

A Critical Thinking on “Critical Period Hypothesis”

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About a hundred years ago, Austrian zoologist K. Z. Lorenz (1935: 137 -213) studied the behavior of many new-born goslings and ducklings; and found that these just-hatched animals took the first moving objects they witnessed as their parents for granted easily. But this indelible ability only last for less than 24 to 30 hours. Usually, the mother goose or duck gets this chance and new-born goslings or ducklings will follow their mother. But if the mother is absent in this critical period, they will never have another chance to form this kind of intimate parent-child relationship, for the new-hatched “develop a fear of strange objects and retreat instead of following” (De Villiers and De Villiers, 1978: 210). Lorenz (1935: 137 -213) called this following phenomenon “imprinting” and his thought about the critical period soon attracted a lot of attention from many research fields out of biology.

Critical period is often confined in a limited duration. According to Almlı and Finger (1987: 126), the critical period varies in different species. It may take place in a cat for 4 to 12 weeks, while a monkey for 1 to 9 weeks. When it refers to human beings, the wisest of all creatures, it happens when we are 1 to 3 years old.

In linguistic studies, the term “critical period” (CP) often refers to a rapid learning process in an early life stage, in which children can acquire a language with a corresponding social behavior pattern much more easily. “Once this period of time is passed, ... the ability to learn languages declines.” (Birdsong, 1999: 1)

1. The Definition of “Critical Period Hypothesis” (CPH)

Critical period was first applied in first language learning in the mid-1920s, then expanded into second language acquisition (SLA). Brown (2007: 57) defines “the critical period” as a “biologically determined period of life when language can be acquired more easily and beyond which time language is increasingly difficult to acquire.” It also varies according to different individuals for maturational restrictions on SLA in a quite large range. Therefore, there are a lot of different point of views on how to do a second language teaching under the guide of CP, although most of them agree that the younger, the better. But when is the best starting time or the optional time for SLA?

Critical period was a hot topic in the middle of 20th century. In 1959, American neurologist Penfield & Robert (1959: 287) proposed the “white edition theory”, in which they argued that “Children’s language acquisition is related with development of the brain.” (ibid) Children are all born with a brain function of language perception. Through this active brain exercise in the critical period, children can learn languages quickly

in a native way. But this optional time of language learning only occurs in our first decade of life. Then the brain gradually begins to lose its plasticity, and memories are fading away, then the optional time would slip away without saying a goodbye, “for the purposes of learning languages, the human brain becomes increasingly stiff and rigid after the age of nine” (Penfield & Roberts, 1959: 236). This claim advocated us to promote early SLA, for the brain of adults would be less adaptive in language acquisition.

Based on the forerunners’ studies, Lenneberg first proposed the critical period hypothesis (CPH) and became the father of CPH. In his masterpiece *Biological Foundations of Language*, Eric Lenneberg (1967: 176) pointed out that “... although the incidence of ‘language-learning-blocks’ rapidly increases after puberty. Also, automatic acquisition from mere exposure to a given language seems to disappear after this age, and foreign languages have to be taught and learned through a conscious and labored effort”. Lenneberg collected data from aphasia and mental retardation patients as evidence to demonstrate that the primary language acquisition is predictable and promising in a certain young stage, but it will “quickly be outgrown at puberty” (ibid: 142), which was the approximate cutoff age for a successful SLA. Nonetheless, he also connected the notion of the critical period with the accomplishment of cerebral lateralization of SLA. He believed that this

lateralization of SLA developed gradually in childhood until it reached its puberty.

Based on Lenneberg's critical period hypothesis (CPH), we define the critical period hypothesis (CPH) as an optional language learning process before puberty, in which children are inbuilt a plastic language perception, but this fast-learning ability will disappear naturally after puberty. Just as the instinct of baby swimming, the critical period is a priceless gift from God that encourages our curiosity and protects our confidence in our childhood.

2. A Comparison between L2 Children and L2 Adults under CPH

According to CPH, age plays an important role in promoting how successful a learner is in SLA. It is universally known that the language acquisition of L2 children in a critical period is frequently associated with a greater second language proficiency than L2 adults' language acquisition. Therefore, it is advisable for SL learners to start earlier before their puberty. In other words, if a child learns a second language during his or her critical period, his or her SLA will be more naturally, more easily and more native-like.

