

# Age and Second Language Acquisition

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## 1. Introduction

It's universally acknowledged that language achievement varies from person to person. The causes of this difference might be many factors, among which individual differences can't be ignored. They include learners' motivation and attitude, aptitude and intelligence, learning preferences and beliefs, age of acquisition, and personal character. etc. The studies about the effects of age on SLA have brought storms among not only linguistics but also policymakers worldwide. This essay intends to review the controversial research on the correlation of age and SLA and point out the similarities and differences between young and old learners, then suggests several approaches for second language teaching under different social contexts.

## 2. An overview of Critical Period Hypothesis

The relationship between age and second language learning is too complex and hard to list out all the different positions. Generally speaking, there are two major views about the impact of age on SLA, with the first recognizing a critical period of one's life in second language learning, and the latter objecting to it. The following will mainly explore the first view.

### 2.1 Origin&definition of CPH

The most controversial theory about how age influences SLA is generally recognized to be the Critical Period Hypothesis(CPH in short later). The idea of "Critical Period" was originated in "biological sciences" with ducklings' behavior as an example. "After hatching within some time, ducklings tend to follow the first object in motion they see and this period of time is seen as the critical period for their following behavior(Singleton 2007)." A similar critical developmental period was found in binocularity among cats, monkeys and men, yet with varied critical periods(Singleton 2007). Thus, David Singleton characterized the Critical Period as "*a limited time duration within possible predictable and well-clarified termin, relating to some specific individual behaviors and capabilities*(Singleton 2007)".

The CPH is generally agreed in first language acquisition by most researchers with the case study of Genie widely quoted. But when it comes to SLA, it's caught enormous sensation. The theory CPH was first put forward by Penfield and Roberts in 1959, crowned as the forerunner of CPH, suggesting that "*human brain becomes progressively stiff and rigid after nine for learning languages*" and "*when languages are taken up for the first time after ten, it's hard to achieve a good result because it is unphysiological*" (Penfield&Roberts 1959) The main idea means brain plasticity loses its capability after nine and language achievement after ten is diminished. Later in 1967, Lenneberg, known as the father of CPH, postulated with age two as the onset and puberty as the close of this critical period. He presumably attributed the declining ability of natural language acquisition from puberty to the end of neural plasticity and the close of brain lateralization(Hinkel 2005). Here's a definition of CPH from David Singleton(2018), "*the idea that the biological aging puts constraints on what can be attained by language acquirers beyond a certain point is labeled the maturational approach or the Critical Period Hypothesis*" (CPH).

### 2.2 Supporting evidence

The CPH was first welcomed by many researchers with their empirical studies to test and support it. Here a few significant case studies are exemplified as follows.

Many early studies reported the phonological native-likeness was clearly found in children rather than older learners. For instance, after assessing 71 Cuban learners of English, Asher and Garcia (1969) revealed those who arrived in the US at 6 or even earlier were more likely to be judged as nativelike speakers(Hinkel 2005); Similar result was confirmed by Oyama's test(1978) with 60 Italian Americans who started English acquisition around the age range of 6 to 20 and lived in America for 5 to 18 years. Only subjects with the onset of acquisition before ten were rated in the native-speaking control range(Hinkel 2005).

In addition to supporting CPH with evidence in accent, Patkowski(1980) tested 67 immigrants to America with different ages and periods of residence in the US from the perspective of syntactic competence and proficiency. The result unwrapped that early arrivals indicated a strong tendency of proficiency in syntax yet with little influence of other variables.

Moreover, Johnson and Newport(1989) investigated 46 native Chinese and speakers arriving in America between the age range of 3 to 39 and then with 3 to 26 years residence in the US by their testing time. The test was grounded in grammaticality, which showed that early arrivals demonstrated strong superiority over later arrivals. The test performance of subjects displayed a linear uptrend by puberty yet a variable downtrend after puberty. The research supports the CPH theory in terms of grammaticality.

