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Exploring learner factors in second language (L2) incidental vocabulary acquisition through reading

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Abstract

This study examined the predictive role of several learner factors in second language (L2) incidental vocabulary acquisition through reading: L2 proficiency, motivation, anxiety, and mastery of strategies. Participants were 129 English learners in a comprehensive university in China. Participants read two English texts and were given an unannounced vocabulary test to assess their incidental vocabulary acquisition. Their levels of motivation, anxiety, and mastery of strategies were measured by three specifically designed instruments that targeted incidental vocabulary acquisition. A multiple linear regression analysis revealed that L2 proficiency, anxiety, and mastery of strategies were positive and significant predictors of incidental vocabulary acquisition, although motivation was not. This confirms the role that learners' linguistic, affective, and cognitive features play in L2 incidental vocabulary acquisition.

Keywords: incidental learning, vocabulary acquisition, L2 reading, learner factors, Chinese-speaking English learners

Second language (L2) vocabulary knowledge is essential to the development of L2 proficiency (e.g., Coady, 1997; Laufer, 1992; Nation, 2001). L2 learners acquire new words not only through intentional learning, but also through incidental learning as "a by-product of any activity not explicitly geared to lexical learning" (Hulstijn & Laufer, 2001, p. 554). When learners are

engaged in linguistic activities (e.g., listening, conversation, or reading) for purposes of comprehension, fun, or information other than lexical learning, they may encounter new words, process new words, and develop knowledge of new words. The words they acquire through these activities are considered to be acquired incidentally (Huckin & Coady, 1999; Hulstijn & Laufer, 2001; Reynolds & Bai, 2013). Although L2 learners acquire words incidentally through listening and conversations (Ellis, Tanaka, & Yamazaki, 1994), reading serves as the primary source of input for L2 incidental vocabulary acquisition. This is especially true in an English as a foreign language (EFL) context where there is a lack of oral input (Grabe, 2004; Kweon & Kim, 2008).

The number of words learners acquire incidentally through reading might vary according to many factors including input factors, word properties, and learner factors (Ellis, 1994). Both input factors (e.g., input elaboration, frequency of exposure, topic familiarity, context clues) and word properties (e.g., word salience, word class type, clause type) were found to be significantly associated with L2 incidental vocabulary acquisition through reading (Chen & Truscott, 2010; Cho & Krashen, 1994; Kim, 2006; Ko, 2012; Kweon & Kim, 2008; Pulido, 2007; Reynolds & Wible, 2014). However, learner factors (including linguistic, motivational, affective, and cognitive) are seldom explored in relation to L2 incidental vocabulary acquisition through reading.

L2 incidental vocabulary acquisition through reading usually involves the process of learners noticing an unknown word, searching for its meaning, and elaborating upon the form-meaning connection (Laufer & Hulstijn, 2001; Peters, Hulstijn, Sercu, & Lutjeharms, 2009). In this process, the amount of attention learners allocate to unknown words is crucial to the amount of vocabulary acquired through reading (Huckin & Coady, 1999). As Huckin and Coady (1999) pointed out, "incidental learning is not entirely 'incidental,' as the learner must pay at least some attention to individual words" (p. 190). Although learners' focal attention in reading is on the major reading purposes such as text comprehension, a certain degree of peripheral attention might be paid to unknown words, leading to incidental vocabulary acquisition (Ellis, 1994; Schmidt, 1993). Because learners decide whether to pay attention to unknown words and regulate the amount of attention allocated to them, it is reasonable to argue that learner factors (e.g., mastery of strategies dealing with new words), in addition to input factors and word properties, might play a role in predicting incidental vocabulary acquisition (Ellis, 1994). However, few empirical studies have explored the predictive role of learner factors in incidental vocabulary acquisition through reading.

In this study, we aimed to fill this research gap by examining the predictive role of learner factors in L2 incidental vocabulary acquisition through reading. The four learner factors selected for this study are L2 proficiency, motivation, anxiety, and mastery of strategies. These learner factors were chosen because prior research suggests they influence the way in which L2 learners process information (Laufer & Hulstijn, 2001) and contribute to both L2 vocabulary acquisition (Fontecha & Gallego, 2012; Pulido, 2003; Tseng, Dörnyei, & Schmitt, 2006; Tseng & Schmitt, 2008) and L2 reading performance (Anderson, 1991; Day & Bamford, 1998; Mori, 2002; Saito, Horwitz, & Garza, 1999; Zhao, Guo, & Dynia, 2013). These learner factors might also influence L2 incidental vocabulary acquisition, although they haven't been examined together in a single study. Chinese-speaking L2 English learners were chosen as our target population because they constitute the largest number of L2 English learners in the world; however, this population is

largely understudied, especially in L2 vocabulary acquisition research. Nevertheless, Chinese students are the largest group of international students in U.S schools (Institute of International Education, 2015). By examining four important learner factors together, this study may shed light on how teachers can better facilitate their students' L2 English vocabulary learning not only in China, but also in the U.S. In this paper, L2 refers to any language learned in addition to one's native language, regardless of where this language is learned.