Based on a study on 46 Chinese and Korean immigrants from age 3 to 39 in American, Johnson & Newport (1989: 60 - 90) states that acquiring grammatical proficiency was quite foreseeable according to their first

touch of English, but gradually the decrease in the level of proficiency was witnessed from ages ranging from 6-7 to 16-17, and age 8 is the first stage of decline in these immigrants' grammatical ability. People of different age had a great connection with their different grammatical competence. Therefore, they conclude that younger members learn more quickly, and reach to higher levels than older members. Krashen (1985: 13) claims the impact of "affective filter." He (1985: 13) argues that: "While the filter may exist for the child second language acquirer, it is rarely, in natural informal language acquisition situations, high enough to prevent native-like levels of attainment. For the adult it rarely goes low enough to allow native-like attainment." In other words, a younger start is better, for after puberty, L2 adults should pay more effort in SLA.

These scholars are persuading "the earlier, the better" in SLA, and they are convincing us that under the CPH, L2 children seem to be superior to adolescents or adults with a greater SL proficiency than L2 adults. SLA should commence before the critical period. But is it always the case that L2 children perform better than L2 adults in SLA because of inborn "imprinting"?

Snow C. & Hofnagelhohle, M. (1978: 1114 - 1128) did a famous study about CPH and got an opposite view. They took 42 English native speakers who had studied Dutch language for more than 13 months in Holland as their experimental participants. These experimental

participants, aged from 3 years old to the adulthood, were tested from various aspects, such as pronunciation, morphology, vocabulary, auditory discrimination, sentence repetition for four or five months. The results showed that the age group of 12 to 15 and those of adults mastered the Dutch language best in the first month while the age group of 3 to 5 was depressed for they did the worst.

The study of Snow C. & Hofnagelhohle, M. really challenges the critical period hypothesis (CPH). In fact, CPH is not just a problem about age in SLA, for it involves with many other important factors, such as participants' intelligence, aptitude, personality, motivation & attitudes, learners' preference, and learner beliefs. (Lightbown, P. M. and Spada, N, 2000: 29 - 36) For example. L2 children with less intelligence, no talent, strong personality, low motivation, and weak learner beliefs will surely perform worse than an average L2 adult. Lenneberg (1967) just outlined the CPH in a general way. Snow & Hofnagelhohle (1978), Scovel (2000), and many other scholars are challenge CPH from the perspective like morphology, phonology, and so on. But these challenges also enrich CPH, for truth does not fear arguments. The more the truth is debated, the more precision we get from polishing the theory and practice of critical period hypothesis. To sum up, the biggest weakness of CPH lies in the factors that it simplifies various conditions of linguistic

experimental participants and overstates a confined critical period in language acquisition.

3. A Critical thinking on L2 Children and L2 Adults under CPH

Of all human inventions, none was more consequential than the birth of language. Before its creation, everyone's knowledge was limited to himself directly. Only with language can we share our experiences. The most significance of CPH lies in that it provides us an optional time, or critical period, to effectively accumulate that knowledge and experience. But it is still a long way to go for us to enrich CPH, because of the following reasons:

3.1 The younger, the better? Is there any critical period in our later life after puberty?

Eric Lenneberg (1967: 176) proposed CPH on the base that "...the incidence of 'language-learning-blocks' rapidly increases after puberty" for L2 adults, while L2 children's ability of SLA will "quickly be outgrown at puberty" (ibid: 142). My daughter started to call us father and mother when she was 7 to 8 months. But as a bilingual, I soon realized that there are some coincidences between Chinese and English: For example, 妈妈 (mother), which pronunciation is "mama" in Chinese seems having a great similarity with the pronunciation of the English word "mama" or "mummy", while 爸爸 (father), which pronunciation is "baba" in Chinese seems having a great resemblance with the

pronunciation of the English word “papa.” This new founding intrigued me to teach my child some English words soon, such as mama and papa, or mummy and daddy. To my surprise, it is effortless for her to pronounce mummy and papa out, without realizing that she was learning a second language. Now, she is more than two years old. Compared with the situation she met a year and a half ago, she is more curious, more focused, more sophisticated, and more eager to learn. It is a solid evidence that the younger, the better has its limitations.

Now we all admit that there exists a comparatively low degree of language ability when we first start to speak, then we develop this ability to a higher level. In other words, in our childhood, we still can divide it into several parts of critical periods, and when it comes to the definition of the critical period, it has no definite answer. For example, my daughter performs better in SLA now than what she used to be, say, when she was 7 to 8 months old. Then is there any other peak critical time in our later life after puberty?

