

The Age Effect in Second Language Acquisition and Its Study Design Method

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Abstract. The focus of this paper was the effect of age on second language acquisition. The effect of the critical stage of second language acquisition is introduced. A retrospective discussion on the influence of age on second language acquisition, this paper tackles the conventional empirical methods of age-effect studies and analyses and summarizes some of the key questions in related research. The different testing methods used in these studies are the main reason for the research's contradictory results on the effects of age in second languages, including subject selection, content study content and time for comparison. Because of these issues, reference principles for research design on the influence of second language acquisition age are proposed: appropriate criteria for selecting subjects and number of subjects. Extensively sampled subjects, tools for testing and uniform implementation of assessment criteria, and a dynamic and comprehensive examination of the effects of age. The implication of the study on the influence of age on second language teaching and learning is that different teaching methods for students of different ages and different language characteristics should be applied in second language teaching.

Keywords: Second Language Acquisition, Age Effect, Critical Period Hypothesis, Study Design.

1. Introduction

The time when a learner begins to learn a language has an important influence on the outcome of language acquisition. Therefore, Consequently, the age of onset has become a central topic in linguistics. In the field of second language acquisition through immigration studies, researchers have found that the language level of immigrants arriving in the destination country in childhood is generally higher than that of immigrants who arrive in the destination country as adults and their language level is closer to that of native speakers with weaker foreign language accents. Therefore, from the ultimate achievement of second language acquisition, early learners are considered to have incomparable advantages over late learners [1].

In view of the phenomenon that children are obviously superior to adults in second language acquisition, biological theories have been introduced and developed in academic community and has proposed a new linguistic theory, the critical period hypothesis (Critical Period Hypothesis, CPH). With the deepening of study, researchers have found that there are also significant differences between young children (or children) learners in the critical period and between young (or adult) learners after the critical period. Therefore, in the relevant literature, the "critical period effect" has been replaced by the "age effect" with a broader connotation [2]. "Age effect" refers to the differences in learning efficiency or academic performance of learners of different acquisition ages in the second language learning process. However, although the study has lasted for a long time and achieved many results, there has been no consistent conclusion. One of the reasons is that the design method of previous studies has many differences in the selection of subjects, the content of investigation and the comparison of time, which is one of the reasons accounting for the opposition of the results of a study on age effects in a second language.

The critical period concept and its related studies are first introduced in this paper. Later on, relevant studies on the critical period concept and the age effect are considered in two different acquisition contexts: second language context and foreign language context. The differences in study

methods used in these studies are then analyzed. Finally, three references are proposed for study design on the effect of age of learning a second language in the Chinese region.

2. Critical period hypothesis

2.1 The concept of critical period in second language acquisition

According to the interdisciplinary concept, the critical period is defined as "a period in the life cycle during which certain types of environmental stimuli are more sensitive than others" [3]. Originally derived from biology, this theory deals with the stage of individual development where environmental influences play the greatest role. Therefore, it is widely applicable to all aspects of human and other animal behavior.

In linguistics itself, critical periods are often used to study first language learning and second language learning. In linguistics; Critical Period (CP) refers to a "special period of life development" in which learning occurs easily and rapidly without external intervention and direction." Penfield suggested that children's ability to learn is biologically related to brain development, i.e., the golden period the brain for language learning is a critical phase of language learning [4]. In 1967, in Lenenberg's important book "The Biological Basis of Language", Lenenberg presented an "important period" in the language, a formal idea of the natural language can only occur at an important time. Originally proposed only for first language learning, the critical period hypothesis was introduced by linguists into the field of second language research. This has raised further concerns in the academic community. Scholars have hotly debated the optimal starting age for the critical stages of second language acquisition.

2.2 Optimal age hypothesis in critical times Second language hypothesis and theoretical basis

According to Lenneberg, the key period for natural language acquisition through contact is between the ages of 2 and 12, that is, before the end of adolescence [3]. During this period, children are equipped with an innate language learning ability, as well as brains with strong plasticity. Therefore, children's language acquisition could be carried out naturally and effortlessly. Similarly, Researchers believe that there is an optimal age for learning a second language, a hypothesis known as the "optimal age hypothesis".

