The Critical Age Hypothesis
and Interlanguage Phonology

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It will be argued here that the findings from studies on age-related differences in the ability to acquire the phonological system of a second language are highly consistent with the notion of an optimal period for such acquisition. To be more precise, it will be argued that the research focused on ultimate, or at least long-term, attainment of the sound system of a second language provides robust evidence of the superiority of younger learners over older learners, while uncovering no counter-evidence to this claim.

This task is made easier by the recent publication of two texts (Scovel, 1988; Singleton, 1989) and an exhaustive review article (Long, 1990), which are devoted entirely to examining the evidence for and against the critical period hypothesis (though the terms “critical,” “sensitive” or “optimal” will be used interchangeably herein). These three sources, therefore, will first be examined for their conclusions relevant to the issue of an optimal period specifically for phonological acquisition in second languages. Then, three recent studies (Flege, 1991; Flege & Fletcher, 1992; Thompson, 1991) which directly compare the acquisition of early and late learners will be similarly scrutinized.
To state it formally, the assertion that is claimed to be sustained by all the relevant research is the following:

There is a period, ending around the time of puberty (operationally defined to mean somewhere between the ages of 12 and 15 years), during which it is possible, but not inevitable, for learners to acquire, as an end-product of a naturalistic L2 acquisition process, full native-like fluency in the phonological system of a second language, and after which such a possibility does not exist anymore. Thus, a comparison between younger and older learners of their long-term achievement (operationally defined to mean that naturalistic exposure has occurred for at least 5 years or so under "advantaged" sociological, cultural, psychological, and affective circumstances) should reveal (a) that only younger learners can sometimes be shown to attain full native-like phonological L2 competence, and (b) that, overall, there is a strong statistical difference in the long-term achievement of younger and older learners.

This definition, although wordier, is essentially that used in Oyama's (1976) seminal study in which the optimal period was defined as stretching from about 18 months to puberty, and as being a time during which a learner can master the phonology of a second language but after which complete acquisition becomes very unlikely if not impossible. This definition, furthermore, is consonant with Lenneberg's (1967) view of the critical period as being a time of "peculiar sensitivities, response propensities, or learning potentials" (p. 175, emphasis added).

The evidence for such a period is examined without delving into possible causes (neurological, psychosocial, cognitive, or other); thus, the claim being made here is clearly a limited but nevertheless important one, because even this limited claim has been highly controversial in the field of second language acquisition for decades. The author believes, however, that the time has come for the field to accept the notion of an age-related constraint on language acquisition, and for the controversy to circumscribe itself to the discussion of its causes.

**REVIEW OF THREE RECENT REVIEWS**

Attention will now be turned to the three aforementioned reviews; the purpose is not to examine in detail all aspects and claims put forth in these texts, but to focus on the aspects most relevant to the issue at hand, namely, the research evidence concerning long-term attainment in second language phonology. Scovel (1988), Singleton (1989), and Long (1990) will be reviewed in their chronological order of publication.
Scovel, in *A Time to Speak: A Psycholinguistic Inquiry into the Critical Period for Human Speech*, places great emphasis on what he terms the "Conrad phenomenon," named after the Polish-born author whose control of the written form of the English language allowed him to produce some of the great masterpieces of the English language literature, while at the same time his spoken language remained so poor throughout his life that he decided to forego the well-remunerated American lecture circuit that so many of his contemporaries and successors plied to their financial advantage. This term thus refers to Scovel's strongly held notion that there is a clear critical period for the acquisition of second language phonology whereas there are no such constraints on the acquisition of various other aspects of a second language, such as syntax in particular. Indeed, that is the fundamental thesis of his book, which reviews evidence from paleontology, ethology, sociobiology, neurology, the study of feral children (ferology?), and language acquisition studies. For the purposes of this discussion, attention will be devoted primarily to those chapters most directly relevant to the issue under consideration, namely Chapters 3 and 6 which present the Conrad phenomenon and discuss evidence from language acquisition research.

