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Investigating age effects on ultimate attainment in second language acquisition

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Abstract

The Critical Period hypothesis and its successors have been widely tested in relation to Second Language Acquisition. This paper presents a brief review of some of the research findings, and concludes that the jury is still out on the extent to which age correlates inversely with ultimate attainment in a second language. It suggests that there is too much evidence of high achievement amongst adults to attribute decline in proficiency to age, and proposes instead a selective age effect which may leave syntactic knowledge more intact than other language levels.

This paper attempts to review some of the evidence and the theoretical motivation for justifying investigating age as a continuing factor in ultimate attainment in second language acquisition after the onset of puberty.

Most of the work done on age effects on ultimate attainment — as opposed to language learning ability — has focused on differences between child and adult learners and on the origins of these differences. It tends to be centred on discussion about the Critical Period Hypothesis (CPH) and maturational approaches. What I would like to do is see if a case can be made for examining age effects in relation to differential achievement amongst non-native speakers who have arrived in the second language community at different ages during adulthood.

Lenneberg's version of the Critical Period Hypothesis (1967) proposed that primary language acquisition was confined to the period between 2 and 14 years of age: language acquired after puberty was a matter of semi-linguistic communication strategies using central cognitive processes. It was the *plasticity* of the immature brain that allowed language to develop: after hemispheric lateralization, the dominant left hemisphere took over language functions.

Clearly, a major problem with the *end* of the Critical Period Hypothesis relates to evidence. Subsequent biological and linguistic investigations, notably by Krashen (1973) and Curtiss (1977) — on the case of Genie — suggested that there is no abrupt shutdown of first language learning capacity at around 14: a 'weak' version of the CPH suggests a 'sensitive' period after which learning is possible but irregular and incomplete. The rather strict relation between lateralization and language learning proposed by Lenneberg has been undermined by the discovery that lateralization seems to be complete long before puberty — perhaps soon after birth. The latest study is of 'Alex', who had no speech and no apparent comprehension until his left hemisphere was removed at the age of 9, and who went on to develop full language functions (Isaacs *et al.* 1996).

In L2 learning, where there is abundant linguistic evidence from adult learners as well as children, the question of an end to the critical or sensitive period is much more contentious. On the one hand, it seems clear that 'younger = better in the long run': that is, although younger children are less efficient *learners* than older children or even adults, they are far more likely to achieve native-like proficiency in the L2. However, there remain two questions:

1. are there any adult learners who are able to achieve native-like proficiency in phonology and syntax?

2. if access to UG principles is what enables children to succeed, can adult learners ever access these as effectively as child learners — on the assumption that the most successful route to L2 proficiency is the child route?

Ioup *et al.* (1994) investigated the proficiency of a native English speaker of Egyptian Arabic who had acquired her L2 naturalistically from the age of 22. Her spoken production was judged to be at native speaker level and her intuitions in a GJ test of a range of both UG principles and language specific features proved largely native-like (where her responses were indeterminate, so were those of native speakers).

It is abundantly clear however that such cases are exceptional: Selinker's estimate of 5% as the proportion of adult learners who 'succeed' in a second language is undisputed. It seems clear that such talented learners have a significantly different brain organisation (Schneiderman & Desmarais 1988).

What is contentious is whether adult learners are able to tap into UG when exposed to a second language in the way that child L1 and child L2 learners seem to (though I am not suggesting this is established fact): if they are, why is proficiency so uneven, i.e. normally distributed? If they are not, then how can *any* native-like achievement be explained, in particular native-like intuitions about UG principles, i.e. native-like *competence*, given that L2 learners suffer from impoverished stimulus as much as L1 learners (Cook 1991, Schwarz 1993)?

Johnson & Newport's two studies (1989, 1991) which compared Chinese-speaking child and adult learners of English provide the major source of evidence against adult access to UG (see also Patkowski 1980, Oyama 1978, Schachter 1990). The subjects were tested for their knowledge of a number of features of English and of subjacency (a constraint on movement not instantiated in Chinese) and a clear decline over age of arrival was found — a decline that started with the earliest age-group (those who arrived in the US from 4 to 7 years) and finished with the adult arrivers, performing just above chance. This matches a trend found in primary acquisition of sign language (Newport & Supalla 1990). Moreover, performance on the subjacency test was slightly worse than on language-specific features of English (although this may reflect test difficulty, showing a problem of not controlling for proficiency).

