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Lexical Fossilization in Chinese L2 learners: Analysis from the Cognitive Perspective and Prospect of Future Development

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Abstract

As the status of English education has become increasingly higher in China, schools nationwide have started to advance the age of onset of L2 (English) learning because of children's edge in language acquisition over adults. However, it is found that merely emphasizing age without looking into other aspects that influence the effect of L2 learning is not enough. Fossilization still exists, notably seen in lexical learning. Despite the advance of age of onset of English education, children's English ability ceases to develop when they reach certain level. Through study of both domestic and foreign literature, this study aims to find other contributors in cognitive aspects by analyzing the causes of lexical fossilization based on the mental representation of L2 lexis and different stages of lexical development. Measures are provided from the perspective of input and output to tackle such problem during language processing, and suggestions are also proposed for educators, hoping that in the future, changes can be made to the content of English material, the form of English exams as well as teaching patterns so as to maximize the effect of L2 learning.

Keywords: age of onset, L2 learning, lexical fossilization, cognitive aspects

1. Introduction

In recent years, English education has gained an increasingly higher status in China. The consultancy firm Frost & Sullivan (2019) suggested that the compound annual growth rate of the Chinese English education market between 2013 and 2018 was about 19%, and it would rise to 20% over the next five years, pushing the total market value to 365.9 billion yuan ($53.2 billion) by 2023. According to Science Times, by 2019, there had been over 300 million English learners in China, among which the number in elementary school, high school and university was over 100 million. Also, a child spends around 1/5 of their time on English learning during their school time. In China, English is a compulsory subject and children need to take exams on a regular basis. It can be inferred from those statistics that English learning is one of the priorities in China's education system. Therefore, educators and scholars are doing research to find ways to improve children's English competence.

However, despite efforts such as advancing the age of onset of English learning, taking extra English lessons after school and increasing the difficulty of English learning material, little progress can be seen in children's performance. Gong Yafu, a scholar from National Institute of Education Sciences, stated on the 2019th Global English Education China Assembly that there was one misunderstanding in China's English education, which is the common belief that the age of onset for L2 learning is the determinant factor that influences learners' language competence. Even if children start to learn English at very young age, their learning results are not necessarily ideal because other more decisive factors are overlooked, such as how much time they spend on English learning and whether they have the chance to communicate in English. In fact, the majority of the students' English competence ceases to develop after they reach certain level, which is especially obvious in lexical learning, resulting in fossilization. The term 'fossilization', coined by Larry Selinker in 1972, refers to the

end-state of SLA, the point at which learners' mental representation of language, developing system or interlanguage cease to develop (VanPatten & Benati, 2018).

In the past several years, many Chinese researchers have conducted study on this topic, mostly looking into the causes from a single perspective, such as external/internal factors that influence the L2 lexical learning, bilingual mental lexicon or development of L2 lexical knowledge or lexical competence, or studying the combined influence from those angles mentioned above (Zhao et al., 2014). And most study overemphasizes the importance of input during L2 learning (Li, 2018; Li et al., 2019; Luo, 2021). Few studies are conducted from learners' cognitive perspective and offer solutions based on both input and output to maximize the L2 learning effect (Huang et al., 2017).

By studying both domestic and foreign literature, the current study aims to find out how to overcome lexical fossilization by understanding learners' lexical representation and development, and the reasons behind this phenomenon during language processing. Based on the analysis, measures are given to deal with lexical fossilization from both the input and output aspects, and suggestions are offered to teachers for the future English education.

