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The Impact of "The Critical Period Hypothesis" Within Age Factors on the Learning Ability of SLA

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Abstract: With the accelerated development of globalization, second language acquisition (SLA) has become a crucial issue in the study of language education research. In the recent years, the impact of individual difference on the SLA process has been a matter of great concern, including age, sex, character, cognitive style, study motivation, affective factor and so on. All these factors can influence the learners' choices of language study tactics and their study effectiveness. The article summarizes research results on the influence of age on SLA learning ability, discuss the critical period hypothesis and relevant controversial views in depth, in order to provide theoretical support and direction guidance for future research. All in all, Despite the existence of different views and disputes, the "CPH" proposed by Penfield and Roberts and Lenneberg's subsequent research, to a certain extent, all offer important insights and thinking on understanding the influence of age on SLA. Educators can tailor their teaching base on learner's age and needs, with a focused approach to promoting effective learning language.

Keywords: Second language acquisition, the critical period hypothesis, age.

1. Introduction

With the accelerated development of globalization, SLA has become crucial topic in language education research. Language acquisition is the key of human communicating, understanding culture, developing cognition and enabling social participation. It promotes individual thinking development and cross-cultural communication in the global era. The effect of individual difference factors on the SLA process has been a major issue for an increasing number of academics in recent years, including age, sex, character, cognitive style, study motivation, affective factor and so on. These factors not only affect learners' choices of study strategies, but also have a direct correlation with language learning's efficacy and efficiency.

In view of this, this article aims to summarize the current research results on how aging variables affect on SLA learning ability, clarify its development process and related important theories, thoroughly review and explore the research content of various scholars, and explain the influence of the "CPH" theory on SLA learning ability. It will indicate the route for further research and offer theoretical justification for upcoming experimental studies.

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2. Critical Period Hypothesis

“Critical period”, it is the period that environment affect can have the greatest impact in the individual development process. The special period which can be relatively easily acquire some skills or behavior. Next paragraph is about the background of the “CPH”.

Age is one of the important factors affecting SLA. Age factor was introduced into SLA research mainly on the later 1960s to the early 1970s. During this period, research on SLA started to concentrate on how children and adults learn, and it explored whether there is an important stage. (Critical Period Hypothesis, CPH), during which language learning can be most effective. The“CPH”, first appeared in the work “The Biological Foundations of Language” by American psychologist Lenneberg [1]. In this work, it was proposed that language learning has a critical period. Because after people reach their teenage years, the capacity to pick up a language appears to undergo some clear changes. Based on this view of “CPH,” it began to be widely researched and discussed by scholars.

3. Relevant Views and Disputes

Scholars have proposed many related viewpoints in relation to how age affects SLA. In the work of Professor Md. Enamul Hoque, it is mentioned that osmosis language input is essential. The literature points out that babies begin to learn language from birth. All babies will experience similar learning stages: at 18 months, they can speak words consisting of two characters; at the age of five, they begin to speak complex sentences; and at 10 years old, they will be applying language skills proficiently [2]. This phenomenon indicates that children quickly learn how to speak due to natural rules. There still remains a question that When it comes to learning a language, youngsters are more advantageous than adults.

In the investigation into how age affects SLA learning capacity, the famous theory proposed by Penfield and Roberts is the “CPH”. According to this theory, SLA has a specific sensitive period (before age 9), and missing this period will make SLA more difficult. Later, Lenneberg expanded the hypothesis, proposing language learning from 2-13 is most beneficial. Due to the plasticity of the brain weakens with age, it may have an impact on adults' SLA learning ability.

In Li’s study, based on CPH and a comprehensive understanding and extension of related research, the scholar proposed that human learning of a second language can be classified by age, dividing the human learning process into three periods: the Plastic Period, the Pre-learning Period, and the Post-learning Period. The Plastic Period is the “critical period”. At this time, the brain's system for learning languages is still immature. and humans still maintain their first language acquisition ability, with a strong capacity to accept and internalize new language. Furthermore, language ability is not yet fixed in the left brain. If the brain is stimulated by external language input at this stage, its responses are most active, demonstrating strong plasticity in language ability. From a theoretical perspective, learners can engage in unlimited and systematic learning of multiple languages during this period [1].

However, in recent years, the use of SLA has decreased as a result of new discoveries in the study of language theory and first language acquisition. Instead, the focus is solely on learners' abilities and tactics. Some scholars have suggested that the widely recognized point 'CPH' is not correct.

Scholars are beginning to question these views, so further studies have put forward different viewpoints. For example, in the study by Chee et al., although the participants had a relatively late learning age, through sufficient exercises and suitable teaching approaches, they were still able to reach a high level of SLA ability. Another case is the study by Kazuya, where the scholar explored the impact of age on the efficacy of vocabulary learning in SLA beyond the key period. In this study, learners were able to quickly attain vocabulary levels comparable to those of native speakers

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following the crucial period [3]. Besides, the report conclusion by Ervin-Tripp pointed out that older children learn grammar and other knowledge faster than younger children.