In Chapter 3, after discussing Penfield and Roberts' (1959) and Lenneberg's (1967) classic notions of a neurologically based optimal age for the acquisition of language, Scovel presents one of his own early accent recognition studies (Scovel, 1969) which demonstrated that 117 untrained, native-speaking, junior high school students could easily and accurately identify non-native speakers of English on the basis of hearing a short taped greeting spoken twice by 10 subjects. Five subjects were native speakers of American English, and five were L2 speakers who had learned the language "after childhood," and who knew English "very well and wrote so competently that it would be impossible to ascertain whether they were 'native writers' of American English given their written work alone" (pp. 59–60).

Later experiments, reported in Chapter 6, illustrated that 146 even younger native children could just as easily recognize accented speech, reaching an adult level of accuracy (which Scovel set at 95%) by the age of 9 or 10 years. In contrast, 92 ESL college students performed so poorly that even advanced level non-natives were outperformed both by 6-year-old natives and by a group of 23 native aphasics. In this case, there were 20 subjects, 10 natives and 10 nonnatives. The latter group had all lived in an English-speaking country for at least 5 years and were or had been graduate students in the United States; age at the start of acquisition is not given but can be deduced from other information as being above 15
in all cases. In contrast to the accent recognition tasks, Scovel also found that essays written by his subjects could not be distinguished by the judges as native or non-native; indeed, 31 adult American English judges achieved a 95% accuracy rate in the accent recognition task, but only a 57% accuracy rate (more or less chance level) in correctly appraising whether compositions were written by natives or not, thus demonstrating that the subjects' English language competence had reached a high level.

Scovel presents his results to demonstrate the validity of the Conrad phenomenon. For the purposes of this discussion, and leaving aside the issue of whether the composition task in question truly demonstrated "full-native syntactic competence," it is clear that the results are fully consistent with the hypothesis presented in this paper's introduction.

Scovel then reviews the collective evidence from other studies, including such well known ones as Asher and Garcia (1969); Seliger, Krashen, and Ladefoged (1975); Oyama (1976); and Tahta, Wood and Loewenthal (1981). The methodologies varied, but all four of these studies dealt with the phonological attainment of immigrants to various countries. Oyama's study is the most clearly focused on eventual achievement, as her sample included only subjects whose length of residence in the L2 country ranged above 5 years. However, even though the other studies included subjects whose length of residence was as low as 1 or 2 years, because of large sample sizes (which range from 60 for Oyama to 394 for Seliger et al.) and because of upper ranges of length of residence as high as 55 years, the information gathered can still be considered as germane to the issue of eventual achievement, and clearly is relevant to the question concerning the abilities of younger and older learners to "pass for native." In addition, it should be noted that Oyama's findings were fully replicated with a similar size sample of subjects who had also resided in the L2 country for a minimum of 5 years (Patkowski, 1990, pp. 78-80).

It is noteworthy that all the above studies found a marked phonological advantage for earlier L2 learners, and none found any effects on long-term achievement for other practice or motivational factors when tested for. Scovel came to a similar conclusion, and considered the evidence for a critical period for the ability to sound like a native speaker "so overwhelming that (he) cannot see how its existence can be denied; so compelling that non-biological factors alone cannot account for its etiology" (p. 122).

Singleton (1989) takes a far more skeptical view in his Language Acquisition: The Age Factor. Indeed, the theme of his book seems to be that the evidence on age-related differences is murky and contradictory. Singleton does, however, find some consistent results in the language
acquisition literature. For example, in Chapter 2, his reading of the
evidence on (first) language development in infants and children is that it
clearly supports the notion of stable speech milestones that unfold
within relatively well defined age ranges. He notes that findings in
abnormal first language development also support the concept of speech
milestones, as when, for example, normal babbling and cooing occur in
deaf babies. The existence of speech milestones had been one of the
arguments advanced by Lenneberg for the biological basis of language.
On the other hand, Singleton also finds first language evidence to
support the notion that L1 acquisition continues well beyond the
purported critical period into late adulthood, particularly in the areas of
lexical acquisition and of "meta-memorial skills," although it is unclear to
this writer why vocabulary development and certain memory tasks are
considered relevant to the issue of a critical period for language.