2. Overview of English Learning in China

As one of the compulsory subjects in school, English is the second language of most people in China. With the progress of internationalization, China has put an increasingly greater emphasis on children's English education mainly through advancing the age of onset for L2 learning. Over the past few decades, the age of onset for English learning has changed from twelve years old to nine, and then to six. In some big cities, such as Shanghai and Beijing, most children have started to learn English since kindergarten, and recently, bilingual pre-school education has gradually become popular. One of the major theories that supports the reform of Chinese English education is Critical Period Hypothesis (CPH) proposed by linguist Lenneberg (1967). In 1959, Penfield and Roberts found that the plasticity of brain only existed within the first 10 years of life and disappeared after puberty, arguing that such neurological change was a disadvantage for older learners. Based on Penfield and Roberts' research, Lenneberg proposed CPH and extended this research from L1 to L2 acquisition, believing that due to the lexical chunks needed for language learning increased rapidly after entering into puberty, L2 learners required more conscious efforts and would have more problems in overcoming the accent. The maturity of brain led to the decrease of its plasticity and impeded L2 acquisition.

However, despite the advance of the age of onset for English learning, fossilization still exists in many aspects, especially in L2 lexis. By comparing and analyzing the errors made by students in a senior high school who have been learning English since the age of six, Jin (2016) found that some types of high-frequency errors are common in English compositions, such as wrong verb tenses and mistakes in singular and plural form of nouns, which can be seen as fossilization. Shi (2017) compared the analysis results of lexical errors, especially the frequency of errors of the same type of vocabulary in two compositions written by students in a college in Xinjiang, China. He found that among all types of errors, the proportion of misuse of nouns, verbs and prepositions is relatively higher, and the error frequency did not show any sign of decrease, proving the existence of lexical fossilization.

Therefore, merely emphasizing the age of onset cannot make sure that learners' language ability is well improved. Instead, Chinese educators need to study on other factors that may make contributions to the effect of L2 lexical learning.

3. Lexical Fossilization in L2 Learning

As is mentioned before, there is not enough research related to the cognitive factors of lexical fossilization in China. Thus, in this part, the process of L2 lexical representation and development will be analyzed to explain in which stage lexical fossilization is formed, laying a theoretical foundation for the illustration of the two specific causes during language processing.

3.1 L2 Lexical Representation and Development

(Mental) representation refers to the underlying, abstract and implicit linguistic system that exists in speaker's mind, which is a synonym of competence (VanPatten & Benati, 2018). Due to lack of extensive, highly contextualized exposure to the language and the influence of the established L1 lexical system, there are fundamental differences between the lexical representation and development of L1 and L2 (Jiang, 2000). According to Garrett (1975) and Levelt (1989), a lexical entry in L1 has two components: the lemma, which consists of semantics and syntax, and the lexeme, which consists of morphology and formal information. One of the most significant features of the L1 lexical representation is that all those different information is highly integrated within every lexical entry. Once the entry is opened, all those information would be available automatically. However, L2 learners learn new vocabularies through translation from their L1 equivalent instead of acquiring them in the natural context of the target language. Therefore, the syntactic, semantic, morphological

and formal information in L2 cannot be as highly integrated into its lexical entry as that in L1, which means it takes conscious efforts for L2 learners to extract information from their L2 lexical entry and that information may not be so accurate. This is also one of the reasons why there is a never-ending argument about whether L2 learners can become native-like.

Learners' competence develops as their exposure that language increases. The lexical development of L2 involves three stages: the formal stage, the L1 lemma mediation stage and the L2 integration stage (Levelt, 1989). In the formal stage, L2 words are mainly learned as formal entities with little semantic, syntactic and morphological information created in the lexical entry. The meaning is provided either through association with translation from L1 words or through definition, and the learners mainly focus on the formal features (i.e., spelling and pronunciation) of the words. Therefore, the lexical items in this stage actually doesn't contain any lemmas (De Bot et al, 1997). Although the meanings of L2 words and some information about grammar can become available in instructional environments, that information is not considered an integrate part of the mental lexicon, which refers to a kind of dictionary that contains information about a word's meaning, pronunciation, syntactic characteristics and etc. (Elman, 2004), so it cannot be retrieved automatically in natural communication.

