Analyzing the Acquisition of English Polysemy of Chinese High School Students: a Quantitative Study

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Abstract. The study explores the acquisition of English polysemy by senior high school students and two factors that will have an influence on students' acquisition of English polysemy, which include part of speech and meaning frequency. The participants are 148 Chinese senior high school students who are involved in a test including 30 English polysemous words within the scope of senior high school learning. The results show that: (1) there is no correlation between students' examination scores in school and their scores on the polysemy test; (2) students tend to master verb polysemy better than adjective polysemy and adjective polysemy better than noun polysemy; (3) students have a better command of the most frequent meanings of polysemy than the less frequent ones, whereas there are some special cases. According to the results, suggestions are put forward for senior three students to learn polysemous words and teachers to teach polysemous words, which can better help students in the acquisition of polysemous words, improving the vocabulary learning efficiency.

Keywords: L2 vocabulary acquisition; Polysemy; Part of speech; Chinese high school students.

1. Introduction

Vocabulary learning is one of the basic and important parts of English learning. To some extent, it determines the practical application level of listening, speaking, reading, and writing. Therefore, improving vocabulary level in daily learning is essential for second language learners. Polysemy, as an indispensable part of English vocabulary, is more difficult for students to master.

However, in China, students seem not to have a good command of polysemy, and some teachers just require students to learn multiple meanings of polysemy words by rote memorization, which leads to students' inability to understand and master polysemy fundamentally. Some scholars have studied students' acquisition of English polysemy and the results show that conceptual metaphor theory can help students learn polysemous words [1]. Hence, it is necessary to further explore whether the mastery of polysemy is closely related to students' English achievement and factors that affect senior high school students' acquisition of polysemy.

In this paper, 148 senior high school students are involved in a polysemy test. Among the many factors that affect polysemy learning, the research focuses on meaning frequency and part of speech as to discuss how much the two factors affect the acquisition of polysemy.

2. Literature Review

2.1 Polysemy and Homonym

English polysemy and homonyms always bewilder the learners as well as the researchers, for it is comparatively difficult to tell the difference between the two terms. To conduct an experiment with regard to students' acquisition of polysemy, it is essential to understand how to distinguish polysemy and homonyms.

Lots of previous studies have focused on the difference between polysemy and homonyms and how to decide whether a word is polysemous or homonymous [2,3]. Homonyms may have several meanings that are semantically unrelated [4]. For example, bank can refer to an organization that provides various financial services or can refer to the side of a river. These two meanings are obviously semantically unrelated. Some researchers regarded homonymous word meanings as a result of different words coincidentally having the same sounds and word form [4]. Thus, on the other hand, polysemous words are those having semantically related senses [4]. For instance, silver refers to both a chemical element and an object made of silver. Habibi, Hauer, and Kondrak adopt a graph-based approach of homonymy and polysemy detection, constructing a sense graph for an input word using WordNet, and a multilingual extension, BabelNet (Navigli and Ponzetto) [2]. And there is an etymological approach to fundamentally judge whether a word is a polysemy or homonym, which is to look at word meanings from the perspective of diachronic development. Two meanings are unrelated if there is no historical connection between them [3].

2.2 Researching Polysemy from the Perspective of Cognitive Linguistics

English polysemous words always have several senses, among which one sense always stands out as the most frequent and is the default meaning out of context [5]. In a study of acquisition of noun English polysemy, Öztürk found that EFL learners knew the core senses of polysemous nouns better than the extended senses, and between the metonymically extended senses and metaphorically extended senses, they knew the former better [5]. Also, Csabi found that the explicit knowledge of conceptual metaphors, metonymies, and conventional knowledge present as motivational factors in the target language facilitate learning word meanings in the target language [6].

2.3 Factors Affecting Students' Acquisition of Polysemous Words

Most of Chinese high school students are requested to prepare a dictionary and use it whenever they learn a new word. According to the guide to Practical Lexicography, there are basically three orders of senses: (1) Historical Ordering. To honor the history of vocabulary development, the senses will be present in the order in which they entered the language; (2) Frequency Ordering. To adapt to daily use, usually the most frequently used senses are put at the beginning of an entry; (3) Logical ordering. Sometimes the core meaning is followed by semantically closest meanings, with more marginal uses appearing later [7]. Karlsson found that Swedish advanced speakers of L2 could get only a third of the full score on average on a multiple-choice test covering forty polysemous words, appearing to know the most frequent sense of a polysemous word better than the less frequent ones [8].

Also, as for part of speech, some researchers have discussed the relationship between the difficulty of memorizing vocabulary and part of speech [9]. Laufer proposed that nouns seem to be easier to learn than verbs, verbs are easier to learn than adjectives, and adverbs are the hardest to learn [10]. Besides, relevance has more influence on nouns than verbs. It is much easier to remember related nouns than related verbs [10]. On the contrary, Huttenlocher and Liu's research results show that a group of verbs with related meanings are easier to forget than a group of nouns with unrelated meanings [9].

