PASAA
Volume 48
July - December 2014

Assessing the Depth and Breadth of Vocabulary Knowledge with Listening Comprehension

Feng Teng
Nanning University

Abstract

This study was inspired by Qian (1999) and Stæhr (2009) and researched 88 Chinese learners who had already passed the College English Test 4 (CET). These learners volunteered to participate in the study regarding the depth and breadth of vocabulary knowledge and its relationship with listening comprehension, which was assessed by analyzing the results of a series of comprehensive tests including the vocabulary size test (VST), depth of vocabulary knowledge (DVK), and listening comprehension test (LCT). The findings suggested that a vocabulary level of 5,000 word families had a higher correlation with academic listening comprehension (r=0.86), while a vocabulary level of 3,000 word families had a lower correlation with a lower listening comprehension (r=0.41). This is evidence that outstanding listening scores require a larger vocabulary size than does reading. This study also showed that the depth of vocabulary knowledge provided a higher correlation (r=0.91)

with listening comprehension and a higher predictive power in listening comprehension than the breadth of vocabulary knowledge. A multiple regression analysis was used, and the R^2 change was 2.6% when adding DVK to VST, which demonstrated that the depth of vocabulary knowledge had a significant predictive power on the scores of listening comprehension. This showed that attention should be paid to this area, with teachers as well as learners, in China as well as in other EFL contexts in future teaching and learning of listening comprehension.

Keywords: breadth of vocabulary knowledge, depth of vocabulary knowledge, correlation, prediction, listening comprehension

Introduction

As a receptive skill of learning English as a foreign language (EFL), listening comprehension is believed to be an indispensable input for language learning resources (Goh, 2000; Mendelsohn, 2008). It is a complex process of decoding information, and listening comprehension requires faster and more efficient word recognition and decoding than does reading, and it is affected by many variables, one of which is vocabulary knowledge (Renandya & Farrell, 2011; Wang & Renandya, 2012). Likewise, it is widely acknowledged that vocabulary knowledge is a significant predictor of a learners' language proficiency (Meara, 1996). A number of researchers (Meara, 1996; Qian, 1999; Read, 1989; Wesche & Paribakht, 1996), proposed that the two dimensions of vocabulary knowledge be known as 'depth' and 'breadth'. The depth of vocabulary knowledge is concerned with the level of understanding of the various aspects of a given word and the breadth of vocabulary knowledge is regarded as vocabulary size. The depth and breadth

of vocabulary knowledge is a key to comprehending the material (Qian, 1998); therefore, the importance of vocabulary knowledge in achieving success in comprehending academic English material is receiving more attention.

The existing research concerning the depth and breadth of vocabulary knowledge focuses exclusively on its relationship with reading comprehension. Research conducted on the relationship between vocabulary knowledge and listening is limited, which provides the motivation for the current study. In addition, a strong preference for teaching syntax or grammar strategies, with slight attention to vocabulary knowledge and word-level competency for English as a foreign language (EFL) learners have shown their disadvantages in teaching listening comprehension. The main listening problems are from word recognition and attention failure during perceptual processing (Goh, 2000).

Therefore, it is essential to assess the role of depth and breadth of vocabulary knowledge and to probe the correlation between vocabulary knowledge and listening comprehension, and thereby explore to what extent that vocabulary knowledge will contribute to EFL listening comprehension. This will propose some implications for teaching listening skills to EFL learners whose first language is Chinese.

Literature Review

The word

Richards (1976) and Nation (1990, 2001) defined 'the word' as a range of aspects of *sub-knowledge,* including spoken and written knowledge, morphological knowledge, word meanings, collocation and grammatical knowledge, and connotative and associational knowledge. When an unfamiliar passage is given to EFL learners, the biggest challenge in retrieving the embedded meaning of the passages is the unknown words (Grabe & Stoller, 2002), along with the vocabulary level that a learner has (Laufer,

1996). Word families, which are groups of words including the base form of a word plus its inflected and derivational variance made from affixes with the same core meaning (Nation, 2001; Schmitt, 2010), are generally applied in calculating a learners' vocabulary level. The research on the acquisition of word-level competency and measuring how well a word is known is getting more attention. Thus, research on the breadth of vocabulary knowledge and the depth of vocabulary knowledge appears to become more important.