The reason for not being able to acquire language before the age of two is because the brain is not fully developed and has not yet acquired this ability [5]. After puberty, language input becomes difficult for children, which is caused by the gradual elasticity loss of the brain. Just like the wolf children often mentioned in studies, the reason accounting for the wolf children's inability of language acquisition as ordinary people is their loss of language input ability in their brains caused by their missing out on the critical period of language acquisition. Researchers discovered a girl whose name was Genie in Los Angeles in 1970 [6]. Until the age of 12, she lived in a world completely cut off from languages, and it wasn't until it was discovered that she began to learn to speak. At 18, she slowly learned to speak in short sentences, but with minimal vocabulary; only idioms and knowledge of grammar, no auxiliary verbs; no inversion with pronouns. However, she is no less than normal children in other areas such as recognition and behaviour. Language acquisition shows that some brain functions can only be fully utilized at certain levels. Anything beyond the critical stage will be difficult to achieve at the level of the native language. The age at which a second language begins to learn is a significant reason in successful second language learning. Such facts and numerous studies have led some linguists to focus on the existence and importance of critical stages in second language learning. The period from the age of 2 to adolescence is widely regarded as the golden age of foreign language learning.

3. A review on Age Effect of Second Language Acquisition

Studies of age effects of second language learning are generally based on two different learning contexts: the second language environment (e.g., non-English immigrant children learning English in

the United States and bilingual education programs in English-speaking countries) and the foreign language environment (e.g., Chinese students learning English in China).

According to literature research in the second language environment; Immigrants who arrive earlier in the destination country have higher language skills. The literature review shows that pronunciation has the greatest advantages [7]. There are many studies that show the benefits of early practitioners at the audiology level [8,9], most notably Piske et al. [9] studied the effect of age of onset on the British accent of Italian-British immigrants and found that immigrant children have lower foreign language accents than adults and are closer to native British accents. In addition, Early learners of vocabulary, Grammar Researchers have found significant benefits in syntax and language production [2,10]. For example, Huang [10] examined the effect of age on grammar and language production in 118 Chinese immigrants to the United States, and found that there was a momentous association between age schooling of young immigrants with grammar and speaking ability. They outperform older immigrants in grammatical ability and language production. Younger migrants still fare better than older migrants, even with the same standard of living and the same level of education.

Although early learners are more likely than adults to achieve better results in second language settings, it cannot be ruled out that some gifted adults will eventually achieve second language proficiency equivalent to first language proficiency [11]. According to literature reviews, most adults are vocal; Syntax Literature reviews show that vocabulary and overall language skills are well acquired. Nevertheless, because there are successful cases of adult learners, the long-term benefits of second language learning for most early learners cannot be denied. In general, Early learners in second language learning have a clearer advantage in eventual success.

However, the advantage of early learners in a non-native language environment over a second language environment is not very clear. The literature has shown that there are large differences between foreign and second language environments [12]:

1) Quality and quantity of language input; Lessons are limited to 2-4 times a week for around 50 minutes;

2) The objectives of language teaching; The target language is not a peer-to-peer communication language and should not be used outside of the classroom.

3) Language skills of teachers; The teacher's oral skills may be limited in the target language.

Therefore, the corresponding studies in the foreign language environment show that under the same educational conditions, the language level of early language learners is not necessarily better than that of late language learners.

For example, some studies have found that the earlier learners learn English, the later learners understand it better. For example, Domínguez & Pessoa [13] found that early learners of English have a more solid grasp of listening, speaking, reading and writing, and the earlier learners of English have more confidence in their language skills. Other studies have found that late learners have better academic performance than early learners. For example, Burstall et al. [14] found that the reading ability of late learners was better than that of early learners, especially in reading ability; Goikoetxea [15] found that late learners communicate better. Furthermore, some studies have not found significant differences in foreign language learning performance between early and late learners. For example, Dwaik & Shehadeh [16] on grammar, listening found no significant difference in speaking and writing between early and late learners.

In general, most of the above studies are parallel studies on the learning outcomes of early and late learners, mainly looking at the differences in learning outcomes of learners of different ages in a given age group. certain period. In contrast, there are fewer diachronic studies on learning outcomes of learners at different time points, including Burstall et al. [14], Oller & Nagato [17] is more typical. It is believed that as time goes on, the advantages of early learners in foreign language learning will gradually disappear. However, as mentioned above, there is no consensus on whether it is better and more advantageous to learn a second language as early as possible in a foreign language environment.

