Explaining listening comprehension among L2 learners of English: The contribution of vocabulary and grammar knowledge[1]

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ABSTRACT: This study explores the relative importance of two types of knowledge – vocabulary and grammar – to explain success for L2 learners' listening comprehension (LC). Forty Chinese learners of English studying in a UK university participated in the study. L2 learners' vocabulary knowledge was measured through a receptive aural vocabulary test and their grammar knowledge was measured through an aural grammar test. The Cambridge Preliminary English Test (PET) listening section was adopted to measure L2 learners' listening comprehension proficiency. Results from correlation analysis showed that both vocabulary and grammar measures correlated with L2 listening ($r = .65$ and $r = .74$, respectively). Hierarchical regression analyses showed that the vocabulary and grammar measures jointly explained 65.7% of the variance in the listening score and that each measure made a unique contribution. It was also found that the grammar measure explained more of the variance in L2 listening than the vocabulary measure. These results demonstrate the importance of good L2 vocabulary and grammar knowledge in benefiting learners' LC.
Keywords: vocabulary knowledge, grammar knowledge, second language listening comprehension.

Explicando la comprensión auditiva entre estudiantes de inglés como segunda lengua: La contribución del conocimiento de vocabulario y gramática

RESUMEN: Este estudio explora la importancia de dos tipos de conocimiento, vocabulario y gramática, para explicar el logro en la comprensión auditiva (LC, por sus siglas en inglés), de estudiantes de segunda lengua. Cuarenta estudiantes chinos que estudian inglés en una universidad del Reino Unido participaron en este estudio. El conocimiento de vocabulario de los estudiantes de segunda lengua fue medido a través de una prueba auditiva de vocabulario receptivo, y su conocimiento gramático se midió a través de una prueba auditiva de gramática. Además, se adoptó la sección de audio de la prueba de Cambridge Preliminary English Test (PET) para medir el nivel de comprensión auditiva de los estudiantes. Los resultados del

análisis de correlación mostraron que tanto el vocabulario como la gramática se correlacionan con la comprensión auditiva en el segundo idioma (r = .65 y r = .74, respectivamente). Los análisis de regresión jerárquica mostraron además que las medidas de vocabulario y gramática en conjunto explican el 65.7% de los cambios en el puntaje de comprensión auditiva, y que cada medición hizo una contribución única. También se encontró que la medición de gramática explica más sobre los cambios en la comprensión auditiva del segundo idioma que las medidas de vocabulario. Estos resultados demuestran la importancia que tiene un buen conocimiento de vocabulario y gramática en la segunda lengua en el beneficio de la comprensión auditiva de los estudiantes.

Palabras clave: conocimiento de vocabulario, conocimiento de gramática, comprensión auditiva del segundo idioma.

1. Introduction

Listening comprehension (LC) is a complicated process as it is based on both listeners' linguistic and non-linguistic knowledge (Buck, 2001). Recently, an increasing number of studies have been conducted into the relationship between second language (L2) learner individual differences and their LC (e.g., Andringa, Olsthoorn, van Beuningen, Schoonen, & Hulstjin, 2012; Cai, 2020; Leonard, 2019; Masrai, 2019a, 2019b; Matthews & Cheng, 2015; Vandergrift & Baker, 2015; Wang & Treffers-Daller, 2017). Andringa et al. (2012) explored the following determinants of success in native (NS) and non-native speakers' (NNS) LC: linguistic knowledge, cognitive ability, processing speed, and working memory. Meanwhile, Vandergrift and Baker (2015) investigated learner variables in L2 LC, i.e., first language (L1) listening ability, L1 and L2 vocabulary knowledge, auditory discrimination ability, metacognitive awareness of listening, and working memory capacity. More recently, Masrai (2019a) examined the relationship between vocabulary knowledge and working memory and L2 LC. Following this, Leonard (2019) explored the correlation between L2 learners' decoding ability and LC and Vafaee and Suzuki (2019) investigated the concurrent roles of linguistics, cognitive, and affective variables in L2 listening. Finally, Wallace (2020) examined the role of knowledge, metacognitive awareness, memory, and attention in L2 LC, and Cai (2020) explored the relative importance of lexical and syntactic knowledge in the area. Most of this extant literature focused either on only one source of learners' linguistic knowledge or did not examine the relative significance of different sources. Certainly, the consensus seems to be, according to Bloomfield, Wayland, Rhoades, Blodgett, Linck, and Ross (2010), that vocabulary and grammar knowledge, along with phonological knowledge, are the most important linguistic components of L2 listening ability.