Be that as it may, the chapter which is by far the most relevant to this
review is clearly Chapter 4, which is devoted to second language
evidence. In this chapter, Singleton reviews four positions which,
according to him, have been at the center of the critical period debate.
The positions are the following: (1) The "younger = better" position; (2)
its opposite, the "older = better" position; (3) the "younger = better at
acquiring accent and basic interpersonal communicative skills (BICS)"
position; (4) the "younger = better in the long run" position. A final
section of this chapter deals with possible age-related differences in the
process of second language acquisition. It can be seen that the fourth
position is most relevant to this discussion, and it will be reviewed last
and in the greatest detail.

The problem, to this writer at least, with the first three positions is
that they fail to differentiate between short- and long-term studies and
between naturalistic and formal language exposure conditions, although
Singleton does allude to these factors when reviewing studies under each
category. Thus, in considering position 1, Singleton begins by referring
to observations made in 1925 concerning the common habit of adult
British residents in India of bringing along their 4- or 5-year-old children
to act as interpreters in their dealings with the house-servants. He then
switches to a discussion of American studies of the effects of the foreign
languages in elementary schools (FLES) programs of the 1960s. This back
and forth continues, eventually covering the long-term studies
mentioned above such as Oyama, Seliger et al., and so on. Not surpris­
ingly, Singleton concludes that hypothesis 1 is not supported by the
available evidence.

A similar pattern unfolds with respect to position 2, which is after all
only the opposite of the first. Here the tendency is in fact to examine
short-term studies involving formal instruction, although not to the absolute exclusion of naturalistic long-term investigations. Again, the evidence is found inconclusive. Position 3 fares no better, although Singleton does refine the parameters somewhat; thus position 3 seeks to examine findings relevant to the question of whether L2 learners of different ages enjoy selective advantages, and in particular, whether younger learners are more efficient in acquiring native-like L2 pronunciation. However, studies involving naturalistic exposure as well as formal instruction in real or even artificial languages are again discussed side by side, and again, the evidence is found inconclusive. With respect to the last issue which Singleton examines in the chapter, namely whether differences in the process of L2 acquisition can be uncovered between younger and older learners, some limited evidence is found in favor of such differences. For example, the author feels that studies have demonstrated a greater contribution of IQ to L2 acquisition with older learners; nevertheless, the overall evidence on process is again found contradictory and difficult to interpret.

It is thus, in this writer's opinion, particularly revealing to note that Singleton does find clear supportive evidence, and no actual counter-evidence, for the notion that learners who begin second language acquisition as children and under naturalistic conditions achieve higher levels of proficiency in the long run. Here, Singleton, like Scovel, quotes the immigrant studies (e.g., Asher and Garcia, 1969; Seliger et al., 1975; Oyama, 1976; Patkowski, 1980). Although Singleton does not really separate his discussions of long-term attainment in syntactic, morphological, and phonological aspects of a second language, as has been seen earlier, the above studies (with the exception of Patkowski, 1980) do focus on accent.

In this section, Singleton pays special attention to Snow and Hoefnagel-Hohle (1978) who examined English speakers residing in Holland and learning Dutch and found that, despite initial higher gains for older learners, in the longer run the advantage returned to their younger counterparts, in what was a natural exposure situation. To this writer, a most interesting finding from the Snow and Hoefnagel-Hohle research, which Singleton does not discuss, concerns the significant differences which were uncovered in the speech rates of younger and older learners. Learners aged 5 to 15 years reached approximately (the figures quoted here are read from a diagram) 1.4 words per second, up from initial rates of .15 to .8 words per second. The adults, in contrast, attained only a rate of .8, up from .6 words per second a year earlier. Thus, subjects who acquired a second language before the close of puberty appeared to speak considerably faster than their adult counter-
parts; it seems intuitively plausible to posit that this difference reflected, to some degree, a greater control of the L2 phonological system of the early acquirers.