Incidental Vocabulary Acquisition and L2 Proficiency

The existing literature suggests that high L2 reading proficiency is favorable to incidental vocabulary acquisition through reading (Pulido, 2003; Zahar, Cobb, & Spada, 2001). In a study conducted by Pulido (2003), learners with higher L2 reading proficiency acquired more words than learners with lower L2 reading proficiency in reading texts of both familiar and unfamiliar topics. Proficient readers usually have more efficient decoding skills, which frees up their attention resources to enable the construction of ideas from context, the successful inferencing of word meaning, and subsequent vocabulary acquisition. There are studies showing a mixed relationship between incidental vocabulary acquisition and L2 proficiency. For example, Tekmen and Daloglu (2006) found that among L2 English learners in Turkey, advanced proficiency level students were able to acquire more words from reading than intermediate and upper intermediate proficiency level students. However, no difference in incidental vocabulary acquisition was found between the intermediate and upper intermediate proficiency level students. A limitation of this study is that L2 proficiency was treated as a categorical variable which was converted from a continuous variable (placement test scores). The treatment of a continuous variable as a categorical variable, however, usually reduces power, making it hard to find existing effects (Aiken & West, 1991). In the present study, to address the limitations appearing in previous studies, we treated L2 proficiency as a continuous variable by using raw proficiency scores from a large-scale standardized test.

Incidental Vocabulary Acquisition and Motivation

Motivation "provides the primary impetus to initiate learning the L2 and later the driving force to sustain the long and often tedious learning" (Dörnyei, 1998, p. 117). Consequently, motivation is considered to be a key factor that influences the success of L2 acquisition (Dörnyei, 1998; Mori, 2002). L2 motivation is context-specific and dependent upon both the macro-context, such as social and cultural context, and the micro-context, such as specific tasks to be accomplished in the social or academic setting (Dörnyei & Skehan, 2003). In the context of L2 reading, when learners read for purposes other than lexical learning, they might be motivated to learn some of the new words if they regard these words as relevant to the understanding of the text (Hulstijn, Hollander, & Greidanus, 1996). Laufer and Hulstijn (2001) were among the few who paid attention to the motivational aspect in addition to the cognitive aspect of L2 incidental vocabulary acquisition. They conceptualized motivation as a dichotomous construct (strong versus moderate motivation). According to this construct, learners with a self-imposed need to acquire vocabulary were considered to be strongly motivated and those with an extrinsically imposed need were considered moderately motivated. They argued that strong motivation would

incur more involvement than moderate motivation, possibly leading to more vocabulary acquisition. However, this assumption was not empirically tested.

L2 motivation has been approached from many different perspectives, including the expectancy-value theory (Dörnyei, 1998; Mori, 2002; Ryan & Deci, 2000). Based on this framework, motivation is conceptualized as a multifaceted construct that includes self-efficacy, extrinsic motivation, and intrinsic motivation (Dörnyei, 1998; Komiyama, 2013; Mori, 2002; Ryan & Deci, 2000; Wigfield & Guthrie, 1997). Self-efficacy refers to a person's judgment of his or her capabilities to conduct certain tasks. These perceived capabilities are believed to influence a person's behavior such that when a person believes that his or her behavior can lead to a desired outcome, he or she executes the behavior required to achieve that outcome (Czerniak & Chiarelott, 1990). Therefore, if L2 learners believe that they are capable of learning new words through reading when their reading purpose is not lexical learning, they are more willing to exert effort on these words. Intrinsic motivation refers to the participation in a task based on personal interest in the task itself while extrinsic motivation reflects involvement in a task based on external values and demands (Dörnyei, 1998; Ryan & Deci, 2000). In terms of L2 incidental vocabulary acquisition, if an L2 learner learns a word incidentally through reading because of his or her interest in the word, he or she is intrinsically motivated; if he or she learns words incidentally from reading to improve his or her grade in a language course, he or she is extrinsically motivated. Typically, an L2 learner possesses both intrinsic motivation and extrinsic motivation, which may impact L2 acquisition (Komiyama, 2013). Deng (2010) was among the few researchers that examined learners' motivation for L2 incidental vocabulary learning. He found that L2 learners had higher self-efficacy in learning words incidentally through reading, compared to listening. This study emphasized the motivational construct of self-efficacy but neglected intrinsic motivation and extrinsic motivation, which are also important aspects of the motivational construct based on the expectancy-value framework (Komiyama, 2013).

Given that motivation is a context-specific, multidimensional construct, it is important to evaluate it comprehensively in the specific context of learning words incidentally through reading. Hence, this study incorporated three motivational constructs (i.e., self-efficacy, intrinsic motivation, and extrinsic motivation) into a comprehensive context-specific motivation instrument to investigate learners' motivation in L2 incidental vocabulary acquisition through reading. The present study explored whether motivation can predict L2 incidental vocabulary acquisition.

Incidental Vocabulary Acquisition and Anxiety

Research suggests that learners tend to feel anxious when they encounter unfamiliar words in reading (Shi & Liu, 2006; Zhao et al., 2013). L2 learners generally lack the effective strategies necessary to cope with new words encountered when reading (Nassaji, 2003). In dealing with new words, 80% of the strategies that L2 learners use are lexical inferencing strategies (Paribakht & Wesche, 1999). That is, L2 learners employ their semantic, grammatical, and syntactic knowledge, as well as contextual cues, to infer the meaning of unknown words. However, their linguistic knowledge is usually not sufficient enough or the context cues are too scarce or vague for learners to successfully infer the meaning of words, resulting in a low lexical

inferencing rate. Nassaji (2003) found that more than three quarters of the lexical inferences made by L2 learners during reading were partially or completely wrong. Their inability to effectively determine the meaning of new words thus might incur anxiety. Therefore, this study hypothesizes that L2 learners experience a specific type of anxiety when they encounter new words during reading, try to find their correct meanings, and worry about inappropriate text comprehension due to their improper understanding of unknown words. This type of anxiety, incidental vocabulary learning anxiety, may influence L2 incidental vocabulary acquisition.