However, in the study of Hakuta, one novel idea was proposed: “The critical period hypothesis needs research to prove its study results, which generate great changes, rather than merely discusses the steady deterioration of learning capacity with aging. ” “The critical period hypothesis” is a popular theory used to explain why children's SLA learning is apparently successful, while adults' learning often fails [4]. The scholar examined the CPH using a large number of participant samples to look for indications of a gap in the attainment of English proficiency. What's more, the researcher hypothesized separately that 15 years old and 20 years old could be the critical points marking the conclusion of the critical period, but there has been no indication of this discontinuity in terms of language learning capacity. Rather, the strongest evidence indicates that the success rates of SLA steadily decline throughout the entire life cycle.

4. Review of Relevant Empirical Research

The “CPH” theory is the focus of scholars' debate. In practical research, scholars use diverse research methods, mainly including experience studies, longitudinal studies, cross-sectional studies, neuroscience methods, questionnaire surveys, interviews, and language sample analysis and other methods. Here is a review of the most typical and representative empirical research. Studies analyze the critical period's possible existence by assessing testers' abilities in syntax, pronunciation, learning, and brain reactions.

Johnson and Newport’s study is the most typical study to prove the existence of the critical period. It selected 46 Chinese or Korean immigrants as testers who immigrated to the US between the ages of 3 and 39. The participants' second language is all English. Additionally, the testers lived in the US and interacted with English for at least 5 years. The study evaluated the English proficiency of these experimental subjects by testing their English syntactic judgment. After the test, the scholars found that the behaviors of immigrants who migrated before age 7 approached the level of local people. The behaviors of immigrants who migrated after age 7 showed a downward trend with increasing age. In summary, the researchers believe that there exists a special age stage. Before the critical period, SLA can have the best results, and after that, the ability for SLA gradually weakens as age increases. This study proved that the critical period might exist and have a fixed age stage during which learning can be most effective [5].

A study by DeKeyser, involving 57 adult Hungarian immigrants, partially confirmed this hypothesis. Few adult immigrants achieved the same scores as children on grammatical judgment tests. High scores among kid immigrants were not necessarily predicted by the few adult immigrants who had high levels of linguistic analysis ability. This study explained the noteworthy exceptions found in the research and confirmed the results of Johnson and Newport [6].

However, this study also has some limitations. It seems to compare language ability rather than language learning ability. Language learning ability focuses more on the growth of ability after the learning process, rather than the original level of superiority or inferiority. Furthermore, the scholar pointed out several issues that needed to be addressed: Firstly, it is recommended that the subjects have been using their second language for 10 years or more. Secondly, it should be avoided to conflate the testing age with the arrival age. Thirdly, the testing time should be shortened to prevent excessive fatigue among the subjects. Lastly, finding enough volunteers in the crucial 15–20 year old age period is challenging, which may affect the convincingness of the experiment [6].

In Johnson and Newport’s study, it pointed out that the correlation between early immigrants' arrival age and test scores is more significant than the correlation in the entire group [7]. However, the study by DeKeyser did not duplicate this result. Among individuals who arrived before 16 years old, the correlation is -0. 26 (not significant). The representativeness of the data is weak because, in

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the study, the informational points for the 12–16 age group are insufficient (2 and 5 respectively). Furthermore, it should be noted that, compared with earlier learners and adults, Johnson and Newport's data showed that the skill level scores of 12-16-year-old learners declined. Since there is no theory to explain why only young learners exhibit this phenomenon, the study's conclusion may be unreliable and the correlation may overestimate the real correlation [6].

In Patkowski's study, the existence of CPH was explored in relation to phonological acquisition. The testers were Cuban immigrants of different age stages who had immigrated to the US. Subsequently, the researchers assessed these immigrants' English pronunciation abilities. According to the study, immigrants were more likely to sound like native Americans if they had arrived before the age of six. The proportion of such immigrants was as high as 71%, while only 17% arrived after the age of 13. This indicates that age plays a critical role in SLA, confirming the existence of of the CPH. However, this study did not control for the influence of other factors on SLA [8].

Scholars suggested in the research of Snow and Hoefnagel-Höhle that "initial language acquisition must begin before the end of brain unilateralization, so that if SLA begins before adolescence, it will proceed more quickly, and the quality may be similar to that of the first language" [5]. The idea demonstrated that, from the biological aspect, the impact of age on the brain does exist, supporting the existence of CPH.