Singleton concludes the section on eventual attainment as follows: "to sum up... there is a fair amount of evidence suggestive of a long-term advantage for learners whose experience of the target language begins in their childhood years. Most of this relates to natural exposure situations... There is no counter-evidence from natural exposure studies" (p. 122).

Although not as ringing an endorsement as Scovel's, it is nevertheless a significant one, given the author's highly skeptical approach to the critical period hypothesis.

For Long (1990), the evidence is neither murky nor contradictory; it is in fact seen as being very strongly supportive of the following hypothesis:

There are sensitive periods governing the ultimate level of first or second language attainment possible in different linguistic domains, not just phonology, with cumulative declines in learning capacity, not a catastrophic one-time loss, and beginning as early as age 6 in many individuals, not at puberty as is often claimed. (p. 255)

Long further argues that while many critics reject the notion of maturational constraints as counter-intuitive in itself, it is in fact the opposite hypothesis, that there are no such constraints, which is the marked hypothesis. Given the well established maturational based constraints which have been uncovered in the development of other animal species, in other kinds of human learning, and in other human neurological abilities. Of course, Lenneberg and Scovel have both presented a similar point of view.

Long then turns his attention to the relevant first and second language literature and, as already mentioned, finds the facts convincing. With respect to normal first language acquisition, he notes, like Singleton, that the existence of a language-specific maturational schedule, which is independent of general cognitive development, is well established. With respect to abnormal first language acquisition, his review of two cases of feral children (Curtiss, 1977; Mason, 1942), and of several studies involving the acquisition of American Sign Language by deaf subjects of various ages (in particular, Newport, 1984) leads him to conclude that the findings "combine to provide compelling evidence of maturational constraints" (p. 259)

As before, it is Long's view on the issue of long-term L2 phonological attainment that is of interest. Again, the Oyama, Asher, and Garcia, and Tahta et al. studies, among others, are reviewed. Long concludes unequivocally in support of maturational constraints but, interestingly, suggests that
these constraints begin to set in as early as age 6. In fact, Long states that "exposure needs to occur before age 6 to guarantee that an L2 phonology can become native-like" (p. 274).

To this writer, Long's assertion is worded too strongly to be supported by the data. Tahta et al. (1981) found 31 of 60 learners whose ages at the start of L2 acquisition ranged from 7 to 12 years to be accent-free (Table 1, p. 268). Oyama (1973) found 8 of 25 learners, within the same age range at the start of L2, to be accent-free on the more demanding of her two accent tasks (Figure 1, p. 68). Patkowski (1990) found 8 of 23 learners whose ages at L2 ranged from 7 to 15 years (or 7 of 19 learners with an age range of 7-12 years) whose pronunciation was also judged accent-free (Figure 2, p. 79). Long does, in fact, allow that, at least in some learners, the onset of maturational constraints may come as late as age 12; it therefore seems to this writer that Long's assertion about the need for exposure before age 6 to "guarantee" a native accent in a second language is insufficiently supported by the data.

Returning to the three studies discussed in the preceding paragraph, it should be noted that, in all cases, not a single adult learner obtained an accent-free rating. The subjects with the highest age at the start of L2 acquisition to acquire native ratings were 12 years old for Tahta et al. (with 109 subjects), 11 years old for Oyama (with 60 subjects), and 15 years old for Patkowski (one case, with the next two cases being 11 years old, with 67 subjects). The other two-long term studies, Asher and Garcia (1969) and Seliger et al. (1975), did not provide any evidence relevant to this issue. The former found that none of 71 subjects received a native accent rating; the latter employed self-ratings by 394 subjects, and although 12 of 173 learners who had begun L2 acquisition after the age of 15 years considered themselves to have no accent, the unreliability of a self-assessment measure for this purpose seems self-evident (although there is no reason to think that, with such a large sample size, the vagaries of personal reporting would essentially alter the general comparison between the L2 abilities of the younger and older learners).

