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AUTHOR Singleton, D. M.
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ABSTRACT

The assumed connection between ease of language learning and age has been investigated in recent years by researchers from a wide range of disciplines. With the exception of the findings of research that authentic accents are more easily acquired by children, studies seem to indicate that efficiency in language learning increases with maturation. Evidence does not indicate that there is a firm qualitative distinction to be drawn between the respective ways in which children and adults master a second language. However, much thinking of theorists in second language acquisition has been based on the assumption that children are more efficient second-language learners. Results of this theorizing are outlined under the following headings: (1) imprinting; (2)lateralization and cerebral plasticity; (3) the thalamus theory; (4) the cognitive developmental hypothesis; and (5) affect and motivation differences between children, adolescents, and adults. It is concluded that the evidence for a general age-related deterioration in the capacity to learn a second language is scanty. Of the theories proposed, those which seem to be most consistent with the evidence are those which do not assume a sharp cut-off point for all aspects of language acquisition. (AMH)

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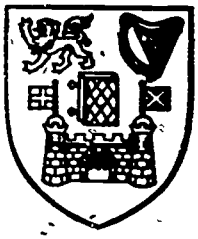

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Age as a factor in second language acquisition

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AGE AS A FACTOR IN SECOND LANGUAGE ACQUISITION: A REVIEW OF SOME RECENT RESEARCH

by

D. M. SINGLETON

Introductory

It is commonly held that a person's capacity for language learning diminishes drastically at some point between childhood and adulthood. This belief is based on the everyday observation of differences between children and adults in the matter of language acquisition:

> ... babies pick up their mother tongue with what seems like great ease, and young children in suitable environments pick up a second language with little trouble, whereas adults seem to struggle ineffectively with a new language and to impose the phonology and syntax of their mother tongue on the new language.
>
> (Macnamara 1973, p.63)

In recent years, the assumed connexion between ease of language learning and age has been investigated more scientifically by researchers from a wide range of disciplines. Inevitably, the investigation has generated controversy.

Some evidence of age-related differences amongst language learners

The results of a number of experiments and surveys suggest that early exposure to a given second language is the surest way of acquiring an authentic 'accent' in that language. An account of some of this evidence is given below.

In 1969 James Asher and Ramiro García reported an experiment they had carried out in California on seventy-one Cuban immigrants between the ages of seven and nineteen and a control group of thirty American children. A panel of nineteen American high school students was asked to listen to randomly ordered recordings of these young Cubans and Americans uttering the same set of English sentences, and to judge fidelity of pronunciation by ticking one of the following categories for each subject:

A indicated a native speaker
B indicated a near native speaker
C indicated a slight foreign accent
D indicated a definite foreign accent

Asher and García found that, irrespective of age of entry into the United States and length of stay, not one of the 71 Cuban children was judged to have native pronunciation. However, many were deemed to speak with near-native pronunciation, and the highest probability of this near-native sound production occurred in children who had gone to the United States between the ages of one and six years and who had lived there over a period of between five and six years. Moreover, the younger a child had entered the United States the higher the probability of a native-like accent, and this probability was further increased the longer the child had lived in the United States.

> For example, of the children six or younger, who lived here between 5 and 8 years, 71% had a near-native pronunciation as compared with only 50% of those living here between one and four years. For the older children, those in the age range of 13 to 19, nobody (N = 9) who lived here between 1 and 4 years had a near native pronunciation, and only 17% of these children who lived in the United States between 5 and 8 years (N = 6) had a near-native speech.
>
> (Asher and García 1969, p.340)

More recent findings have been published by Herbert Seliger, Stephen Krashen and Peter Ladefoged (1975), Ann Fathman (1975) and Susan Oyama (1976). Seliger, Krashen and Ladefoged supervised the interviewing of 394 adult subjects who, at various ages and from various countries, had emigrated to the United States and Israel respectively. The questions asked concerned country of birth, age, age of arrival in the United States/Israel, and distinguishability from native-speakers of English/Hebrew. An analysis of these interviews revealed that a majority of those respondents who had migrated at or under the age of nine years reported that most speakers of their target language thought they were native speakers. Most respondents who had migrated at or over the age of sixteen years, on the other hand, felt they still had a foreign accent. Of respondents who had migrated between the ages of ten and fifteen years the number who reported a foreign accent 'was nearly identical to the number who reported no accent' (Seliger, Krashen and Ladefoged 1975, p.21).