The importance of incidental vocabulary learning anxiety has not received much attention with respect to L2 vocabulary acquisition. The existing research has primarily focused on the relationship between L2 vocabulary acquisition and foreign language anxiety or foreign language reading anxiety. Most researchers agree that foreign language anxiety negatively influences foreign language performance in general, and vocabulary acquisition specifically, as it may occupy learners' cognitive processing capacity and reduce the amount of attention that students are able to allocate in completing the task at hand (Horwitz, Horwitz, & Cope, 1986; MacIntyre & Gardner, 1989, 1994). Foreign language reading anxiety is negatively associated with foreign language reading performance (Saito et al., 1999; Zhao et al., 2013) but is not related to L2 incidental vocabulary acquisition (Sas, 2002).

Drawing from previous research on foreign language reading anxiety and the process of incidental vocabulary acquisition (Laufer & Hulstijn, 2001; Saito et al., 1999; Zhao et al., 2013), one premise of this study is that incidental vocabulary learning anxiety, rather than other types of anxiety (e.g., foreign language reading anxiety) may be related to L2 incidental vocabulary acquisition. This type of anxiety might be debilitating or facilitating to incidental vocabulary acquisition. Incidental vocabulary learning anxiety, like foreign language anxiety, might cause attention deficits, resulting in learners' inability to obtain enough information about the vocabulary for the processing of form-meaning connection, thus detrimental to vocabulary acquisition (Horwitz et al., 1986; MacIntyre & Gardner, 1989, 1994). On the other hand, if learners experience anxiety in learning words incidentally through reading, it is possible that unknown words actually capture their attention. This attention to vocabulary is the first and important step to incidental vocabulary acquisition (Hulstijn et al., 1996; Schmidt, 1993) and thus incidental vocabulary learning anxiety might facilitate incidental vocabulary acquisition. More empirical research needs to be conducted to examine the exact relationship between incidental vocabulary learning anxiety and incidental vocabulary acquisition. The present study contributed to the existing literature by examining the predictive role of anxiety in L2 incidental vocabulary acquisition through the utilization of an incidental vocabulary learning anxiety scale.

Incidental Vocabulary Acquisition and Mastery of Strategies

Different strategies can be employed in different stages of the incidental vocabulary acquisition process. In the stage of noticing unknown words, selective attention strategies, such as deciding if the unknown word is important to learn, are commonly used (Gu & Johnson, 1996). In the subsequent searching for meaning stage, various strategies including lexical inferencing strategies, the use of a dictionary or glosses, or asking teachers or peers for meaning, can be used (Cho & Krashen, 1994; Ko, 2012; Luppescu & Day, 1993; Nassaji, 2003). Among these, lexical

inferencing strategies which exploit linguistic and contextual clues and learners' various knowledge sources are the strategies most widely adopted by L2 learners (Fraser, 1999; Paribakht & Wesche, 1999). In the stage of elaborating on form-meaning connections, a group of cognitive and memory strategies such as repeating, creating semantic networks, associating with known words, remembering the context, and using words in sentences can be employed (Fan, 2003; Gu & Johnson, 1996; Schmitt, 1997).

There are several studies that have explored the relationship between the specific strategy used (e.g., the use of a dictionary or glosses) and L2 incidental vocabulary acquisition (Cho & Krashen, 1994; Ko, 2012; Luppescu & Day, 1993; Nassaji, 2003). To the best of our knowledge, no study has explored whether L2 incidental vocabulary acquisition is predicted by learners' overall mastery of strategies used in the specific context of incidental vocabulary acquisition through reading. Recent research suggests that it is the skillful mastery of strategies, instead of the frequency of strategy use, that impacts L2 learning results (Nassaji, 2003; Tseng et al., 2006). Learners with a good mastery of strategies are usually those who seek active and creative participation in the learning process (Tseng & Schmitt, 2008). An effective and skillful mastery of strategies enables them to choose flexibly from a wide range of possible strategies and apply them to different learning tasks and contexts. Therefore, instead of using many strategies frequently and randomly, learners' skilful mastery of strategies might benefit L2 incidental vocabulary acquisition.

In addition, research indicates that strategy use is context-specific (Gao, 2006). That is, learners adjust their strategy use according to the specific tasks, different learning contexts, and their perception of appropriate learning behaviors. Due to the influence of context on strategy choice, new instruments need to be created or adaptations need to be made to existing instruments in order to better measure students' strategy use in specific contexts (Griffiths & Oxford, 2014). To better reveal the predictive role of the mastery of strategies in L2 incidental vocabulary acquisition, this study drew on recent strategy research and utilized a novel instrument to assess learners' mastery of strategies within the specific context of L2 incidental vocabulary acquisition.

The Present Study

A review of the literature indicates that learner factors such as L2 proficiency, motivation, anxiety, and mastery of strategies have been investigated inadequately in L2 incidental vocabulary acquisition through reading. The predictive role of these variables in L2 incidental vocabulary acquisition has seldom been explored. Previous research also shows that motivation, anxiety, and mastery of strategies are context-specific (Dörnyei & Skehan, 2003; Gao, 2006; Saito et al., 1999) but there are no existing scales measuring these constructs in the context of L2 incidental vocabulary learning through reading. With three specifically designed instruments, this study aims to fill this research gap by addressing the following research question: How do learner factors, including L2 proficiency, motivation, anxiety, and mastery of strategies, uniquely predict L2 incidental vocabulary acquisition through reading?

