ULTIMATE ATTAINMENT AND THE CPH

SOME THORNY ISSUES
INTRODUCTORY

- Definition of *critical period*
- Brief survey of evidence in respect of age-related effects in language acquisition
- Three problematic issues associated with this line of research in the L2 domain
  - (i) the dubium surrounding the appropriacy of measuring L2 achievement predominantly by reference to native-speaker levels of proficiency
  - (ii) the difficulties posed by variability in the precise terms of the CPH
  - (iii) the narrowing of research horizons occasioned by the hegemony of CPH perspectives on ultimate attainment
THE NOTION OF CRITICAL PERIOD

The term *critical period* is used in biology to refer to a strictly limited phase in the development of an organism during which a particular competency must be acquired if it is to be acquired at all.
An illustrative example often used is that of imprinting in ducklings and goslings, which, for a short time after hatching, become irreversibly attached to the first moving object they perceive—usually the mother duck.

This following behavior only occurs within a certain time period after hatching, after which point the ducklings develop a fear of strange objects and retreat instead of following. Within these time limits is the critical period for the following behavior.

(De Villiers & De Villiers, 1978: 210)
THE NOTION OF CRITICAL PERIOD: EXAMPLE 2

- A critical period for the development of binocularity may begin when central nervous system cells driven by each eye grow and compete for cortical synapses (Wiesel and Hubel, 1963). … The critical period for development of binocularity may take place between weeks 4 and 12 in the cat; 1 and 9 in certain monkeys; and years 1 and 3 in man.

(Almli & Finger, 1987: 126)
THE NOTION OF CRITICAL PERIOD APPLIED TO LANGUAGE

- If language acquisition in human beings is rigidly constrained by the limits of a critical period on this kind of definition, the implication is that unless language acquisition gets under way before the period ends it simply will not happen. There may also be an implication that even if language acquisition begins within the critical period it does not continue beyond the end of that period.
Two frequently cited cases:

- Victor, found running wild in the woods of Aveyron in late eighteenth-century France, (see e.g. Lane, 1976)
- Genie, rescued from the isolation imposed by her parents in late twentieth-century California (see e.g. Curtiss, 1977; Rymer, 1993).

Typically some post-rescue progress in language development is observed – but of a limited and abnormal kind. Some researchers see this as “first language acquisition after the critical age” (De Villiers & De Villiers, 1978: 219); others see it as evidence of "specific constraints and limitations on … language acquisition outside of … the critical maturational period" (Curtiss, 1977: 234).
L1 EVIDENCE: LATE SIGNERS

- Studies of deaf subjects deprived of language input in early life who then acquire sign language as L1 beyond childhood (see e.g. Curtiss, 1988; Emmorey, 2002; Long, 1990: 258f.; Mayberry & Fisher, 1989; Mayberry, Fischer & Hatfield, 1983; Morford and Mayberry, 2000; Neville, Coffey, Lawson, Fischer, Emmorey & Bellugi, 1997; Newport, 1984, 1990; Newport & Supalla, 1987; Woodward, 1973): language does not fail to develop, but some deficits are observed in the language of later signers.

- Absence of access to linguistic communication during the phase in a child's life when cognitive development is at its most intense may have general psychological/cognitive effects; it may be these general effects that are reflected in later language development. Some research (e.g. Peterson & Siegal, 1995; Schick & Gale, 1997) indicates that late signers have problems in the area of “theory of mind” – with possible far-reaching consequences for language development (see e.g. Lundy, 1999).

- Other general cognitive problems associated with late L1 acquisition may emerge from further research.
In a study of 54 Down's syndrome subjects Lenneberg et al. (1964) were able to record progress in language development only in children younger than 14. This is taken by Lenneberg (1967: 155) to indicate that “progress in language learning comes to a standstill after maturity”. Alternative interpretations of these data: (i) what Lenneberg et al. were observing was a general developmental cut-off point (widely reported in the relevant literature), (ii) what was involved was not actually a complete arrestation but a temporary plateau (again referred to in the literature on mental retardation), (iii) the halt in progress was due to the absence of the right kind of stimulation).
One can question the relevance of evidence from such abnormal situations for normal language development – given the ample indications that normal first language development continues well into adulthood (see e.g. Singleton & Ryan, 2004: 55-60).
Interpretations of the CPH in the L2 domain can be summarized as follows:

(i) after a certain maturational point the L2 learner is no longer capable of attaining to native-like levels of proficiency;
(ii) and/or needs to expend more conscious effort than in earlier L2 acquisition;
(iii) and/or makes use of different mechanisms from those deployed in L2 acquisition during childhood;
(iv) in any case, there is a sharp decline in L2 learning potential (different in nature from the more gradual age-related declines in the organism’s general learning capacity) beyond a particular maturational stage.
L2 EVIDENCE: NATIVE-LIKENESS

- Scovel (1988) claims that those who begin to be exposed to an L2 after age 12 cannot ever ‘pass themselves off as native speakers phonologically’ (p. 185) (cf. Scovel 2000, 2006). Long (1990: 274) agrees in relation to phonology, but goes on to claim that for the acquisition of L2 morphology and syntax to reach native levels L2 exposure must begin before age 15 (see also Long 2006).