Fathman tested a sample of 140 young immigrants living in the Washington D.C. area. These were school students of diverse language backgrounds and of ages ranging from six to fifteen years. An oral production test was used based on a series of pairs of pictures. The examiner would point to one of the pair, giving a relevant stimulus utterance, then point to the second picture and require the subject to complete its description by supplying omitted words, phrases or sentences. In addition, each student was asked to give a general description of a composite picture. The scores for the more structured part of the test were related solely to correctness of morphology and syntax, whereas the discursive descriptions were given ratings on a five point scale for pronunciation and fluency as well as grammatical accuracy. As far as pronunciation was concerned, the younger children, aged six to ten years, were given significantly higher ratings than the older group, aged eleven

to fifteen years, despite the fact that all the children had been exposed to English for the same period of time. This seemed to suggest 'that the group of younger children may be learning English phonology at a faster rate than the group of older children' (Fathman 1975, p.249).

Oyama's experimental group were sixty Italian-born immigrants who had learned English at various ages and had been in the United States for varying numbers of years. Their English pronunciation was scored from two speech samples, a short paragraph read aloud and the recounting of a dangerous experience. A 45-second extract from each passage was then judged by two native-speakers of English on a five-point scale, from 'no accent' to 'heavy accent'. The results indicated that age of arrival in the United States was a better predictor of accent than the number of years spent there.

These findings, taken together, seem to indicate a link between the age at which a learner first encounters the target language and whether or not he acquires an authentic pronunciation. Three points need to be made in connexion with this tentative conclusion. First, all of the studies described above were concerned with the degree to which non-native-speakers were able to pass for native-speakers in terms of accent. There is no suggestion that distinguishability in this context equals unintelligibility. For those speakers who were deemed to have a non-native accent, that which distinguished them from native-speakers could easily have been no more than a matter of redundant phonetic detail. It is quite possible, for example, for a person to have a perfectly adequate functional command of the English consonant system and yet retain, say, a uvular version of /r/ or retroflex versions of /t/, /d/, /n/, etc.

Secondly, the evidence is for a trend rather than for the operation of an absolute and inexorable law. Exceptions to this

trend are numerous. In Asher and García's experiment, in which the best assessment obtained by any of the experimental subjects was that their speech 'indicated a near native speaker', 7% of those who had entered the United States after the age of thirteen were judged to have attained this level. Similarly, in the surveys carried out by Seliger, Krashen and Ladefoged, 7.6% of those who had learnt English/Hebrew as adults claimed no accent.

Thirdly, there is some counter-evidence. Robert Politzer and Louis Weiss (1969) tested about 250 subjects with no knowledge of French from 1st, 3rd, 5th, 7th and 9th grades for auditory discrimination between French vowel phonemes and between French and English vowel sounds, for imitative pronunciation of French words and for ability to recall these words a short while later. On the basis of their results they concluded that 'performance in all these three tasks tends to increase with maturation' (p.83). Lars Ekstrand (1976) obtained various kinds of data on 2,189 immigrant pupils of school age registered in Swedish comprehensive schools and regarded as needing special tuition in Swedish. Tests for pronunciation, transcribing dictation, listening comprehension, reading comprehension, free oral production and free written production in Swedish were administered to this population (or, in the case of pronunciation and free oral production tests, to samples thereof). All test results except those for free oral production were found to correlate positively and significantly with age, suggesting that language ability, including pronunciation, 'improves with age' (p.190). Ekstrand also reports (1976, p.182) that an early investigation of the English pronunciation and listening comprehension of 1,200 Swedish pupils (grades 1 - 4) who had been taught English over one semester indicated that 'the older children did significantly better than the younger ones'.