Method

Participants

The participants in this study were 129 Chinese-speaking L2 English learners enrolled in 6 English courses at a comprehensive university in eastern China. All participants were sophomores majoring in English, with an average English learning experience of 9.5 years in school settings. As English majors, their major related courses (e.g., Integrated English, English Composition, English Speaking, Extensive Reading, and Culture in English-speaking Countries) were taught with English as the language of instruction. Participant ages ranged from 18 to 21 years. As is typical with English programs in China, there were more female participants (n = 106) than male participants (n = 23).

Reading materials

The reading materials selected for this study were excerpts from two English passages in a textbook for English majors in China (Liu, 2007). The first passage was from *All Un-Alone in the City* (hereafter "City") and the second from *Can We Know the Universe---Reflections on a Grain of Salt* (hereafter "Universe"). The "City" passage discusses what friendship meant to people living in big cities such as New York. It has 960 tokens in length with 94.48 % of the tokens falling within the 5000 most frequent words in the British National Corpus (Heatley, Nation, & Coxhead, 2002). It has 41 sentences and 23 of them contain embedded clauses. The "Universe" passage presents the author's reflection on science and discusses whether the universe has regularities or rules that are knowable to man. It has 851 tokens in length with 94.95% of the tokens falling within the 5000 most frequent words in the British National Corpus (Heatley et al., 2002). It has 33 sentences and 17 of them contain embedded clauses.

To estimate the difficulty level of the passages in terms of known words ratio, we used the procedures adopted by Swanborn and de Glopper (2002). Four instructors teaching the same proficiency level of students as those in our study were presented the two reading passages and asked to mark the words they suspected would be unknown to average students in their class. If a word was marked by at least two of the instructors, it was considered a potentially unknown word. Twenty-six words in the "City" passage and 27 words in the "Universe" passage were identified as potentially unknown words. Therefore, 97.29% of words in the "City" passage and 96.83% in the "Universe" passage were determined to be known words. Both passages fall into the optimal ratio of 96% through 99% suggested by researchers for L2 reading comprehension and vocabulary learning (Hu & Nation, 2000; Waring & Takaki, 2003).

Target words

The purpose of identifying potentially unknown words in the passages was not only to estimate the approximate known words ratio and but also to aid in the selection of target words. Although it was suspected that potentially unknown words would not be familiar to average participants, they may be familiar to some of the participants. Therefore, only words identified as potentially unknown by all four instructors were regarded as candidate target words. Thirteen words from "City" and 15 words from "Universe" were identified as candidate target words. Of these

candidates, 10 highly specified content words were selected from each passage as target words. The 20 target words include 12 nouns, 3 verbs, and 5 adjectives (see Appendix A). We carried out a pilot study examining the target words among 33 students at the same proficiency level as participants in the present study. Six students reported knowing one word and one reported knowing two words. The remaining 26 students reported knowing none of the target words. As not one word was recognized by more than one student, all target words were included in the present study.

Vocabulary acquisition test

In the present study, an unannounced vocabulary test with the 20 target words was administered to participants after they finished reading the two passages. The vocabulary test listed the target words in a random order and participants were asked to provide either the English definition or the Chinese translation of these words. Both English and Chinese responses were accepted to accommodate participants' preference in using L1 (Chinese) or L2 (English) to define the target words (Laufer & Hulstijn, 2001). At the end of the test, participants were prompted to list the target words they knew prior to reading the passages. These lists were then scored and used as indicators of participants' pre-knowledge of the target words. A pretest of target words was not administered. This was done to avoid highlighting the target words and drawing participants' attention to these words in the following reading procedures, which might compromise the incidental nature of this study (Laufer & Hulstijn, 2001; Waring & Takaki, 2003). Fifteen participants reported knowing one word, five participants reported knowing two words, and one participant reported knowing three words prior to reading the passage. The remaining participants reported knowing none of the target words prior to encountering them in the reading passages.

L2 proficiency test

The participants' scores on the *Test for English Majors-4* (TEM-4, China National Advisory Committee for Foreign Language Teaching, 2012) were used as indicators of L2 proficiency. TEM-4 is a large-scale standardized test that all English majors in China take during their second year in the English program. It is administered by the Ministry of Education of China in April and the students' test scores are usually announced in October. It includes six parts: writing, dictation, listening comprehension, cloze, vocabulary and grammar, and reading comprehension. The range of possible scores for TEM-4 is 0-100, with higher scores indicating greater English proficiency (Xi & Jiang, 2006). Studies of the TEM-4 have indicated good content validity and reliability (Li, 2012). Since the participants took the TEM-4 one week before they participated in this study, we waited till October to collect the TEM-4 scores and used them as participants' L2 proficiency scores.

Instruments

Three instruments were developed by the authors specifically for this study to measure participants' levels of motivation, anxiety, and mastery of strategies in L2 incidental vocabulary acquisition through reading: The Motivation for Incidental Vocabulary Learning Scale (MIVLS, see Appendix B), The Incidental Vocabulary Learning Anxiety Scale (IVLAS, see Appendix C),

and The Mastery of Incidental Vocabulary Learning Strategies Scale (MIVLSS, see Appendix D). To determine the constructs and dimensions of each instrument, a review of the literature regarding L2 reading, vocabulary acquisition, and incidental vocabulary acquisition, as well as relevant motivation, anxiety, and strategy scales was conducted. These instruments were originally written in English and then translated into Chinese by a professional translator (a translation teacher) to facilitate comprehension by the participants. The Chinese versions were then translated back into English by another professional translator (a graduate student majoring in translation) to check for consistency.

