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CRITICAL PERIOD CONTROVERSIES FOR SECOND LANGUAGE ACQUISITION: IMPLICATIONS FOR LANGUAGE TEACHING

Randy Lucio

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CRITICAL PERIOD CONTROVERSIES FOR SECOND LANGUAGE
ACQUISITION: IMPLICATIONS FOR LANGUAGE TEACHING

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
English Composition:
Applied Linguistics and Teaching English as a Second Language

by
Randy Lucio
June 2020

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Approved by:

Sunny Hyon, Committee Chair, English

Rong Chen, Committee Member

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ABSTRACT

It was proposed by Eric Lenneberg (1967) in *Biological Foundations of Language* that implicit first language (L1) acquisition was only possible during a critical period (CP) spanning from infancy to puberty. The critical period hypothesis (CPH) has since been a topic of controversy among L1 and second language (L2) scholars, whose studies have produced varying results that argue for and against a CP. It is suggested in this paper, however, that these often-varying results offer important insight that can serve to inform current and future L2 educational policy and instruction within K-12 education in the U.S. Thus, it is imperative to bring these diverse studies together and gather the most important information that will lead us to create more effective L2 educational policy. The research suggests a need for future CP-related L2 studies to view the L2 user as distinct from the L1 speaker, a move that would allow L2 user performance to be evaluated independently and challenge the perceived negative CP effects; and, more importantly, it would allow L2 educational policy to be focused on developing the L2 user's linguistic abilities more effectively.

While focused primarily on second language acquisition (SLA) research, over the course of this paper, I review both L1 and L2 CP-related scholarship, finding that the CPH has its origins in Lenneberg's work on hemispheric lateralization. Studies using computer modeling techniques also suggest that a CP may have emerged during the course of human evolution as a result of a biological selection for an advantageous (non-linguistic) working memory trait.

Evidence from social and linguistic isolation cases and sign language studies additionally provide support for a CP for L1 acquisition, leading to a consensus that one does indeed exist for L1 acquisition—though its exact nature is not fully known. When extended to L2 acquisition, however, age-related CP studies have produced inconsistent results, with evidence from ultimate attainment and rate of acquisition studies both supporting and refuting a CP. Other age-related factors (e.g., vocal tract muscle development) and theoretical mechanisms (e.g., system preservation device), along with non-age-related factors (i.e., formal instruction, feedback, amount of exposure, and identity), were also said to possibly affect L2 outcome. Moreover, researchers critiquing the idea of the monolingual native speaker (NS) as the baseline for L2 performance presented the argument that L2 speakers should be viewed as successful L2 users with multicompetent capabilities. It is suggested that by taking such a view, the perceived deleterious effects of a CP might be diminished and our approach to CP research changed. The insight gained from this research is then considered with respect to L2 policy and instruction in California’s K-12 educational system and, more specifically, within a regional school district like the Los Angeles Unified School District (LAUSD). Such insight can be used to reimagine L2 policy and instruction in a way that serves to develop the multicompetent L2 abilities of their K-12 students.

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DEDICATION

For my mother Antonia.

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CHAPTER ONE:
CRITICAL PERIOD CONTROVERSIES FOR SECOND LANGUAGE
ACQUISITION: IMPLICATIONS FOR LANGUAGE TEACHING

First proposed in *Biological Foundations of Language*, Eric Lenneberg's (1967) critical period hypothesis (CPH) posited that first language (L1) acquisition must occur before puberty in order for individuals to successfully acquire the native characteristics of a given language. Beyond this point, Lenneberg argued, successful acquisition becomes highly unlikely for the learner. However, given that nearly all humans are exposed to and acquire an L1 from birth, testing the validity of the CPH has been a difficult task (Lenneberg, 1967; Newport, 1990). Studies proclaiming to have data supporting a critical period (CP) argument have been scarce and controversial as potential confounding factors may have similarly influenced the language acquisition outcomes reported in these studies. Nevertheless, there remains a consensus that a CP for L1 acquisition exists although its exact nature is not entirely known (Hurford, 1991; Hurford & Kirby, 1998; Marinova-Todd, Marshall, & Snow, 2000; Moskovsky, 2002).

Yet as researchers have continued to explore the possibility of a CP for L1 acquisition, similar efforts have been made to understand if the CP argument could be extended to second language acquisition (SLA). Although studies focusing on second language (L2) learners have been plentiful, there remains a lack of consensus among researchers as to whether a CP can serve as a viable

explanation for the varying degrees of ultimate attainment generally seen among children and adults, or if other relevant factors (e.g., formal instruction, identity) similarly shape L2 outcome (DeKeyser, 2013; Marinova-Todd et al., 2000). The layperson and researcher alike often observe, for example, that children possess an advantage when it comes to learning an L2 (DeKeyser, 2013; Mayberry, 2010; Mayberry & Kluender, 2018; Penfield, 1965; Penfield & Roberts, 1959). Children appear to achieve greater and more nativelike proficiency with relative ease while adults retain non-native accents and reach varying levels of proficiency (Hill, 1970). Early work on foreign accents and language acquisition by Scovel (1969) suggested, for instance, that in parallel cases where both children and adults were acquiring an L2, the adult often exceeded the performance of children when learning words and sentence structure. Yet the adult, regardless of their high proficiency, continued to have difficulty shedding their L2 accent (Scovel, 1969). There are, nevertheless, those adults who seemingly achieve nativelike accents in their L2 and further complicate our understanding of a CP for SLA (Lenneberg, 1967; Hill, 1970; Mayberry & Kluender, 2018). These general observations have, in turn, led researchers to further explore the nature of the SLA process and critique the possible role of a CP in shaping L2 outcome (e.g., Kanik, 2018; Krashen, 1973; Johnson & Newport, 1989; Lenneberg, 1967; Scovel, 1969).

While the extension of a CP for SLA has been controversial, it should be noted that this discussion does have important implications for both existing and

future L2 educational policies as well as teaching. L2 policies and instruction, for example, can be better informed by taking into consideration the different findings from such varying scholarship. These findings can help create L2 policies that designate an appropriate age-range to integrate L2 instruction into the curriculum and tailor L2 teaching to the language learning abilities of L2 students. Moreover, a critique of the idealized monolingual native speaker (NS) concept may similarly allow researchers, L2 educational policy makers, and instructors alike to move away from a dependency on L1 speakers as the baseline for L2 performance and instead view L2 students as independent L2 users. This could, in turn, place a greater focus on providing students with the necessary tools to become successful L2 users without the expectation of needing to reach nativelike L1 speech.

Thus, it is necessary to bring together these varied studies and glean from them the most pertinent information that will allow us to create more effective L2 educational policy. The research indicates, for instance, that our focus in CP-related L2 studies may need to shift from measuring L2 users against NS proficiency to measuring L2 users based on their own distinct linguistic abilities, a move that would likewise challenge the perceived negative effects of a CP. This, in turn, would allow us to create educational policy aimed at developing the abilities of L2 users instead of aiming to achieve nativelikeness in the L2. Over the course of this paper, then, I explore the existing literature on the CPH by tracing its roots from Lenneberg's clinical data on hemispheric lateralization to

studies focused on understanding the biological purpose of a CP, and then to considerations of a CP in relation to L2 outcomes. Finally, I consider the implications of this discussion for existing and future L2 policies and instruction in the U.S., which can be informed based on the insight gained from CP-related scholarship. The impact of this research on such policies and instruction will be considered within the context of K-12 education in California and, in particular, within the Los Angeles Unified School District (LAUSD), a regional school district.

Critical Period Hypothesis

A Basis in Hemispheric Lateralization

The formation of the CPH came after Lenneberg (1967) analyzed a series of studies focused on the linguistic progress of individuals recovering from traumatic aphasia resulting from injury to the brain and hemispherectomy, and those with general learning disabilities and deafness. Additionally, he considered the role of hemispheric lateralization in shaping the linguistic outcome of both children and adults with these characteristics. Lenneberg's analysis revealed that in the majority of these situations, children appeared to be able to overcome interruptions in their linguistic development before the onset of puberty. This was in contrast to teenagers and adults who were unable to return to their original states and exhibited little improvement in their language abilities thereafter (Lenneberg, 1967). Lenneberg's investigation into the process of hemispheric lateralization offered a potential explanation for these differences in outcome. He noted that the brain undergoes a process of lateralization beginning at the age of

2 and finishing by the early teens. During this time, the left brain typically assumes hemispheric (or cerebral) and linguistic dominance. Lenneberg highlighted, however, that “the hemispheres are still equipotential” (p. 151) before the age of 2, enabling the healthy hemisphere to assume linguistic responsibilities if damage to the brain were to occur. However, once this process has been completed, “the ability for self-organization and adjustment to the physiological demands of verbal behavior quickly declines” (Lenneberg, 1967, p. 158) and the healthy hemisphere is no longer capable of taking on such responsibilities. From these observations, Lenneberg thus proposed this window to be a critical period for L1 acquisition and recovery.

In related studies on hemispheric lateralization, Penfield (1965) and Penfield and Roberts (1959) similarly suggested that the flexibility of the child’s brain enabled relocation of the “speech center” from the left to the non-dominant right hemisphere in cases where children had seemingly lost the ability to speak because of brain injury; adults were unable to do the same. Penfield (1965) argued that this is due to the brain having already established the speech center in the dominant left hemisphere by the ages of 10-12. The non-dominant area that may have been used by the adult for language during this time becomes occupied by other non-linguistic functions and is, therefore, unable to assume linguistic responsibilities. Collectively, Penfield (1965) and Penfield and Roberts (1959) would appear to corroborate Lenneberg’s CP for L1 acquisition, which closes with the completion of hemispheric lateralization.

Likewise, Scovel (1969) posited cerebral dominance as a potential reason for the greater fluency seen in children than in adults when considering this primarily for SLA. He contends that there is “strong circumstantial evidence” that indicates a link between hemispheric lateralization and the human capacity to acquire language (Scovel, 1969, p. 250). In forming his argument, Scovel turned to late 19th century work by Marc Dax, Paul Broca, and John Hughlings Jackson, who explored the relation between the different hemispheres and the language function, as well as to a variety of work by several of his contemporaries (e.g., Lenneberg, 1967; Penfield, 1965). In this respect, Scovel attributed children’s ability under the age of 12 to acquire L2s with native accents to the plasticity of their brain, much like Lenneberg (1967), Penfield (1965), and Penfield and Roberts (1959) had previously suggested. Because the lateralization process has not yet been completed by this age, children can still acquire language with relative ease. After this point, the ability to acquire language diminishes, and the completion of lateralization hinders future language acquisition.

The nature and impact of the lateralization process on L1 and L2 acquisition, however, has been subject to critique over the years (Krashen, 1973, 1975). One of the earliest critiques came from Krashen (1973) who found lateralization to be completed much earlier than previously suggested. Lenneberg’s initial argument that lateralization was completed by puberty, for instance, derived from clinical data on children recovering from aphasia after

injury to their brain disrupted their L1 acquisition. After revisiting this data, Krashen concluded:

On closer examination...this data is consistent with the hypothesis that the development of lateralization is complete by five. In all cases of injury to the right hemisphere resulting in speech disturbance, the lesion was incurred before five. (p. 65)

Thus, while Lenneberg's initial argument was based primarily on data of aphasic children recovering their L1 if the injury to the brain occurred prior to their teens, Krashen noted that the precise timing of these injuries was not fully considered in Lenneberg's initial interpretation. In this sense, Krashen contends that lateralization is completed not by puberty but instead by the age of 5. Beyond this point, both right and left hemispheric involvement appears to be the same in both children and adults (Krashen, 1973). Krashen provided further support for his argument by turning to data from dichotic listening, where individuals were presented with simultaneous auditory stimuli to both ears. The findings indicated a right ear advantage when presented with verbal stimuli, which pointed to left cerebral dominance with respect to linguistic function (Krashen, 1973). Assessment revealed no "significant change in degree of lateralization or right ear advantage" (Krashen, 1973, p. 66) for individuals between the ages of 4 and 9, possibly suggesting an even earlier completion of lateralization at age 4 (Krashen, 1973). A critique of the lateralization hypothesis thus reveals possibly

minimal impact on the SLA of children and adults if the hinderance of cerebral dominance occurs at an early age before the onset of puberty.