An interesting sidelight is thrown on this question by a consideration of regional/national variations of accent amongst native-speakers of the same language. William Labov (1966; 1970) claims that people rarely acquire the accent of a particular region if they move into that region after puberty. Paul Christophersen, on the other hand, asserts that at least some speakers do change their accent (1973, p.48). Clive James, recently reviewing the BBC coverage of the Winter Olympics and, in particular, some interviews with the British skater Robin Cousins, lent unwitting support to Christophersen's view:

> All this time the BBC commentators had been doing their best to stay calm about Robin Cousins. They rarely mentioned him more than a thousand times a night. There were only a hundred interviews with his parents, while whole hours went by without Robin himself being called to the camera. When he did speak, it was with a noticeable American accent - an indication that his gift has been brought to flower somewhere else than here. Nevertheless he is still one of us.
>
> (*The Observer*, 24.2.80, p.20)

With regard to other aspects of language, evidence for a falling-off in learning capacity as the child progresses towards adulthood is quite scarce. Oyama (1973) gave her subjects (Italian-born immigrants to the United States) a number of tests involving syntax and semantics.

> In two of these (a 'sentences through noise' task and a test in which subjects were asked to make grammatical acceptability judgements) a clear effect for age of arrival was observed; those who arrived in the United States at younger ages did best, and there was no effect for years spent in the U.S.
>
> (Report in Krashen 1975, p.218)

Similarly, C. A. Ramsey and E. N. Wright (1974) examined immigrants in Canada and found that

> the older a child was when introduced to English, the poorer the performance on various tests of English language skill. Children who arrived after the age of 6 tended to have lower scores on tests of language skills as their age of arrival increased.
>
> (Report in McLaughlin 1978, p.56)

Against these two studies must be placed several others with quite different results. One of the most commonly cited is that of Asher and Price (1967), summarized below by Martin Braine.

> Asher and Price gave the same controlled exposure to a little Russian to 8-, 10-, and 14-year-old children, and to college students. In three short sessions over a four day period, the subjects heard Russian commands uttered on tape and learned the meanings of the commands just by watching the adult model obey them. Half of each age group simply watched the model act out the command; the other half copied the model's acting out of the command. There was no other teaching of Russian of any sort. In the retention tests that came later, the subjects were tested by seeing if they could act out Russian commands without the adult model. The Russian material consisted initially of one-word commands like *Sit, Walk, Squat,* then of combinations like *Run to the table, Put down the book,* and ended with instructions like *Pick up the paper and the pencil and put them on the chair.* Several of the tests used combinations of words which were not identical to those used in the training. The results were that the adults obtained nearly perfect scores on all tests; they were superior to all the children, doing about twice as well as the 8-year-olds, with the intermediate age groups in between.
>
> (Braine 1971b, pp.71-72)

Smith and Braine (reported in Macnamara 1973, pp.63-64) in a rather different kind of experiment obtained results tending in a similiar direction. They attempted to teach subjects of different ages a miniature artificial language and then tested them on their progress. In these tests the adult subjects performed better than the children.

Other studies were confined to younger and older groups of children. Urs Bühler (1972) investigated more than 1,500 Swiss school children learning French as a second language. Of these, some had begun French in the fourth grade, others in the fifth. On two separate testing occasions the children who had begun French later performed significantly better on various tests of French language skills.

Likewise, Susan Ervin-Tripp (1974) found that even in a natural milieu where the second language was a constant feature of the environment and where the emphasis was on communication, older children acquired the language more rapidly than younger children. Her sample contained children ranging from four to nine years of age, and her study focused on morphology and syntax. It was the older children who exhibited a superior mastery of these elements, even though their exposure to the second language was no more than equal to that of the younger children.

McLaughlin reports a similar study carried out by C. E. Snow and M. Hoefnagel-Höhle (1975). Again, the learning environment was natural rather than formal:

> ... in a sample of American children, adolescents, and adults learning Dutch in Holland, it was the adolescents who acquired the language most readily.
>
> (McLaughlin 1978, p.57)

Two studies which have already been mentioned in other contexts are also relevant here. As has been stated above (p.3), Fathman (1975) obtained results suggesting that younger children are more successful than older children at acquiring an authentic pronunciation when learning a new language. However, she also found that the older children in her sample (11 - 15 years), whose exposure to the language was the same as that of the younger group, 'performed significantly better...on the

morphology and syntax subtests... than did the younger children, 6 - 10 years' (pp.248-249). As we have seen (p.5), Ekstrand's findings (1976) run counter to Fathman's on the question of pronunciation. On the other hand, since they indicate a general improvement of learning ability with age over a whole range of language skills, they appear to confirm Fathman's conclusion that older children are 'more successful in learning the morphology and syntax of a second language' (p.251).