Thus, the available evidence does seem to bear out the twin claims, made in the introduction, that (a) only younger learners can sometimes be shown to attain full native-like phonological L2 competence and (b) overall, there is a strong statistical difference in the long-term achievement of younger and older learners. In addition, it does clearly emerge from this review of Scovel (1988), Singleton (1989), and Long (1990), that all three authors, having extensively reviewed the available evidence on the notion of an age-related limitation on language acquisition, are essentially in agreement on the second claim, and that two (Scovel and Long) are in essential agreement on the first claim while Singleton does not specifically
either refute or accept this assertion. The question to which we now turn, then, is whether any counter-evidence has appeared since the publication of the three reviews.

THREE RECENT LONG-TERM ATTAINMENT STUDIES

A search of the relevant literature from 1990 to 1992 (i.e., since the publication of the three reviews just discussed), found three further studies germane to the issue of long-term L2 phonological achievement by learners of different ages.

A study by Thompson (1991) clearly falls into the mold of the long-term accent research of Oyama (1973, 1976) and Tahta et al. (1981). Speech samples of Russian immigrants to the United States were collected according to three procedures (free speech, reading of a prose passage, and reading of sentences constructed to contain difficult sounds) and were rated for accentedness. Thompson also examined a wide range of independent variables (including age at arrival, length of residence, degree of English-language usage, sex, self-reported characteristics such as ability to mimic, musicality, motivation, extraversion). The data were gathered by a questionnaire.

A correlational analysis showed that age at arrival was the best predictor of degree of accent; other variables, including length of residence, years of education in English, and English language usage were correlated among themselves and confounded with age at arrival. Therefore, a multiple regression analysis was carried out, and age at arrival again emerged as the most significant predictor variable, contributing to 66% of the variance in accent scores. Length of residence and English exposure variables dropped out of the multiple regression.

One difference between this study and previous long-term studies is that the sample size was markedly smaller (36 subjects, as opposed to 60 to 394 subjects for the earlier studies), and another that the distribution of age at the onset of L2 seems rather unbalanced, based on the information which is revealed. Thus, we are only told that the range was from 4 to 42 years, and that just six of the subjects had arrived in the United States before the age of 10. Clearly, both a larger sample size and a more balanced range of age at arrival would be preferred. Nevertheless, Thompson's results clearly show that age of arrival was the best indicator of the accuracy of (subjects') pronunciation in English, accounting for well over half the variance in their accent scores.
The effect of Age at Arrival in the U.S. was so great that most other independent variables had relatively little to contribute to the prediction of success in mastering English pronunciation. (p. 195)

Thus, assertion (b) of the hypothesis stated in this paper's introduction is supported.

At the same time, there is no confirming evidence to be found here for assertion (a), as even those six subjects who had arrived in this country before the age of 10 were not consistently judged to be accent-free. These results, then, are similar to those reported by Asher and Garcia (1969), but unlike those uncovered by Oyama (1973, 1976), Tahta et al. (1981), and Patkowski (1990). It would be appropriate to reiterate, at this point, that the sensitive period hypothesis does not "guarantee" accent-free speech for younger L2 learners, but merely states that the potential exists until the close of the sensitive period and ceases to exist thereafter. For that potential to be realized, socio-affective, cognitive, and other factors must be optimal. As was seen in section 2 of this paper, the available evidence does show that only L2 learners who began naturalistic exposure before the close of the hypothesized sensitive period have received accent-less ratings, and that the eventual performance of younger learners is consistently higher than that of older learners.