To assess reliability, a pilot study was conducted with 33 students of the same L2 proficiency level as participants in the current study. The students filled out the three measures during regular class time and 5 volunteers provided feedback during a subsequent group discussion. Minor modifications of items in the three measures were made based on the feedback. In the pilot study, the internal consistency (Cronbach' alpha) was 0.74 for MIVLS, 0.80 for IVLAS, and 0.81 for MIVLSS. The reliabilities of all the three measures met the cut-off of 0.70 suggested by Dörnyei (2003) for second language acquisition research. All items were maintained with some minor revisions.

Motivation measure. The MIVLS was used to assess motivation, encompassing three constructs: self-efficacy (13 items), intrinsic motivation (7 items), and extrinsic motivation (6 items). This measure was based on the Motivation for Reading Questionnaire (Wigfield & Guthrie, 1997) and the Motivation for Vocabulary Questionnaire (Deng, 2010). The self-efficacy items were designed to measure students' self-efficacy about noticing unknown words and selecting words to learn, searching word meanings, and processing form-meaning connections, roughly corresponding to the incidental vocabulary acquisition process. The intrinsic motivation items focused on curiosity, involvement, and importance. The extrinsic motivation items focused on recognition, grades, and competition (Wigfield & Guthrie, 1997). Participants responded to the 26 items using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The internal consistency (Cronbach's alpha) of MIVLS in the present study was 0.78.

Anxiety measure. Anxiety was assessed by the IVLAS, a 5-point Likert scale with 10 items. These items were designed to capture the anxious feelings students might have when they encounter unknown words during reading, try to find word meanings, and worry about inaccurate text comprehension due to their inappropriate understanding of word meanings. The scale was based on the Foreign Language Reading Anxiety Scale (Saito et al., 1999), but items were written in such a way that they targeted the specific anxiety that students might have when they encounter unknown words during reading and try to obtain the appropriate meaning for text comprehension. Participants responded to the 10 items on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Note that the negative statements were scored using a 5-point rating scale (5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree). The scores of the positive statements were reversed (1 = strongly agree, 2 = agree, 3 = neither agree nor disagree, 4 = disagree, 5 = strongly disagree). The internal consistency (Cronbach's alpha) of IVLAS in the present study was 0.81.

Mastery of strategies measure. The MIVLSS assessed students' mastery of the strategies that are frequently adopted in incidental vocabulary acquisition through reading. It included 26 items

within three categories roughly corresponding to the process of incidental vocabulary acquisition: noticing the word (e.g., selective strategies; 2 items), searching for word meaning (e.g., inferencing strategies, glosses, and dictionary use; 9 items), and elaborating form-meaning connections (e.g., cognitive and memory strategies; 15 items). The MIVLSS was adapted from the Vocabulary Learning Questionnaire (Gu & Johnson, 1996) and the Vocabulary Learning Strategies (Schmitt, 1997). Participants rated their mastery of strategies on a 5-point Likert scale ranging from 1 (no mastery), 2 (little mastery), 3 (some mastery), 4 (good mastery), to 5 (very good mastery). The internal consistency (Cronbach's alpha) of MIVLSS in the present study was 0.88.

Procedure

Data from the present study were collected during regular class time in the spring semester. The participants took part in the study on a voluntary basis and it was explained that the results from the vocabulary tests would not impact their course grade. When the researcher collected data in the classroom, the instructors waited in the teachers' lobby and returned to the classroom after all the tests and measures were collected. Participants were given 25 minutes to read the reading materials as a regular in-class activity. They were told by the researcher to read and try to understand the materials as best as they could. They were also told they would be asked some comprehension questions after reading. These instructions were given to direct participants' attention to text comprehension. Although learners' intention cannot be controlled (Bruton, López, & Mesa, 2011), clearly stating the purpose of reading as text comprehension may guide participants' focal attention to text comprehension instead of lexical learning, constituting one important condition for incidental vocabulary acquisition. The participants were not forewarned of the subsequent vocabulary test, as the announcement of vocabulary test may draw learners' attention to lexical learning and compromise the incidental nature of this study (Peters et al., 2009). After the researcher determined that all students finished reading the two passages, the passages were collected and students were given the unannounced vocabulary test of the 20 target words. The tests were then collected and not returned to participants. Following a short break, participants completed the three instruments: MIVLS, IVLAS, and MIVLSS. Participants' TEM-4 scores were obtained later from each instructor directly.

Scoring

The incidental vocabulary acquisition test was scored using the rubric created by Laufer and Hulstijn (2001). One point was assigned to a correct response and half a point was assigned if the response was semantically approximate. The degree to which a response was semantically approximate was negotiated among the researchers. No point was assigned if the response was incorrect. At the end of the incidental vocabulary test, participants were asked to write down the words they knew prior to the reading task. The scoring rubric for this pre-knowledge of target words was as follows. If the participant reported knowing a word before the reading task and gave a correct response during the incidental vocabulary acquisition test, the item was considered as pre-known and one point was assigned to the pre-knowledge score. If the participant reported knowing a word before reading and gave a semantically approximate response during the incidental vocabulary acquisition test, half a point was assigned to the pre-knowledge score. If the participant reported knowing a word before reading but gave an incorrect response during the

test, no point was assigned to the pre-knowledge score. This scoring rubric for pre-knowledge of target words was used to control for participants' overestimation of their pre-knowledge of target words. Incidental vocabulary acquisition scores in this study were then calculated by subtracting the pre-knowledge score from the incidental vocabulary acquisition test score. For the three instruments MIVLS, IVLAS, and MIVLSS, the total scale mean scores (i.e., students' responses to all items were averaged) was used in the analyses.