On the evidence, the case for an overall decline in the capacity to learn a second language at the approach of adulthood would have to be deemed not proven. In fact, if one disregards the matter of acquiring a native accent, most of the research reviewed points in the opposite direction; for other aspects of language, the learning capacity seems actually to *increase* with age.

Other research, less explicitly comparative in nature, provides good grounds for believing that language learning, including first language learning, both can and does proceed beyond the years of early childhood. Braine (1971b) reports an unpublished study carried out by A. Bar-Adon (1959) on children learning Hebrew as their first language:

> Hebrew lexical roots usually consist of three consonants; vowels intercalated between the consonants belong to the formative morphemes distinct from the lexical root. Because they have more than one phonemic realization, several of these consonants have to be considered as morphophonemes, and their varying phonemic shapes are determined in a complex way by the position of the consonant in the root (i.e., whether first, second, or third consonant), the 'conjugation' in which the root appears, and the tense form.... These ... morphophonemic alterations are not found regularly in children's speech; instead, one shape of the consonant tends at first to be used in all forms of a particular verb.... Regularizations of this sort may be found as late as adolescence....
>
> (Braine 1971b, pp.28-29)

John Carroll (1971, p.117) quotes from F. Zidonis's investigation of some American ninth graders' written English:

> When rigorous criteria of well-formedness were applied in the analysis of writing samples, almost half of the sentences written by the ninth graders were judged to be malformed. This finding runs counter to the widespread contention of the structural linguist, who is not concerned with well-formedness as a grammatical goal, that children have acquired virtually full command of the grammar of English at an early age. The more likely contention is that the grammar of English is never fully mastered.
>
> (Zidonis 1965, p.408)

Carroll goes on to observe:

> Although there are certain aspects of grammatical competence that seem to be well mastered even at the normal school entry age, there are other aspects in which development is slow, at least for many children. We know little about the actual grammatical competence of adolescents or even adults as manifested in either speech or writing. Many of Zidonis's ninth graders were apparently unable to recognize the malformedness of the sentences they wrote. It cannot be concluded that all adults have acquired the degree of grammatical competence assumed by many linguists.
>
> (p.121)

Semantically-rooted first language skills have also been shown to continue developing long after early childhood. Referring to a study of such skills by L. Thurstone, McLaughlin remarks on the relative sluggishness of the language capacity in reaching full potential:

> Thurstone's analysis of seven primary abilities indicated that verbal comprehension reaches 80% of adult competence at age 18 and word fluency at age 20. In contrast, number and memory factors reached 80% of adult level at 16, space and reasoning at 19, and perceptual factors at age 12 (Thurstone 1955). In comparison with other mental capacities, then, language capacity does not seem to develop remarkably quickly.
>
> (McLaughlin 1979, pp.55-56)

This may be something of an understatement. Carroll, reviewing the results of various vocabulary tests, concludes (1971, p.124) that vocabulary tends to increase significantly up to at least the age of forty or fifty.

Even some aspects of the phonological system of one's first language may not be mastered until one is well into adulthood, as is evident from Carroll's account of a doctoral dissertation dealing with stress placement in English:

> Robinson (1967) studied the development, in grade school children and adults, of competence in pronouncing, with correct stress placement, derived words with the suffixes *-ity* (as in *polárity* < *pólar*) and *-tion* (as in *generátion* < *génerate*). She found that these competences develop very slowly; many adults appear not to have acquired rules for the pronunciation of these derived words...
>
> (Carroll 1971, p.116)

There is some evidence that elements of the language learning capacity not called upon in the acquisition of a first language may later play a role in the acquisition of a second language. An experiment conducted by William Ritchie (1978) yielded results pointing to the retention beyond puberty of some very specific language learning principles. Ritchie investigated a group of adult Japanese learners of English, with particular reference to the presence in their internalized English grammar of the 'right roof constraint'.

The 'right roof constraint' is postulated as preventing the generation of sentences in which an element has been moved to the right out of the embedded sentence where the element originated. Thus it would allow:

[$_S$*That a gun went off which I had cleaned*$_S$] *surprised no one*

but not:

*[S that a gun bent off S] surprised no one which I had cleaned.

