of testing effects, retention scores had not been accurately measured and therefore could not be used and reported in this study. Yet we know that attrition almost always occurs in vocabulary learning and thus the impact of learner-related variables on the retention of vocabulary gains from listening also needs to be investigated. To this end, future research could employ a different research design in order to avoid possible testing effects (see the research design in van Zeeland & Schmitt, 2013a). Second, in this study, five different dimensions of word knowledge were measured at the level of recognition but not recall. Measuring these dimensions at both levels of recognition and recall might have led to learner fatigue while completing the post-test. Since incidental vocabulary gains from listening have been shown to be minute, more sensitive recognition measures were given priority over recall measures in this study. However, "using only receptive or productive tests to measure learning might provide misleading results" (Webb, 2005, p. 50). Therefore, examining the impact of learner-related variables on L2 incidental word learning at the level of recall would be valuable. Third, in this study, the participants received aural input, but their vocabulary gains were measured using written tests. The test of spoken form was the only test administered aurally and the test of

written form inevitably had to be written. However, the tests of part of speech, syntagmatic association, and form-meaning connection were also written; while this allowed the participants to complete the tests at their own pace, the mismatch between the mode of input and mode of measurement might have decreased the scores on these three tests to some extent (Alali & Schmitt, 2012). Finally, incidental vocabulary gains from listening are influenced by learners' EFL proficiency (Vidal, 2003). In the current study, all the participants were of intermediate L2 proficiency; a different picture might emerge with learners at other levels of L2 proficiency.

In sum, the present study showed that males and females are equally successful at incidentally acquiring vocabulary from listening. Furthermore, the results suggested that simply listening to L2 material may not be adequate to enhance L2 learners' abilities in incidental vocabulary learning; explicit instruction might also be needed. Moreover, three facilitating factors for incidental vocabulary acquisition from listening were revealed: L2 vocabulary size, enjoyment from the listening content, and level of comprehension. Learners with a large L2 vocabulary who have access to enjoyable, comprehensible texts are likely to gain more vocabulary from listening. Future research would benefit from identifying other facilitating variables, whether learner-, word-, text-, or task-related.

5. Conclusion

Throughout this dissertation, I have endeavoured to shed further light on the nature of L2 incidental vocabulary acquisition from reading and listening. In this final chapter, I will summarize the main findings of each of the three papers, discuss their educational implications, and provide suggestions for further research.

The Differential Impact of Reading and Listening on L2 Incidental Acquisition of Different Aspects of Word Knowledge

In the first study, I compared the effects of L2 reading and listening on the incidental acquisition of five aspects of vocabulary knowledge (i.e., spoken form, written form, part of speech, syntagmatic association, and form-meaning connection) and on the retention of one aspect (i.e., form-meaning connection). Moreover, the relationship between frequency of word occurrence and L2 incidental acquisition of these five aspects of word knowledge was investigated across reading and listening.

The findings revealed that both L2 reading and listening are sources of incidental vocabulary learning. However, all aspects of word knowledge measured here were more effectively acquired through reading than listening, except for recognition of spoken form, for which no significant difference was found between the reading and the listening groups. Further, it was revealed that regardless of whether the input was written or spoken, the incidental acquisition of form precedes the incidental acquisition of meaning. In both the reading and listening groups, the largest gains were in word form recognition, while the smallest gains were in meaning recall.

With regard to retention rates, which were measured only for form-meaning connection, the reading group again scored significantly higher than the listening group on the recall test. On

the recognition test, however, the difference between the two groups was not significant. The findings showed that after three weeks, the listeners retained almost all the knowledge of meaning recognition and meaning recall that they had initially acquired, whereas the readers lost some of their initial gains, that is, 8% of their gains in meaning recognition and 3% of their gains in meaning recall. Hence, loss of vocabulary knowledge was greater for readers than listeners after three weeks.

Moreover, in this study, in line with previous research (e.g., Brown, Waring, & Donkaewbua, 2008; Horst, Cobb, & Meara, 1998; Pigada & Schmitt, 2006; van Zeeland & Schmitt, 2013a; Vidal, 2003; Webb, 2007), it was found that, generally, the more frequently words were met, the more likely they were to be acquired. However, the effect of frequency of occurrence was far greater in reading than in listening. In the reading group, there was a significant increase in gains from the first frequency band (2-5 occurrences) to the second frequency band (7-10 occurrences) and from the second to the third (12-15 occurrences); in the listening group, the difference in gains between the four frequency bands (i.e., 2-5; 7-10; 12-15; 17-20) was not significant. In addition, in the reading group, the greatest increase in gains occurred between the second frequency band (7-10 occurrences) and the third (12-15 occurrences). Hence, for frequency of occurrence to have a significant impact on incidental vocabulary gains through reading in the participants tested here, it appears that 10 or more occurrences were necessary, whereas, for frequency of occurrence to have a significant impact on vocabulary gains through listening, it appears that far more than 20 occurrences were necessary.

In sum, in this study, similar to previous research (Brown et al., 2008; Vidal, 2011), reading was found to be a more effective input mode than listening for L2 incidental vocabulary

acquisition and retention, even when measuring separate dimensions of word knowledge. Frequency of word occurrence was also found to be a more facilitating factor for incidental vocabulary gains through reading than listening. Yet, the importance of listening for incidental vocabulary acquisition should not be underestimated, as it was clearly shown that the lexical items gained through listening, although not many, were well retained.