What remains under-explored is the relative contributions made by vocabulary and grammar knowledge to L2 LC. Therefore, this study addresses the gap in understanding of the learner variables which have an impact on L2 learners' LC; it does so by providing empirical evidence about the extent to which L2 learners' vocabulary and grammar knowledge can explain the variance in their LC. The aim is to establish the relative contribution of both learner variables to L2 LC; a better understanding of these is urgently needed because L2 learners find it hard to improve in this area (Graham, 2011). The study was conducted among 40 Chinese learners of English studying in a UK university in majors of financing, accounting and computer engineering. Data were collected by measuring the learners' L2

LC proficiency and L2 vocabulary and grammar knowledge. Hierarchical regression analysis was adopted to explore the relative importance of each learner variable in the model of LC.

2. LITERATURE REVIEW

In the conceptual framework established by Bachman and Palmer (2010), language ability is defined as "the capacity that enables language users to create and interpret discourse" (p. 33). Accordingly, they state that language knowledge covers grammatical knowledge, which includes vocabulary, syntax, and phonology. Similarly, Field (2013) put forward three models of lower/higher-level processing in LC; one of which comprises the same three sources of knowledge, albeit with vocabulary labelled differently: phonological, lexical, and syntactical.

Vocabulary knowledge has been presented in models of L2 LC as a way of assigning meaning, at least in part, to aural input (Vafaee & Suzuki, 2019). Although studies have been conducted which explore the relative contribution of vocabulary knowledge to explain variance in L2 LC (e.g., Bonk, 2000; Matthews, 2018; Staehr, 2009; Vandergrift & Baker, 2015; Wallace, 2020), a limited number of studies have been carried out which investigate the contribution of both vocabulary and grammar knowledge to the prediction of L2 LC in a single study. According to Bachman and Palmer (2010), grammar knowledge is an indispensable component of a learner's language ability; a view widely shared in the field of applied linguistics. Furthermore, although Clahsen and Felser (2006) assume that NNS are mainly guided by lexical and semantic cues, rather than syntactic ones, related studies reveal different findings.

As early as 2000, Mecartty investigated the relationship between L2 vocabulary knowledge and grammar knowledge in reading and LC activities and found that learners' L2 grammar knowledge correlated significantly with their L2 LC, but did not contribute significantly to explaining any variance. In Mecartty's (2000) study, participants were 154 students of Spanish at university level. The results showed that L2 both vocabulary and grammar knowledge significantly correlated with reading proficiency, but only vocabulary knowledge emerged as a significant predictor, explaining about 25% of reading ability. Vocabulary knowledge also significantly correlated with L2 LC, explaining about 14% of the variance, however, grammar knowledge did not explain any variance. The strength of the relationship between vocabulary knowledge and LC may have been reduced because of a weakness in the study, i.e., learners' ability to recognise spoken forms of the words is important to their LC (Macaro, Graham, & Woore, 2016), but what Mecartty's (2000) study investigated was their grammar knowledge using written tests, therefore testing their ability to recognise the written forms of the words.

In another study, Andringa et al. (2012) investigated 121 NS and 113 NNS of Dutch, with the aim to uncover the determinants of success in LC. In their study, a written receptive vocabulary test was used to assess the NNS' vocabulary size, and an aural task was used to measure their grammar knowledge. The results showed that linguistic knowledge – subdivided into vocabulary knowledge, grammar knowledge, and phonological knowledge – correlated significantly with NNS listeners' LC (r = .96). In addition, the authors found that linguistic knowledge and IQ together explained 96% of the variance in NNS' LC.

In a recent study, Vafaee and Suzuki (2019) examined the relative significance of vocabulary knowledge and syntactic knowledge in L2 listening ability among 263 EFL learners. A standardized IELTS listening test was used to measure the learners' listening ability and aural tests were adopted to measure their syntactic and vocabulary knowledge. The study also examined the effects of several cognitive and affective factors when explaining L2 listening. Structural equation modelling analysis showed that both vocabulary and syntactic knowledge were significantly correlated with L2 listening scores and they were significant predictors of L2 listening proficiency. The results also showed that vocabulary knowledge was a stronger predictor of L2 listening ability with an effect size being almost twice as much as the one for syntactic knowledge.