From phonology to grammaticality, CPH seems to demonstrate its robustness in SLA coupled with some other similar experiments in morphology and semantics.etc., yet the hypothesis has never been in an agreement in terms of its connotation, applicability and there's no unified voice of CPH heard.

### **2.3 Multiple dimensions of CPH**

Actually, there are still some unsolved questions about CPH, leading to various derivatives theories and definitions established by different researchers. First of all, the term "critical period" was defined differently even by its supporters. Some researchers, such as Bialystok and Miller(1999), suggested "sensitive period" as more appropriate labeling because the decline in language ability was not an abrupt but a gradual process(Hinkel 2005). And Singleton(2007) found 14 different versions of the definition. Second, there were some derivative hypotheses proposed, such as "exercise hypothesis" and "maturational constraint hypothesis" by Johnson and Newport, with the former referring to the available language learning mechanism when people exercise it, taken as "use it or lose it" approach by Birdsong(Hinkel 2005). The latter referred to the deterioration of the acquisition system at the closure of the critical period, resulting in less desirable linguistic outcomes, which was named as the "use it then lose it" perspective of the critical period(Hinkel 2005). Thirdly, there has been no consensus on the proposed onset of acquisition as well as the ending point of CP or even the duration of CP in different social-cultural contexts, resulting in criticism from its opponents; Fourthly, the critical period is not decisively the only one definite period as for the varified definition on language itself and dynamic nature of the acquisition.

Reviewing the major literature of CPH, some critics concluded that most of the studies were conducted in a natural setting with unlimited linguistic input and immigrants as subjects, a situation rather different from formal classroom learning conditions of SLA or FLA worldwide, as Munoz(2010) pointed out. As a result, the credibility and replicability of research results, the theoretical validity, and even the methodology of those supportive empirical studies are challenged and doubted.

### 3. Challenges against CPH

This part of the essay mainly delves into the critiques on CPH in theory itself and its supporting evidence.

#### 3.1 Challenges against the critical period and age of acquisition

The first widely critiqued area of CPH involves whether there really exists a critical period. If yes, is there only one critical period? Is the start and closing point of the critical period exactly as definite and precise as it was suggested by its father and forerunner? And are later learners really under-performed in language achievement compared with early starters?

To begin with, many subsequent researchers questioned Lennberg's idea of age two as the onset and puberty as the offset age and the only one critical period idea. The idea of onset and offset age varied from one to another. For instance, a year after Lennberg's proposition, Molfese proposed that the offset of phonology might be around the very first year of a child, which accorded with Ruben's claim that 12<sup>th</sup> month was the ending period of phonology yet 14<sup>th</sup> year was the closing of syntax and 15 or 16<sup>th</sup> for semantics (Singleton 2007). Later in 1988, Scovel suggested age twelve might be a cut-off time to acquire native-like pronunciation, which was endorsed by Long's assertion in 1990 that younger than twelve was a prerequisite for L2 phonological nativelikeness and morphological and syntactical nativelike proficiency can't be achieved after 15 (Singleton 2007). Therefore, multiple critical periods were hypothesized by many other scholars, such as Fathman in 1973 asked for different critical periods corresponding to different developmental aspects within the language itself (Gursoy 2011), which was in accordance with Diller's statement that the phonological critical period was linked with age 6 to 8 whereas other higher cognitive functions with later maturation (Singleton 2007).

Along with the above multiple critical periods hypotheses, no critical period assumption was also on the agenda. Here listed a few. Stevens in 1999 found that though immigrants before the acquisition of age 5 were most likely to be reported as good language speakers in adulthood, there was no definite abruptly critical period (Hinkel 2005). The non-discontinuity and no sharp and abrupt decline in any age were confirmed later by Chiswick and Miller (2008) with microdata from the *2000 US Census*. In Stevens' perspective, the affective factors of language proficiency stretched from age to other social factors. Likewise, Kuhl (2000) also explained that it's not only age that influenced language acquisition, but also language experience played an important role proved by studying infant linguistic development. No critical period for semantics was also confirmed by Slabakova (2006) as the literature he reviewed demonstrated no failure of adults acquiring phrasal semantics.