Because of the presence of testing effects in this research, retention rates were not accurately measured for all aspects of word knowledge (except for form-meaning connection), and thus, were not analyzed in the study. To avoid such testing effects and to more fully capture retention rates for all the aspects of word knowledge, future research would benefit from use of a different research design. For instance, the participants could be subdivided into two additional groups: one that receives the written/spoken input followed by an immediate post-test, and one that receives the input followed by a three-week delayed post-test (van Zeeland & Schmitt, 2013a). In this way, the same group of participants would not receive the vocabulary post-test twice. Measuring retention rates for all aspects of word knowledge is extremely important because, according to Schmitt (2010), "immediate post-tests should be interpreted mainly as showing whether the treatment had any effect, and only delayed post-tests interpreted as showing learning" (p. 156). Moreover, future research could address the research questions in this study at other levels of L2 proficiency, for example, with beginners or more advanced learners. This is also particularly important, as it has been shown that the differential impact of reading and listening on L2 incidental vocabulary acquisition can vary with proficiency level (Vidal, 2011).

The Role of Perceptual Learning Style Matching in L2 Incidental Vocabulary Acquisition through Reading

This study investigated whether there are any differences in L2 incidental vocabulary acquisition and retention through reading when learners' perceptual learning style preference is matched or mismatched to their input mode, or mixed. In addition, in this study, the perceptual learning style preferences of university-level Iranian EFL learners majoring in engineering were examined.

The findings revealed no differences in terms of incidental vocabulary gains through reading, at both levels of recognition and recall, between (1) learners whose perceptual learning style was visual and therefore matched to their input mode; (2) learners whose perceptual learning style was either auditory or kinaesthetic/tactile and therefore mismatched to their input mode; and (3) learners who had mixed modality preferences. Three weeks later, again, no differences were observed between the three groups in terms of retention rates. These findings suggest that learners, regardless of their perceptual learning style, and regardless of whether or not their perceptual learning style is matched to their input mode, are able, to the same degree, to incidentally acquire and retain vocabulary from reading. This study, therefore, adds to the body of research that questions the notion that learning can be enhanced when material is presented in one's preferred modality. Hence, instead of focusing on individual students' preferred learning style, it might be more worthwhile and practical to focus on the modality that is most effective for teaching/delivering what is to be learned (Willingham, 2005). With regard to L2 incidental vocabulary learning from input, which is the focus of this study, the most effective modality, as shown in the first paper of this dissertation, appears to be reading.

Furthermore, an examination of the perceptual learning style preferences of the university-level Iranian EFL learners who participated in this study showed that 33% had mixed modality preference, while the majority (67%) of the participants had a single modality preference. Moreover, by far the most popular single modality preference was visual. One reason that the participants selected for this study were highly visual might be their field of study, engineering, which, when compared with other fields, such as social sciences and humanities, involves dealing with more concrete concepts and processes and greater use of formulas, graphs, and visual aids (Alireza & Abdullah, 2010). Another reason might be that the participants in this study were all academically successful students (they had all been admitted to a high-ranking, prestigious university), and previous research has shown links between being academically successful and having visual preferences (Park, 1997). A third reason might be the education system in which these participants were studying and its great emphasis on reading and learning from textbooks. The more exposure language learners have to the written word, the more comfortable they feel learning visually (Rossi-Le, 1995, as cited in Oxford & Anderson, 1995). Hence, the prevalence of visual modality preference among the participants in this study suggests that learners' field of study, degree of academic success, and type of education system may all be related to perceptual learning style preferences.

However, the self-reporting nature and relatively low reliability of learning style questionnaires should always be considered when interpreting the results. Moreover, differences might have been detected between the groups in this study if retention rates had been accurately measured. In Tight's (2010) study, for instance, benefits of style matching were found only for the retention of vocabulary knowledge and not its immediate acquisition. Thus, as mentioned above for the first paper of this dissertation, by using a different research design, future research

could prevent testing effects and more accurately measure retention rates for all the dimensions of word knowledge under investigation. This way, a clearer picture of the role of perceptual learning style matching in L2 incidental vocabulary learning from reading might emerge. Furthermore, it might be worth exploring the role of perceptual learning style matching in incidental vocabulary acquisition through L2 listening. A point to consider, however, is that a relatively large number of auditory learners would be needed to form the "matched" subgroup for the listening group, and this might not be easy to access in some contexts, such as the current one, in which the auditory learning style was the least common among the participants.

The Impact of Learner-related Variables on L2 Incidental Vocabulary Acquisition through Listening

This study investigated the impact of five learner-related variables on L2 incidental word learning from listening. The variables were gender, L2 vocabulary size, amount of L2 listening (for academic purposes and pleasure), level of enjoyment, and (self-reported) level of comprehension.

The results revealed no statistically significant gender differences in L2 incidental word learning from listening. This finding supports previous studies, which have shown that gender does not play a significant role in L2 listening comprehension (e.g., Bacon, 1992; Feyten, 1991; Vandergrift, 2006), and plays only a very minimal role in learners' self-reported strategy use while listening in the L2 (e.g., Vandergrift, 1997). In sum, it appears that a commonly held belief in SLA, that women are more successful foreign language learners than men (Rua, 2006), does not apply to incidental word learning from listening.