42 English-speaking Dutch learners, ages 3 to maturity, participated in a 13-month study in the Netherlands by Snow and Hoefnagel-Höhle. They found that children aged 12 to 15 learned Dutch the quickest at first, but that after a year, children aged 8 to 10 and 12 to 15 had the highest competency, while children aged 3 to 5 did the worst. Their findings contradicted CPH. In his article, Snow mentioned a viewpoint that if an individual demonstrates ability and advantage in learning their first language, they may achieve similar results in SLA due to their inherent advantages. This suggests that the critical period has no bearing on a person's capacity to acquire a second language [9].

In a test mentioned in Ann Fathman's article, about 200 children from lower socioeconomic backgrounds, ages 6 to 15, who spoke their mother tongue at home and were studying English as a second language in American public schools, participated in the study. The testees were assessed through grammar, accent, and other exams, and were finally scored and evaluated by two linguists [10].

The study's findings were utilized to validate the connection between the speed of acquiring English grammar structures and the sequence of learning within those structures. The results indicated that age and acquisition rates are related. Among kids who had spent the same amount of time in English, older children scored higher in morphological and linguistic tests, while younger children scored higher in phonological tests. The order in which children of different ages built the structures included in the test, however, did not differ significantly. These findings imply that learning English morphology, grammar, and phonetics varies amongst individuals [9].

These data cannot prove that SLA has a key period, but they can prove that any aspect of age may have an affect on SLA. These discrepancies could be caused by environmental, physiological, or maturity-related factors. Indeed, distinct key eras might exist. For example, the time before adolescence may include such a period. During this period, abilities such as distinguishing, explaining, or imitating sounds have the best performances; however, after that period, abilities to learn grammar, generate language, or utilize memory systems can still develop sufficiently and have significant interactions.

At the same time, in the study by Wartenburger and other scholars, the main participants were early bilinguals (those acquiring a second language before the age of 6) and late bilinguals (those learning a second language after the age of twelve) made up the majority of participants. The scholars examined the impact of the bilingual SLA age factor on brain activity in the cerebral cortex. While late bilinguals activated more brain regions when processing second language grammar, early

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bilinguals showed no discernible change in brain activity between processing first and second language grammar [11]. This conclusion was different from Lenneberg's research and further demonstrated that the CPH exists, but the specific age stages at which it exists are not clear.

Scholars' studies have various focuses, leading to non-universal applicability. However, the affect of age on SLA should not be exaggerated. Maturity does not equate to earlier learning; children excel at implicit language acquisition rather than explicit understanding of structures. Nonetheless, implicit acquisition necessitates substantial input, which can typically be provided by immersive courses. The study indicates that adulthood proficiency necessitates a clear and defined learning process.

Bialystok briefly reported on two studies about the effect of age on SLA. One study involved college students, who started learning French as a second language at varying ages and who were native speakers of English or German. The other study focused on a group of individuals who immigrated to Canada after becoming native Chinese speakers, and they started learning English as a second language at different ages. People who acquired a second language later in life (after the age of 15) did better than younger learners in both studies [12]. This served as proof against the CPH, according to Bialystok. However, since the experimental conclusion measured learning speed rather than final acquisition level, and Bialystok's report did not mention the minimum residence period, it is plausible that many learners had not yet reached their full acquisition potential.

In reviewing existing research, it can be observed that more detailed studies are still important to identify which additional components of the SLA process shift with age, the kinds of mistakes students make, and the methods they use. Additional comparative studies are required to ascertain the influence of individual differences and various learning contexts on this process.

The Snow and Hoefnagel-Höhle’s study only examined a limited age range. Fathman's study was conducted among participants aged 6 to 15, Ekstrand's study focused on ages 8 to 16, and Ervin Tripp's study covered the age range of 4 to 9. It is evident that most studies have not comprised volunteers from all age groups within the study's target range, which is roughly three years old to a few years post-puberty. For instance, age differences are often evaluated horizontally rather than vertically. Since age differences observed at any given point after the initiation of SLA may reflect recent acquisition progress in a specific group rather than a consistent difference in acquisition rates, it is essential to assess different language abilities separately. This is because the acquisition of different language abilities may rely to varying degrees on brain plasticity.

5. Conclusion

Age factor is not the only factor that causes SLA. Individual, learning motivation, quality of language input, teach skills are also important. An increasing number of studies on SLA have been conducted in recent years and the relevant factors that affect it are also increasing. Perhaps highly motivated adult learners may compensate for age disadvantages through sustained effort and appropriate teaching methods; children who lack motivation may not be able to fully realize their potential for language acquisition, even if they are in a critical period.

In summary, scholars have acknowledged the influence of age factors, yet no definitive conclusion has been reached, necessitating further research for exploration. Despite the ongoing debate, the affect of age on SLA cannot be overlooked. Existing literature provides educators with a wealth of content from various perspectives and levels for consideration. Educators may tailor their instruction according to learners' ages and needs to facilitate effective language learning.

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