Snow C. & Hofnagelhohle, M. (1978: 1114 - 1128) had done a study over 13 months in 1978, taking 42 native English learners of Dutch in Holland as their experimental participants. Their research had shown that the age group of 12 – 15 and the age group above 18 surpassed the age group of 3 – 10 during the first few months, but by the end of the year,

the most successful L2 learners were the age group of 8 – 10, while the least successful L2 learners were the age group of 3 – 5.

Based on Snow & Hofnagelhohle's study, we found that L2 adults performed better than L2 children aged 3 to 5. So, it is ridiculous to say: "the younger, the better." After puberty, L2 adults still has a lot of potential for us to explore in second language acquisition, although Dutch learners of English aged from 8 to 10 was the most potential group.

3.2 The younger, the better? Then how younger?

In the previous part "The younger, the better? Is there any critical period in our later life after puberty?", we are fighting against that "The younger, the better." is an arbitrary decision which cannot predict everything. In this part, we will discuss one of the most fundamental parts of CPH --- how younger?

How younger? This is also one of the most confusing questions according to CPH. David Singleton did a summary of a range of proposals for critical period termini in 2005. In his essay *The Critical Period Hypothesis: A coat of many colours*, Singleton (2005: 273) collected the data of the onsets critical period time and the offsets critical period time from ten famous scholars' research of CPH. Based on Singleton's table (2005: 273), Penfield W. and Robert I. (1959) set the offset at age 9, while Lenneberg (1967) argued that the onset was age 2 and the offset was puberty. Scovel (1988) studied his experimental

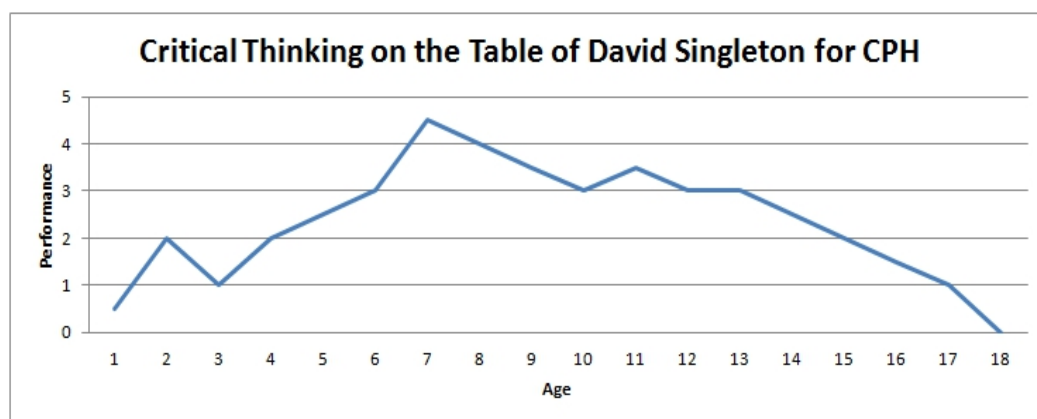
participants and stated that age 12 is the critical offset for phonetics / phonology. Johnson & Newport (1989) made two offsets of phases: the first offset of phase was age 7 and the second offset of phase was puberty.

Table 1. *Summary of a range of proposals for CP termini*

Penfield and Roberts (1959)	Offset: age 9
Lenneberg (1967)	Onset: age 2 Offset: puberty
Molfese (1977)	Offset for phonetics/phonology: age 1
Seliger (1978)	Offset for phonetics/phonology: puberty
Diller (1981)	Offset for phonetics/phonology: age 6-8
Scovel (1988)	Offset for phonetics/phonology: age 12
Johnson and Newport (1989)	Offset of phase 1: age 7 Offset of phase 2: puberty
Long (1990)	Offset of phase 1: age 7 Offset of phase 2 for phonetics/phonology: age 12 Offset of phase 2 for morphosyntax: age 15
Ruben (1997)	Onset for phonetics/phonology: 6th month of foetal life Offset for phonetics/phonology: age 1 Offset for syntax: 4th year of life Offset for semantics 15th/16th year of life
Hyltenstam and Abrahamsson (2003)	Offset: shortly after birth

Picture 1: Singleton's Summary of a Range of Proposals for CPH (2005: 273)

Based on Singleton's table (2005: 273), it is really confusing because different scholars got different views on the onset and offset on CPH, for the critical period varies in each research and get different answers ranging from shortly after birth to adolescence. therefore, let me draw a picture to demonstrate the mainstream ideals of CPH according to Singleton's table as follows.