Krashen echoed this possibility in a later paper, proposing that a CP may not necessarily be related to hemispheric lateralization after finding this process to be completed much earlier (Krashen, 1975). Lateralization, instead, may be associated with the completion of L1 acquisition, a process that similarly concludes at approximately 5 years of age (Krashen, 1975). In this sense, the adult's inability to achieve nativelylike proficiency in an L2 may not be a result of lateralization impeding their SLA. Nevertheless, the nature of a CP for both L1 and L2 acquisition has continued to be a point of discussion among researchers. While the CPH developed out of the evidence suggested above, researchers have similarly attempted to understand why language learning becomes increasingly difficult as individuals mature and does not remain constant.

Possible Evolution of a Critical Period for First Language Acquisition

As mentioned earlier, humans are born into a world of language. This is a characteristic unique to humans and is fundamental not only to our everyday interactions but also to our survival as a species. It is thus important to examine this trait closely in order to see why a seemingly disadvantageous phenomenon like a CP might exist at all. By taking such an approach, we can begin to understand why a diminishing ability to acquire language would be present in humans when the capacity to acquire it plays a central role in the survival of our

species. Several researchers have attempted to provide explanations for this apparently restrictive trait (Elman, 1993; Hurford, 1991, 1998).

Evolutionary Computer Model. As human evolution progressed during prehistorical times, the ability to acquire language emerged as an apparently distinctive characteristic that increased the chances of survival and reproduction for those individuals who possessed it (Hurford, 1991, 1998). However, as Hurford (1991) noted in his paper on the evolution of a CP for L1 acquisition, one would not expect to see such an advantageous trait to diminish as individuals enter the stage of reproductive potential. To further explore this paradoxical problem, Hurford (1991) presented an evolutionary computer model simulating the advantages of developing the ability to acquire language among individuals in artificial human populations. Computer modeling, Hurford explains, offers researchers the opportunity to test their proposed theories in a relatively objective fashion by removing the human element, helping to strengthen or highlight their limitations (Hurford, 1991, 1998). Hurford (1998), for example, suggested in a later article that “computational simulation and checking of theories may improve their detail and ensure their internal consistency” (p. 344), but also noted that it is nevertheless unable to provide a definitive answer as to whether the theories can be confirmed or rejected. Simulations by Hurford (1991) revealed that artificial “simulated” individuals with the ability to acquire an L1 (and more specifically those who acquired it before puberty) tended to hold a greater advantage over artificial individuals without the same capacity, leading to their

increased selection for reproduction and survival within the populations. Enabling the capacity to access a seemingly unlimited resource like language, then, appeared to have generated particularly well-adapted individuals for this artificially constructed environment. Hurford (1998), moreover, offered a possible explanation for the concentration of L1 acquisition occurring before puberty. He explained that it is advantageous for humans to acquire as many beneficial qualities prior to their transition into the stage of life when reproduction becomes possible. By acquiring a wide-ranging set of advantageous qualities prior to this stage, individuals are better prepared for the challenges they will meet in later life.

Interestingly, according to Hurford (1991), individuals acquire the necessary amount of L1 needed for later life by the time they reach puberty. Once the fundamental aspects of the L1 have been acquired, Hurford contends that it is no longer expected for humans to undergo this process of L1 acquisition again since language loss is not a common occurrence after the initial process is completed. Additionally, retaining the ability to acquire additional language does not hold a greater advantage (Hurford, 1991). Based on the results of the evolutionary model, he concluded that the absent need to (re)acquire language beyond this point in life essentially allowed a CP for L1 acquisition to emerge as an evolutionary by-product of natural selection rather than as any type of adaptation (as seen with language) (Hurford, 1991, 1998). In other words, the proposed CP was an unexpected consequence of both the selection for

language and the need to acquire it by puberty in preparation for adulthood. Additionally, the simulations revealed that once the L1 acquisition process had been completed, there was no particular advantage for any individual with the capacity to continue to acquire language throughout the remainder of their life (Hurford, 1991, 1998). Although not discussed here by Hurford, it would be interesting to consider how our rapidly evolving culture is affecting the trajectory of our biological evolution. It could be the case that acquiring an L2 will be essential for humans in the future. Nevertheless, while Hurford (1991) cautioned against accepting the conclusions from this artificially designed model, it offers a different method for testing longstanding theories about L1 acquisition. Other models have also been created to understand why children and not adults are the most well-equipped to acquire language when the opposite is normally true for other forms of learning.

Neural Network Model. A related (though non-evolutionary) neural network model was presented in Elman (1993) as a way to investigate the possible mechanism(s) responsible for the learning advantage children appear to hold over adults. Elman conducted his simulations using an artificially created language that contained the basic properties of human language. He trained the networks to process and reproduce the intricate nature of these properties, which included understanding recursion and being able to predict grammatical structure in output like proper subject-verb agreement. The simulations revealed that the networks were able to learn more complex language and make better predictions

in output when gradually exposed to a complete data set. However, understanding that this was not a relatively accurate representation of human language learning—children, for instance, are exposed to all levels of language complexity from birth—Elman alternatively presented the network with a complete data set and instead initially restricted the ability of its memory to process data before allowing its capacity to grow through maturation. Elman refers to this mechanism as “working memory” (p. 72) and these scenarios as “starting small” (p. 72). The results suggested that when the networks were allowed to develop and increase their memory capacities, they were able to achieve the same results as when they were gradually exposed to complex data. As the working memory mechanism matures, however, “[t]he earlier malleability also gives way to an increasing rigidity, such that the network is able to respond more effectively to mistakes early during learning and less so as learning progresses” (Elman, 1993, p. 93). The transition from a state of malleability to rigidity, in this sense, would appear to designate a CP for language acquisition; although in this case, the working memory mechanism that Elman proposed would not necessarily be specific to language learning but might instead be a general learning mechanism that could indirectly affect language acquisition (Elman, 1993; Hurford, 1998). Hurford (1998) made an interesting observation regarding Elman’s neural networks: they do not necessarily indicate the timing during which an increase in working memory capacity might occur for humans

but did suggest Elman's model may nevertheless point to early life stages as the time that this mechanism first begins to develop.

Complementarity of the Two Models. In his critique of the computational models in Hurford (1991) and Elman (1993), Hurford (1998) noted that a CP emerging as simply a by-product from a lack of selection pressure to (re)acquire language beyond puberty was a weakness of his initial model. In other words, while it served to provide an understanding of the timing of L1 acquisition, it did not consider a possible mechanism responsible for the decrease in L1 acquisition ability. Hurford (1998) attempted to remedy this weakness by complementing his initial model with the findings from Elman (1993), arguing that while they take different approaches, the two studies are still compatible with each other and are capable of offering a stronger explanation for a CP. For instance, Hurford (1998) contended that the working memory mechanism presented in Elman (1993) might in fact be what undergoes a developmental change that ultimately leads to the diminished L1 acquisition ability after puberty. Elman's working memory appeared to allow neural networks to process the adequate level of data necessary to learn the artificial language before growing and being able to process more complex language. However, as mentioned, this mechanism becomes less flexible over time through maturation. Elman proposed that as an individual's working memory matures and expands, it becomes better equipped to process the more complex input that is expected in later stages of life and, in the same sense, becomes less concerned with the basic linguistic properties that

Hurford (1991) suggests are typically acquired in childhood. Although it is not directly specific to language learning, working memory, here, is the possible developing mechanism that indirectly affects language learning. Hurford stated that this mechanism, when incorporated into a version of his earlier evolutionary model, would likely be selected for in his simulations. He reasoned that “there would be evolutionary selectional pressure to retain a reasonably large ‘working memory’ in adulthood” (Hurford, 1998, p. 352) as it is used to process not only complex language input in adulthood but also other non-linguistic tasks as well. Because a working memory capacity is not directly related to language, it continues to grow as individuals mature, regardless of whether or not they have been exposed to language. If a person does not receive linguistic input in early childhood, it would thus become increasingly difficult to acquire an L1 as the working memory has expanded to process more complex input expected in later stages of life. From this perspective, a CP is, to a certain extent, a consequence of a developing working memory, which would likely be selected for as an advantageous trait needed for adulthood.

While the simulations from these computer models are performed under highly controlled conditions, they nonetheless present alternative methods for testing theories on language and its different aspects such as a CP. The knowledge from these models, therefore, might better inform past and present studies on a CP.

A Critical Period for First Language Acquisition: Support from Child and Sign Language Studies

Cases of Social and Linguistic Isolation

Researchers have also turned to cases of social and linguistic isolation as a way to investigate the possibility of CP effects on L1 acquisition. Perhaps the most well-known case comes from “Genie.” Neglected and abused, Genie endured an extended period of extreme isolation from the time she was 20 months of age until her discovery at 13 ½ years-old (Curtiss, 1977). Concurrent studies conducted by Curtiss, Fromkin, Krashen, Rigler and Rigler (1974, 1975) and Curtiss (1977) noted that although there was little indication as to the amount of linguistic input that Genie might have received during this period, it was known that her abusive father prevented her from making any type of noise. Initial observations by Curtiss et al. (1974, 1975) revealed that Genie had difficulties controlling the organs necessary for speech production and determined she had no L1, a result perhaps of her early isolation.

Discovered at a point in time where she was considered to be past the CP, Curtiss et al. (1974, 1975) and Curtiss (1977) were then in a position to test Lenneberg’s CPH by examining the progress Genie made during her L1 acquisition. The authors administered a series of tests focusing on the development of her syntax and phonology. Over the course of a year from 1971 to 1972, the tests revealed progress in Genie’s comprehension of specific syntactic aspects such as the conjunctions “and/or,” negative/affirmative statements, possessive pronouns, and several other grammatical elements.

Genie also exhibited acquisition of phonological rules, which were reflected by her deletion, nasalization, simplification or insertion of vowels and consonants given their phonetic environment (Curtiss, 1977, p. 188). Despite the social and linguistic isolation she endured during the proposed CP, the authors concluded that Genie learned some language after she was discovered. However, they did acknowledge that her syntactic development was significantly slower than the average child at the same stage of L1 acquisition. For example, while children typically remain in the two-word stage for approximately 6 weeks, Genie remained at the same stage for about 4 months, according to these studies. It is important to note, however, that the extreme conditions endured by Genie limit the conclusions that can be made with respect to Lenneberg's CPH as they very well could have been confounding factors in her language development (Grimshaw, Adelstein, Bryden, & MacKinnon, 1998; Mayberry, 2003, 2010; Mayberry & Lock, 2003; Newport, 2002).

A related study by Grimshaw, Adelstein, Bryden, and MacKinnon (1998) extended the work of Curtiss et al. (1974, 1975) and Curtiss (1977) with an individual that did not endure such extreme conditions as Genie. In their study, Grimshaw et al. (1998) examined the linguistic progress of "E.M.," a 19-year-old, profoundly deaf individual from Mexico who lived in linguistic isolation until age 15 when he was fitted for hearing aids. According to the authors, the hearing aids "corrected [E.M.'s] hearing loss to 35dB," and he was "therefore able to hear speech spoken at a conversational level," allowing him to begin learning verbal

Spanish (Grimshaw et al., 1998, p. 241). Grimshaw et al. additionally reported that before acquiring the hearing aids, E.M. had developed a homesign system as a mode of communication as he was never exposed to any signed language.