The breadth of vocabulary knowledge

The breadth of vocabulary knowledge is regarded as vocabulary size. Put simply, it is concerned with the number of words that a learner at a certain level knows (Nation, 2001). It has long been acknowledged that vocabulary size plays an important role in EFL learners' academic competency in English (Nation, 1993; Stæhr, 2008). Shimamoto (2000) compared the results of four different tests with the results of Nation's (1990) vocabulary level test, and concluded that the various aspects of vocabulary knowledge were interconnected. The mentioned research aroused the awareness of probing further into vocabulary knowledge, for which the breadth of vocabulary knowledge was found to be easier to measure than the depth of vocabulary knowledge because of its faster accessibility. The threshold level, however, still remains to be a controversial issue in EFL vocabulary research. In other words, how large a vocabulary size should an EFL learner need in order to understand academic material is a much-discussed issue.

Regarding threshold level, Liu and Nation (1985) conducted an experiment of using passages with 95% lexical coverage of known words compared to passages with 90% lexical coverage of known words, and discovered that a larger vocabulary level was essential for achieving higher scores in guessing unknown words.

Nation and Waring (1997) used the results from their research on the vocabulary size that native speakers have and found that native speakers could add about 1,000 word families a year to their current vocabulary level of around 20,000 word families. Goulden, Nation and Read (1990) concluded that well-educated university graduates who are native speakers had a vocabulary size of about 17,000 base words. Although native speakers have a large vocabulary level, they use only 3,000-10,000 words in their daily use. Therefore, the vocabulary that native speakers frequently use should be the threshold level for an EFL learner to master. Some scholars (Cobb, 2007; Laufer, 1992, 1996; Qian, 1998) concluded that the vocabulary level that can be assumed to be sufficient for comprehension be set at 3,000 word families. The problem is deciding whether listening comprehension requires the same threshold level or not.

In addition to this, when taking various forms of words including affixes, suffixes, tenses, and singular and plural forms into consideration, the vocabulary level an EFL learner needs to master is very large. Although there is a great deal of research on vocabulary size, most of it is focused on the relationship between vocabulary size and reading comprehension. Research on the threshold level for comprehending authentic listening material is lacking, and it is one of the research purposes to be discussed in this current study. To facilitate understanding vocabulary knowledge better, research on the depth of vocabulary knowledge is also essential.

The depth of vocabulary knowledge

Depth of vocabulary knowledge is considered to be the understanding level of various aspects of a given word. In other words, depth of vocabulary knowledge is the measure of how well a learner knows a word (Qian, 1998, 1999). The earliest definition could be traced back to Richards (1976), as he proposed that

knowing a word means knowing its relative frequency and collocation, limitations on use, syntactic behavior, basic forms and derivations, association with other words, semantic value, and many different meanings associated with a given word. A decade later, Nation (1990) added receptive and productive knowledge, as well as defined form, position, function, and meaning as the four components of lexical knowledge. Qian (1998) refined the theoretical frameworks of Richards (1976) and Nation (1990) by including pronunciation, spelling, morphological properties, syntactic properties, meaning, register, and frequency to the depth of vocabulary knowledge. In addition, Qian (1999) added collocation properties. The research mentioned above showed that the depth of vocabulary knowledge was a difficult and complex process, and even an advanced EFL learners' vocabulary knowledge might be incomplete. "Some learners are good at the grammatical functions of particular words, for example, and others have a strong knowledge of English word parts" (Lessard-Clouston, 2013, p. 5).