Meanwhile, Cai (2020) explored the correlation between lexical and syntactic knowledge with L2 LC and the unique contribution made by these two types of knowledge. The study recruited 258 Chinese learners of academic English and made use of a retired IELTS listening test to measure participants' L2 listening proficiency. A partial dictation task was adopted to measure lexical and syntactic knowledge and the results showed both measures correlated strongly with L2 listening proficiency ($r = .77$ and $r = .67$, respectively). Hierarchical regression analyses showed both measures jointly explained 62% of the variance in the L2 listening scores and that each measure made a unique contribution. The lexical score alone was a good predictor of L2 LC, explaining 59% of the variance in the listening score; meanwhile, the syntactic score alone was also a good predictor of L2 LC, explaining 45% of the variance in the listening score.

The extant literature shows that although L2 vocabulary knowledge plays an important role in L2 LC, the role of L2 grammar knowledge does not have that consensus. As Vafaee and Suzuki (2019) point out, research is needed which focuses on those variables which contribute to L2 LC in order to enhance our theoretical understanding of the listening construct and to provide suggestions for L2 listening pedagogy.

3. METHOD

The current study is designed to improve our understanding of L2 LC construct and is a part of a larger project. Two research questions (RQs) on the correlation between learners' linguistic knowledge, their listening comprehension proficiency, and the contribution of learners' linguistic knowledge to their LC were raised. In order to find answers to the RQs, this study investigated 40 non-native English speakers (NNES) who are undergraduate students studying in a UK university. The independent variables were participants' scores on two tests measuring their vocabulary and grammar knowledge. While the extant research described in Section 2 used written tests, rather than aural tests, or used just one task to measure learners' vocabulary and grammar knowledge, the present study adopted two aural tests to measure this knowledge separately. The dependent variable was participants' scores on a LC test. Correlation analysis and regression analysis were undertaken. The following sections explain this process.

3.1. Research questions

As the aim of this study is to disentangle the contribution of vocabulary and grammar knowledge to LC and to establish the relative contribution of each source of linguistic knowledge, the following research questions are posed:

1) How do vocabulary knowledge and grammar knowledge correlate with L2 LC in an ESL context?
2) Do vocabulary and grammar knowledge each make a unique contribution to L2 listening comprehension in the ESL context?

3.2. Participants

Participants were 40 Chinese undergraduate university students, studying in the UK, for whom English is a second language (Male = 6, Female = 34). Their ages range from 18 to 23 (M = 20.5, SD = 1.1) and they had been learning English for an average 12.6 years, ranging from nine to 18 years at the time of data collection. The duration of their time studying in the UK ranged from 12 to 36 months (M = 16.1, SD = 6.6). All participants achieved an IELTS score of 6.5 or over in order to meet the minimum requirement of English language ability for international students studying in a UK university.

3.3. Instruments

The Cambridge Preliminary English Test (PET) listening section
The Cambridge Preliminary English Test (PET) is a comprehensive exam developed by Cambridge English Language Assessment. The PET measures test-takers' skills in reading, listening, writing, and speaking. The listening section aims to assess test-takers' abilities to comprehend dialogues and monologues in both informal and neutral settings on a range of everyday topics. These include daily life, the environment, hobbies and leisure, transport, and personal identification, among others, and all are based on authentic situations. The listening section includes 25 items (25 marks in total) and represents 25% of the total marks available for the exam. There are four parts to the listening section, ranging from short exchanges to longer dialogues and monologues, and lasting 35 minutes, including six minutes given to transfer answers to an answer sheet. The PET listening was chosen to measure participants' LC proficiency mainly because it is an international, standardized exam recognised for purposes of business, study, and immigration by employers, further education institutions, and government departments (Cambridge English Language Assessment, 2014).

An aural vocabulary test
The Listening Vocabulary Levels Test (LVLT, McLean, Kramer, & Beglar, 2015) was used to measure participants' aural vocabulary knowledge. According to McLean et al. (2015), the LVLT was designed to measure Japanese learners' aural vocabulary knowledge of English words from the first five 1K frequency levels and the Academic Word List (AWL). The LVLT comprises six parts with 150 items in total. In each of the first five parts, 24 items are included, measuring 1K frequency on one level. In the sixth part, 30 items are

included which measure the AWL. The LVLT items were chosen from the British National Corpus (BNC) / Corpus of Contemporary American English (COCA) list (Nation, 2012), the first five 1K frequency levels of which provided adequate coverage for listening across a wide range of genres (McLean et al., 2015) and provided nearly 96%-97% coverage of conversations (Nation, 2006). The AWL was included in the LVLT because it covers 10% of tokens in academic texts and 4.41% of academic spoken English (McLean et al., 2015).