Because of the similarities with Genie, Grimshaw et al. were able to administer to E.M. Spanish adaptations of the same comprehension tests from Curtiss et al. (1974, 1975) and Curtiss (1977) and likewise recorded his L1 acquisition progress. Testing revealed many of the same deficits in comprehension and production seen with Genie and remained consistent with the CPH. For example, like Genie, E.M. appeared to find speech production challenging, using isolated spoken words to complement his gestural communication rather than to replace it (Grimshaw et al., 1998). Moreover, although E.M. seemed to show signs of improved comprehension of specific syntactic structures such as singular/plural and the conjunctions “and/or,” his performance throughout the testing was inconsistent even after four years of language learning (Grimshaw et al., 1998). According to Grimshaw et al. (1998), these results suggested that the linguistic deficits exhibited by Genie are not, perhaps, entirely attributable to her unfortunate background, “provid[ing] converging evidence for the existence of a critical period for [L1] acquisition” (p. 250). Cases of linguistic deprivation such as those of E.M. and Genie provide insight into the language acquisition process of individuals exposed to an L1 beyond the proposed CP. Additionally, these studies highlight the importance of considering the background of each individual in order to better understand the

impact of various psychological and physical factors on language development and assessment.

Sign Language Studies Supporting a Critical Period for First Language Acquisition

With cases of social and linguistic isolation being quite rare and difficult to assess, researchers have argued that studies exploring possible CP effects related to L1 acquisition must focus on individuals without such extreme histories in order to minimize these complicating factors (Mayberry, 2003, 2010; Mayberry & Kluender, 2018; Mayberry & Lock, 2003; Mayberry, Lock, & Kazmi, 2002; Newport, 1990, 2002). This has led several researchers to examine the L1 acquisition of signed languages in congenitally and prelingually deaf individuals as a way to measure possible CP effects related to their L1 outcomes (Mayberry et al., 2002; Mayberry & Lock, 2003; Newport, 1990). Unlike hearing children who are surrounded by language from the time they are born, deaf children are often first exposed to an L1 at different ages. In these instances, delayed L1 exposure is often due to a number of factors such as the parents' belief that the child can acquire a spoken language without the need for a signed language, a delayed diagnosis of deafness, or a lack of sign language knowledge by the parents or caretakers. Several studies have reported, for instance, that only about 10% of deaf children are born into deaf families and are exposed to a sign language from birth; the remainder are born to hearing parents who cannot provide the necessary linguistic input during infancy and early childhood (Mayberry, 2003, 2010; Mayberry & Lock, 2003; Newport 1990). Deaf individuals,

in this sense, afford researchers the opportunity to examine possible age-of-acquisition effects on L1 outcomes, testing the validity of the CPH.

Newport (1990) presented the findings from her previously unpublished co-authored work that had examined possible age effects in the L1 outcome of 30 deaf adult American Sign Language (ASL) speakers. According to Newport (1990), the speakers were separated into three groups based on time of first exposure—Native learners (from birth), Early learners (ages 4-6), and Late learners (ages 12 and older)—and were tested for the comprehension and production of several aspects of syntax (e.g., basic word order in ASL) and morphology (e.g., verb inflections) (pp. 15-16). The results showed greater age-of-acquisition effects for morphology across groups than for basic word order. She argued that this data appeared to be suggestive of “an effect of the maturational state of the learner” (Newport, 1990, p. 18) for at least the development of some aspects of language. In other words, as the age of first exposure to ASL increased for each speaker, the less native their performance was when determining or using certain aspects of their L1. Related studies by Mayberry, Lock, and Kazmi (2002) and Mayberry and Lock (2003) provide similar results. That is, deaf adult ASL speakers that received early linguistic input performed better than those with delayed L1 exposure on grammaticality judgment tests and a sentence-to-picture matching task. Based on the findings from these three studies, age of acquisition appears to be correlated with the ultimate attainment of the L1.

Newport (1990) offered two possible explanations for the age-of-acquisition effects seen in the various L1 outcomes achieved by the ASL speakers. The first considered a *language faculty* with innate constraints. For example, it has been traditionally thought that the reason that children—the least mature learners—perform better than adults in terms of language acquisition is because of a language faculty that enables children to have an advantage at an early age for acquiring language. It has been posited that the language faculty is the innate human capacity to acquire the rules of any language. Because of its innate nature, these constraints can be understood as an aspect of the language acquisition process that is present from infancy (Newport, 1990). Similar to Elman (1993), Newport hypothesized that the decline in language acquisition potential is due to non-linguistic cognitive abilities impacting the language learning process. Within this view, constraints are not necessarily derived from decay in our innate capacity to acquire language but rather are related to other capacities developing. Newport referred to this view as the *Less is More* hypothesis, which suggests that the underdeveloped cognitive capacities in children essentially allow them to more easily retain and locate parts of complex language compared to adults who remember entire structures. In this sense, while children are indeed at a disadvantage cognitively, it is this particular limitation that ensures successful language acquisition as they are able to acquire input appropriate for their stage of learning. This gradual learning

process serves to scaffold long-term ultimate attainment in their L1 but declines as their cognitive abilities increase through maturation.

This hypothesis stems from the two types of errors the Late learners typically produced. Newport (1990) classified the first type of error as *frozen structures*, where Late learners did not appear to perform any type of analysis of the appropriate sign and instead produced whole-word signs, “in contexts where morphologically constructed forms [were] required” (p. 23). The second type of error included the production of variable structures, where these structures were not used in a consistent manner. Newport contended that Late learners either do not consistently produce and analyze language structures, or they have learned multiple analyses of particular structures that hinder their performance.

Differences in performance, then, appear to be correlated to the “age differences in perceptual and memorial abilities” (Newport, 1990, p. 26). Whereas children's limited cognitive abilities facilitate the analysis of acquired linguistic input, the increased cognitive capacities of adults seem to hinder their ability to locate acquired linguistic structures. Newport's work thus offers insight not only into the effects age of acquisition might have on individuals with delayed L1 exposure, but it also presents maturational constraints on cognition as a possible explanation for a diminished ability to acquire an L1 in later stages of life. These types of studies have, in turn, strengthened support for a CP related to L1 acquisition and provided us with a better understanding of its nature.

A Critical Period for Second Language Acquisition: Varying Perspectives from Second Language Research

Rate of Second Language Acquisition, Ultimate Attainment, and the Role of Age

In contrast to the literature on L1 acquisition, studies extending the CP argument to SLA have often produced varying results. A common belief with respect to SLA has been that children are better positioned to acquire an L2 with nativelike proficiency than individuals whose acquisition begins in later stages of life (DeKeyser, 2013; Mayberry, 2010; Mayberry & Kluender, 2018; Penfield, 1965; Penfield & Roberts, 1959; Scovel, 1969). From this perspective, early L2 exposure is necessary for ultimate attainment. This has led researchers, in turn, to test the CP argument in both short- and long-term studies in order to gain a better understanding of the SLA process and the possible effects of a CP on L2 outcomes. To collect their data, many of these studies have often turned to grammaticality judgement tests as a way to gauge the morphological and syntactic abilities of L2 learners with varying ages of first exposure to L2 input (Abrahamsson, 2012; Birdsong & Molis, 2001; Johnson & Newport, 1989). Other researchers have also tested the speech perception and production of these different L2 speakers, comparing the L2 proficiency of both younger learners (e.g., young children) and older learners (e.g., older children and adults) (Abrahamsson, 2012; Snow & Hoefnagel-Höhle, 1978).

A year-long study by Snow and Hoefnagel-Höhle (1978), for example, examined the linguistic development of 51 English speakers (children and adults)

who were learning Dutch as an L2 without formal instruction in the Netherlands. The authors divided these participants into various age groups (3-5, 6-7, 8-10, 12-15, and adults) and tested them on a variety of linguistic aspects such as their control of Dutch syntax, morphology, speech perception and production, and sentence judgments. Tracking the L2 progress of a wide-ranging age group allowed Snow and Hoefnagel-Höhle to test whether early childhood was indeed the optimal period for SLA. The data showed that 12-15-year-olds and adults outperformed the younger learners in nearly every aspect of language tested. They noted that 12-15-year-olds and adults exhibited the most rapid rate of acquisition during the initial months of the study. These results seemed to them to counter the CPH, which proposes the period preceding puberty to be the optimal period for language acquisition. Snow and Hoefnagel-Höhle added, however, that the linguistic progress of adults slowed considerably in the final months of the study. Nevertheless, they argued that “[t]hese findings are the basis for rejecting the hypothesis that the period 2-12 years constitutes an optimal time for language acquisition” (Snow & Hoefnagel-Höhle, 1978, p. 1122). Through their study, Snow and Hoefnagle-Höhle illustrated that 12-15-year-olds and adults appeared to have an initial advantage in rate of acquisition when compared to younger learners, leading them to reject the CPH. This was similarly suggested by Pfenninger and Singleton (2017) in their study of students in Switzerland who began formal L2 instruction at ages 8 and 13 respectively. Here, students who began intense L2 instruction at age 13 reached the same level of

L2 proficiency in the areas of syntax and morphology after 6 months as the students who began less intense instruction at age 8.

An analysis of short- and long-term L2 studies by Krashen, Long, and Scarcella (1979), however, illuminates an important limitation of Snow and Hoefnagel-Höhle's (1978) argument against a CP for SLA. While Snow and Hoefnagel-Höhle rejected the CPH on the basis of older learners exhibiting a faster initial rate of acquisition than younger learners, Krashen et al. (1979) suggested that both rate of acquisition and ultimate attainment should be considered in order to better understand the SLA process across different ages. Snow and Hoefnagel-Höhle's short-term L2 study, in this sense, appears to be limited in scope as ultimate attainment is not considered in their rejection of the CPH. These limitations are highlighted in light of three generalizations that Krashen et al. (1979) were able to make after analyzing several L2 studies examining differences between child and adult SLA. The first two generalizations they made, for instance, were that both older children and adults acquired syntax and morphology at a faster rate than younger children. The third generalization, on the other hand, was that any individual beginning SLA in early childhood ultimately achieved greater levels of L2 proficiency than older children and adults. Although Snow and Hoefnagel-Höhle's findings appear to be consistent with the first two generalizations with respect to rate of acquisition, the third generalization describing the greater ultimate attainment of young children was an important aspect not taken into consideration. Understanding this distinction

between rate of acquisition and ultimate attainment, then, gives greater insight into the limitations of Snow and Hoefnagel-Höhle's argument for rejecting the CPH (Krashen et al., 1979). Moreover, the generalizations made by Krashen et al. (1979) help to explain some of the inconsistencies often seen across the SLA literature. Similarly, Johnson and Newport (1989) suggested that such evidence like Snow and Hoefnagel-Höhle's need not always be seen as a threat to the CPH. Rather, the authors argued, such studies can serve to better define the CPH by further examining the relationship between age, along with other potentially confounding factors, and linguistic performance.

Johnson and Newport (1989) presented a study testing for possible age-of-first-exposure (or age-of-arrival) effects in 46 adult Chinese and Korean L1 speakers that had acquired English as an L2 in the U.S. at different ages. Specifically, the authors examined whether age of first exposure to the L2 had any significant effect on their ultimate attainment, or if other possible experiential and attitudinal factors likewise impacted their L2 proficiency. To collect their data, Johnson and Newport separated the participants into groups of early arrivals (ages 3-15) and late arrivals (ages 17-39) and tested them on various aspects of English morphology and syntax using a grammaticality judgement test. The results revealed a significant correlation between age of arrival and test performance, with early arrivals outperforming late arrivals. Additionally, when further separated into smaller age groups (3-7, 8-10, 11-15, 17-39), Johnson and Newport highlighted an interesting overlap in performance between those who

had arrived in the U.S. between the ages of 3-7 and the NS group used as a baseline for performance. This data also showed a small decline in performance for those arriving between the ages of 8-10 and a more prominent decline for those in the 11-15 range. For speakers in the arrival age group of 17-39, performance was highly variable, showing no continual decline. According to Johnson and Newport, the results are suggestive of possible maturational constraints as they reveal a decline in performance with increasing age of arrival up until maturation has been reached. The authors contend age of first exposure to be the appropriate predictor of ultimate L2 proficiency as the impact of experiential (e.g., years of exposure) and attitudinal variables (e.g., motivation, cultural identification) did not appear to have a statistically significant effect when isolated from age. Johnson and Newport likewise considered the replicability of their results for speakers of other L1 languages. Although Chinese and Korean L1 speakers were selected because of the languages' dissimilarities to English grammar, Johnson and Newport suggested that similar results should be seen in speakers with different L1-L2 pairings. This possibility was examined by Birdsong and Molis (2001).

