Comparing L2 Children and L2 Adults from the Perspective of Critical Period Hypothesis: A Short Report

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word count (excluding references):

Introduction

Unlike any other species, human beings have a distinct and unique advantage over all other animals in their use of language that is compositional and referential, a fact that never ceases to astonish and amaze researchers. Equally intriguing is the specious difference between children and adults in learning a language, especially a second language, at different rates and achieving different ultimate attainment (UA). It is commonly observed that children are better learners than adults when it comes to learning a foreign language, and they are far more likely to achieve near-native ultimate attainment.

Age may well be one of the crucial factors affecting SLA. It is no doubt also one of the most debated and controversial factors which merits balanced scrutiny. Accounting for the phenomenon, a Critical Period (CP) explanation was mooted, ever since the inception of the field of Second Language Acquisition (SLA) more than half a century ago, especially after Chomsky's revolutionary paradigm shift that points direction to the innate biological 'black box' mechanism that makes language acquisition possible. According to the Critical Period Hypothesis (CPH), there exists a "biological timetable before which and after which language acquisition, both first and second, is more successfully accomplished" (Tavakoli, 2012, p. 95).

This is a bold conjecture—it remains a hypothesis till this day—to suggest that a biological base in children predisposes success in language learning, which operates only for a limited window of opportunity and is fundamentally unlike other general skills that adults can consciously pick up (Lightbown and Spada, 2013; Ortega, 2013). As for the duration of the critical period, a broad spectrum of views have been proposed without any sign of a consensus. Puberty is a key candidate, but there are also others that have pushed it to earlier years, while more recent research seems to point to a much later stage. For example, the most recent large-scale survey equipped with an advanced computational model estimates the 'breaking-off point' to be 17.4 years old (Hartshorne, Tenenbaum and Pinker, 2018). While the observation that children are better language learners has some truth to it, especially in phonological performance, the big picture is much more complex. Increasingly more research on adults L2 learners are yielding new

results that challenge previous assumptions and it remains a difficult task to recalibrate our understanding and accommodate these new findings withing the old CPH framework.

Overall, the CPH still poses a great challenge in the field of SLA after more than five decades of research and intense debates. This short report briefly surveys the keys challenges for the CPH, with a focus on studies that compare the similarities and differences of L2 children and L2 adults. Moreover, it also discusses its pedagogical implications including how it affects my own teaching practices.

The Critical Period Hypothesis and its Challenges

The CPH is the kind of the theory that is strikingly persuasive partly through the simplicity in its formulation. Starting from its earliest proponents Penfield and Roberts, in almost all bespoke versions of its definition, its core idea remains a biological window of opportunity to 'master' a language, after which it is no longer possible or less likely, which seems commonsensical. In its weaker version, we will often find the phrase 'sensitive period' is used in lieu of 'critical period' to imply the possibility that instead of a sharp discontinuity, the human innate sensitivity gradually fades aways rather than suddenly disappears (Tavakoli, 2012). However, as Ortega (2013) reports, the distinction is hard to pin down due to the lack of evidence and in most cases they are used interchangeably. Another attempt to redefine the CPH is to treat 'critical period' in its plural form 'critical periods', sometimes called the 'Multiple CPH' to accommodate the possibility that there is more than one critical period involed. A recent influential attempt is Granena and Long (2012), which defines a sequence of three critical periods that close first for phonology then lexi and finally syntax.

The CPH is notoriously difficult to prove, however. One the one hand, progress in neuroscience has not yet reached the stage where researchers can confidently report on what exactly is going on in our head when we learn a language. Moreover, conceptual quagmires lie everywhere in studies on the CPH. For example, to answer the question 'Can adults L2 learners acquire native-like proficiency', we need first of all a clear definition of all the variables involved (Ellis, 2015). But it is difficult even to tell adults and children apart. Age group after all is an arbitrary construct as a way of simplification. Even within the same age group for the supposed critical period, for example 10-13 years old, are we to assume a 10-year-old and a 13-year-old share the same characteristics or are they inherently different while being in the same group? What is meant by 'proficiency' is difficult to measure as well. It is derived from various tests that often target a singled-out area such as pronunciation and grammar, but how accurately it reflects the overall ability to use the language is often disputed. Likewise, the notion that L2 learners should be compared with monolinguals is taken to task. From the perspective of 'multicompetence' and bilingualism, Bialystok and Kroll (2018) questions the desirability of such comparison. To say that the bilingual L2 learners will never be native-like is like to assert that they will never be monolinguals, which they

certainly will never be, just like apple will never be pears. Rather, it might be better to assume a bilingual person's competence is simply qualitatively and inherently different from that of a monolingual's.

The validity of the CPH in L1 and L2 acquisition is another important theoretical challenge. In their seminal review, Mayberry and Kluender (2018) confirms the 1960s-era hypothesis that the CPH is likely to exist for L1. But its extension to L2 is problematic to say the least. For example, a growing literature now challenge old CPH-informed L2 predictions, such as that there is distinct discontinuity at or near puberty for L2 learners to gain native-like accent (Flege, 2018).