L2 vocabulary size, on the other hand, was found to affect the incidental acquisition of L2 vocabulary through listening. One explanation for this finding is that when learners have a

larger L2 vocabulary size and, consequently, higher L2 proficiency (Stæhr, 2008), the amount of L2 spoken input that they can successfully comprehend is greater (Mecartty, 2000; Stæhr, 2009). As a result, due to the increased likelihood of being able to guess the meanings of unknown words correctly, the amount of vocabulary knowledge that they can incidentally acquire from such input is larger (Vidal, 2003).

Amount of L2 listening did not appear to have an impact on L2 incidental word learning from listening. This finding suggests that mere exposure to L2 listening opportunities in an EFL context cannot significantly improve one's abilities in incidental vocabulary acquisition from listening; strategy training and explicit instruction may also need to be provided. Studies have shown that L2 listening instruction can lead to improvements in listening comprehension (Goh & Taib, 2006; Vandergrift & Tafaghodtari, 2010) and lexical inferencing training can enhance incidental vocabulary gains from listening (at least in terms of word form recognition) (Chang, 2012).

Level of enjoyment from the listening content was found to affect L2 incidental word learning from listening. This finding was expected, as enjoyment and listening comprehension have been shown to be closely related (Ducker & Saunders, 2014). It appears, therefore, that the degree to which learners enjoy the text is an important facilitating factor for successful L2 listening comprehension and incidental vocabulary acquisition. Hence, materials chosen for L2 listening should be interesting and enjoyable to the learners, where possible.

Finally, self-reported levels of comprehension were found to have a positive effect on L2 incidental vocabulary gains from listening; this finding has also been shown in previous research (Chang, 2012; Vidal, 2003). It appears that the higher the level of comprehension, the greater the

incidental vocabulary gains. It is important, therefore, that learners access appropriate-level texts, so that comprehension and, consequently, incidental vocabulary acquisition, can be facilitated.

Again, retention rates could not be accurately measured in this study because of the presence of testing effects. Future research would benefit from investigating the impact of learner-related variables on the retention of vocabulary gains from L2 listening. It should also be noted that vocabulary knowledge was measured only at the level of recognition. Examining the impact of learner-related variables on L2 incidental word learning at the level of recall would be valuable, since "using only receptive or productive tests to measure learning might provide misleading results" (Webb, 2005, p. 50). Moreover, use of a more authentic listening task as well as aural measures that correspond to the aural input received can benefit future research. Finally, incidental vocabulary acquisition from listening is a complex process, influenced by numerous factors. Similar to the body of research that currently exists on the variables that affect L2 incidental vocabulary gains from reading, future research could explore the role of other learner-related variables, as well as various word- and text-related variables that might play a role in facilitating the process of incidental word learning from listening.

Implications for Teaching

The ultimate goal of the research in this dissertation was to further our understanding of the process of acquiring English vocabulary. The findings revealed that reading is more effective than listening for the incidental acquisition of the different dimensions of word knowledge examined. The only dimension for which reading and listening were equally effective was recognition of spoken form. This dissertation also revealed that while frequency of word occurrence is a facilitating factor for incidental word learning from reading, especially after 10 or more occurrences, it does not impact gains from listening, at least not up to 20 occurrences.

Furthermore, perceptual learning style matching did not appear to affect incidental vocabulary gains from reading. Likewise, gender and amount of L2 listening were found to have no facilitating effects on incidental word learning from listening, whereas size of L2 vocabulary, level of enjoyment from the listening content, and self-reported level of comprehension appeared to facilitate this complex process.

Although data were collected in the EFL context of Iran, the findings have implications for all English language learning contexts, especially for learners with characteristics similar to those of the participants in this research (e.g., university-level education, intermediate-level L2 proficiency). The findings clearly revealed the significance of reading and listening as sources of incidental word learning, particularly reading, which can lead to considerable gains in many dimensions of word knowledge. However, while reading results in greater vocabulary gains, listening leads to lower forgetting rates and thus, ideally, learners should be exposed to both modes of input. This research, therefore, strongly supports the value of extensive reading and listening for L2 learners. However, extensive reading/listening programs and the graded texts used for these purposes need to meet certain criteria. For instance, a graded reader or audiobook should provide a lexical coverage of around 95% to 98%, that is, a density of around two to five unknown words in every 100 words. Moreover, graded texts should control for not only vocabulary, but also syntax, as syntactic features and sentence complexity can cause significant problems in both reading (Nation, 2013) and listening (Zeng, 2007). In addition, factors such as content or subject matter; format, font, layout; aids to understanding (e.g., glossary) (Hill, 2008); and speech rate (Renandya & Farrell, 2011) can greatly impact the ease or difficulty with which learners read or listen to a graded text.

In an extensive reading program, once a suitable graded series has been selected considering the above-mentioned factors, it is then necessary for teachers to identify the level at which their learners should begin reading (e.g., by administering the Vocabulary Size Test); the number of books that need to be read at each level (e.g., about five books per level) and within a set amount of time (e.g., between one to two books per week); ways of motivating learners to do extensive reading (e.g., by getting learners to do silent extensive reading in class); and finally, ways of monitoring learners' progress (e.g., by asking learners to fill out worksheets about what they have read) (Nation, 2013, pp. 254-256). The same considerations also apply to an extensive listening program. A graded reading/listening program which takes these steps into account is then more likely to lead to greater vocabulary gains.