Using the same methods and items as Johnson and Newport (1989), Birdsong and Molis (2001) tested the linguistic performance for 61 adult Spanish L1 speakers who had learned English as an L2 in the U.S. Although their findings were relatively consistent with Johnson and Newport's study, Birdsong and Molis nevertheless highlighted some important differences. For instance, while

Johnson and Newport observed maturational effects in their early arrivals—specifically in their 8-10 and 11-15-year-old arrivals—Birdsong and Molis did not. Instead, their data revealed a more prominent age-of-arrival effect in late arrivals (i.e., 17 and older), with a continual decline in performance beginning at age 17. This was an age group that showed significant variability in performance in Johnson and Newport (1989). Birdsong and Molis suggest that the performance differences observed between the two studies may possibly be related to the linguistic (dis)similarities between the L1 and L2. In other words, when a learner's L1 and L2 are similar in grammar, vocabulary, or phonetic inventories, this appears to have a positive effect on a learner's L2 performance, mitigating decline in performance due to age. Birdsong and Molis additionally argue that the postmaturational effects illustrated by the data, i.e., where a gradual decline in performance and less variability continued to be seen among participants who had reached maturity, thus challenge the CPH. Nevertheless, as Johnson and Newport (1989) and Hyltenstam and Abrahamsson (2000) remind us, focused studies on the various aspects of language are needed in order to obtain more detailed results on the linguistic performance of L2 speakers.

Abrahamsson (2012) conducted one such study that focused on both the grammatical and phonetic intuitions of 200 L1 Spanish speakers learning Swedish as an L2. The data collected from a grammaticality judgement test and a test of categorical perception of voice onset time revealed a negative correlation between age of onset (of acquisition) and ultimate attainment up until

age 15 (Abrahamsson, 2012). Age of onset, however, did not appear to have a significant effect on ultimate attainment for learners beyond age 16 (Abrahamsson, 2012). These findings, he noted, thus appear to support Johnson and Newport's (1989) maturation argument. Moreover, Abrahamsson (2012) found nativelike performance on both tests for 30 participants across the entire age of onset range tested (i.e., ages 1-30), with children 1-6-years-old exhibiting the highest number of nativelike results among the 30 nativelike performers. However, nativelike performance was not found for children over 13-years-old, a finding he suggests would likewise support Lenneberg's original CPH. Abrahamsson determined age of onset to be the best predictor of L2 outcome for early learners (ages 1-15) even after possible confounding factors such as length of residence, frequency of L1 use, and age were controlled for. However, this was not the case for late L2 learners (ages 16-30), where age of onset (and the other possibly confounding variables considered) did not show a statistically significant effect on L2 performance for both tests. Abrahamsson suggested that factors such as motivation and formal instruction should also be considered in future studies in order to better understand their effects on post-puberty L2 acquisition. Abrahamsson additionally questioned in his study whether the differences in L2 outcome for children and adults could be owed to different language learning mechanisms. In other words, he questioned whether children's L2 acquisition occurred implicitly, with different aspects of language developing simultaneously, while adults L2 acquisition occurred explicitly, requiring formal

instruction and learning such aspects independently. Although the findings appeared to indicate this, he noted that the results were not strong enough to support this argument. Abrahamsson's work, nevertheless, highlights the importance of examining various linguistic aspects as a way to better understand nativelikeness in L2 learners of different ages.

Proposed Explanations for the Differences in Second Language Outcomes

While many of these studies have shown children to achieve higher levels of L2 proficiency than adults, Abrahamsson (2012) notes that it has not been made entirely clear as to what types of underlying processes are responsible for such outcomes. Scovel (1969), for example, presented an interesting argument in his discussion on foreign accents and language acquisition. He explained that although adults have a capacity to reach high levels of syntactic control and acquire large vocabularies, their difficulties in establishing native pronunciation is attributed to the completion of hemispheric lateralization, a process that leads to a loss in plasticity for the muscles necessary for speech. Although Krashen (1973) has since argued against a relationship between language acquisition and hemispheric lateralization, Scovel (1969) raised an interesting point when he highlights the physical manifestation of speech as opposed to those linguistic aspects such as syntax and vocabulary. The idea of speech production having a physical basis is an interesting one as L2 learners must contend with a possible loss in ability to produce new sounds due to the development of their muscles used in speech. The possibility of physical constraints on nativelike ultimate

attainment has similarly been proposed by Arabski (1984), who argued that older learners must contend with the additional factor of having to (re)train their vocal tract muscles in order to produce the sounds of the L2.

Krashen (1975), however, offered a different perspective on the potential factor(s) responsible for shaping the variable L2 outcomes seen in children and adults. Drawing on Inhelder and Piaget's (1958) *formal operations* hypothesis, Krashen (1975) suggested that the challenges older (or post-puberty) learners face when learning an L2 is perhaps owed to the stage of formal operations that individuals enter as they transition to adulthood. It is during this stage that individuals shift from acquiring language unconsciously, without much concern for error production, to relying on explicit, formal instruction as their primary method for L2 learning (Krashen, 1975). The reliance on formal instruction, likewise, leads older learners to search for explicit explanations to the different components of language (Krashen, 1975). Krashen claims that the developing metalinguistic awareness of the older L2 learner is what hinders individuals from reaching nativelike proficiency in that language. He writes, for instance, that "[t]he adult's desire to have a conscious understanding of language may be just what prevents him from attaining full competence; it is quite difficult to express all of a natural language in terms of isolated rules" (Krashen, 1975, p. 220). Requiring an explanation for every linguistic rule then becomes an obstacle for the older L2 learner who has moved from a state where automatic acquisition is still possible to a state that yearns for explicit instruction.

In more recent work, Kanik (2018) proposed a theoretical mechanism that attempts to explain the possible underlying process responsible for the variable outcomes seen in child and adult L2 learners. Kanik contends that the language constraints that appear to emerge with increasing age might be associated with a learning mechanism he calls a *system preservation device*. He describes the system preservation device as developing alongside the L1 and as preserving the existing linguistic structure from any potentially threatening input (Kanik, 2018). As this mechanism develops, L2 acquisition becomes increasingly difficult for the acquirer as the device continues to monitor the incoming input in order to maintain the L1's structure. It is important to mention, however, that Kanik's (2018) selection of the term "preservation" is meant to reflect the mechanism's resistance to integrating new input into the existing system without being completely closed to change. This flexibility is essentially what allows learners to acquire an L2. Kanik suggests that the system preservation device is partial to the L1 in particular as he notes that native language continues to show gradual growth in later years while L2 acquisition presents many challenges to the learner.

Understanding the Impact of Non-Age-Related Factors

As reflected by the discussion above, ultimate L2 proficiency has often been attributed to an age-related CP, with minimal impact from other potentially confounding factors. However, the effects of these non-age-related factors must not be neglected by the research if the literature on the SLA process and a CP is

to be refined. There have been studies, for instance, that have considered factors such as formal instruction, feedback, amount of exposure, and identity as affecting L2 outcome (Arabski, 1984; Clark, 2003; Hassanzade & Narafshan, 2016; Krashen, 1975; Steinberg, 1980; Trofimovich, Turuševa, & Gatbonton, 2013). Hassanzade and Narafshan (2016), for example, found performance on a grammaticality judgment test to be higher in 3-5-year-old L2 learners who received formal instruction than in those who simply received natural input during the same ages. Krashen (1975) similarly noted formal instruction to be an indicator of L2 outcomes in older learners. It should be mentioned, however, that Krashen relates the positive impact of formal L2 instruction to the innate Language Acquisition Device, explaining that the presentation of linguistic rules to the older L2 learner essentially enables them to “fill in ‘areas’ where the Language Acquisition Device (LAD) is ‘weakened’ at puberty” (Krashen, 1975, p. 217). From this perspective, the diminished ability to naturally acquire language is supplemented by the explicit instruction of language rules for older L2 acquirers. Arabski (1984), moreover, describes the formal learning context to be better suited for teenagers than children.

Amount of exposure has also been suggested to be a determining factor in SLA outcome for L2 learners (Clark, 2003; Steinberg, 1980). A paper by Clark (2003, p. 41) estimates that every child receives roughly 14,610 hours of L1 input over the span of the initial 4 years of life. The average adult L2 learner, meanwhile, receives only about 660-720 hours of L2 input over a similar 4-year

span (Clark, 2003, p. 41). In this respect, the child receives significantly more exposure to the L1 than an adult would receive for an L2. Additionally, Clark notes that adult L2 learners do not receive the same amount of feedback as child L1 acquirers because of the adult's limited L2 exposure outside of the classroom and the possibility of losing face. The varying levels in L2 outcome seen in adults might thus be attributed to these different factors, according to Clark. A limited amount of exposure for adult L2 learners is also highlighted by several other studies as well (Arabski, 1984; Snow & Hoefnagel-Höhle, 1978; Steinberg, 1980). These studies suggest that in the case of adult immigrant L2 learners, there is a greater tendency for adults to surround themselves with members of the same L1 speech community, minimizing their opportunities for further L2 exposure away from the classroom (Arabski, 1984; Steinberg, 1980).

Being members of the same L1 speech community likewise brings forward the issue of identity as a potentially influencing factor in L2 attainment.

Trofimovich, Turuševa, and Gatbonton (2013), for example, illuminated several aspects of ethnic group identity that appeared to affect the L2 proficiency of speakers living in different sociopolitical contexts. In a survey of L1 French-speaking university students learning English as an L2 in Quebec, Canada, Trofimovich et al. found that those supporting Quebec's independence exhibited stronger L2 accents and less proficiency. However, L1 French speakers with positive attitudes toward both their own ethnic identity and the L2 were judged to have higher proficiency by native English speakers (Trofimovich et al., 2013).

Ethnic group identity was also observed to have an impact on L2 outcome in a comparative study of Russian and Latvian university students in Latvia. Having learned each other's respective language as an L2, Trofimovich et al. found that Latvian L1 speakers with strong cultural and political beliefs self-reported lower levels of Russian L2 proficiency. Russians speaking L2 Latvian, in contrast, did not show the same relationship between these different aspects and L2 proficiency. That is, their self-reported L2 proficiency levels in Latvian appeared to be unaffected by their own cultural and political beliefs. Trofimovich et al. suggest that this might be owed to the minority status of Russians and the Russian language in the country, and the potential for upward mobility that learning Latvian would present. The authors add that this might, at the same time, help preserve their Russian identity (Trofimovich et al., 2013). The findings from the two countries thus show the potential role context and identity might play in shaping the linguistic outcome of L2 speakers. The authors explain: "This finding appears to be novel in that it shows that the majority and minority ethnic groups...may relate issues of ethnic identity to L2 learning in rather distinct ways" (Trofimovich et al., 2013, p. 566). As the possibility of a CP for SLA continues to be researched, it will be important to gain new insight from studies focusing on non-age-related factors to better measure their effects on L2 attainment.

Critiquing the Native Speaker Concept in Second Language Acquisition Research

Implicit in many L2 studies is a reliance on the monolingual NS as *the* baseline for L2 proficiency (Cook, 1997, 1999, 2013; Kachru, 1994; Kramersch, 1997). The apparent bias toward the NS as the ideal target for L2 proficiency has been attributed to Chomsky's concept of the idealized monolingual speaker-listener (Cook, 1997, 1999; Kachru, 1994; Kramersch, 1997). According to this concept, the language learned at birth is considered to be a speaker's native language, with the ideal speaker having access to its native intuitions—which are inaccessible to the L2 learner—and who forms part of a larger monolingual community (Cook, 1997, 1999; Kachru, 1994; Kramersch, 1997). The NS is, in other words, a person whose linguistic knowledge has remained unchanged and can therefore serve as a true measure of proficiency (Cook, 1997, 1999; Kachru, 1994).