In the LVLT, participants heard a word in a simple carrier sentence; this provides context in the event that the target word has more than one possible meaning or use. Each item has four answer options. After hearing the target word and the carrier sentence, participants chose one option in the Chinese version with the closest meaning to the target word. The recordings were played only once and the whole test lasted 35 minutes. The LVLT, rather than other vocabulary tests, was used mainly because it is an aural test and it is acknowledged that L2 learners' aural and written vocabulary knowledge differs (Field, 2008; Milton & Hopkins, 2005). In an aural vocabulary test, L2 learners have to make use of their knowledge of English phonology, rhythm, and stress patterns (McLean et al., 2015). In addition, because the four options for each item were in written Chinese, this avoided the risk of measuring participants' reading ability in their L2 instead of their listening ability.

An aural grammar test

Participants' grammar knowledge was measured through the Test for Reception of Grammar version 2 (TROG-2, Bishop, 2003). This comprehensive grammar test was designed to assess understanding of English grammatical contrasts which are marked by inflections, function words, and word order. According to Bishop (2003), by using this test researchers can not only discover how a participant's grammar comprehension compares with that of other participants, but they can also find the participant's specific area of difficulty.

The test comprises 80 items. Participants' understanding of each item is assessed through their answers. For each item, participants hear a sentence and see four choices in the form of pictures on a computer screen. One of the pictures depicts the target sentence, the other three depict distractor sentences, participants must choose one option. Target grammar knowledge covers a wide range of constructions, including negation, reversible structure of Subject + Verb + Object (SVO), comparative/absolute, relative clause in object, and centre-embedded sentences. There are 20 blocks in total and there are four items in each block. The task lasted 12 minutes. The TROG-2 was used in this study mainly because it measures learners' grammar knowledge in aural form, thus maintaining the same form as the listening test. It is well-established that learners who comprehend a written text which tests their grammar knowledge, does not necessarily mean those same learners will comprehend similar text presented in speech form. Certainly, aural form grammar tests have worked well in previous studies, for example, Andringa et al. (2012) and Vafaee and Suzuki (2019).

3.4. Data collection procedure

The data collection was undertaken in a UK university. Participants were recruited by the author after the study was designed. At each collection time, either one or two participants took the tests in a quiet teaching or research room. They were each given the same instructions in Chinese and the tests were then administered where the answers were in

paper-and-pencil format. The vocabulary test and the listening test were counterbalanced in order to avoid the influence of different tests on participants' scores. Headphones were provided by the researcher and participants were instructed not to use their mobile devices. The data collection was completed over a period of about 40 days.

3.5. Data analysis

The scores used in the analyses were equal to the number of correct responses. The maximum score was 25 for the listening test, 150 for the vocabulary test, and 80 for the grammar test. In order to answer RQ1, scores on the vocabulary and grammar tests were correlated to the score on the listening test. To answer RQ2, the listening score was regressed on the vocabulary and grammar tests and hierarchical regression analysis was used to analyze the data. The first analysis started with the vocabulary test in the first step. The second analysis was conducted in the reverse order, starting with the grammar test.

3.6. Ethical issues

Before beginning the tests, each participant was given an information sheet detailing the purpose of the study, the tasks they would be asked to do, and the time these would take. Participants' signed consent forms were collected before the tasks began.

4. Rᴇsᴜʟᴛs

Correlations between vocabulary and grammar scores and L2 English listening scores were calculated to answer RQ1. Table 1 reports the mean, SD, and internal reliability for each of the three tests, and the correlations between each pair of measures.

Table 1. *Descriptive statistics, reliabilities and correlations (n = 40)*

	MEAN	SD	MAXIMUM	MINIMUM	CRONBACH'S ALPHA	CORRELATION COEFFICIENTS	
						VOCABULARY	GRAMMAR
Listening	17.93	4.02	22	8	.84	.65**	.74**
Vocabulary	120.15	12.27	135	84	.84		.44**
Grammar	70	6.26	79	53	.73		

Note. **$p < .01$

Table 1 shows that there were significant positive correlations between L2 listening comprehension and L2 vocabulary and grammar knowledge. The correlation between L2 listening proficiency and grammar knowledge was stronger than that between L2 listening and vocabulary knowledge.