A very positive finding of the current study was that individual differences, such as gender, learning style, and amount of L2 exposure, which are impossible or difficult to control and change, do not appear to significantly impact L2 incidental word learning. On the other hand, factors such as frequency of word occurrence, L2 lexical knowledge, enjoyment, and comprehension, which teachers and learners can control and improve, play an important role in this process. These findings further emphasize the benefits of using graded texts for extensive reading and listening, as they can provide many of these facilitating conditions for L2 incidental vocabulary acquisition. In sum, the importance of incidental word learning in the process of acquiring an L2 cannot be overestimated, and thus, finding ways to provide effective conditions for such learning should be among the priorities of every L2 researcher, program developer, teacher, and learner.

References

Alali, F. A., & Schmitt, N. (2012). Teaching formulaic sequences: The same as or different from teaching single words? *TESOL Journal, 3*(2), 153-180. doi: 10.1002/tesj.13

Alireza, S., & Abdullah, M. H. (2010). Language learning strategies and styles among Iranian engineering and political science graduate students studying abroad. *Educational Research and Review, 5*(2), 35-45.

Bacon, S. M. (1992). The relationship between gender, comprehension, processing strategies, and cognitive and affective response in foreign language listening. *The Modern Language Journal, 76*(2), 160-178. doi: 10.1111/j.1540-4781.1992.tb01096.x

Brown, R., Waring, R., & Donkaewbua, S. (2008). Incidental vocabulary acquisition from reading, reading-while-listening, and listening to stories. *Reading in a Foreign Language, 20*(2), 136-163.

Carson, J. G., & Longhini, A. (2002). Focusing on learning styles and strategies: A diary study in an immersion setting. *Language Learning, 52*(2), 401-438. doi: 10.1111/0023-8333.00188

Chang, L. (2012). *Investigating the relationships between Chinese university EFL learners' metacognitive listening strategies and their comprehension and incidental vocabulary acquisition from listening tasks* (Doctoral dissertation). University of Auckland, New Zealand.

Chen, C., & Truscott, J. (2010). The effects of repetition and L1 lexicalization on incidental vocabulary acquisition. *Applied Linguistics, 31*(5), 693-713. doi: 10.1093/applin/amq031

Cohen, A. D., Oxford, R. L., & Chi, J. C. (2001). Learning Style Survey: Assessing your own learning styles. In A. D. Cohen & S. J. Weaver (2005), *Styles and strategies-based*

instruction: A teachers' guide (pp. 16-22). Minneapolis, MN: Center for Advanced Research on Language Acquisition, University of Minnesota.

Cohen, A. D., & Weaver, S. J. (2005). *Styles and strategies-based instruction: A teachers' guide***.** Minneapolis, MN: Center for Advanced Research on Language Acquisition, University of Minnesota.

Dörnyei, Z., & Ryan, S. (2015). *The psychology of the language learner: Revisited*. New York, NY: Routledge.

Dörnyei, Z., & Skehan, P. (2003). Individual differences in second language learning. In C. J. Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp. 589-630). Oxford: Blackwell.

Ducker, N., & Saunders, M. (2014). Facilitating extensive listening with non-graded materials in EFL programs. *International Journal of Innovation in English Language Teaching and Research, 3*(2), 201-245.

Eckerth, J., & Tavakoli, P. (2012). The effects of word exposure frequency and elaboration of word processing on incidental L2 vocabulary acquisition through reading. *Language Teaching Research, 16*(2), 227-252. doi: 10.1177/1362168811431377

Ehrman, M. E., & Leaver, B. L. (2003). Cognitive styles in the service of language learning. *System*, *31*(3), 393-415. doi: 10.1016/S0346-251X(03)00050-2

Elgort, I., & Warren, P. (2014). L2 vocabulary learning from reading: Explicit and tacit lexical knowledge and the role of learner and item variables. *Language Learning, 64*(2), 365-414. doi: 10.1111/lang.12052

Ellis, N. C. (1995). The psychology of foreign language vocabulary acquisition: Implications for CALL. *Computer Assisted Language Learning, 8*(2-3), 103-128. doi: 10.1080/0958822940080202

Ellis, R. (1994). Factors in the incidental acquisition of second language vocabulary from oral input: A review essay. *Applied Language Learning, 5*(1), 1-32.

Ellis, R. (1995). Modified oral input and the acquisition of word meanings. *Applied Linguistics, 16*(4), 409-441. doi: 10.1093/applin/16.4.409

Ellis, R. (2008). *The study of second language acquisition*. Oxford, UK: Oxford University Press.

Ellis, R. (2009). Retrospect and prospect. In R. Ellis, S. Loewen, C. Elder, R. Erlam, J. Philp, & H. Reinders (Eds.), *Implicit and explicit knowledge in second language learning, testing and teaching* (pp. 335-353). Bristol, UK: Multilingual Matters.

Farhady, H., Hezaveh, F. S., & Hedayati, H. (2010). Reflections on foreign language education in Iran. *TESL-EJ, 13*(4), 1-18.

Feyten, C. M. (1991). The power of listening ability: An overlooked dimension in language acquisition. *The Modern Language Journal, 75*(2), 173-180. doi: 10.1111/j.1540-4781.1991.tb05348.x

Fraser, C. A. (1999). Lexical processing strategy use and vocabulary learning through reading. *Studies in Second Language Acquisition, 21*(2), 225-241.

Gamst, G., Meyers, L. S., & Guarino, A. J. (2008). *A conceptual and computational approach with SPSS and SAS: Analysis of variance designs*. Cambridge, UK: Cambridge University Press.