4. Different Design methods to the Study of Age Effect in Second Language Acquisition

Literature shows that there are many reasons for the contradictory results of the study on the age effect in the second language, and one of the main reasons is the different study methods used in these studies. In terms of the type of study, Linguistic and psychological study methods such as behavioural study and neurological study, longitudinal study and cross-sectional study, qualitative study and quantitative study have been widely used in the exploration of age effect in second language acquisition. When it comes to a specific study on age effect, there are great differences in the selection of subjects, the determination of investigation content and the determination of comparison time.

4.1 Selection of subjects

For any empirical study in linguistics, the selection of subjects is very important as part of the methodological design, which will affect the process of study and the results of study. However, a unified criterion for the selection of subjects has not yet been formed in the age effect in second language acquisition.

4.1.1 Second Language Environment Background

. In the second language context, the subjects are usually selected from the children of immigrants or bilingual learners in the target language (such as English) country. Among these, the age of arrival in the target language country was used as a reference for grouping subjects in some of these studies [18]. In some other studies, subjects were grouped according to the age they received [19].

4.1.2 Foreign language environment

. In the context of second language learning, elementary beginners are often compared to secondary beginners when studying the effect of age on second language learning [20]. For example, Vollmer's [21] follow-up study on the FLES program in the United States, which was first published in the literature and repeatedly cited by later researchers; the study of NFER Program led by Burstall [22] in Britain; in addition, Oller & Nagato [17]. What these studies have in common is that the subjects are all from the same grade, but the starting time of second language learning is different." [20].

4.2 The content of the investigation

In the study of age effect in second language acquisition, many researchers believe that it is easy to find evidence of age effect from the pronunciation of second language learners, that is, earlier starters perform better in pronunciation and are more likely to learn native-like accent [23].

In addition, grammatical judgments, vocabulary tests, composition are included in the content of the investigation. Some examine include both phonetics and morphology or syntax, listening, speaking, reading and writing skills, and so on [23].

4.3 Time for Comparison

The determination of the observation time point of the age effect in second language acquisition is almost determined by the subjective will of the researcher or the convenience of the study, which can be as short as a few class hours or as long as 10 years: after ten 15-25 minute recording sessions, after 12 hours of laboratory training sessions, after 18 weeks of instruction, at 3 and 8 months and after 1 year, 200 hours and 416 hours later, 396 hours and 564 hours later, second year of junior high school, students at 11 and 16, before high school or high school graduation [24].

It can be seen that the differences in the design methods of age effect study in second language acquisition lead to difficulties in the horizontal comparison and poor comparability between different studies. The same test material but different subjects or the same subjects but different time of comparison (not to mention different study content, such as phonetics and syntax) may lead to different study findings. The following example is a clear proof: Johnson & Newport's [18] study on Chinese and Korean English learners is considered to be more influential and representative, but Johnson [19] repeatedly used the written version of the original grammatical judgment test and found that the negative correlation between age at arrival in the target language and test scores was significantly weaker than in the

previous study. Birdsong & Molis [18] studied 61 Spanish-English learners using Johnson & Newport's [24] test materials and found no evidence of a relationship between age of arrival in the target language country and test scores [6]. No wonder Ellis [24] commented, "It is not surprising that the results of so many studies are not consistent."

5. The Principles and Models of the Study Design of the Age Effect in Second Language Acquisition

Foreign language learners of different ages have a learning environment; Intelligence level There are many difficulties in experimental studies on this point and due to the variety of maturity levels and metrics, it is difficult to draw satisfactory conclusions.

Different criteria of subject selection: Due to different study subjects and different comparison periods, there are unavoidable differences between studies on the effects of age on second language acquisition for validation or imitation.

As a reader, there is no way to determine which study results are more objective and reliable. Therefore, there is a need to further investigate and improve the design of age effect study methods to avoid the shortcomings of previous study methods. The following principles can be used as a reference for study design on the age effect of teaching a second language (e.g., English) in a Chinese-speaking environment.

5.1 Appropriate subject selection criteria and the quantity of subjects with large sample size

This is because there is no age to reach the target language country in a second language environment for foreign language learning in a Chinese environment. Age of acquisition cannot be used as a basis for examining the age effect of foreign language learning among Chinese students (because researchers cannot continuously monitor the subjects' foreign language learning process, control or exclude how many subjects have learned). Therefore, to estimate the age at which foreign language learning begins. For example, it may be more appropriate to estimate the time when learners begin to receive foreign language learning in the form of foreign language learning as a criterion for subject selection and grouping. At the same time, to avoid the limitations of examining only a few or only subjects in previous follow-up studies, the number of subjects in each initial age group should be recruited with a sufficiently large sample. The persuasiveness of the results is questioned because the subjects in such studies are not representative.