Furthermore, assertion (b) is supported by findings in Flege (1991), and assertions (a) and (b) are both supported by findings in Flege and Fletcher (1992). Thus, Flege (1991) examined how well 10 early and 10 late learners of English would produce the English /t/ and whether learning English would affect the production of their native Spanish /t/. Again, the sample size in this study (as well as in the following) was somewhat limited, but the early and late groups are of equal size. Subjects read words beginning with /t/ at the end of a brief carrier phrase ("Take a ____" or "Tengo un ____") and voice onset time (VOT) was measured. Four of the early learners had been born in Mexico and the other six in border towns in Texas. All were unable to speak English when they began school, but all had native-speaking American teachers in the first three grades and/or a majority of native-speaking classmates, and Flege reported that they spoke without accent. The late learners' mean age of arrival in the United States was 20 years.

Results showed that early learners did not differ significantly from monolingual native VOT norms in their production of both the English and Spanish /t/. In contrast, late learners produced the English /t/ with VOT values considerably shorter than those of monolingual English speakers.

In a second experiment, seven subjects each from the original groups were required to produce Spanish and English /t/ in words, phrases, and
sentences in alternation. A "switching time" difference was uncovered favoring early learners. Flege interpreted his results to support the position that learners who begin L2 acquisition in early childhood, but not older learners, are able to establish phonetic categories in L2 that are independent of the speakers' corresponding L1 categories.

Flege and Fletcher (1992) report on four experiments, but one in particular is of the most direct relevance to the issue under consideration. In this experiment, three groups of 10 native Spanish speakers each were rated for accent by 10 native speakers of American English who indicated the degree of perceived accent by positioning a lever on a response box (yielding a total of 256 possible values) after hearing sentences. The first group consisted of early learners, similar to those described above, whose age of L2 learning ranged from 0 to 6 years; the next two groups consisted of late learners whose age at L2 ranged from 11 to 35 years and who were either experienced (mean length of residence in the United States = 7 years) or inexperienced (mean length of residence = 0.3 year).

The scores of the early learners were almost identical to the scores obtained by native speakers, leading Flege and Fletcher to conclude that the early learners had no perceptible foreign accent. On the other hand, the late learners' scores were considerably lower than those of both natives and early L2 learners (50-80% lower, based on Figure 1, p. 375). Flege and Fletcher (1992) also correlated various independent variables with degree of accent, and found no effect for gender or degree of English-language usage. Age at arrival again showed the highest degree of correlation with accent; and as in Thompson (1991), length of residence and formal education also were correlated with accent as well as with each other and with age at arrival. Thus, a multiple regression analysis was also carried out in which age at arrival again emerged as the most significant independent variable, accounting for 79.8% of the variance in accent scores. English language instruction increased the R2 value to 85%, and none of the other variables were found to be significant predictors of accent.

Other experiments discussed in this paper examined listener- and talker-related factors which affected native perceptions of foreign accent. Although range effects were found (i.e., it was found that perceptions can be influenced by the proportion of native speech samples included in the set to be evaluated), the authors concluded that listeners can make reliable judgments of degree of accent. Another finding was that native Chinese subjects with an average age at L2 acquisition of 7.6 years did have detectable non-native accents, unlike the early Spanish learners. The authors interpreted this as tentative support for Long's hypothesis that foreign accents emerge as early as age 6.
In their general discussion, Flege and Fletcher (1992) propose the following scheme, with respect to the age factor in the acquisition of L2 phonology.

One might hypothesize that a perceptible foreign accent is highly unusual for individuals who begin learning an L2 before reaching the age of six years, is almost always evident for post-pubescent learners, and is evident in an increasing proportion of individuals who begin L2 learning between the ages of about 6 to 12 years. (p. 385)

In addition, Flege and Fletcher propose that variability in learners' degree of accent increases progressively from age 6, when foreign accents first emerge, until some time after the teens. They further speculate that foreign accents become increasingly marked after puberty. Finally, the authors note that their hypotheses are consistent with observations... concerning sensitive periods" (p. 386).