Picture 2. Critical Thinking on the Table of David Singleton for CPH

In Picture 2, the bottom line represents different ages from new-born to puberty, or from age 0 to age 18, and the levels on the left represents 5 different levels of performance. According to different levels of performance, we roughly divide them into 5 catalogs: level 1 stands for fail, level 2 stands for pass, level 3 stands for merit, level 4 stands for excellent, and level 5 stands for exceptional.

Based on Singleton's table (2005: 273), we can see a fluctuation curve moving up and down through our childhood and teenage. In the first place, this fluctuation curve has its highest peak when we are 7 years old, for among the ten scholars in Singleton's table, 3 of them thought age 7 was the critical period. In the second place, the level of performance of this fluctuation curve goes to zero, or decreases to nothing when we reach age 18, which illustrates that L2 adults' "... automatic acquisition from mere exposure to a given language seems to disappear after this age" (Lenneberg, 1967: 176). In the third place, this fluctuation curve has many ups and downs which means that we can have

many critical periods all through our childhood and teenage. But before puberty, these ups and downs weigh differently in our SLA.

Based on Singleton's table (2005: 273), the Critical thinking in Picture 2 lies in 3 main points as follow:

Firstly, this fluctuation curve does not start from zero, because we have antenatal training. It is universally known that classical music is good for the pregnant women and fetus. When I had been pregnant for 7 or 8 months, my daughter could recognize her father's sound and swum near to her father. For example, when my husband was calling her name softly and repeatedly on the left, my daughter received the stimulus and tried to be close to her father's side. She might give me a kick on my left. In other words, when a baby was new-born, he or she has had some capacity to react. In Singleton's table, Hyltenstam & Abrahamsson (2003) were the most radical, but we can make it even more aggressive and challenging. The critical thinking of this point is that we declare that the critical period (CP) may begin before a baby is born.

Secondly, this fluctuation curve does up and downs demonstrating tension with relaxation. This founding is of a great significance in the second language acquisition (SLA) of L2 children and L2 adults. We can never have a stable learning process in SLA. It is natural that we focus on a study for 45 mins, and then rest for 10 mins. The critical thinking of this point is that do not push children too hard; do not push us too hard, too.

Tension with relaxation should be highlighted in our SLA. In a word, going beyond is as wrong as falling short.

Thirdly, because of language-learning-blocks, L2 adults' brains are not so plastic as the brains of L2 children. Can we call this language-learning-blocks stereotype? It is true that L2 adults are more likely to fix a general cognitive ideal, and it is more predictable that L2 adults are always more adaptive to a certain way of routine. But it is dangerous to overgeneralize it. The critical thinking of this point is that the chaos that CPH arouse are invariably biased. If we evaluate SLA on incomplete standards, it is unfair both to L2 children and to L2 adults.

In this part, we have discussed the critical period hypothesis (CPH) has been criticized since it was born because it has no definite age for critical period. For example, Hytlenstam and Abrahamsson (2003) set its offset at shortly after our birth, Lenneberg (1967) set its offset at age 2, Johnson and Newport (1989) stated age 7, Scovel (1988) thought age 12, and Seliger (1978) argued age 18. Ruben (1997) made the most detailed study among all the ten scholars, according to Singleton's table. (Singleton, 2005: 273) Ruben (1997) set the offset for phonetics / phonology at age 1; the offset for syntax at age 4; and the offset for semantics at age 15 or 16. DeKeyser (2018: 916) states that "The critical period phenomenon, however, is not like an onion where nothing is left after peeling off layer by layer, but rather a diamond in the rough, which

sparkles more brightly after a good conceptual cleaning.” We are convinced that we will be enlightened from these debates and move on to new comprehensive methods in our teaching to both L2 children and L2 adults. No sampling and no generalization.

4. A Critical Thinking on Teaching L2 Children and L2 Adults under CPH

In Part three: A Critical thinking on L2 Children and L2 Adults under CPH, we have described the huge influence CPH aroused based on many scholars, but some of them, such as Lenneberg and Penfield were not experts in second language research circle. But their central ideals such as critical period, loss of brain plasticity, imprinting, lateralization, etc. provoked our critical thinking on how a second language should be taught.