Then as for different language achievement between older learners and early starters, results from many studies disapproved CPH's belief that younger and earlier start-off led to better attainment. Take a few major findings for example, not only the famous experiment in Snow and Hoefnagel-Höhle study denounced the children's superiority in Dutch acquisition, but it also specifically emphasized that older learners edged out children in the speed of learning and the best overall performance was found in adolescents (Lightbown & Spada 2000). Besides, the study of White and Genesee found that compared with native speakers, adult subjects also demonstrated almost indistinguishable performance in accuracy and speed of grammaticality and written task, which converted Lennberg's claim that after puberty, good language acquisition was difficult and less attainable (Gursoy 2011). Most CPH advocates were convinced that nativelike pronunciation could be only found in early acquisition. In order to refute this claim, Bonagaerts et al. in 1997

extended the test to phonology and found over 50% of those adult subjects fell into the range of native speakers with several scoring even equal or higher overall(Gursoy 2011), which proved that nativelike phonological acquisition after puberty was not impossible. Moreover, the data collected from BAF Project again supported the advantage of old starters in rate and argued against that early start in the context of instructed SLA or FLA could confer an advantage on the ultimate language attainment(Munoz 2010).

### **3.2 Challenges about brain plasticity and lateralization**

The second challenge is against Penfield's brain plasticity and Lenneberg's lateralization.

Some scholars closely examined Penfield's early assumption of brain stiffness and loss of its plasticity after nine and proved it not exactly true to the real case. Among them, Seliger in 1978 was the first to contend that brain plasticity of language function terminated with different time periods though phonology might be the first to terminate(Hinkel 2005). David Singleton(2018) pointed out that studies from neurobiology could hardly connect variation in brain activation with different performance in L2, and later some scientists of cognition believed that the brain remained its plasticity across the life span and it might also be affected by human experience at any period of life. Birdsong(2018) also expressed partial agreement that the variability of language performance among older learners and young learners and plasticity intersect and interact with each other, and then suggested possible extension of the critical period. Besides, the overall aging literature from neuro-cognition indicated that even seniors still preserved brain plasticity to a large extent and their brains still kept receptive and open to new languages, and some later researchers even suggested that second language learning could enhance neural plasticity and cultivate social communication, etc., as Singleton(2018) put it.

Lenneberg's lateralization presumption was harshly critiqued by critics too, such as Stephen Krashen. In 1973, he thought the *"data collected on the linguistic function transfer suggests that it's possible to achieve perfect transfer only before five"*(Singleton 2018). Then in 1981, his book *Second Language Acquisition and Second Language Learning*(Krashen 1981) reviewed previous studies and categorized lateralization into three kinds. First, "lateralization by zero" was found in anatomical research and results from AER and EEG and others, which indicated that hemispheric lateralization and specialization started even at birth. Second, "lateralization by age 5" was shown in the literature about brain damage on children's linguistic ability and hemispherectomy, implying lateralization completed earlier, before five, rather than Lennberg's claimed puberty. Third, "lateralization by puberty" was exhibited in dichotic research applying "more difficult stimuli." He concluded that it's not necessary to link hemisphere dominance with SLA ability though well before puberty children's left hemisphere tended to dominate much of the linguistic function, and other explanations should be also accounted for linguistic differences in child-adult SLA. These different age findings of lateralization somehow echoed multiple critical periods mentioned above, and the complexity of the relationship between age and lateralization has also been underlined by many other scholars, such as Montrul and Moyer(Singleton 2018), who hinted other factors rather than maturation might also be covered, too.