According to Ritchie, there is good reason to believe that this constraint is not acquired by children on the basis of exposure to primary linguistic data, but rather present from the beginning amongst the principles and strategies which facilitate and guide the construction of their first language.

Now, as it happens, Japanese is a language which does not contain 'right movement' of any kind. Therefore, the acquisition of Japanese does not call for the operation of right roof constraint. Accordingly, if the constraint were seen to be manifest in the newly acquired English of a group of Japanese adults, this could plausibly be regarded as demonstrating the survival into adulthood of previously untapped linguistic potential.

Ritchie's test - a questionnaire eliciting judgments on the relative grammaticality of pairs of sentences - did, in fact, appear to establish the presence of the right roof constraint in the English of his Japanese subjects. In his view, this lent 'preliminary empirical support to the assumption... that linguistic universals are intact in the adult' (p.43).

Some insights into the actual practice of second language learners of different ages are provided by Braine's analysis (1971b) of Israeli census data on the spread of Hebrew amongst immigrants to Israel. These indicate that both preadolescent and adult immigrants tend to use Hebrew as their everyday language within a few years of arriving, whereas Hebrew tends to be used less by middle-aged immigrants and substantially less by elderly immigrants. Braine comments that, whatever the cause, 'if there is a decline in language learning ability with age, it looks as if it is probably a slow decline associated with middle and old age, not with adolescence' (1971b, p.71).

A recent and dramatic set of evidence relevant to the survival into adulthood of the language learning ability is provided by the linguistic development of Genie (Fromkin, Krashen, Curtiss, Rigler and Rigler 1974; Curtiss, Fromkin, Rigler, Rigler and Krashen 1975; Curtiss 1977).

> Genie was first encountered when she was 13 years, 9 months. At the time of her discovery and hospitalization she was an unsocialized, primitive human being, emotionally disturbed, unlearned and without language. She had been taken into protective custody by the police and, on November 4, 1970, was admitted into the Children's Hospital of Los Angeles for evaluation with a tentative diagnosis of malnutrition... When admitted to the hospital, Genie was a painfully thin child with a distended abdomen who appeared to be six or seven years younger than her age. She was 54.5 inches tall and weighed 62.25 pounds. She was unable to stand erect, could not chew solid or even semi-solid foods, had great difficulty in swallowing, was incontinent of feces and urine, and was mute.
>
> (Fromkin *et al.* 1974, p.84)

In view of the appalling circumstances of Genie's upbringing, her condition was hardly surprising.

> There is evidence that from the age of 20 months until shortly before admission to the hospital Genie had been isolated in a small closed room, tied into a potty chair where she remained most or all hours of the day, sometimes overnight. A cloth harness, constructed to keep her from handling her feces was her only apparel of wear. When not strapped into the chair she was kept in a covered infant crib, also confined from the waist down. The doors of the room were kept closed and the windows were curtained. She was hurriedly fed (only cereal and baby food) and minimally cared for by her mother, who was almost blind during most of the years of Genie's isolation. There was no radio or TV in the house and the father's intolerance of noise of any kind kept any acoustic stimuli which she received behind the closed door to a minimum... Genie was physically punished by the father if she made any sounds. According to the mother, the father and older brother never spoke to Genie although they barked at her like dogs. The mother was forbidden to spend more than a few minutes with Genie during feeding.
>
> (Fromkin *et al.* 1974, pp.84-85)

Medical examinations revealed 'no discernible evidence of physical or mental disease that would... account for her retarded behavior' (Fromkin *et al.* 1974, p.86). Nor was she autistic or pathologically disturbed. Within four weeks of her admission to hospital she was no longer apathetic and withdrawn, but showing signs of 'a lively curiosity' and 'emotional responsivity' (*ibid.*, p.86).

It is not known whether Genie had ever spoken before her isolation. On admission to hospital, the only sounds she made were noises associated with spitting and 'a kind of throaty whimper' (*ibid.*, p.86). Tests of linguistic competence produced evidence that Genie understood 'individual words which she did not utter herself, but, except for such words, she had little if any comprehension of grammatical structures' (*ibid.*, p.87). Over the subsequent two years she developed comprehension of such structures as singular-plural contrasts of nouns, negative-affirmative sentence distinctions, possessive constructions, modifications, prepositional usage, conjunction with *and*, and comparative and superlative form of adjectives.