3. Methodology

3.1 Participants

In this study, 148 Chinese high school students including both males and females whose numbers are almost in balance, were chosen as the participants, who are in the 12th grade. Their final aim is to pass the Chinese University Entrance Examination (CUEE), a system that is applied to the vast majority of Chinese high school students. Therefore, these 150 students are relatively appropriate candidates for this test.

3.2 Materials and Test Design

In this study on the acquisition of English polysemous words by Chinese high school students, to guarantee the objectiveness and validity of the final result, 30 English polysemous words are selected to form the test (adapted from Karlsson [8]), which are all from the outline of Chinese University Entrance Examination. In the 30 polysemy, 10 are nouns, 10 are verbs and 10 are adjectives. Table 1 contains the words used in this experiment.

Table 1. Polysemous words used in this experiment.

Nouns	Verbs	Adjectives
matter	abandon	concerned
lesson	abuse	dear
lecture	appeal	easy
nature	introduce	firm
object	recognize	free
position	strike	fit
passage	reflect	mean
review	engage	narrow
rule	settle	regular
practice	address	rough

In the test, there will be 30 questions and each one has more than one choices to be selected by the participant (each one contains 5 meanings of a specific polysemous word and 2 to 3 of the meanings are correct) and they are arranged randomly instead of putting the words of same part of speech together such as questions 1 to 10 are about nouns, in order to ensure the objectiveness of the test result to the largest extent. Also, in each question, the correct meanings of a specific polysemous word are of different frequency of utilization (based on the Collins Dictionary) . The incorrect meanings presented in each question are randomly picked ones that are not related to the word tested. All the meanings will be presented in Chinese so as to let participants understand them easily. As for how to evaluate participants' performances in the test, the method is as follow: for each question, it is mapped with 1 point if all the correct meanings of a polysemous word are indicated and is mapped with 0.5 point if some of the correct meanings of a polysemous word are indicated, otherwise it is mapped with 0 point.

3.3 Research Questions

The following are the research questions of this study.

RQ1: Whether the Chinese high school students' performances in the test of the acquisition of English polysemy correlate with their examination scores in school?

RQ2: Whether polysemous words of different part of speech (noun, verb and adjective) affect the Chinese high school students' acquisition of English polysemy?

RQ3: Whether the meanings of different frequency of polysemous words affect the Chinese high school students' acquisition of English polysemy?

3.4 Data Analysis

As for RQ1, results will be analyzed by Pearson correlation analysis to firstly conclude whether the performances in the test correlate with the examination scores and then linear regression will be utilized to further judge that whether the correlation is positive or negative.

As for RQ2, descriptive analysis will be used to answer this question. The authors will draw a comparison among noun polysemy, verb polysemy and adjective polysemy by calculating the mean and standard deviation of the three parts, to conclude whether polysemous words of different part of speech (including noun, verb and adjective) affect the Chinese high school students' acquisition of English polysemy.

As for RQ3, results will be presented in a table, which will show, for each word, the percent of students choosing its most frequent meaning, second frequent meaning and etc. Thus, it is obvious that whether students tend to have a specific preferred meaning when facing meanings of different frequency. Table 2 shows a result, taking example of the word "abuse".

Table 2. The percent of students choosing words' most, second, third frequent meaning

Vocabulary	The most frequent meaning	The second frequent meaning	The third frequent meaning
abuse	76.4%	47.3%	88.5%

4. Results

4.1 The correlation between students' test scores and their examination performances in school

In table 3, the correlation analysis shows that the p-value is 0.599, greater than 0.05, which indicates that there is no correlation between the student's examination scores in school and the polysemy test scores. The full score of the test is 30, and figure 1 shows that there are only 23 students whose scores in the polysemy test are over 20, accounting for only 15.5%. Most students are in the segments of 10~15 points and 16~20 points, accounting for 65.5%, which indicates that students seem to have a worse command of polysemy than is predicted.