Results

Descriptive statistics of all variables are presented in Table 1. The data showed that participants incidentally acquired an average of 3.19 out of 20 target words ($SD = 2.20$) after reading the two passages. The participants' mean L2 proficiency score was 72.90 ($SD = 6.87$), as measured by TEM-4. The participants were moderately motivated to acquire words incidentally from reading as measured by MIVLS ($M = 3.61$, $SD = 0.34$). A moderate level of anxiety was observed as measured by IVLAS ($M = 3.25$, $SD = 0.57$). They reported some mastery of the strategies often used in incidental vocabulary acquisition as measured by MIVLSS ($M = 3.02$, $SD = 0.58$).

Table 1. *Descriptive Statistics for Main Study Variables*

Variables	M	SD	Range
L2 incidental vocabulary acquisition	3.19	2.20	0 - 9
L2 proficiency	72.90	6.87	53 - 89
Motivation	3.61	0.34	2.62 - 4.81
Anxiety	3.25	0.57	1.70 - 4.60
Mastery of strategies	3.02	0.58	1.69 - 4.46

Note. L2 proficiency from TEM-4; Motivation from the MIVLS; Anxiety from the IVLAS; and Mastery of strategies from the MIVLSS.

A multiple linear regression (MLR) analysis was conducted with L2 incidental vocabulary acquisition as the dependent variable and L2 proficiency, motivation, anxiety, and mastery of strategies as the independent variables. The assumptions of MLR were first checked. The histogram and scatterplot of standardized residuals indicated that the assumptions of normality, homogeneity of variances, and linearity were met. The assumption of independent errors was also met (*Durbin-Watson value* = 1.77). Tests for multi-collinearity indicated that multi-collinearity was not a concern (*VIF* = 1.05 for L2 proficiency, 1.47 for motivation, 1.05 for anxiety, and 1.49 for mastery of strategies). Results showed that L2 proficiency ($\beta = .37$, $t = 4.39$, $p < .05$, see Table 2), anxiety ($\beta = .21$, $t = 2.54$, $p < .05$), and mastery of strategies ($\beta = .20$, $t = 2.04$, $p < .05$) were significant positive predictors of L2 incidental vocabulary acquisition. Motivation ($\beta = .02$, $t = 0.17$, $p > .05$) was not a significant predictor of L2 incidental vocabulary acquisition. The four predictors explained 18% of the variance in L2 incidental vocabulary acquisition through reading, $R^2 = .18$, $F (4, 124) = 6.86$, $p < .05$.

Table 2. *Summary of Multiple Linear Regression Model Predicting L2 Incidental Vocabulary Acquisition*

Variables	B	SE B	95% CI	β	t
L2 proficiency	0.12	0.03	[0.06, 0.17]	.37*	4.39
Motivation	0.11	0.65	[-1.17, 1.39]	.02	0.17
Anxiety	0.81	0.32	[0.18, 1.45]	.21*	2.54
Mastery of strategies	0.77	0.38	[0.02, 1.52]	.20*	2.04
R^2			.18		
F			6.86*		

Note. N = 129. CI = confidence interval.
      **p* < .05

Discussion

The purpose of the study was to examine the predictive role of several learner factors in L2 incidental vocabulary acquisition through reading. Specifically, the roles of L2 proficiency, motivation, anxiety, and mastery of strategies were examined. The findings revealed that L2 proficiency, anxiety, and mastery of strategies were significant predictors of L2 incidental vocabulary acquisition, but motivation was not. Before addressing this finding, it should be noted that this study included a homogeneous L2 sample (i.e., Chinese-speaking L2 English learners who majored in English), and thus the finding must be interpreted in this vein.

The results indicated that L2 proficiency was a significant predictor of L2 incidental vocabulary acquisition through reading. L2 learners with higher levels of proficiency acquired more words incidentally through reading than those with lower L2 proficiency. L2 learners with higher proficiency usually demonstrate better L2 reading proficiency and a larger L2 vocabulary, which are favorable conditions for L2 incidental vocabulary acquisition through reading (Pulido, 2003). Specifically, higher L2 reading proficiency entails better decoding skills which enable L2 readers to readily construct meanings from the text with more efficient allocation of attention at the word, sentence, and textual levels. This efficiency allows readers to use a combination of bottom-up and top-down processing skills, freeing up their cognitive resources. Therefore, there is more potential for readers to allocate attention to words and process the form-meaning connection after constructing meaning from the text. In addition, a larger L2 vocabulary is beneficial to L2 incidental vocabulary acquisition (Peters et al., 2009). Larger vocabularies make it more likely for learners to correctly infer the meaning of an unknown word, relate the new word with words they've already known, and prepare for the new word to enter their mental lexicon and their developing L2 system (Ellis, 1997; Paribakht & Wesche, 1999). This finding, therefore, corroborates previous findings that high L2 proficiency facilitates L2 incidental vocabulary acquisition (Pulido, 2003).