Progress in speech production has been slower, presumably because Genie had not learned the necessary neuro-muscular controls over her vocal organs. She apparently had difficulties regulating air flow and volume. Her sound productions were acoustically weak and strange in voice quality. Nevertheless, her phonological development approximated to that of normal children. As far as syntax is concerned, Genie learned to combine words in three- and four-word strings and to produce negative sentences, strings with locative nouns, noun phrases, possessives and plurals. Broadly, her progress in the acquisition of language, though slower than is usual, parallelled that of normal English-speaking children. Moreover, relative to her stage of linguistic development, she was precocious in dealing with written language, in her acquisition of colour words and

numbers, in vocabulary-building generally, and in understanding the full range of *wh-* questions. However, she also demonstrated some peculiar inconsistencies in word order, interpreting simple NVN sentences incorrectly, despite the correctness of her own sentences and her successful performance in tests imposing apparently identical requirements (Curtiss *et al.* 1975).

It is not at all a straightforward matter to interpret this evidence. It appears that Genie has in an important sense acquired language:

> ...we must keep in mind that Genie's speech is rule-governed behavior, and that from a finite set of arbitrary linguistic elements she can and does create novel utterances that theoretically know no upper bound... Therefore, abnormalities notwithstanding, in the most fundamental and critical respects, Genie has language.
>
> (Curtiss 1977, p.204)

However, the abnormal aspects of Genie's speech may suggest 'specific constraints and limitations on the nature of language acquisition outside of...[the critical] maturational period' (Curtiss 1977, p.234). On the other hand, any claim that it is *impossible* for language acquisition to begin from nothing after puberty becomes barely tenable in the light of Genie's case:

> Genie represents a case of first-language acquisition after the critical age of puberty. To be sure, her development is laborious and incomplete, but the similarities between it and normal acquisition outweigh the differences.
>
> (De Villiers-and de Villiers 1978, p.219)

The implication, *a fortiori*, is that language learning may *continue* into adulthood, and this continuation of language learning presumably includes the possibility of mastering a second language.

So far we have been dealing with evidence concerning age-related differences in, as it were, the success rate of second language learners. The question has also been raised, however, whether children and adults, whatever their respective capacities ultimately to become proficient in a second language, adopt different approaches to the learning task or require different learning conditions.

A good deal of recent research has concentrated on the order in which morphemes are acquired by second language learners. What stimulated this research was an interest in the relationship between first and second language acquisition. Children learning their first language were observed to acquire certain morphemes of that language in a particular order; it was hypothesized that when the same language was learnt as a second language the order of morpheme acquisition might be the same, or that, at any rate, some fixed order of morpheme acquisition might be established in respect of that language for second language learners.

The methods and conclusions of such morpheme studies have been criticized (cf. S. Devitt's paper in this series, 'Creativity and input in second language acquisition'). It is, nevertheless, interesting to note that, where adult second language learners were tested, the resultant accuracy hierarchy (which was claimed to reflect order of acquisition) was the same as for children learning the same language as a second language (see e.g. Bailey, Madden and Krashen 1974; Fathman 1975; Krashen, Sferlazza, Feldman and Fathman 1976; Larsen-Freeman 1976). At least some researchers find such results significant:

> These results provide strong evidence that the onset of puberty does not bring about an abrupt modification in the process of language learning but that the adult uses basically the same strategies as the child, in spite of a great deal more experience with language.
>
> (McLaughlin 1978, p.70).

An earlier investigation conducted by Braine into pattern-learning procedures which may be of relevance to language learning had led him to similar conclusions:

> ... the pattern-learning mechanisms of these two types of subjects [young adults and nine-year-old children] seem to be rather similar for the kind of procedure and learning material used.
>
> (Braine 1971a, p.162, note 3)

Some studies (e.g., Hale and Budar 1970; Fathman 1975) indicate that for younger learners instruction in the target language is less important than contact with the target language group, whereas in a series of studies carried out by Stephen Krashen and others at Queens College, City University of New York (reported in Krashen 1976) the general finding was that for adults the number of years of formal instruction in the language was a better predictor of proficiency than the number of years of exposure to and use of the language. From these contrasting results Krashen argues (e.g., 1976) that whilst children, given a suitable environment, acquire a second language subconsciously and inevitably, adults, as well as having access to this subconscious acquisition process, also learn the target language consciously, and can thus make better use of formal instruction.