CONCLUSION

The relevant literature concerning the ultimate phonological attainment of second language learners who began L2 acquisition under conditions of naturalistic exposure at different ages is compelling; the claim, as worded in the introduction, that a sensitive period exists for the acquisition of phonology in a second language is strongly supported, and no counter-evidence exists. It seems, to this writer at least, that the time has come for the controversy which has surrounded this issue to move to the area of providing an explanation for the observed phenomenon, rather than to continue questioning the existence of the phenomenon itself.

As every participant in this controversy knows, there is still plenty left to debate. For example, despite the quotes from Flege and Fletcher reported above, Flege (1992) clearly continues to reject the notion of a neurological or biological basis to this sensitive period. He finds that the relationship between lateralization and language learning ability, which was proposed by Lenneberg as an explanation for the critical period, has not been established and that chronological age is confounded with too many other factors to make it possible to persuasively demonstrate the existence of maturational constraints. He seeks to explain the difficulties of late learners on the basis of the development and stabilization of the L1 phonetic system itself, perhaps as a consequence of the onset of the Piagetian stage of concrete operations.

Scovel (1988), on the other hand, finds that studies in aphasiology, as well as dichotic studies and studies concerning the results of
hemispherectomies, may contradict some of the details of Lenneberg's formulation, but leave his essential thesis mostly intact. Scovel thus considers the evidence convincing in explaining the existence of a critical period, but one which is solely limited to the acquisition of phonology. Singleton (1989), not surprisingly, considers the evidence from aphasiology contradictory and basically rejects attempts at explaining the critical period hypothesis with reference to the process of cerebral lateralization and neuroplasticity. Yet, he does admit that, as Lenneberg had asserted, similar cerebral lesions cause different aphasic disorders depending on whether the victim is a child or an adult and that the younger brain is more adaptable and more capable of transferring functions than the older brain. Long (1990) and Patkowski (1990) believe that maturational constraints are linked to a loss of the brain's plasticity (as Lenneberg had proposed) but that this loss is not necessarily due to the process of lateralization as envisaged by Lenneberg. Indeed, Long favors the myelination of neural pathways as a potential explanation for the decline in language learning capacity, but recognizes the speculative nature of this position. However, he does consider that the cumulative evidence from feral children, from the acquisition of sign language by deaf children, from first language acquisition by normal and mentally retarded children, and from second language acquisition studies to be overwhelmingly in support of his notion of multiple critical periods for language acquisition; and he finds affective, input, and cognitive explanations unconvincing.

Clearly, proposals to explain what this writer takes to now be a statistically well-established claim in favor of age-related constraints on eventual L2 phonological attainment will continue to generate debate and controversy for the foreseeable future.

INSTRUCTIONAL IMPLICATIONS

Before examining the role of age in language learning from a pedagogical point of view, it is useful to reiterate that the notion of an age-related advantage applies only to L2 acquisition under "naturalistic conditions" and is essentially irrelevant to issues surrounding traditional foreign or second language instruction in the classroom. In fact, it is for this very reason that the failure of the FLES (Foreign Languages in the Elementary School) programs of the 1960s and early 70s in Britain and the United States (as documented, for example, by Burstall, 1975, who compared the proficiency of students who had begun the study of French in elementary school to students who had begun later and found no
advantage for younger learners and disappointing results for all) cannot be taken as counter-evidence to the critical period hypothesis.

Additionally, it also must be reiterated that a myriad of psychosocial and cognitive factors clearly do affect second language development in fundamental ways; thus, as stated in the introduction, the age factor emerges only in naturalistic situations under “advantaged” sociological, cultural, psychological, and affective circumstances. The following brief discussion is therefore be limited to aspects of language education policy that involve contexts which most closely approximate naturalistic acquisition, namely immersion programs, particularly when they involve language majority children who do not face the kind of sociocultural barriers that their language minority counterparts can encounter, or in the case of language minority children from middle- or upper-class backgrounds in their native countries.

