



# A Review on the Organization Model of Second Language Mental Lexicon Based on Word Association Test

Wu Jie, Li Xiuzhi\*

School of Foreign Language, Yangtze University, China

\*Corresponding Author

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**Abstract**— *In the past two decades, the study of second language mental lexicon organization has become a research direction that has attracted much attention from scholars. The research on second language mental lexicon organization has achieved fruitful outcomes in both basic theoretical research and empirical research. The basic theoretical research mainly focuses on the lexical knowledge framework theory and the exploration of second language mental lexicon organization, while the empirical research explored the characteristics of second language learner's mental lexicon organization based on the word association test as the main research method. In addition, future study needs to pay attention to the optimization of word association test, the use of multiple testing methods, the learners at the basic education level, and the attempt to integrate the findings with pedagogical practice research.*



**Keywords**— *Mental Lexicon, Vocabulary Development, Vocabulary Learning, Word Association Test*

## I. INTRODUCTION

Vocabulary acquisition is the foundation of language learning. People must activate and use the vocabulary knowledge stored in long-term memory when comprehending and producing language (Feng Xuefang, 2014), and the vocabulary knowledge stored in the human brain is called mental lexicon by psycholinguists. Currently, researches on mental lexicon have been carried out along the two aspects of vocabulary depth and vocabulary breadth, and studies focusing on vocabulary breadth have been dominant in the field of second language vocabulary research (Mo Qingyang, Sun Lan, 2004). However, since the 1970s, linguists have begun to pay attention to theoretical studies on lexical depth such as the definition of words and the framework of lexical competence (Richards, 1976; Nation, 1990; Read, 2004), among which the research on the organization model of second language mental lexicon has achieved fruitful outcomes and played a vital role in guiding modern lexicography and second language teaching.

In order to deepen the understanding of the organization model of mental lexicon and to promote the in-depth development of second vocabulary acquisition research, this paper compiles the current research on the organization model of mental lexicon, with an aim to provide some reference for the future research in this field.

## II. THEORETICAL RESEARCH

### 2.1 Framework of Vocabulary Knowledge

“What constitutes the acquisition of a word?” is one of the fundamental questions in vocabulary acquisition research (Wang Haihua, Sun Zhi., 2007). According to Richard (1976), acquiring a word involves understanding the probability of its use in spoken or written form, the limitations imposed on the word by changes in function and context, the syntactic behaviors associated with the word, the basic form as well as the derived forms, the associative network with other words in the same language and the different meaning of the words. Nation (1990) also proposed eight aspects of acquiring a vocabulary, namely,

meaning, spelling, pronunciation, grammatical features, collocation, register, association, and word frequency, each of which is divided into receptive knowledge and productive knowledge. Read (2004), in conjunction with previous studies, categorized it as meaning accuracy, complete lexical knowledge and network knowledge, in which network knowledge refers to the fusion of the word into the lexical network in the mental lexicon and the ability to associate or differentiate it from related words. Chinese scholar Ma Guanghui (2007) also tried to build a framework of vocabulary knowledge and put forward the concept of “meta-lexical knowledge”, which is about some macro knowledge of words, such as the concepts of words, semantics, and word planning.

It can be seen that scholars not only emphasize the traditional meaning of vocabulary in terms of phonology and morphology, but also point out the associative knowledge of vocabulary, which shows the importance of the associative network knowledge of vocabulary in vocabulary acquisition. Then, to explore the acquisition of associative network knowledge of words, the study of mental lexicon organization model will become an important part of it.

## 2.2 Model of Mental Lexicon Organization

There are different views about the organization model of the second language mental lexicon, for example, the phonological organization model, the semantic organization model, and the syntactic organization model. The phonological organization model holds that the organization model of a second language mental lexicon is vastly different from that of a native language mental lexicon, in that a native language mental lexicon is linked through semantics, whereas the words in a second language mental lexicon are linked through phonology. The semantic organization model suggests that the organization pattern of the second language mental lexicon is similar to that of the native language mental lexicon, for instance, the words in the mental lexicon are linked through semantics. As for the syntactic organization model, this view holds that there are linear modification and collocation relations between the words in the second language mental lexicon (Zhang Shujing, 2005).

The phonological organization model of the second language mental lexicon was originally proposed by Paul Meara in his Birkbeck Project. In his study, Meara (1983) found that phonology plays a greater role in the organization of the second language mental lexicon, and that semantic associations differ systematically between the second language mental lexicon and the native language mental lexicon. Based on this, the scholar concluded that there were significant differences between

the mental lexicon of second language learners and that of native speakers. Later, Channell (1988) came to a similar conclusion after reviewing related studies. Laufer (1989), on the other hand, explicitly stated in his study that lexical associations in the native mental lexicon are semantic, whereas lexical associations in the mental lexicon in the second language are mainly phonological.