The limits of any hypothesis which can legitimately be based on the studies mentioned above need to be recognized. John Schumann comments:

> ...it must be clearly understood that these studies indicate only that the instruction helps adults to learn second languages. They do not demonstrate that instruction is necessary for adult second language learning, nor do they suggest that instruction is sufficient for adult acquisition.
>
> (1978, p.103)

There is also the question of the results of some earlier studies, which suggest that language instruction is *less* effective for adult students than the use of language in other activities (see, e.g., Upshur 1968; Mason 1971). Moreover, some doubt is cast upon the postulated subconscious nature of children's acquisition of second languages by some data adduced by Evelyn Hatch (1978), which indicate that quite young children in a second language environment are often all too painfully aware of the language learning process they are involved in. In short, it would be premature to conclude that there is a firm qualitative distinction to be drawn between the respective ways in which children and adults master a second language.

Theories

As we have seen, the assumption that children are more efficient second language learners than adults is not, in fact, supported by much that could be described as scientific evidence. With the exception of the findings of research on the acquisition of authentic accents, most of the evidence seems to suggest quite the opposite.

To be fair, it would probably be unwise to dismiss out of hand the wealth of anecdotal and impressionistic data adduced in support of the idea that children are advantaged in this area. Moreover, it may be significant that, at least on the question of accents, there is some convergence between folklore and science. In any case, whatever its scientific foundation, the above-stated assumption has underlain, and continues to underlie, much of the thinking of theorists in the field of second language acquisition. Some of the fruits of their theorizing are outlined below.

1. Imprinting

It is perhaps misleading to include the 'imprinting' hypothesis under the heading 'theories', since the said hypothesis is really no more than an interesting speculation on a possible analogy between language acquisition and aspects of the maturation of certain non-human animals. The term 'imprinting' refers to the way in which certain aspects of animal behaviour are acquired during a 'critical period' of sometimes quite short duration. For example, a duckling learns to follow its mother during a critical time just after hatching. If during this time the mother is absent and some other object, animal or person is present, the infant bird will 'imprint' and thereafter follow that object, animal or person in preference to its mother. It has been suggested that the language learning capacity may be likewise 'keenly operative during some yet to be discovered critical period in the early development of humans' (Asher and García 1969, p.335).

Although this proposal is merely speculative, it does bear a resemblance to the more highly-developed maturational hypotheses which form the basis of much of the following discussion.

2. Lateralization and cerebral plasticity

Since the 1860's, neurologists have noted a connexion between lesions of the left hemisphere of the brain and speech disturbance, and have concluded that language functions in the brain are generally lateralized to the left. On the basis of certain exceptions to this tendency, it has also been hypothesized that in the case of the left-handed it is the right cerebral hemisphere which is dominant for language.

William Penfield and Lamar Roberts, after analyzing the literature as well as the case-histories of their own patients, were able to concur with the former hypothesis but not with the latter:

> It seems clear that the left hemisphere is usually dominant for speech, regardless of handedness. The reason why the right hemisphere is sometimes dominant for speech remains unclear, but it is not related solely to handedness.
>
> (Penfield and Roberts 1959, p.102)

They went on to discuss some differences between children and adults in the matter of transferring speech functions from one hemisphere to the other after injury. They pointed out that children were normally able to re-learn language when injury or disease damaged speech areas in the dominant hemisphere whereas speech recovery in adults was much more prohlematic, and that whereas in young children the speech-mechanism was frequently transferred with complete success from the injured dominant hemisphere to the healthy minor hemisphere, such transfers did not seem to occur in the case of adults (p.240).