- Hyltenstam and Abrahamsson (2000: 155) state that there is no recorded case of a post-pubertal L2 beginner behaving in every detail like a native speaker (cf also Hyltenstam and Abrahamsson 2003a, b) but also note that very early L2 beginners tend to differ too at the level of fine linguistic detail from monoglot native speakers.
Lenneberg (1967: 176) made the claim that post-pubertal L2 learning requires 'conscious and labored effort,' a claim often endorsed since (see e.g. Breathnach 1993; Hyltenstam and Abrahamsson 2000: 152). Bongaerts also seems to favour this point of view, commenting that his results may be partly explicable in terms of the very intensive training received by his subjects (e.g. Bongaerts 1999: 154-155).

However, such training may not be indispensable for successful late L2 learning. For example one of Ioup’s successful adult learners of Arabic was untutored, and her performance was native-like even in areas of which she was unaware – e.g. subtle aspects of syntax and morphophonology (Ioup 1995: 118). Even if later L2 learning is more effortful, this may have nothing to do with the ending of a putative critical period for language. After all, the conscious, deliberate dimension of learning increases in all domains as cognitive development advances.
Some Chomskyans (e.g. Bley-Vroman, 1989; Schachter 1988) have claimed that post-pubertal L2 learning has no access to UG (for discussion, see e.g. Cook and Newson 2007: 237f.); the empirical basis for this perspective was never very solid (cf. e.g. Flynn, 1987; Martohardjono and Flynn 1995; see also Hawkins 2001: 353-359), and different researchers working in the Chomskyan paradigm take very different perspectives on this issue (see, e.g., Mitchell and Myles 2004: 78f.). As Braidi (1999: 67) points out, the evolution of Chomskyan theory renders evaluation of earlier studies extremely difficult, although she also notes that “L2 learners do not seem to exhibit grammars that are not sanctioned by UG”. Much research appears to indicate that post-pubertal L2 learners deal in the same manner as L1 acquirers with linguistic features purportedly having a UG basis (see, e.g., Bruhn de Garavito 1999; Dekydtspotter, Sprouse and Thyre 1998).
L2 EVIDENCE: OTHER MECHANISMS: PROCESSING PERSPECTIVES

- Liu, Bates & Li’s (1992) investigation of Chinese learners of English suggests that, while those whose exposure to English began after age 20 applied Chinese sentence-processing strategies to English, those whose exposure began before age 13 deployed the same processing strategies as monolingual English speakers. In fact, this finding does not require a “different mechanisms” explanation. It is explicable in terms of the increasing extent to which the L1 influences L2 processing as a function of years of experience of the L1 and the degree to which it is entrenched.

- Harley & Hart (1997) found that the early beginners’ L2 outcomes ‘were much more likely to be associated with a memory measure than with a measure of language ability’ (p. 395), whereas the reverse was true of the later beginners. DeKeyser’s (2000) study yielded similar results: the adult beginners in his study who scored within the range of the child beginners evinced high levels of verbal analytical ability, which seemed to play no role in the performance of the child beginners.

- DeKeyser’s reading of his results is that maturational constraints apply only to implicit language learning mechanisms (cf. DeKeyser 2003a; 2003b; 2006). Harley & Hart cite the possible influence of primary versus secondary-level instructional styles. A further possibility is that such results reflect general cognitive changes which affect language learning but other areas of development too.
An oft-cited investigation of the spatial representation of L1 and L2 in the cerebral cortex of early and late bilinguals during a sentence-generation task carried out by Kim, Relkin, Kyoung-Min & Hirsch (1997) revealed little or no age-related separation of activity in Wernicke’s area, but did reveal differences in respect of activity in Broca’s area: among the late bilinguals two distinct but adjacent centres of activation showed up for L1 and L2, whereas in the early bilinguals there appeared to be a single area of activation for both languages.