Table 3. Pearson correlation analysis between English polysemy test scores and students' examination scores in school

		Examination scores in school
Test score	Correlation coefficient	-0.053
	P value	0.599

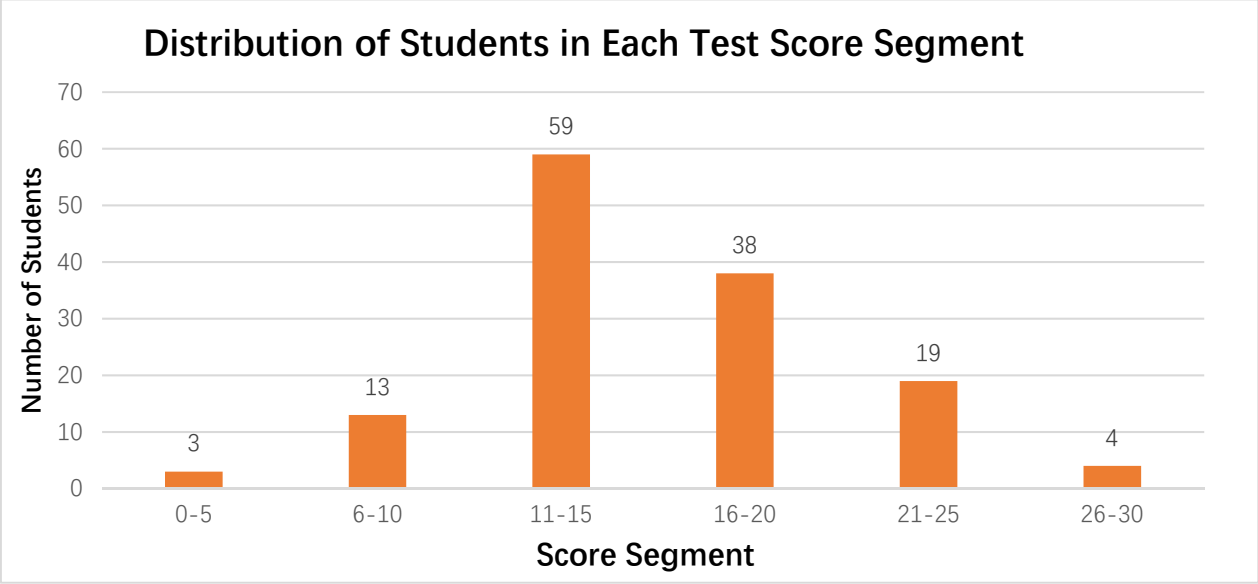


Figure 1. Distribution of students in each test score segment

4.2 Scores of polysemy of different part of speech

As table 4 shows, the average score of verbs is remarkably higher than that of adjectives and nouns. And only the average score of verbs exceeds 5 points, with full scores being 10. In other words, in

polysemy learning, students appear to have the best command of verbs, adjectives second and nouns last.

Table 4. Scores of polysemy of different part of speech

Part of speech	Mean
noun	4.696
verb	5.686
adjective	4.926

4.3 Words meanings of different frequency

The data findings as in table 5 show that 1): for more than half of the polysemous words in the test, students appear to know the most frequent meaning better than the less frequent ones, and for the other polysemous words in the test, which are words of number 1, 2, 6, 7, 9, 16, 21, 23, 24, 25, 28, 30, students seem to know the second or third frequent meaning better than the most frequent one. 2): for the polysemous words of number 4, 8, 11, 12, 13, 14, 15, 20, 29, the percentage of students choosing the second frequent meaning is either higher than the ones choosing the third frequent meaning or lower than the ones choosing the third meaning (within 10%), whereas for the word "position" of number 19, the percentage of students choosing the third frequent meaning is remarkably higher than the ones choosing the second frequent meaning.

Table 5. Percentage of students choosing words' most frequent meaning, second frequent meaning and etc.

Vocabulary	Most frequent meaning	Second frequent meaning	Third frequent meaning
1.abandon	87.8%	93.2%	N/A
2.abuse	76.4%	47.3%	88.5%
3.easy	98.0%	52.0%	N/A
4.appeal	79.7%	52.7%	61.5%
5.lecture	94.6%	43.2%	N/A
6.introduce	64.9%	98.0%	N/A
7.recognize	86.5%	87.8%	23.6%
8.nature	98.0%	64.2%	27.7%
9.strike	72.3%	41.2%	76.4%
10.regular	93.2%	59.5%	N/A
11.rule	89.9%	47.3%	48.6%
12.reflect	94.0%	73.6%	42.6%
13.rough	82.4%	64.9%	40.5%
14.engage	63.5%	43.2%	43.9%
15.firm	70.9%	52.0%	45.9%
16.settle	68.9%	23.0%	89.2%
17.address	95.9%	47.3%	N/A
18.concerned	83.1%	64.2%	N/A
19.position	84.5%	41.9%	77.0%
20.free	100%	94.6%	41.9%
21.object	66.2%	70.3%	51.4%
22.fit	89.9%	39.2%	N/A
23.practice	35.8%	97.3%	25.0%
24.mean	59.5%	79.7%	N/A
25.matter	73.0%	86.5%	27.0%
26.narrow	90.5%	35.8%	N/A
27.lesson	98.0%	55.4%	N/A
28.passage	48.0%	70.3%	N/A
29.dear	99.3%	58.8%	20.3%
30.review	51.4%	29.1%	92.6%
Mean	79.9%	60.5%	51.3%