Although the depth of vocabulary knowledge was given more attention in first language (L1) studies (Anderson & Freebody, 1981; Mezynski, 1983) and second language (L2) studies (Qian, 1998, 1999, 2002; Read, 1990), more research is still necessary, due to the complex nature of the depth of vocabulary knowledge. For example, if more lexical knowledge is needed in comprehension, how much knowledge is sufficient for a basic understanding level? Read (1993, 1995) developed a word-associates test for the depth of vocabulary knowledge, which has had a profound influence on the assessment of the role of the depth of vocabulary knowledge in reading comprehension. Wesche and Paribakht (1996) also developed a five-level elicitation test of vocabulary knowledge scale (VKS) for assessing ESL learners' vocabulary development and progress. According to the VKS, the levels for the depth of vocabulary knowledge range from complete unfamiliarity to recognition of a word to partial

understanding of a word, to the confident ability to use a word accurately. Although the above-mentioned tests or scale evaluations provided insights into estimating the depth of lexical knowledge, further studies are still needed to determine the predictive power of the depth of vocabulary knowledge in listening comprehension.

The role of vocabulary knowledge in listening comprehension

The research mentioned above provides some hints that the breadth and depth of vocabulary knowledge is significantly correlated with reading comprehension; however, such findings cannot be overgeneralized to listening. Put succinctly, it cannot be assumed that an identical vocabulary size and lexical coverage threshold needed in reading will apply to listening (Stæhr, 2009) because listening is not simply an auditory version of reading (Lynch & Mendelsohn, 2002, p. 194, as cited in Stæhr, 2009). In Kelly's (1991) study, lack of vocabulary knowledge was found to be a main barrier for adequate listening comprehension by analyzing learners' error in listening to BBC radio news recordings. Bonk (2000) probed further into the research of vocabulary knowledge and listening, and showed that participants with a lexical coverage of 90% achieved higher listening comprehension scores than the participants recognizing fewer than those having 80 % of lexical coverage. This result was reinforced in detail by Nation's (2006) study, wherein the Wellington corpus of spoken English was analyzed. Nation estimated that 6,000-7,000 word families were needed in coping with an unscripted spoken discourse. In a more recent study (Stæhr, 2009), it was concluded that a vocabulary size of at least 5,000 word families might provide a significant prediction in successful listening comprehension.

Although the research mentioned above provides some hints on the role of vocabulary knowledge in listening, there are at least two issues remaining that need to be researched. These are

different vocabulary sizes that are found to be needed in successful listening comprehension, which might be due to different spoken input; and vocabulary size, and the quality of knowing a word, which provides more facilitated power in listening comprehension.

Research Questions

Research Question 1

This study analyzed the breadth of vocabulary knowledge and proposed the first research question: What is the correlation between vocabulary size and listening comprehension of Chinese EFL students and at what vocabulary threshold level would moderate performance be expected?

Research Question 2

As discussed above, the depth of vocabulary knowledge is assumed to be an important component of listening comprehension. The second research question is: Does the depth of vocabulary knowledge have a higher correlation than r=0.50 with listening comprehension if a higher correlation than r=0.50 exists between the breadth of vocabulary knowledge and listening comprehension?

Research Question 3

In addition to answering the above questions, this study will answer Research Question 3, which is: To what extent does the depth of vocabulary knowledge add to the prediction of listening comprehension, over and above the prediction provided by the breadth of vocabulary knowledge?

Methodology

Participants

The first criterion for choosing participants is to make sure that the participants were representative of tertiary-level EFL

learners in the Guangxi Region of China. The 88 participants, with Chinese as their native language, were from three universities in Guangxi: Nanning University, Guangxi Teacher Education College, and Guangxi University. They ranged from 19-21 years of age, with 20 male and 68 female students. The three universities represent the low levels, intermediate levels and advanced levels in higher education. Therefore, the learners, to some extent, represent tertiary-level EFL learners in the Guangxi Region. The second criterion was having a reading threshold level of 3,000 word families. As the threshold level of 3,000 word families is the basic level for academic reading (Laufer, 1992, 1996; Qian, 1998), a threshold level of 3,000 word families or above is also needed for listening comprehension. College English Test 4 (CET) is a nationwide English teaching assessment test administered by the National Education Bureau with the goal of providing objective and accurate assessment for basic university English teaching. A basic vocabulary level of about 3,000 word families is needed to pass the exam ("College English Test Band 4 and 6", 2005). All the participants involved in this study had already passed CET 4; therefore, it was assumed they had mastered around 3,000 words. The third criterion was the background knowledge of the learners. The local language they speak and the Chinese language they learned from primary school are significantly different from English. When learners share the same language, including local language and background knowledge, the languages they know are quite different from English language, therefore, they are less supported to guess the meaning in testing. Teachers at the three universities helped to find students who met these requirements. Fortunately, all of the 88 participants in the current study were interested in the research because they all wanted to take the opportunity to know more about their vocabulary level.