Marinova-Todd, Marshall & Snow (2000) note that in Kim et al.’s study there was no control of proficiency level and evoke the possibility “that the adult learners assessed … were poorly selected and do not represent highly proficient adult bilinguals” (Marinova-Todd et al. 2000: 17-18). If this were so, the divergences observed might simply reflect differences in proficiency level, which some studies have found to be more important than age of onset in determining brain organization in respect of additional languages (cf. Perani, Paulesu, Galles, Dupoux, Dehaene, Bettinardi, Cappa, Fazio and Mehler 1998; Abutalebi, Cappa and Perani 2001)
L2 EVIDENCE: THE NATURE OF THE DECLINE

- Findings from studies investigating ‘naturalistic’ L2 acquisition favour the notion that, while adolescent and adult subjects may have an initial advantage, in the long run younger beginners are more likely to attain to native-like levels of proficiency (cf. Hyltenstam, 1992; Johnson & Newport, 1989; Krashen, Scarcella & Long, 1982; Oyama, 1976, 1978; Patkowski, 1980; Snow & Hoefnagel-Höhle, 1978). On the other hand, research into primary-level L2 programmes in schools where the general medium of instruction is the L1 (see e.g. Burstall, Jamieson, Cohen & Hargreaves, 1974; Oller & Nagato 1974) shows that pupils who are exposed early to an L2 and then integrated into classes containing pupils without such experience tend not to maintain a clear advantage for long.

- This last finding may, however, relate to blurring/stagnating/de-motivating effects resulting from mixing non-beginners with beginners in the same classes and/or to differences in exposure time between naturalistic and instructed learners (see, e.g., Singleton 1992; Singleton & Ryan 2004: Chapters 4 and 6; Stern, 1976).
L2 EVIDENCE: THE NATURE OF THE DECLINE (contd.)

On the basis of such considerations, both naturalistic evidence and formal instructional evidence may bear an interpretation which is consistent with the view that the younger one starts the better one’s eventual level of proficiency is likely to be, although Muñoz (2006) suggests, on the basis of a long-term comparative study of younger and older formally instructed L2 learners, that younger learners may have a fundamentally different (disadvantaging) cognitive relationship with classroom L2 learning as compared with adolescents and adults.
L2 EVIDENCE: THE NATURE OF THE DECLINE (contd.)

i) The evidence does not support the simplistic “younger = better in all circumstances over any timescale” optique which underlies some early treatments (e.g., Lenneberg 1967; Penfield & Roberts 1959; Stengel 1939; Tomb 1925);
(ii) Even the “younger = better in the long run” view is sustainable only as a general tendency; an early start in an L2 is neither a strictly necessary nor a sufficient condition for the attainment of very high proficiency; age of first encounter is only one of the determinants of the ultimate level of proficiency attained. Even very young L2 beginners diverge at the level of fine linguistic detail from native speakers (see e.g. Hyltenstam & Abrahamsson 2000: 161; Flege 1999);
(iii) There is a question-mark over the existence of an abrupt cut-off point – or ‘elbow’ (Bialystok & Hakuta 1999; Birdsong 2004, 2007; Flege 1999) — such as would normally be associated with a critical period as classically understood. Bialystok & Hakuta’s re-analysis of Johnson and Newport’s data (Bialystok 1997; Bialystok & Hakuta 1994) suggests “that the tendency for proficiency to decline with age projects well into adulthood and does not mark some defined change in learning potential at around puberty” (Bialystok 1997: 122); Bialystok & Hakuta (1999; see also Hakuta, Bialystok &; Wiley 2003; Wiley, Hakuta & Bialystok 2005) have also analysed census data on age of arrival in an English (L2) speaking environment and reported English proficiency; what emerges is a steady linear decline of reported proficiency as age of arrival increases but no indication of a dramatically sharper rate of decline at any point between infancy and senescence; data on the relationship between L2 accent and age of arrival show a similarly continuous decline (cf. also Flege 1999).
In sum, it appears that any decline in second language-learning capacity that occurs at the end of childhood varies from individual to individual, which is not what one would expect if the underlying cause of the decline were a critical period for language; it also appears that any decline in second language-learning capacity with age is continuous and linear, which, again, is not in keeping with the usual understanding of the notion of critical period.
Success has been almost monolithically interpreted as a level of achievement that is undistinguishable from native speaker proficiency. This approach is questionable. It was suggested many years ago (Hill, 1970: 243f.) that the notion of native speaker is very much culture-bound, and that, for example, in an area like South India, where many adults speak several languages exhibiting similar phonetic systems it would not necessarily be easy for native speakers of a given local language to recognize second-language users of their own language who are speakers of other local languages. More recently, Cook (e.g. 1995, 1999) and Davies (2003) have problematized the whole notion of native speaker in an L2 research/teaching context, Cook arguing (e.g. 1999: 185) that L2 users should be focused on in their own right rather than being compared with native speakers, and Davies arguing (p. 213) that “the distinction native speaker-non-native speaker ... is at bottom one of confidence and identity” (cf. also Piller, 2002).
The fact that no post-pubertal L2 beginner has been shown to behave in every detail like a native speaker (Hyltenstam and Abrahamsson, 2000, 2003a, b) is more often adverted to than the fact that very early L2 beginners also tend to differ from monoglot native speakers at the level of detail.