However, the association of L2 words and L1 translation equivalent can be strengthened as one's experience in L2 increases, which at the same time facilitates the integration of L2 words forms and its L1 equivalent, adding lemmas to its L2 lexical items. This process helps the lexical development of L2 move on to the second stage: the L1 lemma mediation stage. The first feature of this stage is that the bond between L2 words and its L1 translation is increasingly stronger, which suggests that information in L1 lemmas may be copied or attached to L2 forms, forming lexical entry with L2 lexical forms but semantic and syntactic information of L1 translation equivalents. In other words, the L1 lemma information mediates L2 word processing (Jiang, 2000). The second feature is the lack of morphological specifications in the lexical entry. The main reason is that L2 words and their L1 translation equivalent often share the semantic and syntactic information while morphological information is usually unique in every language, thus less likely to transfer. For example, English is alphabetic language while Chinese is ideographic language, so the morphological information in the two languages is significantly different even if they refer to the same concept, which means Chinese English learners need to make extra efforts to learn the morphological rules of English rather than use the similar morphological information in its English counterpart. The third feature of this stage is the weak connection between L2 lexical items and conceptual representation. Since the lemma information is copied from L1 instead of established during L2 word processing, some information may be inaccurate or lost, resulting in this weak link.

In the third stage, the L2 integration stage, the semantic, syntactic and morphological specifications are extracted from the exposure of L2 and integrated into the learner's lexical entry, reaching a state that both representation and processing of L2 words become similar to the L1 lexical entry, which means that in this stage, L2 learners are able to use the words in L2 as naturally as native speakers.

It is obvious that the process of L2 lexical representation and development is more complicated than L1, requiring extra efforts to make sure that the semantic, syntactic and morphological information of L2 lexis is integrated into the learners' lexical entry and can be retrieved automatically from the L2 mental lexicon.

3.2 Causes of L2 Lexical Fossilization during Language Processing

Inferring from the analysis above, it seems that any learner can reach the final stage of lexical development as long as there is enough exposure to L2. However, research conducted by scholars at home and abroad suggests that it is not the case. According to Jiang (2000), the lexical development of most L2 learners ceases when it reaches the second stage, resulting in lexical fossilization. Laufer (1998), Jullian (2000) and Wu and Chen (2000) also concluded in their study that lexical fossilization is inevitable. L2 learners' lexis stops its development when it reaches certain stage. In the following part, two of the common contributors that interfere with learners' language processing will be elaborated for a better understanding of lexical fossilization.

One of the causes is the negative transfer of L1. While L1 plays a positive role in understanding and memorizing L2 words in the initial stage of L2 learning, when learners enter the L1 lemma mediation stage, their habit of comprehending the L2 words with the help of L1 translation equivalent actually prevents them from extracting the meaning of words from the context, which strengthens the connection between L1 lemma and L2 lexeme, thus reinforcing the negative transfer of L1. Jiang (2000) believed that L1 lemma mediation stage is the major period in which lexical fossilization appears. During this stage, although increasing the highly contextualized L2 input may help learners to extract the semantic and other information about a specific word, due to the L1 lemma that exists in the L2 lexical entry, L1 lemma mediation may be automatically reinforced by strengthening the connection between the L1 lemma and the L2 lexeme. As the meaning and other information of L2 words can be gained from the L1 lemma, learners would be less motivated to focus on the lexical extraction directly from the natural language context. In other words, learners' lexical development faces a dilemma. On the one hand, the

continuous contextualized input is essential. On the other hand, it prevents further lexical development by reinforcing the L1 lemma mediation. In that case, it takes longer for the transition from L1 lemma mediation to L2 integration and it is mostly never completed, resulting in lexical fossilization.