The assumptions for carrying out a regression analysis were met, i.e., statistical assumptions, such as the normal distribution of residuals and the non-linear correlation between predicted variables and residuals were all met in the analysis (see Figure 1).
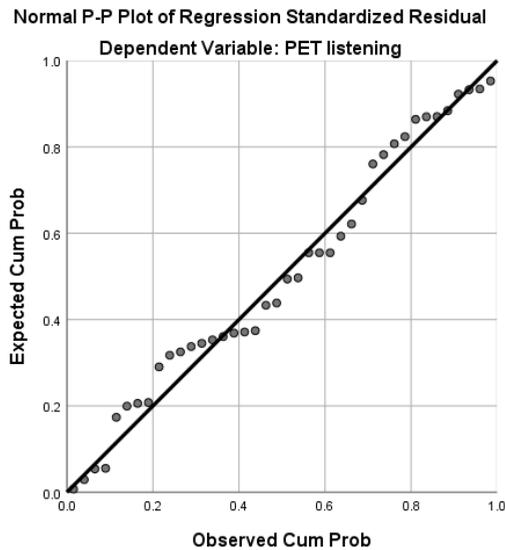

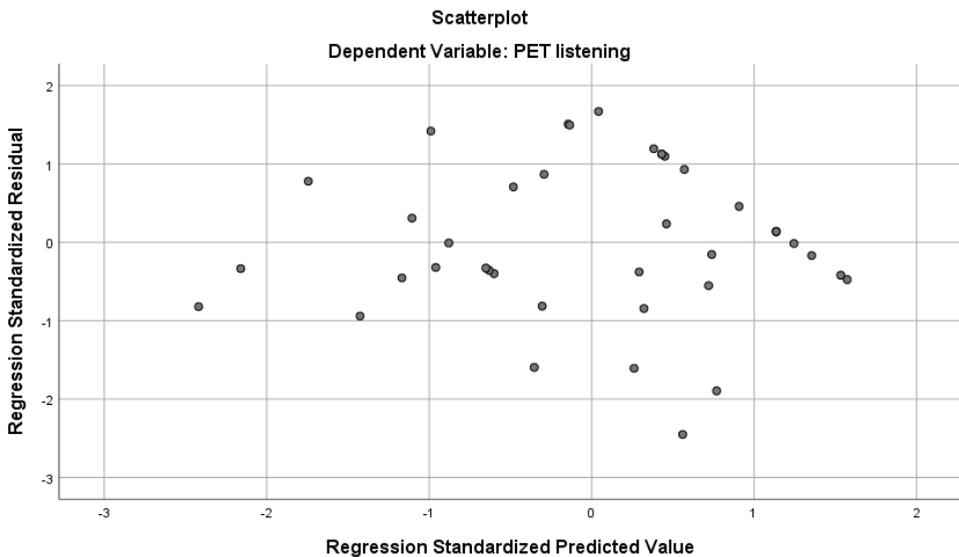**Figure 1.** *Multiple Linear Regression: Normal Probability*

Figure 2. *Multiple Linear Regression: Standardized Predicted Value and Residual*

Hierarchical multiple regression analysis was used to analyze the contribution of the two independent variables (vocabulary knowledge and grammar knowledge) to the dependent variable (L2 LC proficiency). In the first analysis, the LVLT score was entered as a sole predictor of L2 LC proficiency in the first step, with the addition of the score from the TROG-2 in the second step. The regression made with only the vocabulary score was significant, $R^2 = .421$, adjusted $R^2 = .406$, $F(1, 38) = 27.66$, $p < .001$. The addition of the grammar score produced a significant R^2 change, $R^2 = .253$, $F(2, 37) = 38.32$, $p < .001$. These results show that vocabulary knowledge alone is a good predictor of L2 listening comprehension, explaining 40.6% of the variance in the listening score. The addition of the grammar score contributed 25.3% more to that variance.

In the second analysis, the scores of the LVLT and the TROG-2 were entered in reverse order. In this regression analysis, the score of the TROG-2 was entered in the first instance, followed by the score of the LVLT. When the score of TROG-2 was the only predictor variable, the model was significant, $R^2 = .546$, adjusted $R^2 = .534$, $F(1, 38) = 45.71$, $p < .001$. The addition of the vocabulary score produced a significant R^2 change, $R^2 = .128$, $F(2, 37) = 38.32$, $p < .001$. These results show that grammar score alone is a good predictor of L2 LC, explaining 53.4% of the variance in the listening score. The addition of the vocabulary score contributed 12.8% more to the variance. In either order, both predictors were able to explain 65.7% of the variance in the listening score.

In the answer to RQ2, the results show that the vocabulary and grammar scores each made a unique contribution to the L2 LC score. In addition, the grammar score explains more of the variance in the dependent variable than the vocabulary score.