Research (Hyltenstam & Abrahamsson, 2000, 2003a, b) indicates that even very young L2 beginners diverge at the level of lexico-grammatical detail from native speakers. The same is true of phonology; Flege's (e.g. 1999, 2002) studies show that subjects who begin to be exposed to an L2 in an L2 environment as young children are nevertheless quite likely to end up performing with a non-native accent (e.g. Flege, Frieda & Nozawa 1997; Guion, Flege & Loftin, 2000; Piske, Mackay & Flege, 2001) and to be less good than monoglot native speakers at sound perception in their L2 (Flege, MacKay & Meador, 1999; MacKay, Meador & Flege, 2001). The maturational issue may be less important than the fact of knowing another language (cf. e.g. Cook, 1995; Grosjean, 1992). The degree of distance between L1 and L2 may also play a role (cf. Kellerman, 1995; McDonald 2000).
A justifiable perspective in the light of the foregoing is that the appropriate comparison in the investigation of age-related effects in L2 acquisition is not between later L2 beginners and monoglot native users of the language in question but rather between later L2 beginners and those who begin to acquire an L2 in early childhood. Cook (2002: 6) notes in this connection that, while on every side the L2 user is judged against the native speaker, and ‘ultimate attainment is a monolingual standard rather than an L2 standard’, there is actually no intrinsic reason why the L2 user’s attainment should be the same as that of a monolingual native speaker.
THORNY ISSUES: CPH VARIABILITY

Different versions of the CPH set the endpoint — or endpoints — of the critical period at different maturational stages (cf. Singleton 2005). This means that “early learners” and “late learners” may be differently defined according to the version of the CPH that is in question and the language domain that is under scrutiny. Clearly, this has an impact on the interpretation of ultimate attainment data from L2 acquirers with different ages of onset.
On the basis of differential recovery prognoses as between children and adults in cases of damage to speech areas in the dominant hemisphere, Penfield suggested that 'for the purposes of learning languages, the human brain becomes progressively stiff and rigid after the age of nine' (Penfield and Roberts 1959: 236) and that “when languages are taken up for the first time in the second decade of life, it is difficult ... to achieve a good result” (Penfield & Roberts 1959: 255). Lenneberg (1967), for his part, proposed puberty as the offset point for the critical period, purportedly the endpoint of the lateralization process - the specialization of the dominant hemisphere of the brain for language functions. With respect to L2 acquisition, he asserts (ibid.: 176) that after puberty “the incidence of ‘language-learning-blocks’ rapidly increases” and “[f]oreign accents cannot be overcome easily”.
Other researchers have proposed a multiplicity of critical periods with differing ages of offset. Molfese (1977: 206f.), e.g., suggests that the phonetic/phonological critical period comes to an end very early on - in the first year of life. Seliger (1978) also argues that the window of opportunity for phonetic/phonological acquisition closes earlier than that for the acquisition of other dimensions of language although his proposed termination point for the former is puberty, syntax, according to him, being acquirable until later in life. Diller (1981: 76), for his part, claims that authentic L2 accents can be acquired only up to the age of six to eight while cognitive aspects of L2s can continue to be learned by relatively mature people. Scovel (1988: 101) also distinguishes pronunciation from other domains of language, claiming, in fact, that it is the only area of language which shows age effects because it has a “neuromuscular basis”; he suggests that acquiring vocabulary and morphosyntax is fundamentally different from learning pronunciation, because the former unlike the latter does not have a “physical reality”. As we saw earlier, he claims that those whose exposure to an L2 begins after age 12 cannot ever acquire a native-like accent in their target language (cf. Scovel, 2000, 2006).
A further group of L2 researchers take the view that the critical period ends progressively over a number of years, this process beginning around age six or seven. Thus, Johnson and Newport (1989) infer from their study of the long-term attainments in English of immigrants to the USA that there is a specific maturational phase – up to about age 7 – which is particularly favourable for language learning and a second phase - from about 7 years to puberty – during which the language learning capacity disimproves gradually but subsequent to which there is a sharp and definitive decline. Long (1990) accepts Johnson and Newport’s evidence in relation to an early beginning to the deterioration of the language acquiring capacity and agrees with Scovel’s proposal of age 12 as the maturational point beyond which a native-like L2 accent cannot be acquired, further proposing, as we have seen, that the prerequisite for the acquisition of L2 morphology and syntax to native levels is exposure to the L2 before age 15.
More radically, Hyltenstam and Abrahamsson (2003a) cite Ruben’s (1997) review of studies of children who had experienced temporary hearing impairment in their first year of life and who subsequently showed deficits in verbal memory and phonetic perception, retailing his conclusion that the critical period for phonetics/phonology ends around the twelfth month of infancy. Ruben further interprets the relevant research indicating that the critical period for syntax ends in the fourth year of life, and for semantics in the fifteenth or sixteenth year of life. Hyltenstam and Abrahamsson’s own review of the evidence leads them to a certain dubiousness about the critical period idea, and to state in one publication that the critical period may be ‘une chimère’ (2003b: 122). Elsewhere they speculate that the language learning mechanism may be “designed in such a way that it … inevitably and quickly deteriorates from birth” (2003a: 575), and for this reason “nativelike proficiency in a second language is unattainable” (ibid.: 578).
Aram et al. (1997) comment that “the end of the critical period for language in humans has proven... difficult to find, with estimates ranging from 1 year of age to adolescence” (p. 285).

