Literature Review: Theoretical and empirical research on Age effects in SLA: Focusing on Critical Period Hypothesis

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Keywords: Second Language Acquisition, Age effects, Critical Period Hypothesis

Abstract: This article reviews two main language modules in the ultimate attainment of Second Language Acquisition (SLA), morphosyntax and phonology, and discusses the existence pf the "Critical Period Hypothesis" (CPH) in each module. The review includes the relationship between ultimate attainment and age in SLA; also, a comprehensive reflection on the CPH in SLA is presented. Age is an important factor in the second language (L2) pronunciation. Generally, younger learners tend to acquire proper L2 pronunciation more easily than their older counterparts. In terms of grammar, although age to some extent determines the ultimate attainment, other external factors also affect it, such as L2 input and the influence of the mother tongue. The stronger the mastery of the mother tongue, the lower the level of the second language; and the more natural the environment for second language learners and closer to the way native speakers acquire, the higher the ultimate attainment of second language acquisition.

1. Introduction

“Critical Period Hypothesis”(CPH) is a topic that linguists have been paying close attention to. When the CPH was more fully affirmed in the field of the first language acquisition and was extended to the field of ‘Second Language Acquisition’ (SLA), which also aroused widespread concern and discussion among scholars. Although CPH has been fully affirmed in the field of First Language Acquisition, widespread concern and discussion were aroused among scholars when it was introduced into SLA. After half a century of controversy, no unanimous conclusion has been reached on the question of whether there is a critical period for SLA. Many linguistic scholars have shown a keen interest in this topic, they take into account that there are many complicating factors that the ultimate attainment in SLA was affected by various factors. Therefore, researchers designed various experiments adopting qualitative or qualitative research methods from their own perspectives and different viewpoints were therefore obtained.

As the earliest scholars to introduce the theory of "CPH" into the field of linguistics, Penfield and Robert (1959) believes that the best time for language acquisition is before the age of ten, when a child's brain plasticity is formed. Whereas learning after puberty, as the lateralization of the brain is gradually completed and the brain's plasticity disappears, this is when people become less efficient at learning language. Lenneberg (1967) also attributed the advantages of children's language acquisition to physiological factors, arguing that the critical period of language learning is between age two to adolescence. Birdsong (1999: 1) defines CPH as the following: ‘The CPH states that there is a limited developmental period during which it is possible to acquire a language, be it L1 or L2, to normal, native-like levels. Once this window of opportunity is passed, however, the ability to learn language declines’, which means that during the years from birth to adolescence (ages two to eighteen), with sufficient language input, a person is able to fully grasp the language. However, it is difficult to master the language. This is a well-recognized definition of the CPH, Over the past few decades, scholars in the field of the SLA have different attitudes towards the existence of CPH, the timing of the “critical period”, and whether this period can be defined in different language domains. Therefore, in this article, I summarized the rationale of the CPH, and selectively reviewed and analyzed the previous empirical research on different language modules

for the critical period of L2. The content of the first chapter describes the historical development background and the context of CPH; the second chapter illustrates the basic theory of CPH from the perspective of biology and neuroscience; the third chapter clarifies that the ultimate attainment of both morphosyntax and phonology are influenced by age and also discusses whether there is a critical period and its specific timing. The last chapter summarizes the outcomes of researches in this article, analyzes the existing problems and puts forward relevant suggestions.

2. The empirical basis of The Critical Period Hypothesis

2.1 The Critical Period Hypothesis of Language Acquisition from a Biological Perspective

Lorenz (1935) found that baby goose had obvious maternal recognition behaviors within few hours after birth. This means that they will treat the creature they saw at first sight as ‘mother’ and follow the action of “mother goose”. Moreover, Lorenz also confirmed that if the baby goose is born without contacting any moving objects, it will lose its mothering behavior. After that, no matter how much effort the baby goose takes to expose itself to creatures, it will not follow any “mother goose”. Lorenz believed that this natural reaction forms during a critical period "inscription" and the period during which the "inscription" phenomenon occurred is referred to as the “Critical Period of Development”. This phenomenon is also applied to the development of human organs, as there is a period of time when the a similar reaction has been observed in the development of human language learning. Together with Clarence and Muyskens (1959) pointed out a term that “Biolinguistics” when it is the first time that a biology results of the research were combined with linguistics to produce “Biolinguistics”.