Goh, C., & Taib, Y. (2006). Metacognitive instruction in listening for young learners. *ELT Journal, 60*(3), 222-232. doi: 10.1093/elt/ccl002

Hatami, S. (2013). Key concepts in ELT: Learning styles. *ELT Journal, 67*(4), 488-490. doi: 10.1093/elt/ccs083

Hatami, S. (2015a). *The differential impact of reading and listening on L2 incidental acquisition of different aspects of word knowledge.* Manuscript submitted for publication.

Hatami, S. (2015b). *The role of perceptual learning style matching in L2 incidental vocabulary acquisition through reading*. Manuscript submitted for publication.

Henriksen, B. (1999). Three dimensions of vocabulary development. *Studies in Second Language Acquisition, 21*(2), 303-317. doi: 10.1017/S0272263199002089

Hill, D. R. (2008). Survey review: Graded readers in English. *ELT Journal, 62*(2), 184-204. doi: 10.1093/elt/ccn006

Hirai, A. (1999). The relationship between listening and reading rates of Japanese EFL learners. *The Modern Language Journal, 83*(3), 367-384. doi: 10.1111/0026-7902.00028

Horiba, Y., & Fukaya, K. (2015). Reading and learning from L2 text: Effects of reading goal, topic familiarity, and language proficiency. *Reading in a Foreign Language, 27*(1), 22-46.

Horst, M. (2005). Learning L2 vocabulary through extensive reading: A measurement study. *The Canadian Modern Language Review, 61*(3), 355-382. doi: 10.1353/cml.2005.0018

Horst, M., Cobb, T., & Meara, P. (1998). Beyond A Clockwork Orange: Acquiring second language vocabulary through reading. *Reading in a Foreign Language, 11*(2), 207-223.

Hu, M., & Nation, I. S. P. (2000). Unknown vocabulary density and reading comprehension. *Reading in a Foreign Language, 13*(1), 403-430.

Huckin, T., & Coady, J. (1999). Incidental vocabulary acquisition in a second language: A review. *Studies in Second Language Acquisition, 21*(2), 181-193.

Hulstijn, J. H., & Laufer, B. (2001). Some empirical evidence for the involvement load hypothesis in vocabulary acquisition. *Language Learning, 51*(3)*,* 539-558. doi: 10.1111/0023-8333.00164

Kassaian, Z. (2007). Learning styles and lexical presentation modes. *ELIA, 7*, 53-78.

Kaushanskaya, M., Marian, V., & Yoo, J. (2011). Gender differences in adult word learning. *Acta Psychologica, 137*(1), 24-35. doi:10.1016/j.actpsy.2011.02.002

Kiany, G. R., Mahdavy, B., & Samar, R. G. (2011). Towards a harmonized foreign language education program in Iran: National policies and English achievement. *Literacy Information and Computer Education Journal, 2*(3), 462-469.

Kinsella, K. (1995). Understanding and empowering diverse learners in ESL classrooms. In J. M. Reid (Ed.), *Learning styles in the ESL/EFL classroom* (pp. 170-194). Boston, MA: Heinle & Heinle.

Kratzig, G. P., & Arbuthnott, K. D. (2006). Perceptual learning style and learning proficiency: A test of the hypothesis. *Journal of Educational Psychology, 98*(1), 238-246. doi: 10.1037/0022-0663.98.1.238

Kweon, S.-O., & Kim, H.-R. (2008). Beyond raw frequency: Incidental vocabulary acquisition in extensive reading. *Reading in a Foreign Language*, *20*(2), 191-215.

Laufer, B. (2003).Vocabulary acquisition in a second language: Do learners really acquire most vocabulary by reading? Some empirical evidence. *Canadian Modern Language Review*, *59*(4), 567-587. doi: 10.3138/cmlr.59.4.567

Laufer, B., & Goldstein, Z. (2004). Testing vocabulary knowledge: Size, strength, and computer adaptiveness. *Language Learning, 54*(3), 399-436. doi: 10.1111/j.0023-8333.2004.00260.x

Laufer, B., & Ravenhorst-Kalovski, G. C. (2010). Lexical threshold revisited: Lexical text coverage, learners' vocabulary size and reading comprehension. *Reading in a Foreign Language, 22*(1), 15-30.

Lincoln, F., & Rademacher, B. (2006). Learning styles of ESL students in community colleges. *Community College Journal of Research and Practice*, *30*(5-6), 485-500. doi: 10.1080/10668920500207965

Meara, P. (2013). Imaginary words. In C. A. Chapelle (Ed.), *The encyclopedia of applied linguistics* (pp. 1-4). Malden, MA: Wiley-Blackwell.

Mecartty, F. H. (2000). Lexical and grammatical knowledge in reading and listening comprehension by foreign language learners of Spanish. *Applied Language Learning, 11*(2), 323-348.

Milton, J., & Hopkins, N. (2005). *Aural Lex*. Swansea, UK: Swansea University.

Mozayan, M. R., Ebrahimpourtaher, A., Hoominian, Z., Khosravi, A., & Shamsi, F. (2013). Perceptual learning styles of medical sciences students. *Global Journal of Human Social Science: Linguistics & Education, 13*(10).