Research Instruments

Vocabulary Size Test (VST)

The first part of VST in this study was replicated from Nation (1983). Laufer (1992, 1996) also used this test in his study; this vocabulary size test has been widely applied in EFL vocabulary research. This test included five levels: a 2,000-word, 3,000-word, 5,000-word, university word, and 10,000 word levels. Each level included 36 items and 18 choices. Participants had six words with three definitions and needed to match the most appropriate definition to the correct word. An example from the 3,000 word level test follows:

1. administration
2. angel ------ managing business and affairs
3. frost ------ spirits who serves God
4. herd ------ group of animals
5. mate
6. pond

According to Nation (1983), learners needed to match at least 13 correct choices out of 18 possibilities to master the words at that level. The scores of the 3,000-word and the 5,000- word levels were analyzed in the current study. The maximum score for each level in this part is 18 points, with 36 points for the 3,000- and 5,000-word levels.

The second part of the Vocabulary Size Test was also replicated from the two equivalent versions of the VST developed by Laufer and Nation (1999), which included 18 target items. As a reliable test for discovering the learners' breadth of vocabulary knowledge, this test provided a valid measurement added to the VST (Nation, 1983). In this section, each test item contained a meaningful sentence and the first few letters of the missing word

given as a clue for guessing the meaning. An example from the 3,000-word level test is:

I live in a small apa____ on the second floor.

The maximum score for each level in this part is 18 points, with 36 points for the 3,000-and 5,000-word levels.

The Depth of Vocabulary Knowledge Test (VKS)

The test on the depth of vocabulary knowledge used in the current study included two sections. The first section applied part of the VKS invented by Wesche and Paribakht (1996). Slightly different from the five-scale test, a more detailed seven-scale test was used to understand the learners' stages in their knowledge of the tested words in this study. Most of the 50 items tested were chosen from the 3,000-and 5,000-word list (Nation, 1986; Nation & Webb, 2011). The maximum score for the 50 items is 300 points.

Table 1: The Seven-scale Test of Vocabulary Knowledge

Aspects	Scales	Possible scales	Self-report
Form	1	0	I have never seen this word
	2	1	I am only familiar with the form.
	3	2	It possibly means that…
Meaning	4	3	I know, it means…(Chinese)
	5	4	I know, it means…(Synonym in English)
Usage	6	5	I can use the word in a sentence. (Grammatical mistakes are found)
	7	6	I can use the word in a sentence. (Grammatical and collocation accuracy)

The second section was the word-associates test developed by Read (1989, 1993, 1995). It was used to test the knowledge of a specific word group, for example adjectives or verbs. The test

consisted of 50 items testing whether the learners could identify the collocation, synonymous, part-whole, and whole-part relationship between the stimulus word and eight choices. The eight possible choices were put into two groups, with four of the eight choices as distracters, which were distributed either in the left or right box. The 50 items tested were also chosen from the 3,000-and 5,000-word lists (Nation, 1986; Nation & Webb, 2011). The maximum score for the items in this section was 200 points. An example from the 3,000-word level is:

Savage

Wild original cruel desolate	dictatorship mess sight canyons

The words on the left box were all adjectives and the words on the right box were all nouns. The relationship of the given word with the choices (wild, cruel) on the left is either synonymous or part-whole, or whole-part. The relationship of the given word with the choices (dictatorship, sight) on the right is collocational.