Those critiquing this idea, nevertheless, acknowledge that a speaker can only be a NS of a particular language if they are born into that language (Cook, 1997, 1999; Kramersch, 1997). In this sense, regardless if a CP constrains the ability to achieve NS levels beyond a certain period (e.g., puberty), the L2 learner can ultimately never be considered a NS of a language other than their L1. Researchers addressing the CP argument in SLA through L1-L2 comparisons would then need to recognize the inevitability of the differences that would be found in their assessments of L2 learners when compared to NSs. Yet if the purity and dominance of the monolingual NS is put into question in CP-related

SLA research, the claims about the potentially deleterious effects of a CP on L2 acquisition may thus be overemphasized and the L2 learner's success may then be measured by a different set of standards. Several of these authors challenging the ideal NS notion, for instance, contend that even NSs within the same L1 communities tend to show variations in language use that reflect their socioeconomic and cultural backgrounds (Cook, 1997, 1999; Kramersch, 1997).

Because of these observed differences, researchers have questioned the legitimacy of the NS model as a target for L2 learners (Cook, 1997, 1999, 2013; Kachru, 1994; Kramersch, 1997). As these critiques note, direct comparisons to NSs often result in L2 learners being described as failing to meet NS performance. Cook (1997, 1999, 2013), then, has urged against comparing L2 learners to NSs, suggesting instead that L2 learners should themselves be considered legitimate language users. He points, for example, to Labov's sociolinguistic work on discrimination that cautioned against inter-group comparisons as each group has different expectations for its members (Cook, 1997, 1999). This is a principle that can similarly be applied to NSs and L2 learners who are each fundamentally different from one another. Cook (1997) notes that a comparable distinction was made in the 1960s when early childhood speech was recognized as being independent from adult speech, leading to what became known as the *independent grammars assumption*. Based on this view, children are seen as having their own L1 grammar and are, in turn, no longer considered failed adult speakers.

Along parallel lines, Cook (1999, 2013) argues that the linguistic competence of L2 learners is distinct from the monolingual NS, and proposes that L2 learners be viewed from a multicompetent point of view—one that recognizes that the totality of an L2 speaker’s linguistic knowledge resides in the same mind and can be readily accessed and intermixed to fit the given speech situation. This is a unique ability that the monolingual L1 speaker does not have (Cook, 1999, 2013). Cook explains that such a view places a greater emphasis on the L2 learner by highlighting their expanded language repertoire and decentralizes the NS as the ideal target. This perspective likewise leads Cook (1997, 1999, 2013) to reconsider the term “L2 learner” and offers “L2 user” as perhaps a more appropriate term for multicompetent individuals. He explains that the term L2 user highlights the successful use of a particular language while L2 learner implies a state of continual learning (Cook, 1997, 1999, 2013). Shifting the focus from L2 learners to multicompetent L2 users, then, distances individuals from the perception of failed speakers and legitimates them as successful users of the language.

With respect to CP-related research in SLA, a multicompetent perspective essentially allows researchers to look beyond the inevitable differences found in L1-L2 comparisons—which are often used in support of a CP for L2—and instead focus on the language abilities of successful L2 users whose L2 outcomes may not be entirely restricted by a CP. In other words, multicompetent individuals need not be seen as unsuccessful L2 users simply because a CP

might have diminished their ability to implicitly acquire an L2. Instead, L2 users should be seen as independent speakers with distinct multicompetent abilities that enable them to successfully use L2s despite possible CP effects (Cook, 1997, 1999, 2013). A critique of the NS concept thus reveals some important underlying biases that appear to exist in the SLA literature and establishes the need to reconsider the L2 user from a multicompetent perspective, a move that could change the way researchers understand the findings from CP research.

Implications for Second Language Policy and Instruction

As the CPH continues to be explored and critiqued within SLA, the discussion below will demonstrate that despite an array of studies supporting and rejecting a CP, such variety in perspectives can serve to better inform policies, especially those that pertain to language education in the U.S. With the world becoming increasingly interconnected as a result of advances in technology and “external change[s] in global migration flows” (Wiley & García, 2016, p. 50), interactions with individuals from different cultures and diverse language backgrounds have been made much easier. This is perhaps best reflected by schools across the U.S., where students representing these cultures and languages interact and learn within the same classrooms (Gorter & Cenoz, 2017). However, before considering the implications of this research for L2 policy and instruction, I first trace here a brief history of L2 education in the U.S., a history that has been shaped by varied political and ideological factors and that has limited the instruction and use of L2s.

Second Language Instruction in the United States

Although multilingualism and L2 education have garnered support in the U.S. in recent years, we also have a long history of limiting the use and instruction of languages other than English (Gorter & Cenoz, 2017; Wiley & García, 2016). For example, as Wiley and García (2016) explain, a concerted effort was made during World War I to limit language use and instruction to English-only as a way to increase national security. The authors write, for instance, that “[i]nstruction in German as the most commonly taught foreign language in U.S. secondary schools plummeted following World War I, never returning to its former status” (Wiley & García, 2016, p. 51). Although efforts were made to promote L2 instruction in the years following the war, teaching languages other than English still faced several challenges after a late 20th century resurgent “English Only” movement that sought to make English the official language of the U.S. (Gorter & Cenoz, 2017; Wiley & García, 2016).

Additionally, after the No Child Left Behind Act (NCLB) was passed in 2001, there was a greater emphasis on developing the English proficiency of students who were also speakers of other languages (Gorter & Cenoz, 2017; Wiley & García, 2016). Following the passage of this law, “the number of bilingual programs decreased strongly and most bilingual ‘English Language Learners’ had to follow monolingual programs with monolingualism in English as a goal” (Gorter & Cenoz, 2017, p. 233). These efforts reflected longstanding political and ideological beliefs that English should be the only language and

medium of instruction. Multilingualism and language education have thus seemingly held little value within the U.S. even as L2 instruction has been the norm in many parts of the world.

In more recent times, however, there has been a growing acceptance of multilingualism and L2 education, particularly within certain states like California, as the U.S. Constitution defers much of the authority for policies relating to education to the individual states and the many local governments (Gorter & Cenoz, 2017; Wiley & García, 2016).

Toward a Multilingual Student Population

While remnants of the English Only efforts can still be seen in the language programs promoted by the California Department of Education (CDE), the state has become more attentive to providing its diverse student population with multilingual instruction and to preparing students for communicating in an increasingly interconnected world. This is demonstrated by the CDE's mission, which seeks to teach students (in) multiple languages as a way to "better appreciate and more fully engage with the diverse mixture of cultures, heritages, and languages found in California and the world, while also preparing them to succeed in the global economy" (California Department of Education, n.d.). According to data collected by the U.S. Census Bureau, 44% of California's population above the age of 5 speaks a language other than English (U.S. Census Bureau, 2018). This data suggests that a significant percentage of school-aged children may already speak more than one language. California has

thus begun to move toward making learning multiple languages a necessary part of its educational standards. A message from the State Superintendent of Public Instruction and the State Board of Education states: “It is an ambitious step toward fulfilling California’s promise to provide excellent instruction in world languages and prepare our students to compete and collaborate globally” (Zaslow, 2019). Such data and efforts indicate an increasing awareness of the diversity of California’s population, and the benefits that can be gained by increasing access to multilingual education. The state has offered a number of language programs across its institutions such as dual-language immersion (two-way immersion), foreign language elementary experience (FLEX), and foreign language in elementary schools (FLES) as it works toward establishing multilingualism as the norm (California Department of Education, n.d.).

The effect of what can now be considered, in essence, a multilingual movement in California is likewise seen at the local level with school districts like the Los Angeles Unified School District (LAUSD). The LAUSD, the second largest school district in the U.S., has established a Multilingual and Multicultural Education Department, with a specialized office on World Languages and Cultures. According to the LAUSD’s World Languages and Cultures web page, their mission is to “promote bilingualism, biliteracy, and cultural competencies through standards- and proficiency-based teaching and learning of World Languages and Cultures” as they prepare their students for graduation (Multilingual & Multicultural Education Department, n.d.). The school district, in

turn, offers instruction in a number of different languages including Arabic, Chinese (Mandarin), French, Spanish and several more to over 100,000 students. Moreover, the LAUSD notes that English and nearly 100 other languages are represented by its student population, further highlighting the linguistic diversity already present within the school district; Spanish is the most widely spoken language by the students outside of English (Los Angeles Unified School District, 2020).

Efforts have also been made by the LAUSD to recharacterize “foreign language” instruction as “world language” instruction as a way to “affirm that, in a community as diverse as ours in Los Angeles, such languages are not necessarily ‘foreign’, but rather ‘languages of the world’, other than English” (Multilingual & Multicultural Education Department, n.d.).

Having reviewed a brief history of L2 instruction in the U.S. and its growing acceptance within the country, my aim for the remainder of this section is to consider how insights gained from research on CP can be used to better inform L2 policy and instruction within California and, more specifically, within the LAUSD as we continue to move toward an increasingly interconnected, multilingual world. These insights, as we will see, can inform the creation and implementation of L2 policy that addresses when and how to integrate L2 instruction within K-12 curricula.

The findings from several age-related CP studies, for example, suggest that in order to reach higher levels of ultimate attainment, L2 acquisition should

begin prior to ages 16-17 (Abrahamsson, 2012; Birdsong & Molis, 2001; Johnson & Newport, 1989). Beginning L2 acquisition before this time minimizes the possible effects of maturation that Johnson and Newport (1989) argue restrict an individual's ability to acquire L2s. From this perspective, introducing L2 instruction to students as early as possible would afford them the opportunity to achieve more nativelike proficiency in the L2. According to these studies, this appears to hold true at least in the areas of syntax, morphology, and phonology. Moreover, Birdsong and Molis (2001) proposed linguistic similarities between the L1 and L2 as a possible facilitating or impeding factor with respect to L2 acquisition. This is perhaps important to keep in mind as L2 instructors might place greater emphasis on challenging L2 aspects (e.g., basic word order) that stem from the dissimilarities between the two languages.

As part of the arguments related to age effects and L2 outcome, it was also posited that the development of the vocal tract muscles might likewise constrain a person's ability to produce L2 sounds at later stages of life (Arabski, 1984; Scovel, 1969). According to this view, as the vocal tract muscles develop to produce the sounds of the L1, it becomes increasingly difficult for a speaker to produce nativelike L2 sounds as the muscles essentially need to undergo retraining (Arabski, 1984). Aspects of language such as syntax and morphology are cognitively based and may perhaps not be constrained by physical development (Scovel, 1969). If pronunciation is considered an integral part of nativelike L2 outcome, then it further highlights a need for early L2 instruction

(e.g., beginning as early as kindergarten) in order to facilitate phonological development.

Moreover, it could be that as part of these underlying processes shaping L2 outcome is a stage of formal operations that speakers transition to as they reach puberty or, alternatively, a potential system preservation device that limits the capacity for L2 acquisition, further supporting early L2 instruction (Kanik, 2018; Krashen, 1975). Under the formal operations hypothesis, it appears inevitable that an L2 acquirer beginning L2 acquisition after reaching puberty will have to contend with the challenges of learning the language explicitly rather than implicitly as a younger child would learn it (Krashen, 1975). Introducing students to L2 instruction at grade levels coinciding with this stage may present difficulties in L2 learning for the student that could be avoided with instruction at earlier grade levels (e.g., K-5) where automatic acquisition is still possible. Meanwhile, under Kanik's (2018) system L1 preservation device proposal, nativelike L2 outcome is seen as almost improbable as the device limits new input that can be processed as L2. However, his suggestion that the device does not reject all new input leaves open the possibility for L2 acquisition. In this case, exposure to L2 input helps expand the device to acquire additional languages (Kanik, 2018). Thus, providing students with additional opportunities to interact with the L2 early in their education may enable the device to be more receptive to new input as they progress through school and in later life.