Other studies of adult learners have also found significant differences between native-speaker and *near* native-speaker intuitions on UG features (e.g. Sorace 1993). However, White & Genesee's 1993 study, which looked at the same feature (subjacency) as Johnson & Newport, and also compared adult and child arrivers, came up with radically different results. Starting from the premise that previous studies of competence had not actually addressed the question of near-native proficiency, they argue that it is only by investigating the intuitions of native-like adult L2 speakers that age-related effects on ultimate attainment can be properly assessed. They made a very rigorous selection of 89 near-native and advanced speakers of English, with mixed L1s (although mostly French). White & Genesee found their near-natives indistinguishable from native speaker controls, with no age effect and their advanced learners scoring significantly differently only on some sentence types. Even on reaction times (for reading and judging each sentence), near natives and natives showed no significant difference. They conclude, *inter alia*, that 'age effects are not due to a decline in UG itself and that, where they occur, they must be explained by other factors' (White & Genesee 1993:18).

Martohardjono & Flynn (1995) also report on a study of Chinese and Indonesian speakers — whose languages do not instantiate wh-movement — who were adult learners of English. They found that their adult learners were able to recognise violations of UG principles that do not appear in their native languages. They account for differential performances as between L1 and L2 speakers by the fact that the learners must

> shift not only hypotheses concerning principles and parameters but a whole range of interrelated language specific facts ... In adult L2 learning, the instantiation of principles and parameters in the L2 may not be problematic but rather the mapping of the principles and parameters onto the structures of the new target language. This mapping will take time as it of necessity involves inductive learning. (Martohardjono & Flynn 1995:144)

In other words, access to UG does not necessarily allow the learner to proceed straightforwardly to native-like performance in the L2. Perhaps this is begging the question.

None of the studies mentioned so far have differentiated amongst subjects who arrived at different ages after puberty. A study of highly proficient English speakers of French by Birdsong (1992) is, so far as I am aware, the only study that has found a negative correlation between age of arrival after puberty and test performance. The range was 19 to 48 years. While Birdsong found, like Johnson & Newport, that UG principles were not privileged over language specific features, he did find evidence of both native-like proficiency and of an age-related decline.

There seem to be three hypotheses:

Hypothesis A. The strong 'adult-access-to-UG' position predicts that if adult learners have *direct* access to UG, i.e. there is no upper limit to the critical period, there is no reason to suppose this access becomes restricted in later years.

Hypothesis B. If a critical or sensitive period does operate in L2 acquisition (Johnson & Newport 1989, 1991), this predicts no continuing age effect through adulthood:

regardless of age of arrival, learners exposed to the target language after 15-18 will show evidence of lower performance on average than child arrivers, but with a greater range of proficiency — although Johnson & Newport's own data included one adult performing at native-like levels.

Hypothesis C. If adult access is restricted in some way by L1 knowledge, as Lust (1981) and Martohardjono & Flynn (1995) maintain — the latter pointing to 'confirmed beliefs about how each principle and parameter works' (1995:144), while UG itself remains intact, it may be that the later the exposure to the L2 the more L1 knowledge blocks access and that this continues through adulthood.

What happens to language proficiency in later life? Quite a number of studies have investigated L1 comprehension, production and syntactic knowledge amongst older adults, comparing different age-groups.

In the case of production, it seems that older adults (over 40) use significantly fewer complex sentences (e.g. relative clauses, that-clauses and multiple embeddings) than younger adults (Kemper 1986, 1987). This is found in both spoken and written production and seems to be associated with a decline in working memory. When older people, aged from 60 to 93, were tested on their ability to identify constraints on wh-movement, no loss of ability to judge both grammatical and ungrammatical items was found (Pye *et al.* 1992). What did affect the judgements of older people — so that subjects in their 80s made no distinction between grammatical and ungrammatical sentences — was length and complexity: again a factor of working memory, revealing performance effects even in (written) grammaticality judgement tests conducted under very unstressful conditions (in subjects' own homes, on their own). The most difficult sentence types were left-branching. Pye *et al.* concluded that 'adults' linguistic competence remains intact across the lifespan, in so far as elderly adults in their 70s and 80s are able to recognise many different types of ungrammatical sentences' (1992:370).

