

An Exploration of the Relationship between Vocabulary and Affix Knowledge Based on SPSS: Taking Chinese EFL Postgraduate Students as an Example

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Abstract: This article aims to further explore the causes of differences in L2 vocabulary acquisition and provide insights for EFL vocabulary teaching by conducting a quantitative study on the form-meaning link and word part knowledge of Chinese EFL graduate students, and the relationship between the two. The study primarily utilizes the UVLT (Updated Vocabulary Level Test) to assess the participants' vocabulary proficiency and the WPLT (Word Part Level Test) to assess their affix knowledge. The correlation between these two aspects is analyzed using SPSS. The results show a strong correlation between the form-meaning link and word part knowledge, and the intake of affix knowledge can be used as an essential element of L2 vocabulary teaching, and can be further explored in the future.

Keywords: Vocabulary Assessment; Vocabulary Teaching; SLA; SPSS

1. Introduction

Currently, teaching methods aimed at improving English vocabulary ability have been widely studied, and most of the existing research is based on the vocabulary knowledge of the Nation framework[1]. Based on this, two branches and related studies are mainly emphasized, namely, Form-Meaning Connection[2] and Word Part Knowledge[3]. However, more research needs to be done on the relationship between form-meaning connections and Word Part knowledge[4]. In this article, SPSS will be used to measure the correlation between form-meaning connection and word part knowledge.

The research motivation of this article is that domestic English teachers rarely use affix knowledge in vocabulary teaching. So the cognitive relationship between affixes and vocabulary needs to be discussed. The conclusion will also be used to provide English teaching methods and its implications for English teaching in colleges and universities in China.

2. Literature Review

2.1 What is a Word?

In the category of vocabulary, if we want to measure how many words are in the language, we need to know what we count as a word. Here, we have four concepts for counting the word: tokens, types, Lemmas, and word families. Tokens were defined as the overall number of words in a passage that contains the same word that appears more than once. Types were described as the number of words. As for Lemmas, it usually concludes a headword and some of its inflected forms and reduced forms. Word families contain a base word and all its derived and inflected forms.

2.2 What is involved in knowing a word?

Initially, the recognition of necessary components of word knowledge needed to be revised and at a shallow level. Researchers only distinguished the concept of form and meaning from the vocabulary

knowledge[5]. Research in 1976 by Richards is believed to be the first attempt to show all aspects that should be included in word knowledge. However, he only briefly explained his model, which could easily confuse language learners on what to learn. Therefore, to some extent, Richards (1976)'s assumptions are inappropriate for pedagogical use. Later, Nation expanded on Richards' idea and listed eight components in 1990 that a person must master to know a word.

Nation's framework was further developed and expanded in later years and has been widely accepted by its best conclusion of the range of the 'word knowledge'. In Nation (2013)'s framework (see Table 1), the word knowledge was separated into three prominent aspects: form, meaning, and use. Form means the existing status of words in different types of genres. Meaning means what it indicates of a word and use means different types of usage of words. Each component is further divided into several aspects, and each aspect is also divided into receptive knowledge and productive knowledge. Receptive knowledge focuses on the knowledge of words' form, means and relevant words, which mainly combine reading and listening abilities. Productive knowledge focuses on using words in different situations, especially for speaking and writing.

Table 1: Nation (2013)'s framework of word knowledge

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

R-Receptive; P=Productive (Nation. 2013: 49)

2.3 The Form-Meaning Link

The form-meaning link has been widely focused on and discussed for an extended period, which is defined as a situation which a form is connected to some relevant meaning [6]. The connection between form and meaning is focused because researchers have found that only knowing the form and meaning of a word is not enough[7]. The form-meaning link is also varied, which is different from a simple one-to-one matched relationship. As an indispensable part, the form-meaning link is also included and highlighted in Nation's framework of word knowledge.

2.4 The Word Part Knowledge

Word part knowledge is also called affix knowledge [8]. The concept of affix belongs to the category of Morphology, which mainly focuses on affixes and how they match with fundamental forms of words [2]. Affixes can be separated into two types: Inflectional affixes and Derivational affixes. Inflectional affixes are all suffixes. It refers to grammatical information such as number, tense, possessive, comparative, etc, which preserves the part of speech of a word.