As for the viewpoint of semantic organization mode, linguist Trier (1931) pointed out that a vocabulary is a lexical network consisting of semantically associated lexemes, and words are connected to each other through a certain network of relations, thus forming a semantic field. Accordingly, the mental lexicon organization model is based on semantic associations, and such an organization model is essentially a semantic network (Qin Zhaoxia, Yan Minfen, 2014). Saussure, on the other hand, further delineated the semantic associations between words, for example, there are paradigmatic relations and syntagmatic relations between words. Among them, paradigmatic relations are generally manifested as relations of proximity, antonymy, polysemy, and hyponymy, etc., while syntagmatic relations emphasize collocational co-occurrence relations between words, including grammatical collocations and lexical collocations, etc. (Liu Shaolong, Fu Bei, and Hu Aimei, 2012). In the study of stimulus word response categorization of English language students learning French, Marechal (1995) found that outputs of the native language and the second language were mostly semantic responses, with a low percentage of phonological responses. Subsequently, Singleton (1999), in his follow-up research of second language development, also found that most of the responses produced by advanced second language learners were associated with the semantics of the stimulus words, which further supports the idea of a semantic organization model of the second language mental lexicon.

The syntactic organization model assumes that the words in the second language mental lexicon are in linear modification and collocation relationships with each other, which means that there is a difference between the native language mental lexicon and the second language mental lexicon. Wolter (2001) tested native English speakers and native Japanese learners of English by using two sets of words with high and low frequencies, and finally found that for words with different word frequencies, the subject outputs had different percentages of phonological and semantic responses in different proportions. Based on this, the scholar argued that although there were many similarities between the native language mental lexicon and the second language mental lexicon, syntactic associations had a greater influence on the organizational

pattern of the second language mental lexicon for high-frequency words.

The above theories and researches have laid the foundation for the study of second language mental lexicon organization model and provided a certain research paradigm, but there are also areas that need to be improved, for example, the subjects' familiarity with the test words, the word frequency of the stimulus words. Scholars in this field have continued to improve the relevant research based on the reference to previous research.

### III. EMPIRICAL STUDIES OF THE ORGANIZATION MODEL OF SECOND LANGUAGE MENTAL LEXICON

In the past 20 years, a large number of studies have been conducted in China on the organization model of second language mental lexicon. Most of the studies have adopted the method of word association test to explore the organization model of second language mental lexicon (Zhang Shujing, 2005; Li Yongcai, Fu Yuping, 2009; Xu Ge, 2016; Yang Xue, Chen Jianlin, 2022), while some scholars have adopted mediator analysis, corpus, and lexical translation to carry out related studies (Chen Mei, 2005; Qin Zhaoxia, Yan Minfen, 2014; Wang Liuqi, Su Haili, 2015). Since word association test is the current mainstream tool for studying mental lexicon, this paper will review the relevant literature with the main line of research using word association test method.

Since the mental lexicon is difficult to be observed directly, word association tests are commonly used in the study of the organization model of the second language mental lexicon. The basic principle of this test is to give stimulus words to the subjects through a certain way, then collect the response words produced by the subjects, and analyze the connection between the response words and the stimulus words, so as to explore the organization model of the mental lexicon. From such a process, it is not difficult to find out that in order to accurately measure the organization model of the subjects' mental lexicon, it is necessary to strictly consider two key factors, namely, the selection of stimulus words and the classification criteria of response words (Zhang Ping, 2010). Differences in the control of these two factors will have a great impact on the test results.

Wu Xudong and Chen Xiaoqing (2000) tried to test the vocabulary proficiency of English learners of different levels (senior high school students, freshmen English majors, and senior English majors), and prepared a vocabulary proficiency test paper to examine the receptive and productive abilities of the four kinds of vocabulary

knowledge, namely, meanings, derivatives, synonyms, and collocations. As can be seen from the content of the test, the design idea of the test paper is the same as that of the word association test, except that the focus is put on semantic relations. Finally, the study found that the subjects' productive ability for derivatives, synonyms and collocations was much less than that for word meanings, and that the growth of knowledge of all kinds of words basically stagnated when the subjects reached the intermediate level, which meant that they had not really built up the semantic network of the test words until the advanced level. Of course, the test words in this study are all high-frequency nouns, which makes it difficult to reflect the full picture of second language learners' vocabulary ability to a certain extent. Subsequently, Mo Qingyang and Sun Lan (2004) studied the acquisition and development of high-frequency verbs by Chinese learners of English, and found that students' acquisition of the primary meaning of high-frequency verbs was due to the acquisition of other meanings, and that the semantic development of verbs appeared to be a "plateau phenomenon" when students' English proficiency progressed from the intermediate to the advanced level, which is in line with the results of the previous study (Wu Xudong, Chen Xiaoqing, 2000).