4.1 Age is a great influencing factor in teaching SL, but it is never the only factor.

It is true that age is of great significance in second language acquisition, but we should be aware of the dangers of making assumptions like “the younger, the better.” We should define every individual respectively in different situations and give a fair and considerate solution to each, no matter how old they are. Otherwise, we will rush into arbitrary stereotypes and get some wrong conclusions.

On the one hand, in second language teaching, we should examine every individual fairly: everyone is a unique existence, and all of us have the same rights to be treated equally. It is wrong to overstate the plastic advantage of L2 children, and to overlook the seasoned skills and experiences of L2 adults. It is also wrong to simplify a person's linguistic potential based on age only, for our brains are such a delicate machine that most of it is still a mystery for us to explore. Many other factors, such as intelligence, motivation, aptitude, personality, etc. are all influential powers in our SLA.

On the other hand, all the influencing factors in SLA collaborate in a harmonious unit. They overlap with each other, interact with each other and even integrate with each other. For example, Lucy and Lily are twins. They are the same age, living in the same house and going to the same school and attending to the same Second Language class. But Lucy is more outgoing, she communicates more and more eagerly to display, soon Lucy will be a faster learner in the same SL classroom. On the other hand, because Lucy performs better in SL classroom, she will be more eager to display, communicate more and be more outgoing. In this case, each influencing factor is related positively, which forms a sustainable cause-and-effect chain in SLA. Once this virtuous circle has been set, scale benefits follow in.

Confucius once said: “I would like to teach anyone who want to learn.” and “education without discrimination.” In teaching second language acquisition, to build a virtuous circle for a continuous improvement for learners is our most important task. Age never matters more than it in SLA.

4.2 Age is a vague term in SL teaching that every individual has his or her personal Critical Period (CP).

The Critical Period is such a vague term, and this age debates both for and against have never stopped since CPH has born. Lenneberg (1967) set age 2, Seliger (1978) argued age18, Scovel (1988) thought age 12, while Johnson and Newport (1989) set age 7. They are all right while they are all wrong. Each of their studies based on only a small group (Most of their experimental participants are limited in dozens of people.) lasting several months or within two years. Therefore, their pieces of evidence are not so solid to generalize all human beings.

Besides, they are testing different second languages, such as Dutch, Spanish, English and so on. The criteria are not so standard, or no standard has ever been settled to reach a universal agreement.

On the one hand, Critical Period in CPH is still such a tricky term of age that Cardimona K., Smith P. and Roberts L. S. (2016: 559) points out that as to age of acquisition, in the strength of translation and semantic relationships, there is no difference. If anything, the L2 learners, who

acquire their SL after 7 years old, may a little weaker in lexical performance, or more likely to make errors. After puberty, their brains loses the flexible plasticity which lags L2 adults' SLA behind. This misunderstanding cannot be applied universally for although L2 children may speak more native-likely with fluency, L2 adults can perform more skillfully in academic or professional fields.

On the other hand, Critical Period in CPH will still be a vague term of age in the future, for everyone is unique. Even twins may have different personalities, different preferences, different aptitudes and so on. It does no prediction in our linguistic potential in SLA, and it even forms some bias or discrimination for us in how to deal a big ego and a small ego both in one person harmoniously. Strid, J. E. (2017: 711) gets even sharper, and directly points out that the wide acceptance of the CPH greatly harms SLA by reinforcing misunderstandings, which needs to be overturned for a more practical purpose at any age in any language.

All in all, in determining how successful a learner is in SLA, age plays one of the most powerful roles. It is no doubt that earlier second language acquisition is frequently preferable with a better proficiency in a critical period. But this is also its greatest weakness of teaching SL in CPH --- its arbitrary power at a certain age! In teaching a second language, we should be more careful at the arbitrary use of teaching power over our students.

4.3 Personal tailor is a useful solution to settle the chaos under CPH.

Teachers' arbitrary power over the students seem to have long existed since their relation has formed as teachers and students. It is also an inborn effective relationship between teachers and students. Teachers' arbitrary power over the students is a double-edged sword. On the one hand, it is useful to organize a class with many students at one time; while on the other hand, teachers' overuse their arbitrary power will make it a great risk both to the students and to themselves. If all the students follow the same pattern in L2 learning, no matter they are old or young, the teacher will feel tedious and have less motivation to do creative teaching. Meanwhile, the students will become rigid and have less interest in focusing on L2 learning, thus, perform worse and worse in their SL. Do not get into this vicious circle!