In the end, a large cohort of environmental, psychological and socio-affective factors may well play important, if not more important roles in SLA than age. Learner variables, such a motivation, aptitude, opportunity for input, may well paint a picture of complex interplay, in which "all individual factors strongly interact and that these interactions are constantly changing while the process of L2 acquisition proceeds" (de Bot, 2005, p. 75). Though age is often discussed alongside other individual differences, the place of age among these variables is not without dispute. While many, such as Lightbown and Spada (2013) treat it equally with other learner variables, others consider it to be a macro-variable that affects all other variables to some extent. A good example is Rod Ellis (2015), whose first edition treats age among other factors in the same chapter, but in later editions place it in a separate chapter. In light of this dilemma, there has a been a trend of the Emergentist approach that 'provides a framework for relating these changes to variation in the success of L2 learning' through a synthesis incorporating these different groups of factors (environmental support, cognitive abilities and motivation) which change systematically with age. (Caldwell-Harris and MacWhinney, 2023).

Circumventing the obstacle that direct experiment or observation is nigh impossible researching the CPH in SLA, correlational methodologies promote a more controlled way of comparison, with its own inconvenient flaws. To start, measurement has long been criticized for its specious numerical expression belying the fact that concepts such as proficiency and native-likeness are delusive. Equally worrying is the interpretation of the correlation. Researchers find it extremely difficult to rule out the possibility of confounding factors. In the words of Lighbown and Spada, "while it may be that one factor influences the other, it may also be the case that both are influenced by something else entirely" (2001, p. 30). Nevertheless, much progress has been made over the past decades and we now know much better how the age factor and the CPH influence L2 learners.

Empirical Studies: Child vs. Adult L2 Acquisition

Case studies involving unfortunate children with detrimental circumstances have

provided strong evidence for the existence of the CPH in L1. Genie, who was deprived of language input until being rescued when she was 13, never caught up with peers in terms of language ability despite intensive linguistic interventions (Rymer, 1993). The CPH is a strong explanation while we cannot rule out the possibility that it is the emotional trauma or cognitive problems that lead to her language deficits. Similar extreme cases concern the so-called feral children, who are left on their own in the wild with no proper human communication. They often do not fully acquire their L1 when returning to society but again we cannot confidently avert it 'proves' the CPH because there might be other factors at play (Ortega, 2013). More convincing evidence comes from studies on the deaf population. Many deaf children grow up without experiencing proper exposure to either spoken language or sign language until they are sent to primary school. A continuous stream of findings support that they generally do not fully acquire their first language (Mayberry, 2018).

Evidence for the CPH in L2 is much more controversial. When the CPH was first proposed in the 1960s, it was believed to work for L1, and as a corollary for L2 as well. But research on the CPH for L2 acquisition paints a rather obscure picture. In their pioneering studies, Johnson and Newport (1989) investigated a group of Chinese and Korean adult immigrants of L2 English, each had been living in the US for over five years, with half before the age of 15 and the other half older. They were given the grammaticality judgment task, from which a statistically negative correlation of r=-0.77 was found between age of arrival (AoA) and their score. The correlation is only found in the 3-15 age group but not in the 17-39 age group. This evident discontinuity in a certain age is used by Johnson and Newport as evidence for the existence of the CPH in L2.

Johnson and Newport (1989) is one of the most cited research on the CPH in L2 but not without disputes. For example, Birdsong (2014) recounts his earlier attemps to replicate Johnson and Newport by selecting a group of 61 L1 Spanish speakers of English L2 in the US, who took the same grammaticality judgment task. They were divided into two groups, the former with AoA between 3-16, mean L2 residence of 12.2 years; and the latter 32 older learners with 17+ AoA, and a mean L2 residence of 10.5 years. Instead of the abrupt discontinuity observed in Johnson and Newport (1989), here the score witnessed a gradual decline across age groups beyond puberty. A strong negative correlation (r = -0.77) was observed between AoA and grammaticality judgment scores, the same as in Johnson and Newport (1989). However, while early acquirers demonstrated near-perfect scores, suggesting a lack of variability within this group, among late acquirers there was also a significant negative correlation remaning (r = -0.69). Similarly, in similarly designed Foreign Accent (FA) study projects, it is reported that 'there is no sharp discontinuity at or near 13 years of age in the relation between AoA in the host country and strength of FA' (Flege, 2018). As long as there is strong empirical dissonance regarding whether or not there is an evident discontinuity after a certain presumed 'critical period', doubts about the existence of the CP for L2 learners are unlikely to go away.

Another oft-cited seminal study that supposedly produces counter-evidence is conducted by Ioup and her colleagues in the 1990s. By utilizing a case study methodology, it zooms in to the unique L2 adult learner success story of Julie, a native speaker of English who married an Egyptian man, settled in Egypt, and did not learn Egyptian until she was 21 years of age. While she had not received any explicit instruction to use the language, she managed to pick up the language on her own and eventually pass as a native speaker of Egyptian in real life (Ioup *et al*., 1994).

To confirm Julie's 'native-ness', researchers have rigorously tested her in speech production, accent identification and grammatical intuitions. For speech production, her spontaneous speech samples were collected, mixed with speech samples from a range of other native and non-native speaker. Another group of native speakers were asked to judge whether a certain sample they here are produced by a native speaker or not. For accent identification, a similar procedure was followed to test whether Julie can recognize regional Arabic and Egyptian dialects. As for the grammatical intuitions, Julie was asked to complete grammaticality judgement tasks, as well as translate from English to Arabic, covering a range of syntax. The result is astonishing. Julie is rated by most native judges to be a fellow native speaker in most of the tasks she has completed (Ioup *et al*., 1994). In short, if we take into account the bilingual 'multicompetence', Julie indeed has achieved near-native proficiency in her L2, contrary to the key CPH prediction that no adults after the critical period are able to fully achieve native-like L2 proficiency.

Other than the ultimate attainment that the CPH is supposed to constrain, more pertinent to the classroom educations needs may be children and adult L2 learners' difference in the rate of acquisition and their order of acquisition. In this regard, contrary to what one might expect, adults actually outperform children in almost all aspects of language use except pronunciation. When reviewing the rich literature from 1970s onwards in this line of comparison, including a few long-term studies that span decades, Singleton (2022) concludes that older learners learn better and more rapidly at first, but despite the initial advantage, child learners eventually catch up and surpass them. But in a foreign language context, the picture is again complicated. It appears that when the L2 is learnt in a controlled instruction mode with limited input, the younger learners actually do not catch up with older starters (Marinova-Todd, Marshall and Snow, 2000). This is another surprising find that challenges the wisdom of "the younger the better" when it comes to foreign language learning. More pertinent to the results may be whether there is sufficient language input, a high motivation to learn and opportunities for social interaction.

The route or order of acquisition is another key area to compare adult and children L2 learners. After surveying previous studies, Ellis (2015) reasserts that "learners process linguistic date in the same way, irrespective of how old they are". However, he believes it is too early to rule out the possibility that age affects L2 acquisition process. Adults

are more likely to rely on explicit learning while children make use of more implicit learning, with long-term consequences. According to Ellis, implicit instruction attracts attention to the target form in context, delivered more spontaneously, makes no use of metalanguage; while the explicit instruction directs attention to the target from, is predetermined and planned, presents target forms in isolation, uses the metalanguage and involves a lot of controlled practice (2015, p. 262). With this stark contrast, age, but not necessarily the CPH, indeed plays a major role in adjusting our pedagogy for children and adults.

Pedagogical Implications

After half a century's studies on the CPH and the age factor, there are a few key findings that heavily influence pedagogy, especially language policy regarding curriculum design for different age groups. In foreign language settings these influences are tangible and controversial. For example, there has been a growing trend of early L2 learning at school around the world, possibly influenced by the 'earlier=better' common wisdom. Researchers have repeatedly warned that this practice is not informed or supported by research (Sadeghi, 2022). In fact, decades of continuous empirical research point out that children who starts L2 learning at primary school cannot maintain their advantage of earlier start by secondary school. Late starters turn out to perform just as well, if not even better, than earlier starters across a range of language use tests. This directly challenges the wisdom of such language policies that insist on imagined benefits from an earlier start, instead of providing sufficient language support and resources to these young language learners.

Given the amount of investment already going into early L2 education, Singleton recommends not a sharp end to these policies but rather a change of direction. For example we could make L2 education more immersive. Besides, CLIL should be encouraged, "providing the teaching of some school subjects via the L2, thereby increasing L2 exposure without consuming more time" (Singleton, 2022).

Studies comparing child and adult L2 learners have huge implication for classroom teachers as well. SLA research can positively inform differentiated L2 instructional approaches. Knowing that younger children may have a slower start when learning a new language, it should remind teachers and parents alike that in the initial stage of learning, more language support should be provided, especially for those with additional needs at school. This will benefit children's language learning greatly in the long run. Similarly, knowing that older children including adults may have an initial advantage, especially in a foreign language setting, should encourage teachers to have faith in their students.

The CPH should not give older L2 learners despair. Through teachers' explanation, students should understand that the CPH remains a hypothesis. Even if it is true, it is not as scary as it may sound. It does never mean adult language learning is futile or impossible. This is particularly important for me as a college English teacher. Too often I witness my adult students wrongly believe that it is already too late for them to learn English well, which hurts morale and hampers their motivation. Leaner ability does change as they age, but instead of a sharp discontinuity, it is more likely to be a gradual decline. Instead of focusing on the decline, I could remind students that it could be compensated by a high motivation and sufficient input along with a range of other factors at play. After all, learner such as Julie should inspire older learners. And they too, if not achieving the near-native proficiency, could at least make great improvement, often faster than children (VanPatten, Smith and Benati, 2020).

To conclude, in a research-informed differentiated education approach, for children we could prioritize implicit learning by providing more language exposure, create immersive and interactive language environments, emphasize communicative activities that encourage natural L2 use; for adults, we could prioritize explicit learning by supplementing their studies with more systematic rule-based learning, align L2 instruction with their needs, goals and learning experience, and most importantly foster a low-stress environment that facilitate risk-taking and address potential negative affect. No matter the student is a child or adult, the best time to learn a foreign language is NOW and with sufficient support, they can all succeed.

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