Yet the research also suggested that beginning L2 acquisition at increasingly older ages may not have entirely negative effects on the SLA process. In fact, as two of the studies found, the rate of L2 acquisition was actually greater in older learners, particularly in those above the age of 12 (Pfenninger & Singleton, 2017; Snow & Hoefnagel-Höhle, 1978). Though Snow and Hoefnagel-Höhle's (1978) study did not appear to consider ultimate attainment, it nonetheless highlighted the advantage that 12-15-year-old and adult L2 learners appear to have in terms of rate of L2 acquisition over children below the age of 10. Pfenninger and Singleton (2017) likewise found this to be the case in their study comparing the L2 development of students beginning formal L2 instruction at ages 8 and 13 respectively. What these findings suggest, then, is that the later starters (i.e., those beginning L2 learning at older ages), in essence, are able to compensate for lost time by rapidly acquiring the L2. For educational policy makers subscribing to an earlier-is-better notion, i.e., that beginning L2 instruction as early as possible will lead to the best outcomes, these studies offer insight into the rapid L2 acquisition ability seen in L2 acquirers 12 and older. Younger learners, in contrast, do not appear to have such ability. In this sense, rapid L2 acquisition is a strength of older L2 acquirers that educational policy makers might take into consideration when creating future L2 policies and curricula as there may not be a need to begin L2 instruction as early as possible. Instead, it may be more effective to introduce L2 instruction at those

ages proposed by these studies (i.e., 12-13 years of age) as it seems students would be able to utilize their increased ability to rapidly process L2 input.

However, as the acceptance of multilingualism and L2 education in the U.S. grows, it is important to contemplate how the findings from studies focused on factors other than age might similarly inform policy and instruction. Several studies, for example, found formal instruction to have a positive effect on the L2 learning of students in different age groups (Hassanzade & Narafshan, 2016; Krashen, 1975). Hassanzade and Narafshan (2016), for instance, showed that the grammatical judgement ability of 3-5-year-old children receiving formal instruction was greater than in children of the same age who were simply receiving L2 input outside of the classroom. Krashen (1975), meanwhile, suggested that formal instruction could potentially serve as a supplement for post-puberty L2 learners that have difficulties acquiring certain aspects of grammar after their LAD's capacity for L2 acquisition diminishes with the close of a CP. These studies thus appear to suggest that the explicit teaching of linguistic rules can serve to both augment and supplement the L2 acquisition of students depending on the stage of life they are in (i.e., pre-puberty or post-puberty). With California having the authority to set educational policies, having L2 programs that maintain a focus on grammar across a student's entire L2 education may help further support their morphological and syntactic development as they move from one stage of life to another.

At the district level, the LAUSD currently offers a variety of L2 programs in different languages (Multilingual & Multicultural Education Department, 2019). These include the World Language Immersion Program (geared toward L1 English speakers learning an L2), the Dual Language Two-Way Immersion Program (geared toward L1 English speakers learning an L2 and L2 English learners), and the Dual Language One-Way Immersion Program (focused on L2 English learners). These programs begin as early as kindergarten and may, in some instances, continue through the end of 12th grade. Providing continuity in L2 grammar instruction across the different grade levels could essentially facilitate L2 acquisition for students during their early education. Moreover, this could also address some of the challenges that students might face in later grade levels that coincide with their transition into the stage of formal operations at puberty. If L2 acquisition ability declines in post-puberty, L2 instruction during this period could help provide the explicit input necessary for their continuing L2 development.

Pfenninger and Singleton (2017), however, noted that formal instruction is perhaps most effective when the intensity of instruction is greater. According to the authors, this is due to the increased amount of L2 input that students receive within the classroom as well as through immersion programs. For L2 programs like those offered by the LAUSD and future programs, it seems necessary to maintain or provide a constant stream of L2 input for students in order to support their acquisition. In her comparison of child L1 and adult L2 acquirers, Clark

(2003) estimated that children received significantly more exposure to L1 input than adults learning an L2. While providing as much L2 input in a classroom as the amount of natural L1 input children receive would be difficult, offering programs with intense L2 instruction (such as LAUSD's immersion programs, or programs that offer additional interactive L2 activities) regardless of the grade level that it is introduced would nonetheless offer students greater exposure to L2 input. Intense L2 instruction at the K-12 level would, in the same sense, present students with greater opportunities to receive feedback during their L2 development. As Clark noted, children receive more L1 feedback than adults learning L2s as adults must contend with the possibility of losing face when it is provided. In the case of K-12 students in L2 programs, students have yet to enter this stage of adulthood where face loss is a concern, presenting an opportunity to provide additional feedback during their L2 education.

The research additionally indicated that political and cultural beliefs held by individuals appear to influence L2 outcome (Trofimovich et al., 2013). From this perspective, L2 students might benefit from instructors including activities or assignments that similarly integrate examples from their L1 cultures. Such a move could bridge the gap between the culture of the students and of the L2 they are learning, possibly changing their perceptions of the L2 in a way that positively impacts L2 outcome. Factors other than age, then, might play an important role as current and future L2 policies and education are reimagined based on this research.

While CP-related L2 research can help inform L2 policy and instruction, considering the NS critique found in the SLA literature may also help further promote multilingualism and L2 instruction within California and LAUSD's K-12 schools. For example, authors like Cook (1997, 1999, 2013), Kachru (1994), and Kramersch (1997) have noted that there has long been a reliance on the monolingual NS as the baseline for L2 performance. In other words, the performance of L2 acquirers is often measured against the performance of NSs who are thought to be the best representatives of any given L1. A critique of this concept, however, showed that this comparison may not be entirely appropriate and can potentially lead to an unnecessary characterization of the L2 acquirer as failing to meet NS standards (Cook, 1997, 1999, 2013). Instead, the research critiquing the NS concept suggests that L2 acquirers should be seen as legitimate L2 users who have independent and multicompetent L2 knowledge. The L2 student, then, would benefit from having their multicompetent abilities acknowledged by educational policy makers and instructors when language standards and L2 outcomes are being considered.

From this perspective, it would thus seem more important to focus on building the multicompetent L2 abilities of the L2 student than aiming to produce nativelike L2 speakers, an aim that inevitably leads to a characterization of failure. The goal, then, would be to help students achieve communicative competence in their L2 without them feeling compelled to reach NS proficiency. This could ultimately minimize the concern of a CP negatively impacting the L2

acquisition of students as they grow older and dispel the notion that L2 instruction should be introduced as early as possible. As several of the studies noted, introducing L2 instruction at 12-13 years of age does not necessarily have a negative effect on the child learning an L2. In fact, they appear well-equipped to rapidly acquire linguistic aspects like syntax and morphology. Thus, instructors could focus on helping students develop these aspects of language that they may come to find challenging due to possible maturational or physical constraints and prepare them for successful L2 use.

L2 policy and education informed by CP-related research can certainly help enhance the L2 learning of K-12 students within California and the LAUSD, which seek to equip students with multilingual capabilities that will be useful for their future intercultural interactions in our ever-shrinking world. In this respect, the diversity of the student population within these institutions can serve to enhance L2 instruction within the classroom, especially if the focus can be shifted from attaining nativelike status in the L2 to preparing students for successful L2 communication.

Conclusion

Since the 1960s, the findings from CP-related research have produced varied perspectives on both L1 and L2 acquisition. Researchers examining the L1 acquisition of isolated and deaf individuals have generally agreed that a CP constrains L1 acquisition to the period before puberty (e.g., Curtiss et al., 1974; Lenneberg, 1967; Newport, 1990). This has similarly led researchers to consider

why such a restrictive trait would be part of the L1 acquisition process.

Computational models have suggested that a CP for L1 acquisition may have emerged as a non-adaptive by-product of natural selection during the course of human evolution because the (re)acquisition of language did not appear to be necessary once it had been acquired (Hurford, 1991). Elman (1993) later suggested that the mechanism responsible for causing such restriction to L1 acquisition was a working memory that filters out complex input and acquires the appropriate level at each stage of life.

Yet when the CP argument has been extended to SLA, studies have often produced differing results supporting and rejecting the CPH (e.g., Johnson & Newport, 1989; Snow & Hoefnagle-Höhle, 1978). While a CP would similarly suggest the period preceding puberty to be the optimal time for L2 acquisition, studies rejecting the CPH have showed, in contrast, that the most rapid rate of acquisition appears to occur in individuals past the age of 12 (Pfenninger & Singleton, 2017; Snow & Hoefnagel-Höhle, 1978). However, based on the generalizations made by Krashen et al. (1979) from their analysis of several SLA studies, it is also important to consider ultimate attainment, in addition to rate of acquisition, when interpreting the results of these studies. More recent work has also suggested extending the scope of L2 studies to include multiple aspects of language in order to better understand the possible CP-related effects on ultimate attainment and determine the extent to which other confounding factors affect L2 acquisition. The variable levels of ultimate attainment observed among

L2 speakers have also led researchers to question the possible causes responsible for these differences. A number of studies have proposed physical constraints, increased metalinguistic awareness, and a system L1 preservation device as possible explanations for the differences in L2 outcome.

Though age of acquisition has been argued to have the most significant impact on L2 outcome, it is also important not to neglect the potential impact of other non-age factors. As several studies proposed, factors such as formal instruction, feedback, amount of exposure, and identity are all suggested to play a role in shaping L2 proficiency. However, additional research into the collection of these different factors (including age) is needed in order to gain a better understanding of the SLA process and the possibility of a CP constraining L2 acquisition. A further critique of the NS's dominant role in the SLA literature and a focus on linguistic multicompetence are also necessary (Cook, 1997, 1999, 2013; Kachru, 1994; Kramersch, 1997).

The insights gained from this research, in this respect, have important implications for L2 policy and instruction in the U.S., especially when considered within the context of California's educational standards and a regional school district like the LAUSD. A brief review of the history of L2 instruction in the U.S. revealed that political and ideological factors aiming to establish an English Only standard have shaped the perception of, and accessibility to, L2 education. However, in a world that is becoming increasingly interconnected, a move toward multilingualism and L2 instruction has begun to gain support. This is reflected, for

example, by the L2 standards established by the CDE and the LAUSD, who have come to consider L2 instruction an integral part of students' education.

Nonetheless, while the LAUSD has established a variety of L2 programs in an effort to meet these goals, the insight gained from the CP-related SLA research can be used to inform current and future L2 policy and education.

The findings from several age-related CP studies (e.g., Abrahamsson, 2012; Johnson & Newport, 1989), for instance, suggest that early L2 instruction could potentially be beneficial to the L2 outcomes of students. However, there were also studies (e.g., Pfenninger & Singleton, 2017; Snow & Hoefnagel-Höhle, 1978) that appeared to indicate that L2 instruction introduced later in a student's education (e.g., L2 learning beginning in post-puberty) may actually serve to take advantage of their increased ability to rapidly acquire L2s. It was likewise noted that other various age-related and non-age-related factors may possibly impact L2 outcome. These factors, if taken into consideration, could facilitate the development of L2 students' multicompetence, leading them to become successful L2 users whose abilities are distinct from monolingual NSs.

As research on CP continues, it will be important to consider the insight that can be gained from the varying perspectives. In the end, this insight may help researchers, educational policy makers, and L2 instructors determine the most effective and efficient ways to provide L2 instruction, especially as the advances in technology and the ease of travel bring diverse cultures and languages closer together.

CHAPTER TWO: CONFERENCE PAPER PROPOSAL

Eric Lenneberg's (1967) critical period hypothesis (CPH), which posited that successful first language (L1) acquisition was unlikely beyond puberty, has long been a point of contention among L1 researchers and those that have made attempts to extend it to second language acquisition (SLA). Researchers testing the validity of the CPH in various L1 studies have generally agreed that a critical period (CP) constrains L1 acquisition ability to the period preceding puberty, though its exact nature is not entirely known. In contrast, studies extending the CP argument to SLA have produced differing results that have both supported and rejected the CPH as a possible explanation for the varying second language (L2) outcomes observed among individuals who began L2 acquisition at different ages. Nevertheless, exploring these various (and at times differing) studies focused on a CP for SLA has important implications for existing and future L2 policies and instruction in K-12 education in the U.S. For this reason, it is necessary to examine the varying perspectives together and consider the most important information that will allow us to create more effective L2 educational policies. The research, for instance, suggests that viewing L2 acquirers as independent L2 users with distinct linguistic abilities may change our approach to future CP-related L2 studies and educational policy. That is, the distinct linguistic abilities of L2 users would potentially challenge the perception of a CP negatively

impacting L2 outcome if they are measured by their own L2 standards; and, moreover, such a move might similarly allow educational policy to focus on developing these abilities as opposed to aiming for nativelike proficiency in the L2.