Anxiety was also found to be a positive predictor of L2 incidental vocabulary acquisition. This is inconsistent with previous findings that foreign language anxiety usually has a debilitating effect on L2 vocabulary acquisition (MacIntyre & Gardner, 1989, 1994). However, this result may be interpreted by examining the "incidental" nature of vocabulary acquisition through reading.

Many unknown words are either not noticed or ignored when the readers' major goal during reading is text comprehension rather than vocabulary learning. To acquire an unknown word through reading, one has to notice it, decide to pay attention to it, and search for its meaning (Hulstijn et al., 1996). Learners with lower levels of incidental vocabulary learning anxiety usually worry less about learning individual unfamiliar words and instead direct most of their attention to the main task of text comprehension. They see no need to pay attention to unfamiliar words and thus do not acquire many vocabulary words while reading. Learners with higher levels of incidental vocabulary learning anxiety, however, worry more about understanding the meaning of unfamiliar words and thus notice and pay attention to them. Noticing is the first and important step for a word to be acquired during reading (Hulstijn et al., 1996; Schmidt, 1993). Although incidental vocabulary learning anxiety may take up some of learners' processing capacity, it seems to facilitate L2 incidental vocabulary acquisition by drawing learners' attention to unknown words.

Mastery of strategies was another positive predictor of L2 incidental vocabulary acquisition through reading. This finding corroborates previous findings that the quality of strategy use (i.e., the skillful mastery of strategies) makes a difference to language learning (Tseng et al., 2006; Tseng & Schmitt, 2008). Learners with good mastery of strategies usually have developed a personal set of effective strategies and formed an awareness of which strategies to use effectively in different contexts (Tseng et al., 2006). Compared to those with no or little mastery of strategies, L2 learners with good mastery of these strategies are more likely to actively choose the appropriate strategies and exert creative effort in using them for different stages of L2 incidental vocabulary acquisition. The skillful use of these strategies may reduce the cognitive load of the task and make learning more productive, thereby facilitating the L2 vocabulary learning process (Tseng & Schmitt, 2008).

Of the four learner factors that were examined, motivation was the only factor that did not significantly predict incidental vocabulary acquisition through reading. That is, high levels of motivation may not benefit L2 incidental vocabulary acquisition. This finding is paradoxical and surprising, given that motivation has been suggested to be a key factor in L2 acquisition (Dörnyei, 1998). It could be that the motivational instrument (MIVLS), constructed within the expectancy-value framework, treated motivation as a static attribute; therefore, it may have failed to capture the dynamic and complex nature of motivation. Recent research stresses that L2 motivation is continuously changing, evolving, and interacting with individual-level and environmental-level variables (Waninge, Dörnyei, & de Bot, 2014). It is likely that learners' motivational levels fluctuate during the L2 incidental vocabulary learning process. Such fluctuations may impact the relationship between motivation and L2 incidental vocabulary learning. However, this assumption remains an empirical question and alternative explanations exist, warranting further study of the possible predictive role of motivation in L2 incidental vocabulary learning.

Conclusion and Implications

In conclusion, the results of this study demonstrate that L2 proficiency, anxiety, and mastery of strategies are positive predictors of L2 incidental vocabulary acquisition through reading for

Chinese-speaking L2 English learners. These findings suggest that L2 incidental vocabulary acquisition is affected by linguistic, affective, and cognitive learner factors such as L2 proficiency, anxiety, and mastery of strategies, thus highlighting the necessity to add these learner factors to the more recognized variables of input factors and word properties in incidental vocabulary acquisition models.

These findings provide preliminary, yet important implications for L2 vocabulary learning and instruction. It should be understood that individual differences exist in L2 incidental vocabulary acquisition. L2 learners with higher L2 proficiency, better mastery of strategies, and higher level of incidental vocabulary acquisition anxiety tend to acquire more words incidentally through reading. Thus, instructional attention should focus not only on linguistic skills (i.e., L2 proficiency), but also on cognitive (i.e., mastery of strategies) and affective (i.e., anxiety) skills. Specifically, to improve the L2 incidental vocabulary acquisition rate, teachers may encourage L2 learners to become strategic learners by developing a personal set of effective strategies, instead of teaching them a group of arbitrary strategies. In addition, teachers should be aware that incidental vocabulary acquisition anxiety can facilitate incidental vocabulary acquisition. This type of anxiety may be encouraged by teachers as it guides learners' attention to L2 vocabulary and boosts vocabulary acquisition through reading. These noted instructional implications require future examination.

A few limitations of this study should be noted. First, no retention test was administered, so it is not possible to determine whether learner factors predicted L2 incidental vocabulary acquisition and retention in the same manner. Future studies should broaden the measurement scheme to include a vocabulary retention test. Usually the retention test is administered several weeks later after the acquisition test and contains the same test items as the acquisition test. Second, L2 vocabulary acquisition was limited to the acquisition of word meaning. Therefore, it is not possible to generalize these findings to the acquisition of other aspects of vocabulary knowledge such as form, syntactic features, and collocation. Third, this study focused narrowly on learner factors and left other important factors, such as input factors and word properties, unexamined. Future studies should adopt a more comprehensive approach, investigating the interactions among these factors and their interactive effect on L2 incidental vocabulary acquisition. Fourth, the dynamic and complex nature of motivation was not taken into account when measuring the incidental vocabulary learning motivation. Future studies accounting for the dynamic nature of motivation (e.g., measuring motivation level at different time points of a learning task) might better reveal the role that motivation plays in L2 incidental vocabulary acquisition. Fifth, given the correlational nature of the present study, it is not possible to draw conclusions concerning causal relations. Future studies should adopt an experimental design for causal inference.