### **3.3 Challenges against the nonconformity of measuring standards**

As arguments go on, the validity and credibility of counter-evidence against CPH somehow was struck back. Though the validity of CPH was truly weakened by some native-like language proficiency among adult participants in studies mentioned above, CPH supporters, such as Mike Long(2005) condemned that those studies were based on very limited samples, therefore taken as

exceptions. A similar stand was held by Dekeyser(2000), who had examined 57 adult Hungarian American immigrants with a varied age of arrival in the US ranging from one to forty through a grammaticality test. It unveiled that younger starters' performance was all up to an almost-native or native level, whereas only one adult learning English after sixteen achieved near-native grammatical competence. Dekeyser dug into the aptitude performance and unearthed that adult had a very high aptitude and assumed that this adult native-like performance was an exception, hence can not be taken as counter-evidence of CPH. Unfortunately, Vanhove(2013) revisited Dekeyser's old data and found the correlation between aptitude and GJT performance is fallacious by "comparing two correlation coefficients", not to mention different learning settings and social-cultural contexts of immigrants from formal classroom learning.

Thus, the core of constant dispute probably lies in how to assess linguistic attainment and native-likeness. For one, the definition of language varied from formalists to functionalists, with the former focusing on language competence and the latter on its performance. That divergence generated different criteria and operations of assessing L2 learners' linguistic attainment, such as some studies tested grammatical judgment from linguistic competence while others measuring language performance(Zhu 2011). Above all, it's almost out of human capacity to acquire an all-acknowledged linguistic parameter to be tested in every aspect of language(Zhu 2011), and it's even hard for a native-speaker to attain nativelikeness in all linguistic components.

To further clarify it, how to assess nativelikeness and judging standards have never reached an agreement. For instance, Gregg and Eubank in 1999 called for the reevaluation of the methods and means to measure learners' ultimate language attainment, combining their physiological brain activity with behavioral competence(Schouten 2009). The evidence of physiological activities affecting the desire and achievement of native-like pronunciation in L2 was later found by Trofimovich and Magid in 2005(Lightbrown&Spada 2013). It revealed that second language learners with accurate L2 pronunciation were sometimes regarded as less loyal and true to their ethnic identities and communities than those keeping a strong foreign accent, resulting in some SL learners' reluctance to acquire a standard accent(Lightbrown&Spada 2013); Birdsong even attributed the criticism on CPH to the arbitrariness of standards(Schouten 2009); some researchers such as Abrahamsson and Hyltenstam(2009) scrutinized subjects' performance under the criterion of nativelikeness in almost all linguistic features among late acquirers and concluded that nativelikeness was unattainable among adult language learners and not common in children either; That was in line with Birdsong's standpoint(2018) that the effects of bilingualism supported that putting aside the age of acquisition, neither the acquirers' L2 nor L1 could be completely like that of a monolingual; Grosjean believed there's no need to require the L2 proficiency of bilinguals to reach the same as that of monolinguals(Singleton 2018). Similar perspectives were taken by Cook (2002), stating that "*ultimate attainment is not a standard for L2 for bilinguals but monolinguals.*" And then Davies remarked on the difficulty of how to define actual nativeness(Munoz&Singleton 2011). Furthermore, Thompson pointed out the results from pronunciation assessment were actually susceptible to the test nature as well as the rating judges, which was consistent with Flege's thought that some variables influenced the rating judgment of nativelikeness in speech(Hinkel 2005). That ushered the discussion into the next part.

### **3.4 Other factors**

As mentioned above by many critics, other factors rather than biological fact (age) were strongly recommended to include for different SLA outcomes.

First, the influence of L1 could greatly facilitate or impede L2 learning in many aspects. Some studies suggested the similarities between L1 and L2 could promote L2 acquisition, such as two studies from Bialystok in 1997 unfolded that structural correspondence between two languages could predict the success of SLA(Hinkel 2005), whereas similar structures were also proved to undermine L2 acquisition among German children learning English by Wode in 1978(Hinkel 2005). At the same time, some insisted that the differences between L1 and L2 mainly mounted load on SLA. For example, some learners would even reject the attempt to make the utmost effort of SLA as they see L2 far too different or and distant from L1, indicated by Hakan Ringbom's experiment(Lightbown& Spada 2013). The distance between L1 and L2 affects not only phonology but also other linguistic aspects. The Bongaerts' phonological study demonstrated the difference between L1 and L2 could increase the learning difficulty of L2 pronunciation, whereas Collins'(2002) English verb investigation among French speakers showed that L1 influence took place in the lexical area(Lightbown& Spada 2013). The L1 influence could also be found in the error-making and interlanguage. For instance, Chinese speakers usually forget the plural s/es of a noun and verb inflections where they are speaking English because there is no noun plural or verb inflection in L1. Similar traces were disclosed by Richards' study(Krashen 1981). Similarities of interlanguage and L1 could be easily detected in L2 learners, too. Besides, other aspects of L1 could also modulate the level of L2 attainment, such as how much L1 is activated, what kind of entrenchment L1 sets up, the language dominance between L1 and L2 and attrition of L1, presented by Birdsong(2018). Therefore, compared with the length of L1 exposure between children and adults, it makes sense that adults' L2 performance might be more deeply affected by L1.