This paper, then, examines the wide-ranging perspectives in CP-related scholarship, with a focus on L2 studies that have presented evidence supporting and rejecting the CPH with respect to L2 acquisition. Moreover, it considers possible underlying factors responsible for shaping the different L2 outcomes often seen among L2 acquirers. A critique of the ideal monolingual native speaker (NS) then reveals that these differences need not be seen as deficiencies of L2 acquirers who, when viewed from a multicompetent perspective, are legitimate L2 users with unique linguistic abilities distinct from those of a NS. The presenter will conclude by discussing the implications of these wide-ranging perspectives in L2-CP scholarship for L2 policy and instruction within California's K-12 language education and, more specifically, within the Los Angeles Unified School District's (LAUSD) L2 instructional programs.

CHAPTER THREE: CONFERENCE PAPER

In 1967, Eric Lenneberg hypothesized that implicit language acquisition (L1 or L2) was constrained to the period preceding puberty. Lenneberg deemed the period from the age of 2 until the onset of puberty to be a critical period (CP) for language acquisition. Lenneberg's critical period hypothesis (CPH), however, has been a point of contention within L1 and L2 research since the time of its proposal. Some studies, for instance, have provided support for a CP in L1 and L2 acquisition, while others have rejected it. The various findings from these studies provide important insights for U.S. and California K-12 language policies and instruction. In this respect, it is necessary to explore a collection of these varied studies as the most relevant information from these diverse perspectives can be used to develop more effective L2 educational policy. The studies indicate, for example, that CP-related L2 studies may need to shift from a reliance on the L1 speaker to measure L2 performance to viewing the L2 acquirer as a legitimate L2 user with distinct linguistic abilities. Such a shift would not only allow us to challenge the perceived negative effects of a CP for L2 acquisition, but it would also enable us to create L2 educational policies that are aimed at developing the linguistic abilities of L2 users rather than focusing on reaching nativelikeness in the L2.

In this paper, I review the ongoing and controversial conversation on the CPH in both L1 and L2 studies, with a primary focus on SLA. I begin with a brief look into Lenneberg's original argument and consider the question about a potential biological purpose of a restrictive trait like a CP. I then explore the often-varying CP arguments found within the SLA literature before considering a critique of the idealized monolingual native speaker's (NS) role within SLA and CP-related L2 studies, a critique which may effectively decentralize the NS as the baseline for L2 performance and legitimize the L2 acquirer as an independent and multicompetent language user. Finally, I take the insight gained from these studies and discuss its implications for L2 policy and instruction in the U.S., and more specifically within California's K-12 education and a regional school district like the Los Angeles Unified School District (LAUSD). The questions guiding my research, therefore, were:

1. What arguments have been made with respect to the CPH in both L1 and L2 studies, and what educational insights can be gained from them?
2. What are the implications of these insights for L2 policy and instruction in K-12 education in California and, more specifically, in a regional school district like the LAUSD?

With respect to the first question, I revisited the origins of the CPH in order to better understand Lenneberg's argument for a CP for language acquisition. In forming the CPH, Lenneberg had analyzed clinical data on the linguistic development of individuals recovering from aphasia as a result of injury to the

brain, hemispherectomy, and those with developmental disabilities or deafness. Lenneberg concluded that those whose L1 acquisition had been disrupted or delayed as a result of these circumstances before the onset of puberty were, for the most part, able to restore their language abilities to their original state. Those whose L1 acquisition was interrupted after or delayed until puberty, on the other hand, did not. Lenneberg attributed these outcomes to the hemispheric lateralization process that is completed with the onset of puberty. Once this process is complete, he argued, the ability to automatically acquire language diminished greatly and a conscious and labored effort was required thereafter. Other studies on hemispheric lateralization during this time appeared to support Lenneberg's argument for a CPH.

However, after revisiting the clinical data that Lenneberg used to formulate his CPH, Krashen (1973) later showed that hemispheric lateralization and a CP may not be entirely related. That is, Krashen noticed in his re-analysis of the data used by Lenneberg that the individuals recovering from aphasia had all suffered injuries to their brain before the age of 5, suggesting that hemispheric lateralization was in fact completed well before Lenneberg's initial proposal at puberty. This was an interesting finding by Krashen (1973) as Lenneberg's proposed CP was largely based on hemispheric lateralization being completed at puberty, an observation that led Lenneberg to argue that L1 acquisition and recovery in post-puberty was unlikely. Krashen's re-analysis of the clinical data used by Lenneberg's thus revealed that the timing of the injuries and recovery

were overlooked by Lenneberg. Additionally, after analyzing data from a dichotic listening test, Krashen noted that when presented with auditory stimuli to the right ear, participants between the ages of 4 and 9 showed little to no difference in hemispheric (or cerebral) dominance, possibly suggesting that the hemispheric lateralization process is completed even earlier at age 4. Although not necessarily rejecting the CPH, Krashen's critique of Lenneberg's initial analysis is important because it helps further define the nature of a CP if a CP does indeed restrict L1 acquisition to the period before puberty.

My curiosity additionally led me to wonder about the possible purpose a CP might serve, when having a CP would not appear to be advantageous for any human. This question was addressed by Hurford (1991) and Elman (1993), who utilized different computational models to better understand its possible purpose and the potential mechanism responsible for limiting L1 acquisition with increasing age. Hurford's (1991) evolutionary model suggested that a CP emerged simply as a non-adaptive by-product of language at some point during human evolution. With the fundamental aspects of language appearing to be acquired before the onset of puberty, and because language development normally progresses uninhibited without a need to reacquire it, Hurford contended that a CP was allowed to emerge without a specific purpose. Elman's (1993) non-evolutionary neural network model, meanwhile, suggested that L1 acquisition appears to be most effective when a general learning mechanism he calls a "working memory" (p. 72) is limited in its capacity to acquire complex

aspects of language in early life stages. However, as the working memory grows over time, it is able to process and produce increasingly complex language appropriate for its current life stage.

While Elman's model did not directly address the question of a CP, a later article by Hurford (1998) suggested that the two models were in fact complementary. That is, Hurford saw working memory as a trait that would possibly be selected for as it is useful to have a larger capacity to acquire other non-linguistic skills in adult life. From this perspective, a CP emerges because the working memory continues to develop regardless if the individual is exposed to L1 input at early life stages. In other words, as the working memory grows, it becomes less attentive to the basic aspects of language, aspects that would normally have been acquired in the period preceding puberty and used to scaffold language learning in later stages of life.

Aside from thinking about a CP's purpose, I also found the longstanding discussion concerning the validity of the CPH to be an interesting one. Researchers, for instance, have tested its validity against cases of linguistically and socially isolated children and deaf individuals by examining their L1 development. One of the most well-known cases of linguistic isolation is that of "Genie," a girl who was believed to have had no L1 after being held in isolation by her abusive father until her discovery at age 13. Noting this, Curtiss (1977) and her co-researchers (Curtiss, Fromkin, Krashen, Rigler, & Rigler, 1974, 1975) thus tracked the L1 acquisition progress of Genie, finding her to

exhibit initial comprehension of syntactic aspects and phonological rules despite her years spent in isolation. The authors did, however, acknowledge that her syntactic development was much slower than children that had developed their L1s under normal circumstances. As several researchers emphasized, it is perhaps important to keep in mind the difficulty of drawing conclusions from such a case because of the extreme physical and psychological abuse endured by Genie, which may have likewise played a role in shaping her L1 development (e.g., Grimshaw, Adelstein, Bryden, & MacKinnon, 1998; Mayberry, 2010). A later study used Spanish adaptations of the tests used with Genie to track the L1 development of a deaf 19-year-old Mexican individual known as “E.M.” whose hearing had been corrected to 35dB (Grimshaw et al., 1998). Like Genie, E.M. had been linguistically isolated but did not experience the same physical and emotional abuse. They found E.M.’s L1 development to be similar to Genie’s, suggesting perhaps that her L1 proficiency may not have been attributed entirely to her background. Although these cases showed L1 acquisition to be possible after the close of a potential CP at puberty, they nevertheless reflected the possibility that L1 acquisition may indeed be constrained to the period before it.

Evidence from sign language studies revealed that deaf American Sign Language (ASL) speakers, too, exhibit age-of-first-exposure effects in their L1 proficiency, particularly in their comprehension and production of ASL morphology. That is, the older the deaf ASL speakers were when they first began to acquire their L1 (i.e., ASL), the less native their L1 performance was when

tested for grammaticality judgement. The findings from these studies appeared to support a CPH at least for L1 acquisition. Newport (1990) attributed the seemingly diminishing capacity to acquire an L1 to maturational constraints. In other words, Newport suggested that the maturation process appeared to play a role in reducing a person's capacity to acquire an L1. She additionally proposed the *Less is More* hypothesis that posited that the limited cognitive capacity of children actually enables them to process and acquire L1 input appropriate for their age, much like Elman's (1993) working memory mechanism. The input acquired at early ages, from this perspective, essentially establishes a foundation for more complex language acquisition at later ages. In sum then, there are differences in the arguments presented in these L1 studies of linguistically and socially isolated, or deaf individuals. However, the findings of these studies indicate that the CPH appears to be generally supported in L1 acquisition.

The extension of the CPH to SLA, however, has been met with much caution as L2 studies have often presented arguments that both support and reject it. A commonly held belief by the layperson and researcher alike is that childhood is the best period for L2 acquisition. In other words, there is the view that the earlier a person begins to acquire an L2, the more proficient or nativelike outcome they will reach. Results from a formal year-long study in the Netherlands of L1 English speakers learning Dutch as an L2 appeared to support this belief. The study, for instance, revealed that those who had begun their L2 acquisition between the ages of 12 and 15 or in adulthood actually exhibited a

faster rate of acquisition in nearly every linguistic aspect tested when compared to children below the age of 10 (Snow & Hoefnagel-Höhle, 1978). The authors rejected the CPH based on these results as they appeared to counter what the CPH posited, that the period before puberty was the best period for (L2) acquisition. Similar results were found in a study by Pfenninger and Singleton (2017).

At first glance, Snow and Hoefnagel-Höhle appear to make a compelling argument rejecting the CPH. However, a paper by Krashen, Long, and Scarcella (1979) showed that short- and long-term L2 studies tend to focus not only on rate of acquisition, but also on the ultimate attainment of L2 acquirers. This is a key observation as a second look at Snow and Hoefnagel-Höhle's argument shows ultimate attainment was not taken into consideration, highlighting a limitation of their study. If arguments are to be made either for or against the CPH, it would then appear necessary to consider both rate of acquisition and ultimate attainment in order to better understand the SLA process and the possible effects of a CP.

Studies by Johnson and Newport (1989) and Birdsong and Molis (2001) would later take into account ultimate attainment as they tested for age-of-first-exposure effects on L2 outcomes measured via grammaticality judgment tests. Moreover, they took into consideration the extent to which possible non-age-related confounding factors might likewise affect L2 outcome. While both studies argued age of first exposure to have effects on ultimate attainment and to be the

best overall predictor of L2 outcomes over other factors, the two studies nevertheless had some interesting differences. Johnson and Newport (1989) found a gradual decline in L2 acquisition ability until the age of 10, with a more significant decline between ages 11-15, after which performance on their tests appeared to be highly variable. They (1989) attributed these results to maturational constraints much like Newport (1990) found with respect to L1 acquisition, where increasing age limits L2 acquisition capacity as different stages of life only allow specific levels of L2 input appropriate for each respective stage. Birdsong and Molis (2001), however, found L2 acquirers to exhibit age-of-first-exposure effects even after maturation had been reached, a finding that they contended could essentially be used to reject a CP argument for SLA. In other words, although performance on the grammaticality judgment tests appeared to show age-of-first-exposure effects for their participants under the age of 16—though these were not considered to be statistically significant, in contrast to the findings from Johnson and Newport (1989)—they were also continued to be seen in participants above the age of 17. Here we see two studies that utilized the same procedures but produced different results: one in support of a CP and one seemingly rejecting it.