According to [3], affix knowledge can help learners infer an unknown word in the word family of an already known word. The argument is supported by Nagy and Anderson (1984)'s research that the derivatives have a n extensive coverage in English words, and its percentage is increasing as word frequency declines. [8] also indicates that if a word is made of word parts, its learning burden will also be lightened. With the deepening of research, the relationship between word part knowledge and other

components in Nation (2013)'s framework has been widely discussed and analyzed. The following section will review previous research on form-meaning links, and word part knowledge respectively and their relationship.

2.5 Studies on the relationship between form-meaning link and word part knowledge

After the distinction between the breadth and depth of word knowledge has been highlighted many times [7], researchers realize that both breadth and depth knowledge are necessary. [4] also add that an admirable mastery on vocabulary size test may indicate a poor accomplish of words. Besides, the lack of in-depth knowledge can also cause a misuse or a vague acquisition of a word. Regarding this situation, tests that can focus on both aspects (breadth and depth) are required because they can let learners obtain complete word knowledge [4]. In this study, based on the assumption that a good mastery of affix knowledge will coincide with vocabulary development because more word families will be recognized [9], the relationship between word part knowledge and form-meaning link is mainly focused.

Three typical L2 research are listed that focus on this relationship (Schmitt & Meara, 1997; Mochizuki & Aizawa, 2000; Ishii & Schmitt, 2009), As shown in Table 2.

Table 2: Three typical L2 research

Research	Tools (Vocabulary / Word Part)	Participants	Correlation between vocabulary and suffix knowledge
Schmitt & Meara (1997)	VLT/only Suffix knowledge was directly tested	three classes of Japanese students	0.27 in productive knowledge, 0.37 in receptive knowledge
Mochizuki & Aizawa (2000)	VLT/ Affix Knowledge Test	403 Japanese high school and English-Major university students	ranged from 0.54 to 0.65
Ishii & Schmitt (2009)	VLT/ Derivative Word Forms Test	Not mentioned	a higher correlation at 0.73 between vocabulary size and derivation

Overall, there are not too many studies which focus on the relationship between form-meaning link and word part knowledge. Besides, the measuring tools still need to be improved especially in affix knowledge because none of the previous tests can meet the requirements completely and effectively.

2.6 Research questions

As can be seen from the literature review, the main gap is the relationship between the form-meaning link and word part knowledge, there are not enough research which can support it. This study was conducted to fill this gap. It aims to address the following research question:

[RQ 1] Is there a relationship between their vocabulary levels and knowledge of English affixes?

[RQ 2] Is there a relationship between affix training and participants' word part knowledge?

3. Methodology and Data Analysis

3.1 Participants

A total of 40 participants took part in this study. They were all Chinese who studied Taught-postgraduate programmers at university in the U.K. Participants included both male and female and their age ranged from 22 to 24. Details are displayed in the Table 3.

Table 3: Main source of participants' major and university

Major	TESOL	Education	Marketing	Finance	IT	Engineering
Percentage	37.5%	7.5%	5%	20%	10%	15%
University	Leeds	Birmingham	Nottingham	QMUL	UCL	Sussex
Percentage	62.5%	10%	7.5%	5%	7.5%	5%

3.2 Data Collection

Data collection took place from 28th June to 13th July. 40 participants participated in the study. The generalizability must be considered during sample choosing [10]. However, it is not convenient to randomly choose a sample in Non-English major postgraduate students because these two tests in my research cost a long time. Therefore, the 'Snowball Sampling' method was used, which refers to the initial participants being requested to seek others who may also be suitable to attend [10]. As for the quantitative data collection method, because the researching objective was to determine the correlation between form-meaning knowledge and word-part knowledge, two tests were selected in this study: UVLT and WPLT. In this study, web-based format of UVLT was utilized.

Participants are recruited by sending a request via social media or face-to-face. Before taking the test, a consent form and information sheet are shown to them and their permission and signature are guaranteed. Data on UVLT was collected from the emails that the test-takers received. Data of WPLT was corrected automatically by the Tencent Questionnaire website background.