Second, the quantity and quality of L2 input might also be indicators of language performance. Most early studies of CPH were conducted in a limitless amount of L2 settings, called natural settings by many researchers(Munoz 2010), and subjects were immigrants who had frequent contact with native L2 speakers and easily accessible L2 resources, thus the L2 quantity was more sufficient and quality was way higher than that of formal classroom or any instructed learning, where learners exposed to language instruction for only a few hours a day or week by native or non-native teachers or even AI instructors, not to mention substantial opportunities of immigrants to utilize and practice L2. To make it further, the quality of L2 input does not simply mean input of native knowledge and information, but comprehensive input in a situation with low anxiety, which is considered necessary and crucial to language acquisition by Krashen (1981). That kind of comprehensive input cannot be guaranteed in many SLA classroom settings with no immigrant background. Hence, CPH should take social-affective factors into consideration.

Thirdly, a close examination of learning conditions of adult and children learners in and outside the classroom would shed some light on their differences in performance. The unbalanced allocation and utilization of resources between the old and the young somehow might contribute to the first difference in learning conditions. Because in many countries, primary education is supported and funded by government while some secondary and adult education is private-sponsored. That's to say, educational resources are prioritized and allocated to children in schools whereas resources for older learners cannot be centralized nationwide. Furthermore, the different study results though with replicated methods might also be explained in terms of the discrepancy in learning conditions between immigrants with well-nurtured language environments in developed countries and subjects in developing countries. Thus, Cook(2008) asserted that given

the same learning conditions and methods, adults tended to do better. In terms of time and energy commitment, children learners could indulge themselves in many hours of L2 classroom learning, peer playing or animation; whereas adults are loaded with work, family and even some social obligations, engaging themselves only in very limited language situations and opportunities. From the aspect of pressure, less pressure but more parental support, tolerance and approval as well as peer cooperation to some degree mold children into a more open, positive, receptive and adventurous attitude to SLA; yet adults are more likely to face more scrutiny, less tolerance and help from outside, resulting in more stress, anxiety, conservatism, loneliness and even silence in SLA. And that is the part of psychological difference kindled by social factors.

Among all the psychological factors, motivation is on top of the debate list. Motivating children with varied interesting teaching arrangements and activities seems easier than that of older learners (Ur 2012), who might already have certain learning preferences or beliefs. But maintaining their motivation has been constantly a headache for many instructors as children's motivation is prone to vary and more subjective to exterior influences. Though some researchers accredited "the main advantage of learning FL early to children's positive attitude and motivation" (Pfenninger & Singleton 2016), the study from Pfenninger and Singleton (2016) illuminated that children didn't have an advantage on motivation and age was not necessarily connected with positive attitudes. Rather, older learners had more stable and focused motivation. That to some extent explains the possibility of superior language attainment by adults.

Apart from the psychological ingredients, the impact of cognitive factors on age should not be neglected, either, which will be discussed in the following part.

#### **4. Similarities and differences between young and older learners**

As Vivian Cook (2008) mentioned, cognitive, physical, linguistic or social factors jointly might explain the difference in learning outcome.