Given these caveats, the critical period hypothesis clearly seems consistent with the positive results found in studies of immersion programs. For example, Lambert and Tucker (1972), in a well-known and influential report, carried out a longitudinal investigation of the impact of schooling Anglo-Canadian children mainly in a second language (French) from kindergarten to the fourth grade. The results showed no deficit in the children’s English language development, but striking progress in French, although native levels were not attained in syntactic or phonological proficiency.

Genesee (1987), in a comprehensive review of second language immersion programs in Canada and the United States, confirmed the effectiveness of immersion programs for majority group, English-speaking students. Such students achieved levels of L2 proficiency far above those achieved in traditional foreign language instruction programs such as FLES, but which still fell short of native standards in vocabulary, grammar, and phonology. Because teachers are usually the pupils’ only language models in these immersion programs, it seems that an insufficient amount of interaction with native speakers, particularly with native speaking peers, largely accounts for these limitations. Genesee recognized the language-learning limitations of most school environments and saw a need for more “discourse-rich” pedagogical approaches so that immersion programs may more fully realize their potential.

Immersion for minority language students is a controversial issue in the United States and approaches such as ESL pull-out classes (which are effectively equivalent to traditional foreign language instruction) and bilingual education programs (which usually involve both ESL instruction and content-matter instruction in the students’ native language) are more common. In Britain, however, educational policy since 1985 has favored placing language minority students in the mainstream with the support of
English-as-a-second-language (ESL) specialists who assist the regular teaching staff by working individually with language minority students in the mainstream class (McKay & Freedman, 1990). This approach allows for significant interaction with native speakers, unlike the North American immersion programs, but does not provide the language minority students with native language development and support. This writer is not aware of any longitudinal data concerning the outcomes of this approach at this time.

However, similar approaches are not completely unknown in the United States, and research results have been published. For example, Collier (1987) examined the length of time second language students needed to become proficient in English in a large public school system on the East Coast that did not offer self-contained ESL classes. The language minority students were described as an "advantaged group" from an upper- or middle-income background in their country of origin. Students spent part of their day receiving special assistance from ESL teachers and the rest of the day in the mainstream classroom. No native language instruction was available in the school. Most students were mainstreamed within 2 or 3 years of entry into the school system, and national norms in language and content areas generally were approached within 4 to 8 years. Students who had arrived at ages 12 to 15 years experienced the most difficulty in L2 acquisition under conditions of immersion, and the authors concluded that such students most needed alternatives to that approach, including content instruction in L1 and content area ESL classes taught at the students' level of proficiency (sheltered instruction).

As can be seen from this brief review, the essential implication of the critical period hypothesis for educational policy is that an immersion approach, given an appropriate sociocultural context, has a potential for yielding results in the L2 acquisition of students whose age at arrival falls below the 12-15 year age range, that are far superior to the results usually obtained in traditional, formal, second or foreign language self-contained instruction. At the same time, it has to be recognized that the hard questions about how this potential can be realized, particularly when the students involved do not fall into the "advantaged" category and the sociocultural context is less than optimal, can be answered only with reference to factors largely unrelated to age. As Genesee (1987) put it, "It is widely recognized that the success of any (emphasis added) educational program for minority language students... will depend on socio-cultural factors" (p. 194).

To conclude, current research evidence strongly supports the notion of an age-based limitation on the ability to acquire native-like control of an L2; yet, to posit the existence of a sensitive period is not to claim that nothing else matters with respect to issues of language education; indeed,
such a belief misconstrues the ethological meaning of the term "sensitive period" with its implications of potentiality, not certitude, of propensity, not inevitability.

REFERENCES