5. Discussion

The result that there is no correlation between students' examination scores in school and their scores on the polysemy test is different from the findings of former research. In 2018, Xu studied the correlation between vocabulary level and English scores of senior high school students in a middle school in Yangzhong City. One of his findings was that the correlation coefficient between vocabulary level test scores and English scores was 0.554, which indicated that there was a significant correlation between the two [11]. Later, Zhao also found that there was a significant positive correlation between vocabulary breadth knowledge and English achievement [12]. Thus, the authors primarily speculated that there may be also a positive correlation between correlation between students' English scores and their acquisition of polysemy. However, the result is that there is no correlation between students' examination scores in school and their scores on the polysemy test, and students generally perform badly on the test, which may be because those students pay much more attention to the vocabulary breadth than the vocabulary depth in their daily learning, so even students with good examination scores in their school and large size of vocabulary do not indicate an excellent performance in the test of polysemy.

As for the second research question, it is consistent with the authors' previous hypothesis, but different from the results of previous studies. Laufer found that nouns seem to be easier to learn than verbs, and verbs are easier to learn than adjectives [10]. Also there has been a saying that nouns are easier to learn than other parts of speech [13]. At present, some studies also show that Chinese students learn English adjectives better than verbs and nouns [14]. However, the specific influence of part of speech on polysemy acquisition needs further study.

The results of the second research question are different from those of other scholars and it may be because: (1) It may be that there are a large number of verbs and adjectives in senior high school textbooks, which occupy a dominant position in CUEE syllabus, so the frequency of contact with adjectives and verbs is much higher. (2) In the process of choosing words, the author neglected the understanding of word length to students. Huang in 2007 made a study on whether the word length factor influenced the vocabulary acquisition of English learners in China. The results showed that the factor of word length has effects on students' vocabulary learning, and the memory effect of polysyllabic words is often much better than that of disyllabic words. But with the improvement of learners' ability, it will gradually weaken [14]. (3) Nouns and adjectives are relatively set at the back section on the test paper, which may cause a situation in which students spend less time and concentration on the nouns and adjectives.

The last finding is consistent with what Karlsson found in his study in 2013 that students have a better command of the most frequent meaning of polysemous words than the less frequent ones [8]. And also Zhang and Wen have found that Chinese students tend to know more about the high-frequency senses of English polysemous phrasal verbs than the low-frequency ones [15]. However, as for the different findings of present study that for some words, students seem to know the second or third frequent meaning better than the most frequent one, it may be because current students may have 2 different ways to learn vocabulary, one is through the textbook and the other is through the electronic dictionary (e.g., Oxford Dictionary, Collins Dictionary) and the most frequent meaning according to Collins Dictionary may not be the dominant one in textbook due to the specific intention of textbook compilation. (e.g., introduce). As for the word "position", its most frequent meaning, "the place where somebody or something is located" and its third frequent meaning, "the official status one has in his company" are in semantic relation (especially when they are translated into Chinese), because the third frequent meaning resembles a variant of the most frequent one [6], whereas the second frequent meaning of "position", which means "the way somebody is sitting or standing, or the way something is arranged" does not give the students a feeling of semantic relation with the most frequent meaning when translated into Chinese. Thus, the phenomenon that the percentage of students choosing the third frequent meaning of "position" is remarkably higher than the ones choosing the second frequent meaning can be explained.

6. Conclusions

Based on the findings and discussion on the acquisition of English polysemy, the authors can draw conclusions as follows: firstly, for Chinese high school students involved in the experiment, their English examination scores in school appear to have no correlation with their scores in the polysemy test. Secondly, Chinese high school students engaged in the experiment have a better command of verb polysemy than adjective polysemy and adjective polysemy better than noun polysemy, according to the average scores of the three parts: verbs, adjectives, and nouns. Finally, Chinese high school students in the experiment tend to know the most frequent meanings of polysemous words in the test better than the less frequent ones, but for some words, they tend to know the second or third frequent meanings better than the most frequent ones.

Also, the authors put forward some suggestions for teachers, students, and future researchers: firstly, English teachers in high schools should attach more importance to English polysemy when teaching vocabulary to their students, in order to avoid the situation that students only know one or two meanings of a polysemous word, which may cause fossilization in their further study of English and also they should incorporate noun, verb and adjective polysemous words in their teaching, instead of focusing only one or two parts of speech. Secondly, for students learning English, they should pay more attention to vocabulary depth at the same time they enlarge their vocabulary breadth, which means they should try to know different meanings and usages of an English word rather than just blindly expanding their vocabulary size. And finally, for future research, the future researchers can further explore the students' acquisition of prepositions in their vocabulary learning, as a preposition is a very complex kind of vocabulary in English and one preposition always has quite a lot of different meanings, which is worth exploring.

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