2.2 The Critical Period Hypothesis of Language Acquisition from a Neuroscientific Perspective

Some studies have shown that age is an significant factor influencing the SLA. Compared with adults, children have more advantages in learning a second language. Adults who start learning a second language after puberty have a lower rate of reaching native-like speakers than children. The CPH originated from biology. Later, Penfield and Robert (1959) introduced the term "critical period" to the field of language acquisition when they believed that the process of human language learning is the same as the process of human organ development. From the view of neuroscience, people have plasticity in the language function of the brain in early childhood (before the age of ten), after puberty, the lateralization of the brain has been completed, the critical period of human language development is missed. Subsequently, Lenneberg (1967) supported the view of CPH in language acquisition, arguing that the master of a second language is almost impossible if there is no language input by puberty. Lenneberg’s perspective also considered that the critical period of language learning is from two years old to adolescence (aged ten to twelve). Lenneberg affirmed the advantages of children's language acquisition and his viewpoint caused widespread discussion in the linguistics community. However, after Lenneberg pointed out "the completion of the lateralization of the brain's linguistic functions", he didn’t mentioned about the cause. When Pinker ((1994) attempted to explain the critical period in language from a genetic evolutionary point of view, where the brain consumes calories under the mechanism of language learning, once the process of learning is complete, the mechanism is recycled for other uses.

After half a century of development, the CPH has been generally recognized in the field of the first language acquisition. However, the controversy it has caused in the field of the SLA is far from over, as in-depth discussions and researches have been conducted by linguists on whether the critical period in the field of second language acquisition exists and its specific timing.

3. An Empirical Study on the Critical Period Hypothesis of Second Language Acquisition

It has been more than half a century since the theory of CPH in SLA was first proposed in 1960s. However, no consensus has been reached on the timing of CPH, as well as whether the critical period varies in different language modules. Based on the results from the previous studies, an

important indicator to estimate learners' acquisition quality is the ultimate attainment of SLA, which can be summarized into two significant language modules: morphosyntax and phonology. The theoretical and empirical studies in these two categories are what this article has reviewed and analysed.

3.1 Age effect on Phonology

In terms of Phonology Acquisition, there are many scholars who have affirmed the role of age in critical period for SLA. For example, Asher & Garcia (1969) and Oyama (1976) conducted an investigation of the English pronunciation of Cuban students who emigrated to the United States. They study showed that the younger the immigrants, the smaller the negative transfer of the mother tongue in accent. In other words, phonology is less affected by the accent of L2 learners' mother tongue, so that younger learners would be more native-like speakers. As well as Snow and Hoefnagel-Hohle (1982) suggested that the advantages of younger L2 learners are more obvious, the pronunciation advantage that older L2 learners initially have is gradually lost after a year of study and is surpassed by younger children. This indicates that the initial advantage of adult learners cannot be retained permanently. Long (1990) also analyzed and summarized the research results of previous studies, concluding the specific timing of CPH for phonological acquisition-L2 learners who started before the age of 6 were less affected by the negative transfer of mother tongue but it is difficult to get rid the negative transfer after age 12.

On the contrary, Flege (1999) noted that there is a certain linear relationship between L2 learned age and pronunciation, however the difference is that he suggests that there is no obvious developmental point or a sudden drop off at a certain age, Thus, he drew the following conclusions. In terms of ultimate attainment of L2, age is not the sole critical factor influencing SLA, especially while taking into account the interference of increasing mother tongue pronunciation on L2. However, age is still a factor that cannot be ignored by L2 learners, since Learning L2 within the timing of the critical period can largely avoid L2 learners from obvious interference of other language.

3.2 Age effect on Morphosyntax

In terms of morphosyntax, Patkowski (1980) was the first who stated that the best age for L2 learners in SLA that is adolescence (12-15 years old) through experiments. I took one of the most influential studies on morphosyntax supported by Johnson and Newport (1989, 1991) as the main context to start relevant discussions. Johnson and Newport (1989, 1991) used "Grammaticality Judgments" (GJs) as the experimental material with oral testing. The results of the experiment showed that the 3 to 7 year-old immigrants to the United States were syntactically similar to native-like speakers, while the results of other groups of subjects were significantly lower than those of the native-speaker groups. These results suggested that, for those participants who immigrated to the United States after puberty, there is a significant relationship between their performance and migration time. This reported that L2 level is not significantly related to their migration time.