Another cause is the lack of input of lexical chunk. Lexical chunk is also known as 'lexical clusters', 'lexical bundles' and 'collocations'. Although this term has no standard definition, it is agreed that it is a sequence of words found together in a predictable pattern, in most cases, a recurring string of words, which can be stored and retrieved as a whole from memory at the time of use with no needs of grammatical analysis (Wray, 2002). That is to say, our brain processes these words in the form of chunks and keeps them in its long-term memory, which means once our brain is familiar with a specific lexical chunk, it no longer needs any extra efforts to make analysis, saving both time and energy. Meanwhile, the fluency and accuracy of language output are also guaranteed (McCrone, 1999). In the past decades, Chinese scholars have also conducted their study on this topic. Diao (2004) found that the ability to build lexical chunks is positively correlated to the comprehensive language ability and the specific language skills. However, some research also indicates that L2 education in China lacks the development of students' awareness to form lexical chunks, which leads to its weak representation in their mental lexicon. It suggests that most of L2 learners in China still haven't built a semantic connection as strong as that of native speakers within their L2 mental lexicon (Wu & Liu, 2013). The process of their lexical extraction therefore cannot benefit from the sequence of words bound together. Due to the complicated yet low-efficient processing of one single word at a time, lexical fossilization seems inevitable.

To sum up, from the cognitive perspective, L2 lexical fossilization can be attributed to negative transfer of L1 during the L1 lemma mediation stage and failure to input lexical chunks in learners' long-term memory. The measures concerning these issues need further discussion.

4. Measures for Tackling Lexical Fossilization

In this part, measures for lexical fossilization are given in two aspects—input and output—to illustrate how to deal with such problem, trying to solve negative L1 transfer and lack of input of lexical chunk during L2 learning.

4.1 Input

Input is the first step of language learning. When learning English, Chinese students usually start by memorizing words and phrases as well as grammar rules in textbooks and then take exams to check their English competence. Students are also required to be able to grasp the main ideas and details of a material through listening comprehension. It is true that those are indispensable parts of language learning. However, such fragmented, discontinuous and insufficient input cannot help students build up a complete L2 mental lexicon from which various information essential to students' understanding of L2 is extracted spontaneously. In fact, many students fail to flexibly use English vocabulary when a semester ends because they have only learned the formal information of certain words and phrases or understand them with the help of L1 translation in textbooks. Also, teachers' teaching pattern is usually monotonous, and the requirements are demanding. Students are asked to do exercises in class and then check the answers. Their scores are given based on the correctness of their answers, and sometimes the level of those exercises is far beyond their capability, which exposes them to great pressure. On the one hand, most students have lost their interest in English learning, considering it only as a compulsory task. One the other hand, students may lose confidence and tend to resort to their L1 knowledge to deal with exercises that are too beyond their capability because they cannot find answers in their L2 mental lexicon. This habit is likely to reinforce the negative transfer of L1. As for this problem, changes should be made to teaching methods in order to improve the learning effect and arouse students' interest.

Comprehensive Input Hypothesis, one of the central hypotheses of the Monitor Model, was proposed by U.S linguist Krashen (1982) in his work *Principles and practice in Second Language Acquisition*. According to Krashen, additional L2 competence is only acquired by understanding language that contains vocabulary and structures which are a little beyond their current stage of competence, where 'understand' means the learner focuses on the meaning instead of the form of the language. Krashen defined the learners' current stage of competence as 'i', which makes the next stage of language development as 'i+1'. In that way, students can understand most of what they are learning while making progress, without relying too much on their L1. Meanwhile, acquiring a new language not only needs exercises but also requires of continuous reading that is interesting and full of content (Krashen, 1982), which means learners should be exposed to a more stable language environment where they have access to various reading and listening input and L2 collocations, helping them store L2 lexical information in the form of chunks in their long-term memory from which they can retrieve in communication.