Listening Comprehension Test

The materials for testing listening comprehension were chosen from the International English Language Testing System (IELTS). The learners needed to answer 40 items by either multiple choice or spelling in the test. Each correct answer got one point and the maximum score for the test was 40 points.

Example:

Answer the following question while listening to the recordings:

1. Work at _____
2. A champion will be in the shop ____
   A. on Saturday morning
   B. all day Saturday
   C. for the weekend

Procedures

The data for the current study were collected from the 88 participants from three universities of different tertiary education levels in the Guangxi Region. The score of the learners' CET 4 had to be over the basic score of 425. It was assumed that, according to the test requirements, the learners had already mastered around 3,000 words ("College English Test Band 4 and 6", 2005.) With the help of the teachers in the two universities, all the learners gathered in a relaxed and friendly setting. The first phase of testing was to conduct the 3,000-and 5,000-word levels of Nation's (1983) and Laufer and Nation's (1999) productive VST. The second phase was the administration of the depth of vocabulary knowledge test, including the VKS of Wesche and Paribakht (1996), and the word-associates test of Read (1989, 1993, 1995). The third phase was to administer the IELTS listening comprehension test. All the tests were conducted in strict order, and it was ensured that all the learners received the same instructions about the tests.

Results

Research Question 1

To answer the proposed research question 1 of whether vocabulary size has a significant correlation with the scores of listening comprehension and to determine what the optimal threshold level is for listening comprehension, the collected data were analyzed with the statistics software SPSS (version 19.0). The results of the VST were as follows.

Table 2: The Descriptive Statistic of the Vocabulary Size Test

	N	Min.	Max.	SD	M	A.S.
3,000 level	88	29	32	5.123	31.77	15.88
5,000 level	88	17	32	9.112	23.4	11.70

Note. A.S. =Average scores (in each part of vocabulary size test)

As shown in Table 2, the learners involved in this study achieved a satisfactory outcome in the 3,000-word level test. The average score in each part of this vocabulary size test was 15.88 points, which met the requirement of at least 13 correct choices as defined by Nation (1983). As the learners had already passed the test of CET 4, it was not difficult for the learners to achieve a satisfactory result at the 3,000-word level. In contrast, the 88 learners achieved unsatisfactory results at the 5,000-word level. Their average score in each part of the vocabulary size test was only 11.70, which was lower than the required level of 13 correct choices. Excluding the learners with low scores, only 40 learners satisfied the requirement of at least 13 correct words in the 5,000-word level. For the next step, the results of the 40 students who had passed the 5,000-word level were analyzed separately from the other 48 students who took part in the LCT at the same time, but did not receive the required score.

Table 3: The Descriptive Statistics of Listening Comprehension Test

	N	Min.	Max.	SD	M.	Score range
3,000 level	48	13	20	2.481	16.81	13-20
5,000 level	40	28	39	2.725	32.10	28-39

As shown in Table 3, the learners at the 5,000-word vocabulary level outperformed the learners at the 3,000-word vocabulary level. The mean score of learners at the 5,000 vocabulary level was almost double than the learners in the 3,000 vocabulary level (32.10 vs. 16.81). To explore the relationship between the vocabulary size test and the LCT, the one-tailed Pearson Product Moment Correlation Analysis was used, and the results are displayed in Table 4.