5.2 Unified testing tools and scientific performance evaluation standards

In the process of literature search, it was found that various language tests had been introduced into the assessment of second language learning achievement. In terms of the most common foreign language pronunciation and grammar tests, in some study designs, the graders determined that the subjects had either native-like pronunciation or strong foreign accent. In some studies, the subjects took the test after a short period of intensive oral English training. The results of such studies did not necessarily reflect the level and ability of foreign language pronunciation of the subjects. In addition, grammar judgment questions were often adopted because the test results were easy to compare. However, some scholars, such as Kellerman et al. [25], thought that there were many problems, because it was not clear whether the grammatical errors of the subjects came from the lack of grammatical knowledge or the influence of semantic and pragmatic factors. The conclusion was unknown. Therefore, apart from the reliability and validity requirements of self-test questions, the standard of achievement test would affect the quality of the whole study and the credibility of the results.

5.3 Dynamic and comprehensive examination of the age effect

From a study on age effects in second language learning; Although only the Muñoz [12] and Burstall [14] studies specified two time points for comparison, it is not hard to find other studies reflecting performance differences at any given point in time. Different subjects. The total marks of

subjects in foreign languages and their marks in various foreign language skills (such as listening, speaking, reading and writing) are not simultaneously examined in the vast majority of study designs. Obviously, it is not convincing enough to infer that there is an age effect in the overall foreign language learning of the subjects according to the differences in pronunciation, reading, writing and even grammatical judgment or cloze test scores of different groups. Obviously, it is not convincing enough to infer that there is an age effect in the overall foreign language learning of the subjects according to the differences in pronunciation, reading, writing and even grammatical judgment or cloze test scores of different subject groups.

6. Conclusion

The effect of age on final acquisition performance is one of the important issues in the field of foreign language acquisition, and the conclusions of the available studies are inconsistent or even contradictory. At the same time, judging from the methodological design of previous studies, very few articles analyze the underlying causes for the inconsistent results of different studies. To address this issue, the concept of the critical period hypothesis and its relevant studies are first introduced in this paper. Then the relevant studies on the critical period hypothesis and the age effect in two different acquisition contexts are reviewed: the second language context and the foreign language context. The review shows that whether the critical period hypothesis make a big different in second language acquisition and whether earlier starters learn better than late initiators is inconclusive in current research. However, the critical period theory is closely related to second language acquisition, which has been confirmed in previous studies.

One of the main reasons why they contradict each other in the research results of the age effect of second language on language is that different research methods used in these studies lead to different results, including Selection of subjects (Second Language Environment Background & Foreign language environment), The content of the investigation and Time for Comparison. Hence, three referential principles for the study design of the age effect of second language (such as English) learning in the Chinese language environment are proposed: Appropriate subject selection criteria and the quantity of subjects with large sample size, Unified testing tools and scientific performance evaluation standards and Dynamic and comprehensive examination of the age effect.

This paper explores the ideal model of methodological design for the study of age effect of foreign language learning in Chinese language environment by proposing the basic principles of the study of age effect of foreign language learning in Chinese language environment, and provides reference for more similar studies in the future. The study of age effects is still in its infancy. In terms of content, it remains to be examined at what age learning becomes difficult for the learner. Further research is needed to examine the immediate and underlying causes of this difficulty. Effects of age on future foreign language learning; The classroom environment can serve as an input to study implicit and explicit learning methods and the impact of different grammatical structures on second language learning. More complex neuropsychological methods can also be used in study methods. More importantly, the quantity and quality of samples need to be improved. Only in this way can the universality of the study results be increased and relevant theories of second language learning and cognitive psychology enriched.

The two main findings about the effect of age are that children learn better, while adults learn faster. Therefore, different teaching methods should be applied to learners of different ages. In addition, if language learning is significantly affected by age, the second language pronunciation, grammatical structure and knowledge are less significant. Therefore, the earlier the language learning age, the better the effect of the input and return ratio. For older learners, it is necessary to draw their attention to these language features in teaching (especially in adult teaching). At the same time, inductive learning from input learning should be promoted. Older learners have better understanding than memory, so that their second language level can be as close as possible to that of native speakers.

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