Both of the above studies focused on only one lexical property and only considered high-frequency words, because lexical property affects the number of conceptual nodes and the type of associative response (Xu Ge, 2016), and word frequency directly affects the output of the subjects. In Zhang Shujing's (2005) study, the scholar took the above two factors into consideration, and after using the word association test on senior English majors, she found that: second-language learners had not yet established semantic connections, and phonological connections were still dominant, which to a certain extent confirmed Meara's view of the second-language mental lexicon's phonological organization model.

At present, there is a basic consensus about the organization model of the second language mental lexicon, that is, the organization model of the mental lexicon will be transitioned from non-semantic to semantic connections as the learners' language level increases. In response to the semantic relations, in which the syntagmatic relations are the basic framework for the semantic organization of the second language mental lexicon (Feng Xuefang, 2015), and the development of the horizontal and vertical networks in the organization model of the learner's mental lexicon is asymmetric and it is believed that the kind of network may show a developmental pattern of the continuum (Liu Shaolong, Fu Bei, 2012). However, in Yang Xue and Chen Jianlin's (2022) study of English

learners of English as a second and third language, it was found that the phenomenon of non-semanticization was attenuated in the third language learners, and it was also found that the syntagmatic associations were higher than the paradigmatic associations in the second and third language learners with moderately low English proficiency. This is a departure from previous studies and may be due to differences in the choice of subjects and stimulus words.

Based on that, is it true that subjects can be considered high-level second language learners as long as they can produce more semantic responses on the test? From the point of view of the word association test itself, the number and lexical properties of the selected test words are limited, and the individual situation of the subjects varies, which lead us to observe that the second language learner's mental lexicon organization model is incomplete, so on the whole, the second language learner produces the type of response from the transition of non-semantic to the semantic, but the phenomenon of the semantic regression back to the phonological also occurs, which is due to the lack of the learner's vocabulary repetition and use (Li Yongcai, Fu Yuping, 2009), which means that second language learners who produce more semantic responses are not necessarily higher-level learners.

By now, research on mental lexicon organization models has yielded many results and has had considerable impact on second language learners as well as language teaching.

#### IV. FUTURE DEVELOPMENT

First, word association test as an important method to study the organization mode of mental lexicon also has its limitations, that is, the test cannot reflect how syntactic collocations are associated and represented in the mental lexicon, and there is no uniform standard for stimulus word selection and association response classification (Shi Zhiliang, 2009), so it leads to contradictory research results between some studies. Of course, regarding stimulus word selection and associative response categorization labeling, domestic scholars have also explored (Zhang Ping, 2010; Li Xiaosa, Wang Wenyu, 2016). Therefore, in the future, vocabulary association tests will be carried out through more standardized stimulus word selection and association response classification, and at the same time, research will be carried out by combining it with Laufer's (2004) computer adaptive test of vocabulary strength and CATSS (Computer Adaptive Test of Vocabulary Size & Strength) (Shi Zhiliang, 2009), with a view to providing a more

precise picture of the organizational model of the second language mental lexicon.

Secondly, as far as the research object is concerned, the current research on the organization model of second language mental lexicon mainly focuses on higher education, and some of the research involves the high school students, and on the whole, it seems that less attention has been paid to the basic education. However, junior and high school students are an important group of English learners in China, and it is also emphasized in the English curriculum standards that students should be able to construct different lexical semantic networks and accumulate lexical chunks according to lexical properties, collocations of words, and thematic content (English curriculum standards for general senior high schools, 2020). So, in the future, the research on the mental lexicon organization model of second language learners in the basic education is also an important direction of exploration.

Finally, as figuring out the second language mental lexicon organization model will have a positive guiding effect on second language vocabulary teaching. At present, scholars have conducted relatively few studies on the combination of mental lexicon organization model and language teaching, staying more on theoretical guidance (Chen Mei, 2005; Qin Zhaoxia, Yan Minfen, 2014; Deng Qi, Zeng Zhihong, 2016). Among them, Liu Qiang (2004) utilized semantic analysis for teaching design, which provided useful insights for subsequent teaching research.

#### V. CONCLUSION

The current research on vocabulary development and representation of second language acquisition is not profound and comprehensive enough (Luo Han, 2008). Meanwhile, the study of second language mental lexicon organization model is an important segment under second language vocabulary development and representation. In the future, in terms of research methodology, word association test combined with other means can explore the mental lexicon organization model of second language learners more comprehensively and accurately, and secondly, in terms of research subject, it can pay more attention to the student group in the basic education, and combining the research results in this field with the vocabulary teaching practice is also important.

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