Table 4: Pearson Correlation between VST and LCT

Variables	LCT
VST in 3,000 level	.41
VST in 5,000 level	.86*

**Significant at 0.05 VST=Vocabulary Size Test LCT=Listening Comprehension Test*

As shown in Table 4, a strong and positive correlation between EFL learners' listening comprehension and the vocabulary size test at the 5,000 word families level (r=0.86) was found. A correlation between EFL learners' listening comprehension and the vocabulary size test at the 3,000 word families level (r=0.41) was lower than the moderate level of r=0.50 as stated by Hamilton (1990). Findings suggested that knowing a word level of 3,000 word families was not sufficient for Chinese EFL learners to perform satisfactorily in academic listening comprehension. Considering the listening comprehension scores of the learners with a level of 5,000 word families, the significant effect that vocabulary size has in the prediction of listening comprehension was established. Although some scholars (Laufer, 1992, 1996; Qian, 1998) suggested the threshold level for academic reading comprehension was at the level of 3,000 word families, this study showed that it was difficult for EFL learners at that level to comprehend when listening to the LCT. It was believed that some words that EFL learners knew when reading a passage might become unfamiliar during listening comprehension (Renandya, 2011). Therefore, a larger vocabulary level or more familiarity with semantic processing in listening is essential for outstanding performance in academic listening comprehension. Although there are various viewpoints of the appropriate threshold level, Sutarsyah, Nation and Kennedy (1994) advised a level of 4,000-5,000 word families while Coady et al. (1993) proposed an explicit understanding of the words at the level of 3,000 word families could provide positive effects. Qian (1998, 1999, 2002) also

confirmed the predictive power of knowledge of 3,000 word families on reading comprehension. However, this study strongly suggested that at least a level of 5,000 word families is needed for EFL learners to have an outstanding performance in academic listening comprehension. This finding also provided some insights beneficial to pedagogical practices in teaching for the teacher as well as learning listening comprehension for EFL learners, e.g., priority in cultivating learners' word-level competency should be taken as a crucial element in listening comprehension. A faster semantic processing of familiar or unfamiliar words while listening might be achieved when the learners focused on word-level competency. If listening comprehension were a picture or a painting that appeared gradually in the learners' mind, then word-level competency would contribute to deepening the interrelated vocabulary knowledge. Too much attention to listening strategy instructions, such as predicting and inferencing, might not work as it would impede the achievement of word-level competency (Krashen, 2011; McDonough, 2006; Renandya & Farrell, 2011; Ridgway, 2000).

Research Question 2

To answer Research Question 2, of whether the correlation between the depth of vocabulary knowledge and listening is higher than the correlation level between vocabulary sizes with listening comprehension, the One-tailed Pearson Product Moment Correlation Analysis was used. The correlation between the vocabulary size test at the level of 5,000 word families with LCT is r=0.86, and, according to the hypothesis, the depth of DVK should have a positive correlation. The results are shown in Table 5.

Table 5: Pearson Correlation between DVK and LCT

Test	LCT
DVK	0.91*

**Significant at 0.05 DVK=Depth of Vocabulary Knowledge LCT=Listening Comprehension Test*

Table 5 showed the correlation between DVK and LCT was *r*=0.91. This finding supported the second hypothesis that, if VST had a high correlation (*r*=0.86), then the DVK would have a higher correlation with the scores of LCT (r=0.91). The reason for this might be explained as DVK probes more into the various aspects of the collocational, synonymous and part-whole, whole-part relationships of the given words while the VST measures only the meaning of the target words.

Research Question 3

To answer Research Question 3, regarding the extent that the depth of vocabulary knowledge adds to the prediction of listening comprehension, over and above the prediction provided by the breadth of vocabulary knowledge, a multiple regression analysis was used. In the current study, a stepwise procedure was used and the predictors were entered into the regression equation in order. For the stepping-method criteria, the probability of F-to-enter was set to be lower or equal to 0.05 and the probability of F-to-remove was set to be larger or equal to 0.10 to enter conditional independent variable or remove any unqualified independent variables for the prediction of LCT. The analysis measured the effects of one variable to another variable by assessing the change of R^2, specifically, by observing the change of the portion of R^2 when adding DVK to VST. The results are shown in Table 6.

Table 6: Regression Results of Multiple Regression Analysis (n=88)

Variable	R	R^2	Adjusted R^2	Std. error of estimate	R^2 Change	F Change	df 1	df 2	Sig.F Change
VST	.927	.860	.858	3.040	---	0.860	1	86	.000
DVK	.941	.886	.883	2.763	.026	19.157	1	85	.000

**significant at 0.01*

As shown in Table 6, the value (R=0.927) showed a close and high degree of change between VST and LCT. The value (R=0.941) showed a higher degree between DVK and LCT. In other words, both VST and DVK contributed significantly to the performance of listening comprehension. Specifically, the independent variance of VST accounted for 86% of the predictions on the LCT and the variance of DVK added more than 2.6% portion on the prediction of LCT. DVK was a more powerful predictor of LCT as DVK added a smaller portion of explained variances in LCT compared with the prediction provided by VST.