3.3 Data Analysis

Two tests are used in this study: the Updated Vocabulary Levels Test [11] and Word Part Levels Test [3]. The UVLT measured test-takers' vocabulary knowledge at different word frequency levels. The WPLT was used to measure test-takers' word part knowledge from form, meaning and use sections. Besides, the data from participants are analyzed by SPSS.

Data from UVLT and WPLT is mainly analyzed by IBM SPSS Statistics (version 25). From each aspect, the one-way repeated ANOVA, independent-samples t-test and Post hoc test have been done to analyse the data from different perspectives. Besides, descriptive statistics have also been analyzed. As for the relationship between the results from the UVLT and WPLT, correlational research has also been done by SPSS.

Correlational research was used to determine the correlation between these two variables. To analyse the relationship between variables in more detail, the square of the coefficient of correlation (r^2) is also highlighted which shows the proportion of common area that the two variables shares. In this study, a simple bivariate correlation will be conducted in SPSS. It has been done to find out the correlation between the results of UVLT and WPLT. Besides, it has also been done between participants' affix training and their word part knowledge.

During the research, the initial version of raw data was in a handwritten version and the final version of raw data has been stored in a private computer and also in google drive as a copy. Both paper-based and electronic versions can prevent losing data. Besides, a paper-based version can also act as a check. After the research has finished, all data will be stored on a mobile hard disk to prevent the leakage of privacy.

4. Findings

4.1 RQ 1

After analysing the results from the UVLT, participants' ability in these two tests has been evaluated. Then it came to the relationship between their vocabulary levels and word part knowledge. Correlational research is mainly used in this part.

Table 4: Correlation between UVLT and WPLT in all 40 students

		Overall (UVLT)	Overall (WPLT)
Overall (UVLT)	Pearson Correlation	1	.622**
	Sig. (2-tailed)		.000
	N	40	40
Overall (WPLT)	Pearson Correlation	.622**	
	Sig. (2-tailed)	.000	
	N	40	40

Table 4 shows the relationship between participants' vocabulary level and word part knowledge. It was investigated using Pearson product-moment correlation coefficient. Considering that the significant level was 0.000 which indicated a statistically significant relationship between two variables, there was

a strong, positive correlation between participants' from-meaning link and word part knowledge [$r=.66$, $n=40$, $p=.000<.0005$], with high levels of perceived control associated with lower levels of perceived stress. Besides, the square of the coefficient of correlation (r^2) was .44, which indicated that the ability of from-meaning link and word part knowledge share 44% common variance. It also showed that there was a moderate fit between two variables ($0.31 < r^2 < 0.5$).

Table 5 presents the correlation coefficients for two groups: English and Non-English. The correlation between form-meaning link and word part knowledge for English major is not significant while for Non-English major students it was obvious (Pearson's $r=.59$). Following the criteria of Cohen (1988), we can indicate that the correlation in English major participants were small while in Non-English major participants were large. The result of correlation in English major participants is abnormal because it is quite low and opposite to the Pearson's R of all participants. This situation will be discussed in the following part. Limitations also exist in this stage.

Table 5: Correlation between UVLT and WPLT in two groups

	Sig	Pearson's r
English	.556	.140
Non-English	.006	.594

4.2 RQ 2

Table 6 presents that the correlation coefficients between all 40 participants' affix training and their word part knowledge is .48 ($p<.05$), which is quite close to .50. It could be seen as a large positive correlation between these two variables.

Table 6: Correlation between participants' affix training and word part knowledge

All 40		Overall (WPLT)
Affix Training	Pearson Correlation	.48
	Sig.	.002

In Table 7, the Data showed that the number of students from English-related major who has received affix training was three times of the students from Non-English related major.

Table 7: Difference of affix training between two groups

	Affix Training
English	45%
Non-English	15%

After the findings have been given in details, it seems that some results from this research is different from previous research. In the following chapter, the similarity and difference of the results will be discussed in order to facilitate the development of L2 pedagogy. Besides, the potential limitations and directions for further study will also be discussed.