5. DISCUSSION

The results of the current study support the findings of Staehr (2009), Vandergrift and Baker (2015), Matthews (2018), and Wallace (2020) regarding the importance of vocabulary knowledge for listening comprehension among L2 learners. The study provides clear evidence that vocabulary knowledge explains unique variance in L2 listening comprehension.

However, these results do not support the findings of Mecartty (2000), Andringa et al. (2012), Vafaee and Suzuki (2019) and Cai (2020), regarding the importance of grammar knowledge for L2 listening comprehension compared with the importance of vocabulary knowledge. The current study shows that both the scores of vocabulary test and the grammar test correlated significantly with L2 LC scores ($r = .65$ and $r = .74$, respectively). When considered jointly, both the vocabulary and grammar tests each made a unique contribution to the variance in the listening score. These results provide further evidence that different degrees of relevance in the measures will yield different results concerning the relative importance of vocabulary and grammar knowledge in L2 LC (Cai, 2020). However, what differs between the results of the current study and those of the above-mentioned studies, is the respective relative importance of the two different types of knowledge (vocabulary and grammar) in explaining L2 LC. The current study indicates that the correlation between grammar knowledge and L2 LC is stronger than that between vocabulary knowledge and L2 LC. It was also found that the grammar knowledge test is able to explain variance in L2 listening comprehension over and above the vocabulary knowledge test. However, in

Mecarrty (2000), it was found that the correlation between grammar knowledge and LC (r = .26, $p < .05$) was weaker than the correlation between lexical knowledge and LC (r = .38, $p < .05$). Although scores on the vocabulary test were found to explain variance in L2 listening scores, the scores on the grammar test were not found to explain any variance. These results may be attributed to a weakness in the study: i.e., L2 learners' vocabulary and grammar knowledge were both assessed using written tests, this method is deemed to be a measure more preferable for assessment of learners' ability to recognize the written form of words (Macaro et al., 2016) than their ability to recognize their spoken form. If aural forms of measures had been used, the results might have been different.

Moreover, the results of the current study also differ from those of Andringa et al. (2012). While this may also be attributable in part to the learners' vocabulary knowledge being measured by a written test, other differences include the analysis methods adopted, and that the participants differed in their L1 compared to the participants in the current study who share the same L1.

Likewise, different results between the current study and Vafaee and Suzuki (2019) may be attributed to different measures of vocabulary and grammar knowledge, different L2 learning background, and data analysis methods.

Although the participants in the current study and in Cai's (2020) were all Chinese learners of English and the measures of vocabulary knowledge and grammar knowledge were in aural form, the learners' different learning backgrounds may have led to the different degree of contribution found between vocabulary and grammar knowledge. The participants in the current study had an average of 16 months experience studying in the UK, giving them an L2 immersion experience which the participants in Cai's (2020) study did not have, and this might help to explain the different results between the two studies.

6. CONCLUSION

In this study, the correlation between the two measures of L2 vocabulary and grammar knowledge and L2 LC, alongside the role played by L2 learners' vocabulary and grammar knowledge in LC, were examined. It was found that each measure had a significant positive correlation with L2 LC. The scores on L2 learners' vocabulary and grammar knowledge tests were found to explain 65.7% of the variance in the scores on the listening proficiency test. Moreover, it was found that both vocabulary and grammar scores each made unique contributions to L2 LC scores, and the grammar score explained more of the variance in the dependent variable than the vocabulary score.

Limitations of the study are twofold: the small simple size and the fact that the role played by other sources of linguistic knowledge was not explored. It is suggested that in further studies, a greater number of participants be included to allow the results to be better generalized in the field. In addition, other sources of linguistic knowledge, i.e., learners' phonological knowledge, may be included in related studies to give a clearer picture of the relative importance of linguistic knowledge in helping L2 learners comprehend L2 speech input.

Results of the current study have implications for L2 teaching and research. Since it is found that both L2 vocabulary and grammar knowledge each make a contribution to L2 LC, it is suggested that teachers focus on improving L2 learners' vocabulary size and grammar

knowledge. Since the participants in this study had L2 learning environment immersion experiences and their grammar knowledge was found to significantly contribute more to explaining the variance in their LC, it is suggested that language teachers better develop grammar exercises for Chinese students so that learners improve their grammar knowledge. It is also suggested that in further studies, L2 learners' learning background, in terms of immersion, or not, in an L2 environment for daily life and activities, be studied as a learner variable.

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