The reason for this might be that, although the predictive power of vocabulary breadth facilitated the understanding of meaning of the words, vocabulary depth was sufficient in understanding the in-depth meaning of the materials. It is easier to associate the meaning of words with a situated context, which might help the learners guess the meanings of some unfamiliar words. In addition, the depth of vocabulary knowledge covers both paradigmatic and syntagmatic knowledge, which the breadth of vocabulary knowledge lacks. In the process of listening, the learners have to process the incoming information of speech fast and automatically (Renandya & Farrell, 2011). To achieve this, learners' automatic processing ability and accessibility to the depth of vocabulary knowledge are required. Therefore, EFL learners need to enhance the understanding level of the depth of vocabulary knowledge to probe into the various aspects of a given

word as well as its association with the context to deal with any unfamiliar words that might appear in the process of listening.

Discussion

The results showed that the breadth and depth of vocabulary knowledge are significantly correlated with listening, which indicated that these two factors are important in teaching academic listening comprehension. However, it is worth noting that a correlation of 0.86 between a vocabulary size of 5,000 word families and listening may be somewhat higher than expected. This might be explained as the effects of using different measurement tools. In a recent study conducted by Milton, Wade, and Hopkins (2010), they used *yes/no* measures of orthographic vocabulary size (X_Lex) and phonological vocabulary size (A_Lex) to measure the correlation between vocabulary knowledge and IELTS listening, and a correlation of 0.52 was found between X_Lex and vocabulary knowledge. Although the correlation level is different, it seems plausible to assume that learners with a larger lexical coverage of spoken input will be more likely to conduct automatic and efficient processing of spoken input. This will allow them to successfully cope with the heavy processing load of academic listening comprehension, for which I argue that the EFL learners who do not reach a threshold level of at least 5,000 word families of declarative knowledge and procedural knowledge will find it very difficult to process the auditory input effectively. The results here have direct implications for teaching academic listening comprehension. There is an explicit need to expand an EFL learners' vocabulary size to enable them to reach a certain lexical coverage level. In this study, a vocabulary size of 5,000 word families is an appropriate target for EFL learners.

Apart from findings of vocabulary size, the results of the current study also revealed that the depth of vocabulary knowledge, operationalized by VKS and word-associates test, had

a higher correlation level of *r*=0.91. The depth of vocabulary added a 2.6% variance to the vocabulary size, and was found to contribute to academic listening comprehension. However, this correlation level is different from Stæhr's (2009) finding of a correlation level of r=0.51 between the depth of vocabulary size and listening. It might be explained that in Stæhr's (2009) study, the breadth and depth of vocabulary knowledge may have tapped into the same dimension of vocabulary knowledge because only the receptive meaning of targeted knowledge was measured, while the productive level of vocabulary was not addressed. In addition to this, the word-associates test was only used in Stæhr's (2009) study to measure the depth of vocabulary knowledge, which also did not measure the productive level of targeted knowledge. The argument can be raised that although depth is a consequence of knowing many words, it does not mean that the more words a learner knows, the more links between words they will form, and the more elaborate structure of the network will be established. However, this does not necessarily mean that the breadth and depth of vocabulary knowledge be treated separately. Rather, in teaching academic listening comprehension, the depth of vocabulary knowledge needs to be given more attention since it has been proven there is a substantial prediction in listening scores. Understanding more about the depth of vocabulary knowledge is highly suggested in achieving this and might provide learners with a more advanced semantic processing ability with either familiar or unfamiliar words in many activities, such as word-level competency.