On the contrary, Birdsong (1999) repeated the same research of Johnson and Newport (1989, 1991), however, the choice of a different participant, whose native language is Spanish, and its fellow Indo-European English as L2, which differs between Johnson and Newport's participant, is inconsistent between native language and L2, and thus yields different results. Moreover, Johnson and Newport (1989) did not categorize their participants according to their English proficiency, but divided them into four testing groups with their arrival age in the United States: 3 to 7, 8 to 10 , 11 to 15 and 17 to 39. The results of the GJs conducted by the subjects showed that: "Age of arrival and ultimate attainment are statistically related." However, Bialystok and Hakuta (1994) reconstructed the data form that study, while they divided the arrival age of the subjects into two groups with a cut-off of aged 20. Form the results of GJs, the differences were not significant when comparing with native speakers. Hence, they put forward a new argument that the cause of the differences in grammatical proficiency between the different age groups is probably in the various educational backgrounds among them. That means that the degree of the subjects who acquired L2

input is inconsistent. For example, children who immigrate to the United States at a young age have a greater proportion of more formal English input, but those who immigrate to the United States after adulthood not learn from the target language at an early age and therefore missing he golden period of early L2 input. As the results of Jia's (1998) research, even the L2 learners' grammatical proficiency can be predicted by the age of arriving in the target language country, the earlier the age, the higher the L2 GJs. He also found that the ultimate attainment of SLA is also affected by the proficiency of the mother tongue and the environment of L2. In general, the stronger the mastery of the mother tongue, the lower the L2 proficiency; the closer the way to native-like language acquisition, the higher the ultimate attainment of SLA.

Therefore, the ultimate attainment of SLA has been questioned in many ways especially in CPH on the morphosyntax module. The experimental results concluded by many scholars show that the CPH is not obvious under the morphosyntax module; Age cannot properly distinguish the level of the ultimate attainment of L2 learners. The critical factors of the ultimate attainment are also influenced by other aspects such as target language input, acquisition environment and so on.

4. Conclusion

According to this chapter, the following consensus can be obtained: 1) there is a certain relationship between the critical period of language acquisition and the plasticity of the brain; 2)there is a critical period of SLA, which reflects that the younger the learner is, the easier it is to acquire the correct pronunciation of the target language; 3) in terms of morphosyntax, further evidence is still needed to explain whether there is a negative correlation between age effects and L2.

The factors that affect the SLA are numerous and complex, among which age is an important factor. In addition, other factors may also interact to affect the results of SLA, so it is important to control the relevant variables during the experiment (e.g. acquisition context, mode of acquisition, and duration of acquisition) to minimize the impact of irrelevant variables, thereby increasing the credibility of the CPH of SLA.

Firstly，based on the experimental results presented above, it can be seen that the factors that affecting SLA are not only age, but also the target language acquisition environment, and the influence of the mother tongue. Therefore, specific research protocols need to be developed for each study, and then the results of similar studies can be analyzed and compared to produce studies that have Referential and relevant conclusions. It is impossible to affirm or deny the existence of a critical period in the SLA based on only one experiment or one aspect of research. In the future, scholars need to design more rigorous empirical researches to answer the question of whether there is a critical period of SLA and its timing.

Secondly, the scope of language modules for the CPH of the SLA should be continuously expanded. The research summarized in this article mainly focuses on age effect on phonetic and grammatical acquisition, but the other aspects of SLA are rarely involved. For example, few people discuss the knowledge on vocabulary of L2, L2 collocation and so on. Future studies are suggested to focus on other influencing factors which received rare attention in previous research, such as word bundle.

In addition, the study of the CPH of the SLA is mainly based on English as a target language, without considering studies on other more target languages in empirical research, which cannot improve the persuasiveness of the CPH. Therefore, it is hoped that future researchers will expand the scope of the target language and improve the feasibility of the Critical Period Hypothesis of the Second Language Acquisition.

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