Murphy, J. M. (1991). Oral communication in TESOL: Integrating speaking, listening, and pronunciation. *TESOL Quarterly, 25*(1), 51-75. doi: 10.2307/3587028

Naserieh, F., & Anani Sarab, M. R. (2013). Perceptual learning style preferences among Iranian graduate students. *System, 41*(1), 122-133. doi:10.1016/j.system.2013.01.018

Nation, I. S. P. (1983). Testing and teaching vocabulary. *Guidelines, 5*(1), 12-25.

Nation, I. S. P. (1990). *Teaching and learning vocabulary.* New York, NY: Heinle & Heinle.

Nation, I. S. P. (2001). *Learning vocabulary in another language.* Cambridge, UK: Cambridge University Press.

Nation, P. (2007). The four strands. *Innovation in Language Learning and Teaching, 1*(1), 2-13. doi: 10.2167/illt039.0

Nation, I. S. P. (2012). *The Vocabulary Size Test.* Retrieved from http://www.victoria.ac.nz/lals/about/staff/publications/paul-nation/Vocabulary-Size-Test-information-and-specifications.pdf

Nation, I. S. P. (2013). *Learning vocabulary in another language* (2nd ed.). Cambridge, UK: Cambridge University Press.

Nation, I. S. P., & Ming-tzu, K. W. (1999). Graded readers and vocabulary. *Reading in a Foreign Language, 12*(2), 355-380.

Nation, I. S. P., & Webb, S. (2011). *Researching and analyzing vocabulary*. Boston, MA: Heinle.

Nishino, T., & Watanabe, M. (2008). Communication-oriented policies versus classroom realities in Japan. *TESOL Quarterly, 42*(1), 133-138. doi: 10.1002/j.1545-7249.2008.tb00214.x

Oxford, R. L. (1993). *Style Analysis Survey (SAS)*. Tuscaloosa, AL: University of Alabama.

Oxford, R. L. (1995). Gender differences in language learning styles: What do they mean? In J. M. Reid (Ed.), *Learning styles in the ESL/EFL classroom* (pp. 34-46). Boston, MA: Heinle & Heinle.

Oxford, R. L., & Anderson, N. J. (1995). A crosscultural view of learning styles. *Language Teaching, 28*(4), 201-215. doi:10.1017/S0261444800000446

Oxford, R., & Crookall, D. (1990). Vocabulary learning: A critical analysis of techniques. *TESL Canada Journal, 7*(2), 9-30.

Paribakht, T. S. (2005). The influence of first language lexicalization on second language lexical inferencing: A study of Farsi-speaking learners of English as a foreign language. *Language Learning, 55*(4), 701-748. doi: 10.1111/j.0023-8333.2005.00321.x

Paribakht, T. S., & Wesche, M. (1999). Reading and ‘‘incidental’’ L2 vocabulary acquisition. *Studies in Second Language Acquisition, 21*(2)*,* 195-224.

Park, C. C. (1997). Learning style preferences of Asian American (Chinese, Filipino, Korean, and Vietnamese) students in secondary schools. *Equity & Excellence in Education, 30*(2), 68-77. doi: 10.1080/1066568970300208

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2009). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest, 9*(3), 105-119. doi: 10.1111/j.1539-6053.2009.01038.x

Pellicer-Sanchez, A., & Schmitt, N. (2010). Incidental vocabulary acquisition from an authentic novel: Do Things Fall Apart? *Reading in a Foreign Language, 22*(1), 31-55.

Pichette, F., de Serres, L., & Lafontaine, M. (2012). Sentence reading and writing for second language vocabulary acquisition. *Applied Linguistics, 33*(1), 66-82. doi: 10.1093/applin/amr037

Pigada, M., & Schmitt, N. (2006). Vocabulary acquisition from extensive reading: A case study. *Reading in a Foreign Language, 18*(1), 1-28.

Pouwels, J. B. (1992). The effectiveness of vocabulary visual aids for auditory and visual foreign language students. *Foreign Language Annals, 25*(5), 391-401. doi: 10.1111/j.1944-9720.1992.tb01119.x

Prince, P. (1996). Second language vocabulary learning: The role of context versus translations as a function of proficiency. *The Modern Language Journal, 80*(4), 478493. doi: 10.1111/j.1540-4781.1996.tb05468.x

Pulido, D. (2003). Modeling the role of second language proficiency and topic familiarity in second language incidental vocabulary acquisition through reading. *Language Learning, 53*(2), 233-284. doi: 10.1111/1467-9922.00217

Ranta, L., & Meckelborg, A. (2013). How much exposure to English do international graduate students really get?: Measuring language use in a naturalistic setting. *Canadian Modern Language Review*, *69*(1), 1-33. doi:10.3138/cmlr.987

Read, J. (1993). The development of a new measure of L2 vocabulary knowledge. *Language Testing, 10*(3), 355-371. doi: 10.1177/026553229301000308

Read, J. (1997). Vocabulary and testing. In N. Schmitt & M. McCarthy (Eds.), *Vocabulary: Description, acquisition and pedagogy* (pp. 303-320). Cambridge, UK: Cambridge University Press.

Read, J. (2000). *Assessing vocabulary*. Cambridge, UK: Cambridge University Press.

Read, J. (2004). Plumbing the depths: How should the construct of vocabulary knowledge be defined? In P. Bogaards & B. Laufer (Eds.), *Vocabulary in a second language: Selection, acquisition, and testing* (pp. 209-227). Amsterdam: John Benjamins.