However, comprehensive input is necessary but not sufficient (Krashen, 1982). In order to ensure the effect of L2 acquisition, the affective filer needs to be low. It is the emotional variable that is related to learners'

motivation, self-confidence and anxiety state, and controls how much input learners come to contact with and how much input is converted to intake (i.e., the portion of the L2 that is assimilated and fed into the interlanguage system). When the filer is high, the natural language acquisition device cannot be activated, receiving little input, while when the filer is low, plenty of input will be let in. That is to say, when students are stressful, they tend to learn less, and the learning effect is usually not ideal. Therefore, teachers need to offer students a more relaxing learning atmosphere while giving them massive and comprehensive input on a regular basis.

4.2 Output

Apart from input, output also plays an important role in L2 learning. Without output in the L2 context, it is difficult for learners to notice their language problems. However, in the traditional classroom-based English education in China, students' language output ability is often ignored, especially for writing and speaking. Teachers put too much emphasis on imparting the formal or semantic information as well as grammatical rules to students, not giving them enough opportunities to apply what they learned to L2 communication. In the past decades, Chinese researchers have been aware of this problem. Wu and Chen (2000) found in their empirical study that lack of language output jeopardizes the development of lexical ability. Li (2013) also stated that overlooking communication, lack of output in language context and absence of timely feedback may all result in lexical fossilization.

Scholars from other countries also conducted some research on the significance of output. Based on Krashen's comprehensive input, Swain (1983) proposed the concept of comprehensive output, arguing that it was wrong to only focus on input during L2 acquisition. She suggested that learners are 'pushed' by those mistakes made in communication to modify their output, which enables them to move from semantic processing in comprehension, the early stage of L2 acquisition, to syntactic processing in production. In other words, if learners use L2 frequently in speaking or writing and have the awareness to find an alternative way to express themselves when there is communication 'breakdown', they tend to become more familiar with both semantic and syntactic information of L2 rather than merely understand the formal information, reducing the likelihood of lexical fossilization. Schmidt and Frota (1986) used 'notice the gap principle' to explain that the L2 learners would begin to acquire the target-like form only if it was presented in comprehensive input and noticed in the normal sense of the word, that is consciously.

Based on the findings above, it is suggested that output serves as a medium to test learners' understanding of what they have input, help them notice their mistakes and then encourage them to search for expressions in the L2 mental lexicon.

5. Suggestions and Future Development

From the analysis in the previous sections, it suggests that both input and output are important for L2 learners. With the combination of continuous input and output, which are both comprehensive and highly contextualized, learners' lexical development is able to move from stage 1 to stage 2, but most of them encounter lexical fossilization before reaching stage 3 due to negative transfer of L1 and lack of input of L2 lexical chunk. Therefore, teachers' attention should be paid to how to make sure that the L2 lexical development of the majority of students reach the L1 lemma mediation stage and what can be done to help students be closer to the L2 integration stage.

The suggestions are given as follows. First, increasing contextualized input. In traditional English education in China, teachers mainly use textbooks on which new vocabulary appears with both English and Chinese version in the glossary of every text. Students memorize those words after class and then do a vocabulary quiz before learning the next text. This teaching method may help students learn some single meanings of a specific word, but it fails to enable them to use those vocabulary freely in communication when the language context changes. On the one hand, students only learn the formal and semantic information of those words and phrases in the context of a specific text rather than acquire them in natural language environment, which causes their lexical development to sway between stage 1 and stage 2. On the other hand, focusing too much on the Chinese translation on textbooks makes students form the habit of relying on L1 translation equivalent to understand L2. It may indeed facilitate their learning process in early stage, but in the long run, this habit reinforces the connection between L1 lemma and L2 lexeme, preventing students from building a well-functioned L2 mental lexicon that helps them reach the final stage of lexical development. Therefore, teachers are encouraged to combine textbooks with native news, novel and other original English listening and reading materials whose levels are a bit higher than students' English competence, exposing them to various language context from which they can acquire different meanings and usage of certain vocabulary as well as learn L2 through lexical chunks. Learning vocabulary in context while reading is the major source of expanding vocabulary size (Nation & Waring, 1997).