More recently, an expanded study by Abrahamsson (2012) examined the grammatical and phonetic intuitions of L1 Spanish speakers acquiring Swedish as an L2. Findings from this study appeared to show support for Johnson and Newport's (1989) maturational argument, and likewise suggested age of onset

(of acquisition) to be best predictor of L2 outcomes over other factors at least until the age of 15. After age 15, however, Abrahamsson found that age of onset did not have statistically significant effects on L2 outcomes with respect to both grammatical and phonetic intuitions and recommended that other non-age-related factors like motivation and formal instruction be taken into consideration for individuals past this age. I found Abrahamsson's work to be an important one as it highlights the need to simultaneously examine multiple aspects of language in future L2 studies in order to see if they are independently affected by a CP as age of first exposure increases.

Abrahamsson also raised a rather intriguing point as part of his study: that it has remained unclear as to what processes are responsible for the different L2 outcomes. In other words, although factors such as age have been suggested to be the best predictors of L2 outcome, what underlying changes might be happening that inhibit L2 acquisition as a person becomes older? Papers by Scovel (1969) and Arabski (1984) presented the possibility that speech production, which is often used as a measure of nativelikeness, is restricted with increasing age because of the physical development of the vocal tract muscles that are trained to produce the L1. From this perspective, the muscles must undergo retraining in order to produce the L2. The authors point out that L2 acquirers do not have to contend with possible physical limitations for other aspects of language such as syntax, morphology, and lexicon because these have a cognitive basis. If this is indeed the case, then attaining nativelikeness in

the L2 becomes increasingly difficult (if not impossible) for the continually developing L2 acquirer. Krashen, however, owed the differences in L2 outcomes between children and post-puberty learners to Inhelder and Piaget's (1958) *formal operations* hypothesis, which posited that children transition from a state of automatic L2 acquisition to a state of increased metalinguistic awareness in adulthood, an awareness that ultimately hinders L2 outcome. From this perspective, it seems as though the older an individual becomes, the more conscious they become about the manner in which they learn language, and the more reliant they become on gaining explicit explanations about language.

A recent paper by Kanik (2018) proposed an alternative theoretical mechanism, called a *system preservation device*, as a possible explanation for the differential L2 outcomes seen among children and older learners. According to Kanik, this system preservation device serves to maintain the L1 structure, filtering out any potentially threatening input. He notes, however, that because the system preservation device is not entirely resistant to new input, the processing of new input is still possible and essentially allows L2 acquisition to occur. Kanik suspects this device develops alongside the L1 as the L1 tends to continue to grow even into adulthood while the acquisition of an L2 becomes increasingly difficult. These different explanations reveal the complexity of understanding the processes or mechanisms seemingly responsible for limiting L2 acquisition in later ages.

As part of this review, I also found it important to consider how other non-age-related factors may similarly affect L2 outcome. These included formal instruction, feedback, amount of exposure, and identity. Work by Hassanzade and Narafshan (2016) and Krashen (1975), for example, suggested that formal instruction appeared to have positive effects on L2 learning. For Hassanzade and Narafshan, this positive effect was seen for a group of 3-5-year-old children that received formal instruction, an effect not seen in children of the same ages that simply received input naturally. Krashen, interestingly, suggested that formal instruction supplemented the hypothetical Language Acquisition Device (LAD) weakened by the close of a CP at puberty. From Krashen's standpoint, formal instruction can, in this sense, provide the explicit input necessary for individuals who can no longer automatically acquire an L2 because their LAD's acquisition capacity has diminished after reaching puberty. The explicit L2 input here, then, serves as a substitute—albeit a poorer one—for input that would have been acquired automatically during childhood.

Feedback and exposure to L2 input have also been factors considered in understanding the L2 outcomes of L2 acquirers. Several papers (Arabski, 1984; Clark, 2003; Snow & Hoefnagel-Höhle, 1978; Steinberg, 1980) exploring these factors suggested that children receive much greater L1 exposure and feedback on their production during L1 acquisition than adult L2 learners receive during their L2 acquisition. For instance, it is estimated that children receive over 14,000 hours of L1 exposure, while L2 speakers only receive between 600-700 hours of

L2 exposure (Clark, 2003). It was also suggested that children receive more feedback because the potential for face loss is much greater for adults (Clark, 2003). Moreover, it is not uncommon for adults to remain within a the same L1 speech communities when living in areas where the L1 is different from their own (Arabski, 1984; Steinberg, 1980).

The tendency for some L2 speakers to remain within their L1 speech community also highlighted the issue of identity as a factor possibly affecting L2 outcomes. Reporting on their results from studies undertaken in French-speaking Canada and Latvia, Trofimovich, Turuševa, and Gatbonton, (2013) have found that certain aspects of identity appeared to affect the nativelikeness of people's L2 speech in different ways. For instance, French and Latvian L1 speakers that held stronger political and cultural beliefs were said to exhibit less nativelike L2 accents by native judges; the same sentiment was expressed through self-reports. In contrast, L1 French speakers that held positive attitudes toward both their identity and the L2 were said to have less of an L2 accent by native judges. Surprisingly, for Russian L1 speakers also living in Latvia, there appeared to be no relationship between their political and cultural beliefs and their self-reported L2 proficiency. The authors attributed this to the possibility that as a minority group living in Latvia, learning Latvian as an L2 offers greater upward mobility and, in the same sense, allows them to retain their Russian identity. As a brief dive into the studies shows, it is necessary to focus on factors other than age in order to better understand SLA and the possible nature of a CP.

While it is important to consider how these different factors might shape L2 outcome, I thought it was also necessary to understand the positions that L1 and L2 speakers hold within SLA and CP-related research. The native speaker (NS), for instance, is often accepted uncritically as the standard for measuring L2 proficiency. A look into the validity of NS concept might allow us to reconsider how we understand CP research. As researchers like Cook (1997, 1999, 2013), Kachru (1994), and Kramsch (1999) have suggested, the monolingual NS has normally been considered to be the best representative of L1 speech as they have remained unaffected by additional language knowledge. This is an idea that stemmed from Noam Chomsky's notion of the ideal monolingual NS, whose L1 could only be native by birth and who exists within a larger monolingual speech community (Cook, 1997, 1999; Kachru, 1994; Kramsch, 1999). These authors, however, have both challenged the dominant role that the NS has assumed in SLA studies and pushed to have L2 speakers recognized as a legitimate and multicompetent L2 users. Cook, for example, argued that by viewing the L2 user from a multicompetent perspective, we are able to recognize the independent multilingual knowledge of L2 users, whose abilities are distinct from those of monolingual NSs. He explained that by legitimizing the L2 acquirer as a successful L2 user, it is possible to move the L2 user away from the label of a failed L2 speaker. This is an important critique to consider because it allows us to rethink our approach to CP research, which has at times relied on L1-L2 comparisons to establish arguments for and against the CPH. By challenging the

idea of the NS, we see that it is possible to move away from L1-L2 comparisons and see L2 acquirers as multicompetent and successful users of L2s as Cook suggests. Likewise, the perceived negative effects of a CP might also be minimized, changing our approach to CP-related L2 research.

Implications

I now turn to the second question regarding the implications of these varying arguments for L2 policy and instruction. While arguments with respect to a CP for L2 acquisition remain fluid, they nevertheless provide insight that can certainly help inform L2 policy and instruction in the U.S. With this in mind, I consider what this might mean for K-12 education in a state like California and, more specifically, at the regional level in a school district like the LAUSD.

Over the course of U.S. history, multilingualism and L2 instruction have been met with varying levels of acceptance as particular ideologies and policies have either promoted or restricted them. For example, since the time of World War I, there have been concerted efforts to move toward English-only within the U.S. through English-Only movements and, in more recent times, with laws such as the 2001 No Child Left Behind (NCLB) act limiting the number of L2 instructional programs. However, as our world has become increasingly interconnected with the ease of travel and technology, there has been a growing acceptance of multilingualism and L2 instruction across the country, in particular in California. This has been facilitated by the U.S. Constitution granting individual states and local governments the power to set educational policy. Nevertheless,

in their effort to further promote multilingualism within the country, the state of California and the LAUSD have established multilingual departments that offer K-12 students a number of programs for L2 instruction.

In this respect, I found it necessary to consider how insight from the contentious research on CP could help inform L2 policy and education within California's and LAUSD's K-12 schools. The research indicates, for instance, that while early L2 acquisition may lead to more nativelike outcomes with respect to morphosyntactic and phonological development (Abrahamsson, 2012; Birdsong & Molis, 2001; Johnson & Newport, 1989), L2 acquisition beginning at later ages does not have entirely negative effects. This was illustrated by the findings from Snow and Hoefnagel-Höhle (1978) and Pfenninger and Singleton (2017), where late L2 acquirers exhibited a faster rate of acquisition for aspects such as syntax and morphology. It is possible that physical constraints do hinder nativelikeness in terms of speech production because of the development of our vocal tract muscles (e.g., Arabski, 1984). In this case, offering L2 instruction that begins earlier (e.g., kindergarten) would certainly aid nativelike phonological development outside of more cognitive aspects like morphology and syntax. This might also be the case if individuals do indeed transition from a state of automatic L2 acquisition to a state where post-puberty learners seek explicit L2 instruction because of an increase in their metalinguistic awareness (Krashen, 1975). L2 policies and instruction informed by such information would better attend to the needs and strengths of the L2 learner.

As I mentioned earlier, seeing how non-age-related factors such as formal instruction, feedback, amount of exposure, and identity might also affect L2 acquisition is also important to consider. For instance, where the CPH posits that L2 acquisition capacity diminishes because of an increase of age, the research shows that (intense) formal instruction—whether through immersion programs like those offered by the LAUSD or by providing additional interactive L2 activities—might have a positive effect on L2 learning (Hassanzade & Narafshan, 2016; Krashen, 1975; Pfenninger & Singleton, 2017). In this respect, while consistent and intense formal instruction may augment L2 development during grade levels coinciding with the pre-puberty stage, post-puberty L2 instruction would serve to supplement students' L2 learning as they transition to a state where natural L2 acquisition is no longer possible. From this perspective, offering intense formal instruction can help counteract a diminishing capacity to acquire an L2 at later grade levels coinciding with puberty. Increasing the intensity of formal instruction likewise would add to the amount of exposure and opportunities for feedback that students require as part of their L2 learning. This might be especially beneficial for students who may not have additional access to the L2 speech community at home because of familial political and cultural beliefs.

If the goal of California and the LAUSD is to prepare students for multilingual intercultural interactions, then it might also be important to consider how a critique of the NS in SLA could help reimagine L2 policy and instruction. In

other words, if we can move beyond a reliance on the monolingual NS as the standard for L2 performance, then we can better focus on the multilingual abilities of successful L2 users that, in turn, can enrich L2 instruction within the classroom. The aim, then, would not necessarily concern producing L2 speakers with NS qualities, but instead it would be to help them develop their communicative levels of L2 competence. This would reduce the perception of the L2 speaker as a failed L2 speaker, and it would also challenge the idea that a CP is detrimental to their L2 outcomes. The hope would be to lead educational policy makers to reconsider any beliefs they might have about early L2 instruction being the best for L2 attainment. L2 teachers can likewise better focus on developing those linguistic aspects of students that may not be physically constrained and allow their own multicompetent knowledge to develop.

Making this a focus of L2 policy and instruction both in California and within LAUSD's institutions would facilitate the L2 acquisition of their diverse students while continuing to meet their goal of preparing them for an increasingly interconnected and multilingual world.

Through a controversial topic within the SLA literature, the insights gained from a review of CP-related research nevertheless have important implications for L2 policy and instruction that can certainly benefit students in California and within the LAUSD.

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