Reid, J. M. (1987). The learning style preferences of ESL students. *TESOL Quarterly, 21*(1), 87-110. doi: 10.2307/3586356

Reid, J. M. (Ed.). (1995). *Learning styles in the ESL/EFL classroom*. Boston, MA: Heinle & Heinle.

Reid, J. M. (1998). Perceptual Learning Style Preference Survey. In J. M. Reid (Ed.), *Understanding learning styles in the second language classroom* (pp. 162-167). Upper Saddle River, NJ: Prentice Hall Regents.

Renandya, W. A., & Farrell, T. S. C. (2011). 'Teacher, the tape is too fast!' Extensive listening in ELT. *ELT Journal, 65*(1), 52-59. doi: 10.1093/elt/ccq015

Richards, J. C. (1976). The role of vocabulary teaching. *TESOL Quarterly, 10*(1), 77-89. doi: 10.2307/3585941

Richards, J. C., & Schmidt, R. W. (2002). *Longman dictionary of language teaching and applied linguistics* (3rd ed.). London, UK: Longman.

Riding, R. J. (2000). Cognitive style: A strategic approach for advancement. In R. J. Riding & S. G. Rayner (Eds.), *International perspectives on individual differences. Volume 1: Cognitive styles* (pp. 365-377). Stamford, CT: Ablex.

Rúa, P. L. (2006). The sex variable in foreign language learning: An integrative approach. *Porta Linguarum, 6*, 99-114.

Schmitt, N. (2000). *Vocabulary in language teaching*. Cambridge, UK: Cambridge University Press.

Schmitt, N. (2008). Review article: Instructed second language vocabulary learning. *Language Teaching Research*, *12*(3), 329-363. doi: 10.1177/1362168808089921

Schmitt, N. (2010). *Researching vocabulary: A vocabulary research manual*. Basingstoke, UK: Palgrave Macmillan.

Schmitt, N., Schmitt, D., & Clapham, C. (2001). Developing and exploring the behaviour of two new versions of the Vocabulary Levels Test. *Language Testing, 18*(1), 55-88. doi: 10.1177/026553220101800103

Seifoori, Z., & Zarei, M. (2011). The relationship between Iranian EFL learners' perceptual learning styles and their multiple intelligences. *Procedia - Social and Behavioral Sciences, 29*, 1606-1613. doi:10.1016/j.sbspro.2011.11.403

Shen, M.-Y. (2010). Effects of perceptual learning style preferences on L2 lexical inferencing. *System, 38*(4), 539-547. doi:10.1016/j.system.2010.09.016

Stæhr, L. S. (2008). Vocabulary size and the skills of listening, reading and writing. *The Language Learning Journal, 36*(2), 139-152. doi: 10.1080/09571730802389975

Stæhr, L. S. (2009). Vocabulary knowledge and advanced listening comprehension in English as a foreign language. *Studies in Second Language Acquisition, 31*(4), 577-607. doi: 10.1017/S0272263109990039

Tekmen, E. A. F., & Daloğlu, A. (2006). An investigation of incidental vocabulary acquisition in relation to learner proficiency level and word frequency. *Foreign Language Annals*, *39*(2), 220-243. doi: 10.1111/j.1944-9720.2006.tb02263.x

Tight, D. G. (2010). Perceptual learning style matching and L2 vocabulary acquisition. *Language Learning, 60*(4), 792-833. doi: 10.1111/j.1467-9922.2010.00572.x

Vandergrift, L. (1997). The comprehension strategies of second language (French) listeners: A descriptive study. *Foreign Language Annals, 30*(3), 387-409. doi: 10.1111/j.1944-9720.1997.tb02362.x

Vandergrift, L. (2004). Listening to learn or learning to listen? *Annual Review of Applied Linguistics, 24*, 3-25. doi: 10.1017/S0267190504000017

Vandergrift, L. (2006). Second language listening: Listening ability or language proficiency? *The Modern Language Journal, 90*(1), 6-18. doi: 10.1111/j.1540-4781.2006.00381.x

Vandergrift, L., & Baker, S. (2015). Learner variables in second language listening comprehension: An exploratory path analysis. *Language Learning, 65*(2), 390-416. doi: 10.1111/lang.12105

Vandergrift, L., & Tafaghodtari, M. H. (2010). Teaching L2 learners how to listen does make a difference: An empirical study. *Language Learning, 60*(2), 470-497. doi: 10.1111/j.1467-9922.2009.00559.x

van Zeeland, H. (2014). Lexical inferencing in first and second language listening. *The Modern Language Journal, 98*(4), 1006-1021. doi: 10.1111/modl.12152

van Zeeland, H., & Schmitt, N. (2013a). Incidental vocabulary acquisition through L2 listening: A dimensions approach. *System, 41*(3), 609-624. doi:10.1016/j.system.2013.07.012

van Zeeland, H., & Schmitt, N. (2013b). Lexical coverage in L1 and L2 listening comprehension: The same or different from reading comprehension? *Applied Linguistics, 34*(4), 457-479. doi: 10.1093/applin/ams074

Vidal, K. (2003). Academic listening: A source of vocabulary acquisition? *Applied Linguistics, 24*(1), 56-89. doi: 10.1093/applin/24.1.56

Vidal, K. (2011). A comparison of the effects of reading and listening on incidental vocabulary acquisition. *Language Learning, 61*(1), 219-258. doi: 10.1111/j.1467-9922.2010.00593.x

Waring, R. (2010). *Starting extensive listening.* Retrieved from http://www.robwaring.org/el/starting_extensive_listening.htm

Waring, R., & Takaki, M. (2003). At what rate do learners learn and retain new vocabulary from reading a graded reader? *Reading in a Foreign Language, 15*(2), 130-163.