Acknowledgments

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Appendix A

List of 20 Target Words

1. invidious	2. taxonomist	3. anathema	4. carom
5. claustrophobic	6. borough	7. opine	8. interloper
9. exterminator	10. hamlet	11. fluff	12. infallible
13. dodecahedra	14. jumbly	15. deflate	16. languor
17. intrepid	18. hallucinogen	19. sinew	20. incest

Appendix B

The Motivation for Incidental Vocabulary Learning Scale

The following statements describe how motivated you are in learning new words when you read material in English for the purpose of comprehension. For each statement, please indicate whether you (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, or (5) strongly agree by circling the appropriate number following each statement. Please give your first reaction to each statement and there are no right or wrong answers.

	1	2	3	4	5
I learn new English words through reading because					
1. I am curious about their meanings.					
2. I want to enrich my vocabulary.					
3. I like hearing teachers say that I can learn new words from reading.					
4. I want to improve my grades in the English course.					
5. My friends sometimes say that it is amazing that I can learn new words from reading.					
6. I pay attention to new words encountered during reading.					
7. I learn a lot of new words from reading.					
8. I want to know what new words mean in the reading passage.					
9. I like learning new words from reading.					
10. I like to learn more words from reading than other students.					
11. I am willing to put more effort in learning new words from reading in order to outperform other students.					
12. It is important for me to learn new words from reading.					
13. New words learnt from reading can boost up my grades in the English course.					
When I encounter new English words during reading					
14. I can use the topic of the reading passage to help understand the new words.					
15. I can tell which words are essential for adequate comprehension of a passage.					
16. I can use my world knowledge to understand the new words.					
17. I can relate the new words with words I previously know.					
18. I can remember the context where the new words appear.					
19. I can learn about the collocation of the new words.					
20. I can use the immediate contexts to understand the new words.					
21. I can analyze the grammatical structure of the sentence to guess the meanings of the new words.					
22. I can ask my classmates or teacher to find out the meanings of the new words.					
23. I can make my own sentences using the new words I learned.					
24. I can use dictionary to find out the meanings of the new words.					
25. I can think of situations where I can use the new words.					
26. I can use my knowledge of affixes to guess the meanings of the new words.					

Appendix C

The Incidental Vocabulary Learning Anxiety Scale

Directions: Statements 1 through 10 describe how you might feel about encountering new words when you read material in English for the purpose of comprehension. For each statement, please indicate whether you (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, or (5) strongly agree by circling the appropriate number following each statement. Please give your first reaction to each statement and there are no right or wrong answers.

	1	2	3	4	5
1. I feel worried when I see many new words in an English passage.					
2. It bothers me to encounter new words that I cannot pronounce while reading English.					
3. I get upset when I encounter new words while reading English.					
4. I enjoy learning new words from reading English.					
5. I get upset when I don't know if my understanding of a new word is correct while reading English.					
6. I am confident that I can learn new words while reading English.					
7. I feel nervous when I have no clue what a new word means while reading English.					
8. I feel nervous when I cannot guess the meaning of a new word while reading English.					
9. I worry about guessing the meaning of a new word wrongly while reading English.					
10. I worry that my understanding of the new words might lead to the misinterpretation of the English materials.					

Appendix D

The Mastery of Incidental Vocabulary Learning Strategies Scale

You might encounter some new words when you read material in English for the purpose of comprehension. The following are some strategies that you might use in dealing with these new words. Decide if you have a good mastery of them. Rate your mastery of these strategies on a five-point scale: (1) no mastery, (2) little mastery, (3) some mastery, (4) good mastery, (5) very good mastery. Please give your first reaction to each statement and there are no right or wrong answers.

	1	2	3	4	5
1. I know which words in a reading passage are important for me to learn.					
2. I repeat a new word aloud to remember it.					
3. I use various means to make clear the new words that I am not quite clear of.					
4. I ask teacher or classmates for meanings of the new words.					
5. I make use of my common sense and knowledge of the world when guessing the meaning of a new word.					
6. I repeat the pronunciation of a new word in my mind to remember it.					

7. I make use of my knowledge of the topic when guessing the meaning of a new word.					
8. I write a new word repeatedly to remember it.					
9. I create a mental image of a new word to help me remember it.					
10. I have a clear sense of whether I need to remember a new word or not.					
11. I remember the sentence in which a new word is used.					
12. I check my guessed meaning of a new word against the immediate context to see if it fits in.					
13. I connect a new word to a personal experience to remember it.					
14. I look up a new word in dictionary if I am not sure of its meaning.					
15. I associate a new word with a known English word that sounds similar to it.					
16. I analyze the grammatical structure of a sentence to guess the meaning of a new word.					
17. I make use of the part of speech of a new word when guessing its meaning.					
18. I associate a new word to a known English word that looks similar to it.					
19. I use the word structure (prefix, root, and suffix) knowledge when guessing the meaning of a new word.					
20. I connect a new word with its synonyms and antonyms to remember it.					
21. I use new words as much as possible in either imaginary or real situations.					
22. I associate a new word with a Chinese word that sounds similar to it.					
23. I use my knowledge of affixes and roots to remember a new word.					
24. I use new words in sentences.					
25. I remember a new word together with the context where it occurs.					
26. I create semantic networks in my mind and remember new words in meaningful groups.					

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