Personal tailor is a useful solution to settle this chaos under CPH. Take SLA for example, treat L2 learners as individuals to help each one achieving their full potential. In doing this kind of teaching, we propose that 6 O principles (occupants, objects, occasions, output & input, operations and objectives) should be highlighted.

(1) Occupants: What kinds of individual attributes do our students have? Examine our students and assess them. Then improve our experiment teaching. For L2 children only two or three years old, teach

them “It’s yummy.” is more preferable than teach them “It is delicious.” Age matters in SLA. For L2 adults whose occupation are sellers, teach them “This kind 1980 Lafite from France is delicious which makes it the best seller in our company.” is more useful teaching contents. So, under CPH, age matters in SLA, but it is never the only affecting factor.

(2) Objects: What kind of SL are our students learning? Examine the second language you are teaching. Then find the similarities and differences between our students’ L1 and L2 to improve our experiment teaching. For a Chinese learner, whose second language is English, there exists some cooperative communicating dialogues. For example “你吃了吗? (Have you eaten yet?)” has the same communicating effect as the English word “Hello!” In Chinese, “你吃了吗? (Have you eaten yet?)” is just an ordinary greeting, not an invitation to treat you with a big dinner. So, the attributes of the second language matter a lot, no matter how old our SL students are.

(3) Occasions: When will our students learn? This has the closest relating point to CPH. The critical period plays an important role in this part. We have a fluctuation curve in the relationship between our memories and our age. In our childhood, our brains are more flexible and plastic in learning new SL words and expressions, but L2 adults, although with more “affective filter” (Krashen ,1985: 13), perform better in logical

and sophisticated field in SLA. Just as what we have argued in part 3, L2 adults still have a lot of potential in SLA consciously or unconsciously.

(4) Output & input: How will our students fully exposed in a L2 atmosphere? How deep and how long our students are fully exposed in a L2 atmosphere is the most influencing factor in our effective teaching. It outweighs the age factor. L2 children may have more gifts in SLA, but diligence is the means by which we can make up. L2 adults may not be the most naturally blessed, but they can compensate with more full exposure in SL by practicing more output & input. After all, practice makes perfect.

(5) Operations: How would our students like to be taught? Do we, teachers and parents have the authority over our children to decide what to learn? when to learn? and where to learn? ... What are the favorite methods they would like to accept? All these questions play critical roles in SLA. Of course, age is also an influencing factor among them. For example, using pictures, colorful books, funny toys, etc. in SL teaching is preferable for the L2 children. Just modify our teaching in the right time and in the right way to suit students' individual needs.

(6) Objectives: Why do our students want to learn this second language? How will they apply this second language in their future life? L2 learners' motivation should be studied and so is their future planning. In training experts like surgeons, how to read and write foreign medical articles and instruments is more important, while in training best sellers,

how to do effective persuasion outweighs. Effective L2 teaching should meet the needs of L2 learners' objections, no matter they are old or young.

The critical period hypothesis (CPH) is never just a problem of age. Personal tailor is a useful solution to settle this chaos under CPH. Penfield (1963) proposed the earlier, the better. But how earlier has never or ever be settled. Instead of studying dozens of people with different ages in SLA, we should pay more attention on how a particular learner master SL more efficiently and proficiently at various ages. Anyway, Singleton's summary (2005) was more agreeable: under CPH, L2 children achieve more and react quickly than L2 adults in SLA, but there is no actual counter-evidence that L2 adults cannot do something to make it up in SLA or even be superior to L2 children in some certain SLA field. Treat every L2 learner fairly, teach each one according to his or her attributes, and most of all, see the L2 potential in a broader sense of CPH.

5. Conclusion

To sum up, CPH can be polished after lively debates. It is of less significance in testing dozens of or even thousands of experimental participants to debug at what age the critical time lies. We propose that everyone has his unequal critical time. Some of us even have several critical times. And this critical time never ends after puberty. Just try to

find that enlightenment time under CPH and never lose our confidence of critical time in ourselves. In the future, we will feel being blessed for we never relinquish an not-so-perfect self now. In a word, there is no rosy road of SLA under CPH, but never limit your SLA within puberty. Life is a long way to run, you will never know what adventures of fate come next. Just be yourself, and find the right time and right way in your SLA, no matter how old you are!

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