Conversely, a recent study by Bloom *et al.* (1996) on adverbial conjuncts, proposes that 'a subtle decline in syntactic processing begins before the age of 70'. This study tested three age groups with a reading and a controlled writing task. The young and middle aged groups (20-25 and 50-55 respectively) produced similar results on the reading task but on the writing task there were indications that at 50 the ability to use terms like 'therefore', 'furthermore' and 'however' correctly is beginning to go. The nature of the task — somewhere between spontaneous production and a GJ test — makes it difficult to compare with studies like that of Pye *et al.*

It is possible that late acquired and language specific items such as adverbial conjuncts are more fragile in later life, while other features — in particular UG features — resist decay.

What happens to elderly bilinguals, and is there a similar change in their handling of syntactic complexity? What studies there are report that bilinguals tend to become less fluent and less accurate in old age and make increased use of code-switching (de Bot & Clyne 1989), although this may be due to affective and environmental factors which have an influence on performance without necessarily producing a loss of linguistic knowledge.

Research into aphasic mono- and bilinguals, for example, demonstrates that 'language loss' caused by cerebral insult can mean only loss of or damage to the productive faculty (Kean 1995 for a review): comprehension may remain intact and even losing the ability to speak may be temporary. Agrammatism itself, which is a feature of some Broca's aphasics, has been described as an adaptation for coping with computational overload (e.g. ellipsis) rather than any linguistic deficit. Moreover, among bilinguals, there is no straightforward relation between age, degree of bilingualism or mode of acquisition (e.g. compound or co-ordinate) on the one hand and order of recovery of the two languages on the other (see e.g. Kolk & van Grunsven 1985).

Findings from neurophysiological investigations can only, in the present state of knowledge, be suggestive for the present inquiry: what they tend to suggest is that at least some features of the language faculty are robust enough to withstand cerebral insult and old age, even when these features are no longer present in spontaneous production. If there is a widening bifurcation between production and comprehension abilities in later and in impaired L1 it may turn out to have a bearing on adult second language learning. It may help to explain the (rather few) attested cases of the 'Conrad Phenomenon'. Patkowski's 1980 study, one of the earliest attempts to test the CPH in second language acquisition, included one Polish subject who moved to the US at 50. His oral production is described as 'excruciating to transcribe' because of his pronunciation and he gained the lowest score on syntactic accuracy (Patkowski 1980:464). Nevertheless, on a multiple choice test of linguistic intuitions he scored at native levels. At the other extreme of mainstream adult learners are White & Genesee's subjects who are not talented language learners in the usual sense but who are highly proficient and also able to perform at near-native level on syntactic tests.

To return to the three predictions outlined earlier, it may be that the age effect after puberty, while ceasing its association with maturation, continues to affect L2 proficiency, but *selectively and asymmetrically*: that is, age of arrival through adulthood can make native-like production in ultimate attainment less feasible, and processing of language specific features (which are more amenable to formal instruction and conscious learning) more difficult, because of memory deficits, while having little influence on UG principles. This position, paralleling what seems to happen, a little later, in monolingual speakers in middle and old age, would predict that even highly proficient older learners would score worse on syntactic aspects of spoken production, but not necessarily on a grammaticality judgement test of subjacency. Recall that Birdsong (1992), who found an age effect after puberty, was testing mainly for intuitions on language specific items. His results with regard to the UG sentences are not conclusive: several judgements of French native-speakers are more indeterminate than those of English native-speakers (especially on That-trace items). Furthermore, most of the UG sentences are 'linguists' sentences'. However, this position would also allow for the case of exceptional adult learners, typified as learners with the ability to use both hemispheres, therefore more of the cortex for language learning: they are not childlike — they are simply exceptional users of language, whether L1 or L2. I would argue, at any rate, that there exists enough contradictory evidence on the effect of age on language proficiency and language knowledge to warrant further investigation into age effects on adult learners arriving at different 'stages' of adulthood, after adolescence.

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