5. Discussion

5.1 Discussion on the RQ1 and RQ2

Result of correlation analysis showed that the relationship between participants' from-meaning link and word part knowledge is highly correlated ($R=0.66$, $p<.0005$). Compared to previous studies, the correlation is close to Mochiziki and Aizawa (2000)'s research ($R=0.54-0.65$) and Ishii and Schmitt (2009)'s research ($R=0.73$).

To test whether major can influence the relationship between form-meaning links and word part knowledge or not, correlation analysis in English and Non-English groups are also tested. Results showed that the relationship is not significant in English major students but is moderately correlated in Non-English major students. It might indicate that the differences in major may not be the influencing factor of the relationship.

Another point that need to be discussed is the measuring method of word part knowledge. Compared with all three previous studies, participants' ability in form-meaning connection was all measured by the Vocabulary Levels Test. The apparent differences were mainly from the tests on participants' affix knowledge. Given that the limitations from previous affix knowledge tests such as

reflecting partial affix knowledge [9]; Lacking of consideration on validation and various types of affixes or ignoring the meaning section of affix knowledge [4]. The reason why WPLT is used in this study can be summarised as three points: Firstly, it contains form, meaning and use which can reflect one's knowledge more completely. Secondly, the validation of WPLT was also verified by [3]. Thirdly, the frequency of affixes in the test has been separated into three levels (Beginner, Intermediate and Advanced), which has pedagogical implications for teachers to help students learn words matching to relevant affixes.

5.2 The pedagogical implication from the results of my research

From the results for the research question, some important points on pedagogical implication should be highlighted.

This study's most significant finding is the relationship between form-meaning link and word part knowledge. The results of this study follow the previous studies' conclusion that there are strong correlation between form-meaning knowledge and word part knowledge. It inspires EFL teaching that teachers could use affix knowledge to improve L2 learners' vocabulary size and knowledge. Especially for Non-English major students, adding affix knowledge into the teaching plan will make their vocabulary improve more effectively.

5.3 Limitations and Future Work

In this study, even though the result has already proved previous studies assumptions and conclusions, limitations still exist in the whole process. It can be concluded into 2 points:

Firstly, an inevitable problem has been discussed in the Vocabulary Levels Test. It was widely supported that the options from multiple-choice tests such as the VLT may help test-takers estimate the correct answer and enhance the possibility of over-reporting scores. In this research, this problem also exists in the WPLT because the example words in meaning and use function can also act as a reminder. Though Laufer and Nation (1999) have given out solutions using more yes/no vocabulary tests or productive tests, this problem still needs further development.

The last limitation is about the sample size and sampling methods. In this research, the sample size is insufficient for quantitative research. Considering that my ideal population is more than 1,000, the amount of 20% (200) is recommended as an appropriate sample size. As for sampling methods, though the usage of snowball sampling is convenient, the limitation shows that the people who were chosen may have similar interests and values, which is not appropriate to reflect the generalizability [10].

As for further study, the key point is how to integrate the teaching of affix knowledge into the teaching process of L2 vocabulary. Like [12], the correlation between different teaching methods and affix knowledge has been analysed. We need more studies that focus on finding out better affixes teaching methods. Given the current rapid development of Generative AI [13], the use of AI tools such as ChatGPT [14] for assisted teaching of affixes may become an attempted research direction for future vocabulary teaching; of course, traditional corpus linguistics methods can also extract words containing specific affixes from the target corpus and apply them.

6. Conclusion

This article investigated the relationship between the form-meaning link and word part knowledge among 40 Chinese postgraduates who study at UK universities. The results showed that participants overall had a good mastery of the first 3,000 word families in knowledge of form-meaning connection. The main contribution of this article is that the relationship between participants' form-meaning knowledge and word part knowledge has been proven to be significantly correlated. This finding followed not only previous typical studies' conclusion that affix knowledge is closely relevant to vocabulary size but also gave theoretical support to the innovation of Chinese EFL teaching situation. In L2 pedagogy, Chinese EFL teachers can make good use of affix training and instruction in the teaching process or teaching plan to improve L2 learners' vocabulary size and relevant form-meaning connection.

This research also has its limitations, which are discussed in the 5th chapter. Overall, the findings highlight that the word part knowledge and its relationship with vocabulary size deserves more attention from EFL teachers and learners.

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