The impact of such uncertainty is, first, to undermine the plausibility of the whole notion of a critical period for language acquisition and, second, to deprive the concepts of “early” and “late” L2 learning of any kind of stable reference point and therefore meaning. Thus, if 12 years is taken to be the critical age, L2 learning at age 4 is presumably “early” learning; if 12 months is taken to be the critical age, then L2 learning at age 4 is already “late” learning. This implies that any comparison of “early” and ‘late’ L2 beginners has to be relativized to a particular siting of the critical age, and that any such comparison risks falling foul of other views on the offset point of the critical period.
THORNY ISSUES: THE HEGEMONY OF CPH PERSPECTIVES

The CPH has dominated the scene in discussion of ultimate attainment differences. Some researchers have been very vocal in calling for other dimensions than maturation to be taken into consideration. Moyer, for instance, has the following to say:

The impact of age should be understood as indirect as well as possibly direct. This requires that we somehow account for other significant factors in the learner’s cumulative L2 experience.

(Moyer 2004: 140)
Other possible factors have in fact been explored. One such, already adverted to, is the degree of distance between the L1 and the L2. McDonald (2000) found, for example, that learners of English from a Spanish-speaking background who had begun to be exposed to the language before age 5 were able to perform to native levels on an English grammaticality judgment test, whereas Vietnamese speakers with pre-age-5 experience of English were not.
Additional factors referred to in the literature have included quantity and quality of input, general cognitive and educational variables. Evidence of a role for such factors, as well as such further factors as attitude, motivation and language awareness/aptitude, has been brought to the fore in a number of recent studies (see e.g. Jedynak 2005; Kinsella & Singleton 2008; Moyer 2004; Muñoz and Singleton 2007).
Jedynak’s (2005) study found that 9 out of 35 post-pubertal L2 learners performed to native-speaker levels in terms of pronunciation of their target language, and that length of learning seemed to emerge as the dominant factor relative to level of attainment.
Kinsella & Singleton found that 4 of their 20 L2 acquirers of French, all of whom were living in France but none of whom had had significant exposure to French before age 20, performed as well as native-speaker controls on a regional accent recognition task; and that the successful subgroup had a higher average length of residence in France than the rest of the sample, that all the successful subjects conducted their social life primarily through French, and that all identified themselves closely with the Francophone community.
Despite such findings the very widespread concentration on CPH has tended to marginalize and indeed discourage such research.
CONCLUSION

In this rather brief treatment we have seen that tracing the connection between the age factor and ultimate attainment is fraught with problematicity. One might add that the problematic areas dealt with here are a very long way from being exhaustive. We have, moreover, seen that the connection between maturation and L2 ultimate attainment itself warrants serious and sceptical scrutiny. This is not to deny the reality of age-related factors in second language learning, but rather to suggest that a certain loosening of the association - between ultimate attainment research and Critical Period Hypothesis issues would open the way to a richer perspective on L2 attainment and a fuller harvest of empirical findings and theoretical insights in this domain than has so far been gathered.