Conclusion

The importance of vocabulary knowledge was stressed in this study, and the ability to understand the words was the prerequisite of comprehending academic listening material. To understand the importance of vocabulary knowledge, this study

analyzed the relationship between the breadth and depth of vocabulary knowledge and listening comprehension, and assessed the role that the breadth and depth of vocabulary knowledge provided in listening comprehension.

This study proposed first that the threshold of vocabulary size for academic listening comprehension is at a level of 5,000 word families, and pointed out that the threshold level of 3,000 word families was not sufficient for academic listening comprehension, even though it was the threshold level for academic reading comprehension (Qian, 1998). The reason suggested for this might be that listening comprehension requires a more advanced semantic processing ability with either familiar or unfamiliar words. This study also suggests that word-level competency be taken as a starting point for teaching or learning listening comprehension. Over-attention on listening strategies should be avoided, because it might hinder the achievement of word-level competency (Krashen, 2011; Renandya & Farrell, 2011). Unfortunately, vocabulary is often ignored and students are bogged down with a dilemma of guessing words in the EFL teaching context. Learners need more time to identify the meaning of familiar words in listening rather than familiar words in reading (Ridgway, 2010). In addition, learners might be required to identify the meaning of some unknown words while listening. Teachers need to apply effective instructions in teaching the depth of vocabulary knowledge, and learners need to take part in more pedagogically practical activities to improve their performance in listening comprehension. Effective instructions on learning the depth of vocabulary knowledge should include cultivating learners' word consciousness, identifying morphological and semantic interconnectedness between words, and enhancing learners' sensitivity to words with multiple meanings.

The breadth of vocabulary knowledge facilitated the understanding of the meanings of the words, while the depth of

vocabulary knowledge provided a better predictive power for understanding the in-depth meaning of the materials and making it easier for learners to associate the meaning of words with background knowledge, which might provide a helpful prediction of listening comprehension scores.

Regarding to what extent the depth of vocabulary knowledge adds to the prediction of listening comprehension, over and above the prediction provided by the breadth of vocabulary knowledge, the findings fall in line with Qian's study (1998, 1999). Although the R^2 change was only 2.6% when adding DVK to VST, it was demonstrated with evidence that the depth of vocabulary knowledge had significant predictive power on the scores of listening comprehension and should receive attention by teachers as well as by EFL learners in China for future learning of listening comprehension skills. It is meaningful for the course designer and English materials editor to consider these findings because the various aspects of vocabulary knowledge receive little attention in the course syllabi and textbooks in Chinese EFL settings. It is also important for the EFL learners to acquire various aspects of vocabulary knowledge, such as raising awareness of word potential, so that its prosperities could be fully exploited for Chinese EFL learners (Liu & Shaw, 2001).

Limitations

One of the limitations in this study is that, although it showed a positive correlation between the level of 5,000 word families and the LCT, it showed a negative correlation at a threshold of 3,000 word families, which was not sufficient for outstanding academic listening comprehension. This point should still be treated with caution because this finding was limited to the Chinese context of learning English as a foreign language. More research is needed to confirm this point. In addition, the correlation between DVK and VST as a new emerging research

point in vocabulary knowledge research was not analyzed in this study. Future research on the interconnectedness and interdependence of the two predictors is needed. Moreover, Adolphs and Schmitt (2004) showed that the lexical coverage and vocabulary size needed for understanding spoken input varies according to different contexts. However, the current study did not cover the issue of using different contexts; therefore, more research into lexical coverage in different contexts is needed to propose a valid conclusion of what vocabulary sizes are optimal for coping with different listening activities.

Acknowledgements

I am grateful to Sabrina Zhang, and Fang He for their assistance in inviting students to join the study. I also want to express my special thanks to Mable Chan for helpful comments at the initial version of this paper. I also thank the anonymous reviewers for their valuable suggestions. All errors are mine.

The Author

Feng Teng is a lecturer and researcher in applied linguistics in the Department of English, Nanning University, China. He has done intensive research on the teaching and learning of vocabulary, especially the correlation between vocabulary knowledge and reading and listening comprehension.

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