Webb, S. (2005). Receptive and productive vocabulary learning: The effects of reading and writing on word knowledge. *Studies in Second Language Acquisition, 27*(1), 33-52. doi: 10.1017/S0272263105050023

Webb, S. (2007). The effects of repetition on vocabulary knowledge. *Applied Linguistics, 28*(1), 46-65. doi: 10.1093/applin/aml048

Webb, S. (2008). The effects of context on incidental vocabulary learning. *Reading in a Foreign Language, 20*(2), 232-245.

Wesche, M., & Paribakht, T. S. (1996). Assessing second language vocabulary knowledge: Depth versus breadth. *Canadian Modern Language Review, 53*(1), 13-40.

Willingham, D. T. (2005). Do visual, auditory, and kinesthetic learners need visual, auditory, and kinesthetic instruction? *American Educator, 29*(2), 31-35.

Wintergerst, A. C., DeCapua, A., & Itzen, R. C. (2001). The construct validity of one learning styles instrument. *System, 29*(3), 385-403. doi:10.1016/S0346-251X(01)00027-6

Wu, J. (2014). Effects of learning styles on self-directed foreign language vocabulary learning. *Studies in Self-Access Learning Journal, 5*(2), 112-126.

Yeh, Y., & Wang, C.W. (2003). Effects of multimedia vocabulary annotations and learning styles on vocabulary learning. *CALICO Journal, 21*(1), 131-144.

Zeng, Y. (2007). *Metacognitive instruction in listening: A study of Chinese non-English major undergraduates* (MA thesis). National Institute of Education, Nanyang Technological University, Singapore.

Appendix A

Frequency Bands, Target words, and Corresponding Non-words

Frequency Band	Target Word	Number of Occurrences	Part of Speech	Non-word
	chair	2	N.	bartle
2-5	big	3	Adj.	scally
	tea	4	N.	lorey
	smiled	5	V.	kemble → kembled
	watched	7	V.	bamber → bambered
7-10	warm	8	Adj.	turley
	noise	9	N.	gamage
	window(s)	10	N.	mollet(s)
	laughed	12	V.	gummer → gummered
12-15	living-room	13	N.	palote
	afraid	14	Adj.	alden
	bed	15	N.	hislop
	old	17	Adj.	galpin
17-20	asked	18	V.	mundy → mundied
	husband	19	N.	pegler
	hand	20	N.	lomax

Note. Verbs were only used in the past tense throughout the story

Appendix B

Vocabulary Post-test

Test1-SF: Recognition of spoken form

[This measure had an aural multiple choice format; participants heard twice the target word and three distracters from a recording and had 5 seconds to check the box corresponding to the correct spoken form of the target word.]

Example:

Participants heard:

Which pronunciation is correct? Please check the box.

Number one [2sec] A bartle [2sec] B bertel [2sec] C burdle [2sec] D bardel [2sec.]

Number one [2sec] A bartle [2sec] B bertel [2sec] C burdle [2sec] D bardel [5sec.]

At the same time, the participants saw on the test page:

Which pronunciation is correct? Please check (✓) the box.

1. ☐ A ☐ B ☐ C ☐ D

Test2-WF: Recognition of written form

[This multiple choice test consisted of the target word and three distracters. The same distracters used for the test of spoken form were used for this test.]

Example:

Which spelling is correct? Please check (✓) the box.

1. ☐ bartle ☐ bertel ☐ burdle ☐ bardel

Test3-Mg-Recall: Recall of form-meaning link

[Meaning recall was measured using a translation test.]

Example:

Translate into Farsi.

1. bartle.....

Test4-PS: Recognition of part of speech

[For this test, the target word was presented in three different sentences. Each sentence used the target word as a different part of speech. Only one of the sentences was correct, and the other two were distracters. In order to avoid any learning effects on the tests that follow, sentences were created in such a way that no clues to the meaning of the target words were provided.]

Example:

Which sentence is correct? Please check (✓) the box.

1. bartle ☐ It is a bartle. (Noun)
   ☐ He is very bartle. (Adjective)
   ☐ She bartled. (Verb)

Test5-SA: Recognition of syntagmatic association

[In this test, the target word was presented followed by four choices: one choice was in a sequential relationship with the target word and the other three choices were distracters. All choices were in the same word class. Because the correct option was a target word in the passage, all the distracters were chosen from the passage, as well.]

Example:

1. Which word is more likely to be used with ***bartle*** in a sentence? Please check (✓) the box.

   ☐ sit ☐ go ☐ open ☐ stop

Test6-Mg-Recog: Recognition of form-meaning link

[In this final test, the target word was presented followed by four options: the original real English word which it had replaced in the text and three distracters. The distracters belonged to

the same word class. Because the correct option had not been read or listened to in the passage, all the distracters were chosen from outside the passage, as well.]

Example:

1. Which is the correct meaning for ***bartle***? Please check (✓) the box.

   ☐ book ☐ chair ☐ food ☐ head

Appendix C

Scales Measuring Comprehension and Enjoyment

[Instructions for these scales were provided orally in Farsi by the researcher.]

The following statements are about "The Monkey's Paw".

1. I understood the story.

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

2. I enjoyed the story.

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree