The Critical Period Hypothesis in Second Language Acquisition

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Abstract

This paper discusses one of the most appealing subjects that is of interest to learners, educators, scholars, and researchers around the world. Researchers in linguistics, cognitive science, psychology, and neurology paid a good deal of attention to the decline in the level of language proficiency that starts around a certain age and what may cause that decline after the end of that period. Many of them called it a critical period. In the following pages we are trying to shed light on this theory in an endeavor to look for factors influencing language acquisition by new language learners. There is a clear uncertainty about factors that have an effect on second language acquisition. This paper aims to review the literature that approached this critical period hypothesis (CPH) and to draw conclusions related to the topic.

Key words
critical period, second language acquisition, language proficiency.

Introduction

The purpose of this paper is to introduce the CPH that attributes a kind of influence to age on the acquisition of language and whether it is possible to acquire the native-likeness after the critical period. In general, a consensus has been reached by researchers on the effect of CPH in first language acquisition (Tokudome, 2010). The literature I have covered in this study discusses two main aspects that can be considered as evidence or counter-evidence to the CPH in second language acquisition (SLA): the native-likeness as an ultimate attainment of SLA and the discontinuity of development after the critical period. From the late seventies to the early nineties, phonetics and phonology were the main aspects of language affected by a critical period (CP) and have been studied widely because they are the domains mostly affected by age (Bettoni-Techio, 2008). The critical period argument is to show that the effect of age on linguistic and cognitive capabilities is crucial to second language acquisition (Birdsong, 1999). The study of the CPH could also bring answers appertaining to the process of acquisition as a whole. Tokudome states...
that his findings concerning the effect of CP appear to be contradicted (Tokudome, 2010). Flege (1999) provided that second language speakers with foreign accents are examples of CPH. Some researchers provided evidence to support the CPH, while others provided counter-evidence to refute it. A third group considers it a null-hypothesis, i.e., there is no relationship among the variables that resulted in a CP. This argument will be discussed in detail in the following pages.

**What is the Critical Period Hypothesis?**

It is a merit for language learning which provides an approach to a period that begins at birth and ends around puberty (Tokudome, 2010). Birdsong (1999) provides that native-likeness in language acquisition, whether first or second, is determined by a critical period. As SLA has been the focus of research, the need for understanding all the factors involved in the process of learning and acquiring language is so urgent. One of those factors is the age and its significance in SLA. Penfield and Roberts (1959) introduced the notion of language physiological constraints due to brain plasticity that hinders learning at some point around the age of puberty. They considered the age of nine is the best age to learn language. Snow and Hoefnagel-Höhle(1978) referred to the CPH in terms of cerebral localization. They argue that the acquisition of L1 is better achieved before this localization is complete; i.e., at the age of puberty. One of the predictions of this argument is that second language (L2) learning is relatively rapid, significant, and almost similar in SLA if achieved within this period. There is no controversy relating to the notion of CPH in first language acquisition (L1A) and whether there is a decline in the ability to acquire a first language due to age. The controversy concerns finding a pattern related to constraints that affect learning in a way similar to what the CPH provides (Hakuta et al., 2003). Mainly CP has two features: premium preparedness for learning during a certain period and a low level for that preparedness after that specific period (Bornstein, 1998; Colombo, 1982). Research comparing children and adult language learning not only identifies advantages, but also disadvantages for learning within the CP. Adults were faster in learning while higher levels of proficiency were attained by children (Gass; Selinker, 2001; Nikolov&Djigunovic, 2006). In order to test the hypothesis, a consensus must be reached in order to prove age effect on the success of the CPH in SLA. Age-restrictedness in SLA must be reflected minimally through two ways: (1) the decline in acquiring proficiency in learning a new language must cease around the end of the CP, and (2) no new language learner can attain the native-like proficiency after the terminus of that period (Bongaerts,
There are several proposed causes of CP as diagnosed by researchers. Penfield and Roberts (1959) state that the loss of brain plasticity could be the key reason behind CP; Lenneberg points to the notion of lateralization; neuromuscular-driven problems in articulation proposed by Scovel; in addition to other explanations such as the affective filter initiated by Krashen (p. 69).

**Correlation of Variables and the Null-Hypothesis**

There is no doubt that children can acquire language easily and more proficiently than adults; however, there are some studies which discuss the correlation of different variables that influence SLA like age of acquisition (age of immigration), maturation, motivation, and other variables like the linguistic, cognitive, social, behavioral, pedagogical, etc. among those factors which may or may not be causing the CP. The biggest challenge is to figure out the relationship between age and other social, emotional, educational, and experiential variables and how they interact with each other and then to lead to success in learning (Abello-Contesse, 2009). Tokudome (2010) maintains that proficient L2 speakers can attain high levels of proficiency by one factor which is personal motivation. There are some studies that attribute the CP to neurological issues. Clark (2003) states that Lenneberg pointed out the reason why language could not be attained after the age of puberty was *lateralization* (the left hemisphere of the brain is responsible for the language) as it was by that time complete. He also refers to the possibility of the recovery of aphasic patients (people whom language abilities were affected by injury or sickness) if it happens before puberty while it is extremely difficult to attain a perfect recovery after puberty. In spite of the fact that children could recover faster from traumatic aphasia than adults do, “vascular disorder aphasia” could rarely be recovered even in young children (Snow and Hoefnagel-Höhle, 1978, p. 1125). Stewe & Sabourin (2005) observed that in the processing of L1 and L2, no matter how old learners are, the same brain vicinities are used; however, late learners often adapt more resources during L2 processing, and even in early language learning these vicinities are not necessarily fully employed during L2 processing (Bongaerts, 2005, p. 265).

In order to ponder about the existence of a critical period, researchers argue that children who are incapable of receiving language at the age of childhood (feral children for example) will not be capable of mastering the grammar after certain age. That is to say that language input at childhood plays a key role in the acquisition and/or learning of a language and the lack of exposure to language
during the CP could lead to a permanent disability in language acquisition (Tokudome, 2010). With reference to SLA, Birdsong (1999) observed two things that occur simultaneously: the age of learning start is strongly relevant to the final success in that language. Also, Johnson and Newport (1989, 1991) have maintained that proficiency decline in language learning is linked to age if it happens before the age of puberty (15 years old) and there is a non-patterned variation with the performance of persons who start language learning after that. Moreover, Hakuta et al. (2003) depicted a linear decline relationship between the age of arrival (AOA) of immigrants and the scores of people who arrived late and served as subjects for the research (Du, 2010). On the other hand, Birdsong & Molis (2001) found that AOA and the achievement among early arrivals didn’t constitute a linear decline; however, they found that what influences the performance of late arrivals was age. Harley and Wang (1997 cited in Abello-Contesse, 2009) have argued that the majority of adult L2 learners can usually make faster progress in acquiring grammar and vocabulary since they are cognitively more developed than children and they are capable of analytical thinking (p. 171). While Birdsong (1999) ascertained that as long as the decline in proficiency is age-related, the decline must also be comprehensive to cognitive mechanisms, the thing that partly explains the deterioration in acquisition/learning effectiveness (p. 172).

The main argument to support the CPH is to provide evidence whether there is a sharp discontinuity in the decline of acquisition after the end of that period and whether native-likeness is possible for adult learners. Long (1990) stated that the loss of neural plasticity due to brain maturation is the reason behind that incline. Nevertheless, Birdsong (1999) posited that

If there is a CP, then the relation between age of learning and proficiency will be nonlinear because of a sharp break at the CP; if there is no CP, the relation will be linear. Regarding other factors, if there is a CP, then age will be the exclusive or primary factor accounting for proficiency; if there is no CP, then other factors will be significant (p. 173).

Most of the studies conducted in this regard showed no sharp cut-off of the discontinuity in language learning capacity and the attainment of second language declines gradually throughout life; however, Penfield, Roberts, and Lenneberg believed that there is a sharp terminus of the capacity to learn a language that is obvious around the end of childhood (Tokudome, 2010, p. 20). Hakuta et al. (2003) brought forward other independent variables that could be considered to influence SLA rather than the CP, based on the findings
of their study that covered data from the 1990 US census. They found that the quality of learning English, in the case of immigrants, not only can it be affected by the AOA, but also there are other socioeconomic factors; especially formal education. In SLA they found an age-related decline in proficiency, but that decline failed to reflect a pattern around the terminus of CP, the thing that is essential to the CPH. In addition, Tokudome (2010) didn’t find in his review a sudden drop of proficiency which is supposed to be a characteristic of the end of the CP. He conveyed Hurford’s (1991) explanation of a neurological change as the language acquisition capacity does not constitute a sharp cut-off around the age of puberty; however, it is a life stage point where many factors and pressures work together (p. 20). Birdsong (1999) also argues in favor of the latter view of the 'switch-off' of SLA capacity at a certain age. That is to say, if there is a CP, SLA must be impossible for adult learners or learners who passed puberty.

In addition to the already mentioned variables, Johnson and Newport (1989) and Flege (1999) stated in their study of immigrants that there are other attitudinal and experiential variables these are correlated in the study of CPH as the length and amount of exposure, age of learning, identification, self-consciousness, quality of input, and motivation. There is a reference to Flege’s attitude that has an influence over the outcomes of testing learners who have already learned speech in their countries from teachers who spoke English with foreign accents or might be non-native speakers of the target second language. The learners’ ultimate attainment would sound alike with their teachers. Han’s (2008) methodological issues are reflected in the studies as being conducted at different times of acquisition and that would affect the overall results (p. 23). Also, speaking of teaching mechanisms and their effect on SLA, experiential studies frequently show that there is no age-based correlation with fast learning or successful attainment of L2, but rather they reflected that teenagers and older children are more inclined to learn efficiently (Abello-Contesse, 2009). Sometimes the L2 learners’ ultimate attainment is subject to deformation by defected teaching mechanisms.

On the other hand, there are extreme standpoints against CP that try to refute the hypothesis. Singleton (1995) tends to be pessimistic when he stood against the CPH and regarded it as an unscientific hypothesis (Bongaerts, 2005). Hakuta et al. (2003) proposed that a substitute to CPH in SLA could be age-related factors that are not necessarily related to only language learning but rather other variables that interfere with learning like social, educational, and cognitive capacity that in some way hinders learning in general (p. 31). If there
is a CP for language learning where influencing variables affect learning after that period, then by the same standards there must be a CP for learning anything else (Birdsong, 1999). While Chiswick and Miller (2008 cited in Tokudome, 2010) concluded that if CP in language learning is age-related proficiency sharp decline, then there is no existence of CP because they discovered, through research, the ability of adults to develop highly sophisticated linguistic systems when learning a new language. Hakuta et al. (2003) in their study covered subjects who spent ten years residing in the US; however, they could not find any residence effect on the English proficiency, but Stevens (2004) argued that there is a strong effect of the length of stay on the linguistic attainment of the adult immigrants. Wiley et al. (2005) concluded that the CP was not evident in SLA. Birdsong (1999), after describing the different factors involved in the acquisition of a new language, concluded that the CPH should be rejected and should be called a null-hypothesis in SLA.

**CPH in First and Second Language Acquisition**

If we consider language as a set of principles and an innate predisposition to be acquired and humans are governed to acquire language within a critical period, then the acquisition process of any new language, L2 or L3, must be similar because the acquisition of language is dependent upon the same principles and the learner’s use of these principles (Birdsong, 1999). Evidence that there is no or little L1 transfer in SLA during the critical period would support the CPH. Coopmans (2006 cited in Bettoni-Techio, 2008) believed that the Universal Grammar theory (UG) could offer an answer to the language acquisition problem as it is most likely for children to have access to that innate faculty of language more than adults do. That proposition would support the existence of a CPH (p. 71). Johnson and Newport (1989) provided that learning L2 after the age of 15 will determine the ultimate attainment of learning and will result in the inability to become a ‘native-like’ or anything near that in the new language (p. 321). Long (1990) argued that only morphology and syntax can be attained like native speakers if the beginning of learning takes place before age 15, while phonology in L2 begins to decline by the age of 6 for many and the native-like ability ceases for anyone who starts learning after age 15 regardless of their being motivated. Also, Long (1990) stated that mastering a second language and attaining the native-like linguistic ability after the end of the CP would refute the existence of a critical period in SLA. The results of the study conducted by Snow and Hoefnagel-Höhle (1978) failed to support the CPH because they found that subjects aged 12-15 years
acquired language faster than children aged 3-5 years did and that a CP in SLA does not exist. However, Birdsong (1999) remarked that informal observations from empirical studies show that children's achievement is more successful in SLA than that of adult learners; however, there are adults and late learners who are able to master a second language like native speakers.

**Multi-critical Periods**

Some researchers disagree to call it a critical period though they adopt another choice of terminology with a moderate version and call it a “sensitive period” instead (Birdsong, 1999, p. 164). Relatedly, Abello-Contesse (2009) also tackled the sensitive periods and referred to an interesting remark that there is not only one critical period, but there are more periods which govern the different linguistic modalities like phonology, morphology, syntax, and semantics. She also presented a few points concerning the critical/sensitive period(s) without introducing further explanation.

References can be found to (i) multiple critical periods (each based on a specific language component, such as age six for L2 phonology), (ii) the non-existence of one or more critical periods for L2 versus L1 acquisition, (iii) a ‘sensitive’ yet not ‘critical’ period, and (iv) a gradual and continual decline from childhood to adulthood (p. 170).

Birdsong & Molis (2001) confirmed that 15 and 16 years of age were the language acquisition cutoff in Flege et al. (1995) Johnson and Newport (1998) respectively; Hakuta and Bialystok (2003) advised that in order for Johnson and Newport (1989) to get better results, it would be better to postpone the cutoff age to 20 years as there is a linear decline related to the age of arrival and the subjects’ scores in the new language.

There is a wide-spread consensus in the field of SLA on the effect of age upon learning and that effect is so significant in pronunciation skill of learners. The moderate version of CP can also be found in the literature as a sensitive period after which attaining native-like linguistic skills are only harder and there are different sensitive periods depending on the different linguistic domains (Bettoni-Techio, 2008).

**Native-likeness and non-native-likeness**

Hyltenstam and Abrahamsson (2003 cited in Bettoni-Techio, 2008; Tokudome, 2010) claim that there is one critical period that begins after birth and native-like proficiency may not be attained for L2 learners no matter how young they are. Nonetheless, they referred to the point that maturation has a strong influence over SLA. Speaking about the ultimate attainment in SLA and the effort of learners to
acquire native-likeness as the ultimate goal, Du (2010) accumulated the findings of research in this regard and provided that Johnson and Newport (1989) and Flege et al (1995) could not find any adult subjects who scored within the range of native speakers. However, Birdsong and Molis (2001) found one late learner who scored native-likeness and Birdsong (2001) found fifteen. Du concluded that there is no agreement on native-like attainment reached and the CPH is still an unsettled topic.

One might ask the question that if we want to compare non-native speakers’ performance, we can do it but comparing to what? Birdsong (1999) raised this question by referring to a crucial point:

Indeed, native speakers do not perform judgment tasks with 100% accuracy. What do we mean, then, when we speak vaguely of second language learners achieving native-like proficiency? This problem of designating a standard linguistic form is evident at all levels of analysis, but phonology is perhaps the most salient (p. 165).

One of the main findings of Johnson and Newport (1989) was that late L2 learners couldn’t achieve native-likeness despite what their L1s were (Du, 2010). Birdsong (2005) argued that learners’ linguistic behavior is irrelevantly linked to native-likeness and insisting on that relationship could falsify the CPH in SLA. Relatedly, he suggested that being nonnative-like does not mean that learning mechanisms are defective. One of the most crucial aspects of learning a new language is the ability to speak like native speakers; the mother language would affect the target language and unavoidably result in speaking with a foreign accent (Du, 2010). Young adults and adults who are not exposed to the new language seem to be unable to have native-like attainment or be proficient in that language regardless of the input or the instruction they receive and nothing can improve their linguistic competence (Tokudome, 2010). On the other hand, Flege et al. (1995), in their study, found that 6% of the 240 Italians L2 learners of English; age of arrival (AOA) to Canada was above twelve years, achieved pronunciation like natives. Bongaerts et al. (1997) showed that Dutch adult learners of English when judged by four British judges some of them gained higher scores than native speakers and attained native-like proficiency.

**Conclusion**

The different versions of CPH are based almost all on the assumption that the variance in child/adult learning capacities and proficiency in the second language are closely related to the “changes in the neural structure of the brain as one gets older” (Bongaerts, 2005, p. 265). The other assumption is that research in SLA showed
that the acquisition is not influenced by a critical period as there is a gradual decline (not sharp shut-off) in the process of language acquisition contrary to the CPH (Tokudome, 2010). As a matter of fact, no study had tested the achievement of L2 learners in the two main skills of language: phonology and grammar simultaneously and such synchronized study would be more valid in defining the nature of the CP and its relevance to the ultimate attainment of L2 learners (Du, 2010). Bongaerts (2005) affirmed the necessity to conduct cross-domain linguistic study to determine the linguistic behavior of L2 learners’ native-likeness performance on the different skills.

The literature reviewed so far showed that there is no immediate discontinuity of decline in language learning around the end of CP, and native-likeness is attainable for adult learners. However, the gradual decline in L2 proficiency for adult learners could be as a result of “the lack of motivation or inadequate input and practice” (Tokudome, 2010, p. 19). By the same token, Bongaerts (1999 cited in Tokudome, 2010) and Bettoni-Techio (2008) add to the role of motivation by suggesting that the outstanding adults’ native-like proficiency may have been due to the three pro-mentioned factors combined: “high motivation, massive L2 input, and intensive training”. In addition, pedagogically speaking, a ‘magic’ age for learning does not exist. Advanced levels of L2 proficiency can be attained by younger and older learners and learning environment can be of paramount importance (Abello-Contesse, 2009, p. 171). Birdsong (1999) also stands with this attitude that age has nothing to do with advanced proficiency, as the decline continues throughout the age of learners; nevertheless, the L2 proficiency is judged by schooling only. Bongaerts (2005) also summarizes the findings of studies that native-like proficiency is attainable in the different domains of language for L2 learners who start learning after the said critical period, and that attainment is not exclusive to speakers of languages “typologically closely related” to the target language (p. 262).

After entertaining the different views and variables involved in the process of learning a new language, research showed that many factors affect the success of this process. There are the neurological factors, the age-related decline, input, exposure, and motivation which all play crucial role in language attainment and proficiency. There are other social and economic requirements that push learners to sound native-like. Every L2 learner would like to acquire the language ultimate proficiency and all like to speak like the native speakers of that language. However, this capacity seems to be difficult to attain in
adulthood; other linguistic skills seem to be at hand. It is age-related decline that affects learning after puberty as there are instances of adults who attain the native-like proficiency; nonetheless, these instances are very few in comparison to the large number of learners around the world. Physiologically speaking, acquiring the native L2 accent is restricted by the plasticity of the articulatory muscles which tend to get stiffer after the age of puberty. Other linguistic domains can be mastered beyond that muscular pressure and for the most cases motivation and determination trespass all obstacles in SLA.

References