Second, changing the form of exam and teaching pattern. In China, teachers tend to check students' understanding on English vocabulary through multiple choices, for instance, asking students to choose the best answer that can be filled in the blank of a sentence from four different words. This method is low-efficient because only one meaning and usage of a word can be tested at a time, and those words are mostly learned by rote memorization, which means students may not be able to recognize them in different context and they would easily be bored. Moreover, students barely have any opportunity to apply the vocabulary they learned to actual communication. However, as is discussed in the previous section, output (i.e., communication) is important because it allows students to notice their mistakes and then make modification accordingly so that they can make progress. Therefore, teachers are advised to increase the proportion of open questions in exams to test students' understanding on a certain material and ask them to give their own opinions. In this way, teachers can not only test students' grammatical and lexical competence in their feedback, but also make the learning process more entertaining and content-rich, arousing students' interest in English learning. Furthermore, teachers are also encouraged to give students more chances to have conversation in English by inviting exchange students from English-speaking countries to interact with Chinese students and hiring more native teachers to give lessons in class, which offers students a language context to both input and output lexical chunks. According to Lewis (1993), the key to language acquisition is obtaining the ability to produce lexical chunks. One of the crucial ways to overcome fossilization in L2 acquisition is to input sufficient and high-quality language material (Fang, 2010).

In summary, to help students reach L1 lemma mediation stage and approach the final state, at the level of input, teachers should abandon the textbook-only English education by combining texts with different kinds of extracurricular English material for a more contextualized learning environment. Also, changes should be made to the form of English exams as well as teaching pattern to make sure that for one thing, teachers can test students' English competence in a more flexible and interesting way, and for another, students are able to input L2 lexis in the form of chunk while communicating with native speakers. At the level of output, it helps them get timely feedback from each other and practice authentic English collocations with native speakers, which is important for improving L2 competence. Therefore, the combination of input and output is the ideal way to help students overcome lexical fossilization.

6. Conclusion

By analyzing research conducted by both domestic and foreign scholars in the past several decades, this study focuses on lexical fossilization, a major problem facing English learners in China. Analysis is first made from the aspect of learners' lexical representation and development, showing that fossilization normally happens in the second stage of lexical development: the L1 lemma mediation stage. Then, causes of lexical fossilization during language processing are illustrated from two perspective: the negative transfer from L1 and lack of input of lexical chunk, and measures to overcome lexical fossilization during the process of input and output are provided respectively to tackle those issues mentioned above. Finally, suggestions as for how to help students overcome lexical fossilization and improve the effect of L2 learning are proposed, emphasizing the importance of combining both input and output, which is easily neglected by educators in China.

Compared with the previous study, the current study pays more attention to the cognitive factors that interfere with L2 learners' lexical learning and tries to find solutions for lexical fossilization by combining input and output in China's instructional English learning environment. However, this study has several limitations: First, theories that mentioned in this study, including Krashen's Comprehensive Input Hypothesis and Swain's comprehensive output, are proposed in the background of L2 acquisition through exposure to the natural language context rather than L2 learning in the classroom-based education in which learners input L2 information from teachers and consolidate knowledge by means of homework and exams. Whether those theories are effective for English education in China have not been tested. Second, although measures concerning tackling lexical fossilization from the perspective of input can be easily realized in almost every school in China, those of output may encounter difficulties due to limited educational resources. For instance, in some less developed areas, it is impossible to enroll exchange students and recruit native teachers to offer students a L2 learning context where they can have the chance to communicate in English.

In the future, further research needs to be conducted on the empirical study of the effectiveness of L2 acquisition theories on the classroom-based L2 education in non-English speaking countries. Moreover, different measures to overcome negative L1 transfer and failure to memorize L2 lexis in the form of chunk should be tailored for students from different regions according to their own situations instead of only considering those developed regions so as to ensure the equality of English education in all areas in China.

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