On the one hand, the learning differences between the young and old basically source from their different degree of cognitive development. Older ones' development of cognition is rather stable, whereas children haven't developed metalinguistic awareness or cognitive maturity fully (Lightbown & Spada 2013). As a result, older learners are able to utilize their cognitive advantages to form superior logical and analytic thinking, metalinguistic and problem-solving ability and more likely to "develop some individual strategies and skills for SLA (Ur 2012)." That might explain adults' advantage on the rate of learning. On the contrary, Dekeyser (2000) held that children were better at implicit learning because people "*lose the mental equipment needed for the implicit induction of the abstract patterns underlying a human language between the range of age 6 to 17*". Contrarily, what older learners take was called the explicit learning approach. Other differences involve the learning process, such as adults tend to be more flexible, self-regulated, autonomous, devoted and cooperative, while children are probably more forced, naughty, undisciplined, unorganized and instructor-dependent.

On the other hand, their similarity in learning is owing to a similar developmental process of human cognition, which somehow shapes the sequence of language development. That means both young and old learners share similar developmental order. Studies (Lightbown & Spada 2013) found similar developmental patterns of morphology and syntax among different learners, which was also acknowledged by Philp et al. (2008).

#### **5. Applying theories into instruction**

The above differences inspired many scholars to study strategies and make specific policies

to optimize the achievement and experience of SLA for learners of different ages.

To language instructors, first, they should tackle SLA with different approaches and adapt their teaching to learners with a variety of backgrounds, such as more explicit instruction for older learners and implicit approach for the young; Second, both formal and informal learning environment should be efficiently used to contribute to SLA proficiency and competence, suggested by Krashen(1981); Thirdly, formal language instruction should count how much comprehensive input of L2 and how intensive instruction offered to learners; Fourthly, social-cultural factors should be thought over during the syllabus and curriculum design and classroom operation, and learners' psychological differences should also be kept an eye on.

To policymakers, as for when to start second language learning, the proposition that the younger is better is not recommended as a one for all approach. First, the above evidence of the achievement of later learners proves that it's not necessary to follow the crowd and start early acquisition, but ponder over the actual goals of educational programs and specific social contexts, stressed both by Zhu(2011) and Lightbrown and Spada(2012). Second, it is especially critical to assess the objectives, available resources and learning conditions for SL development. The nativelikeness in L2 might not be the appropriate and practical goal for all learners for different linguistic purposes. Last but not the least, it's more realistic to estimate the length of SLA and control the quality of instruction based on realistic goals, rather than starting SLA as soon as possible. Because not only the interaction of L1 and L2 was illustrated by some researchers, like Birdsong(2018), the inappropriate early acquisition of L2 could also be detrimental to L1. That was confirmed by the study of Major(1992), demonstrating the loss of English as L1 among a group of adult immigrants in Brazil. To make it worse, children around 6-7 are at a sensitive period of linguistic erosion, implicated by Wang(2014). If starting L2 early and improperly, they are very sensitive to the influence of both languages, possibly eroding both linguistic systems and causing confusion(Zheng 2015).

## **6. Conclusion**

After reviewing the initial CPH and supporting studies, a series of questions are raised to challenge the theory and empirical research. The early conflict over CPH mainly concentrates on age factors, such as the existence of critical period, its duration, definite onset and offset point, brain plasticity and lateralization while aging, and assessment of age-related learning effects. Then it relates to other social factors, such as the influence of L1 and different learning conditions, and cognitive and psychological factors. Any theory on absolute over-simplification and over-generalization of the relationship between age and second language acquisition would lead to more confusion and conflicts, and in the end deny human individuality in specific contexts. Therefore, theories on age and SLA should also be contextualized and reconceptualized with times. It's not sensible to favor CPH or oppose it just based on limited literature without overall consideration of multi-factors involved.

The comprehensive deliberation of those above joint factors on SLA somehow could enlighten language teaching in educational settings. There's never a fixed one-for-all solution to all problems and all learners. Instructors and policymakers should always adapt their actions to specific targets and situations. Finally, the complexity of the relationship between age and SLA is far beyond the exploration of this essay, some other minor affective elements, such as mediating and experiential factors(Birdsong 2006) should be researched in the future to uncurtain the mystery in detail.

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