Their conclusion was

> that for the purposes of learning languages, the human brain becomes progressively stiff and rigid after the age of nine.
>
> (p.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. It is difficult because it is unphysiological.
>
> (p.255)

Penfield also attached significance to the fact that electrical stimulation of the brain during an operation will sometimes 'cause the patient to re-experience the past' (Penfield 1958, p.34). He concluded:

> There is within the brain a ganglionic record of past experience which preserves the individual's current perceptions in astonishing detail. This record, one may assume, is to serve some subsequent purpose.
>
> (Penfield 1958, pp.34-35)

The relevance of this 'ganglionic record' to language learning was, he believed, that early experience of a second language would never be wasted. As examples, he cited the cases of his own children:

> Our two younger children heard only German in the nursery from the ages of 6 months and 18 months onward because they had a German governess. Even their parents talked German with them, to the best of their ability, when they entered the nursery. At the ages of 3 and 4 they entered a French nursery school. From their parents and others outside the school and outside the nursery they began to hear English gradually... After 2 years in the French nursery school they entered a regular English school... In English school too many years elapsed before French and German were presented to them as regular secondary languages. But, nevertheless, they found the work easy and their accents were good. Hidden away in the brain of each were the speech units of all three languages waiting to be employed in the expansion of a vocabulary which normally takes place in later school-years.
>
> (Penfield and Roberts 1959, pp.254-255)

Christophersen, for one, is sceptical about this inference, and indeed about the 'ganglionic record of past experience' generally.

> After all Penfield's patients needed prodding with an electric wire during an operation before their early memories returned. And the return was entirely random. It should be noted, too, that Penfield's patients were

> suffering from epilepsy, and we cannot be sure that a healthy brain would react in a similar manner...; we are not even sure that the alleged early memories were true memories.
>
> (Christophersen 1973, p.49)

With regard to the claim that adults find second language learning difficult because it is 'unphysiological', Leonard Newmark and David Reibel have commented:

> ...if it is 'unphysiological' for an adult brain to learn a new language, how are we to account for the fact that it is possible at all? What could an 'unphysiological' mechanism be that would explain language learning in adults? In fact, many adult learners do learn new languages very well. What is usually taken as evidence against their ability to learn as a child learns is the fact that they speak the new language with an accent. But our point is that they do learn to speak it, and that the amount of skill they often acquire far exceeds the amount of skill they do not seem to acquire. The neurophysiological evidence may be used to argue that adults are quantitatively inferior to children as language learners: it cannot be used to argue that they are qualitatively different *kinds* of learners.
>
> (Newmark and Reibel 1968, pp.154-155)

Penfield certainly admitted that it was 'not impossible' for adults to learn a second language (Penfield and Roberts 1959, p.225). In fact, he actually undermined his own case in the course of a passage in praise of the Direct Method:

> The direct method of learning language can succeed at an older age - even after nine years - and adults can, of course, learn by it. The success of the Berlitz method is evidence of this. Some adults do quite well.
>
> (Penfield and Roberts 1959, p.24)

As an example of an adult learner who, through direct contact with native-speakers, became 'a master' of his target language, Penfield mentioned Joseph Conrad. How the success of the Berlitz Method and Joseph Conrad's English are to be squared with the supposedly 'unphysiological' character of adult second language learning is

not entirely clear.

Probably the best known treatment of maturational factors in language learning is that of E. H. Lenneberg. According to Lenneberg, there are good reasons for suspecting the presence of 'biological endowments in man that make the human form of communication uniquely possible for our species' (Lenneberg 1964, reprint p.32). These reasons fall under five general headings:

(a) Anatomic and physiologic correlates

There is increasing evidence that verbal behavior is related to a great number of morphological and functional specializations...and...sensory and cognitive specializations prerequisite for language.

(b) Developmental schedule

The onset of speech is an extremely regular phenomenon appearing at a certain time in the child's physical development and following a fixed sequence of events...

(c) Difficulty in suppressing language

The ability to learn language is so deeply rooted in man that children learn it even in the face of dramatic handicaps.

(d) Language cannot be taught

There is no evidence that any non-human form has the capacity to acquire even the most primitive stages of language development.

(e) Language universals

Although language families are so different, one from the other, that we cannot find any historical connexion between them, every language, without exception, is based on the same *universal principles* of semantics, syntax and phonology.

(Lenneberg 1964, reprint pp.32-33)

Lenneberg also suggested that the basis for the language capacity might be transmitted genetically. His evidence for this suggestion relates to 'familial occurrence of language disabilities', 'chromosomal abnormality associated with varying

degrees of mental retardation and a striking failure of speech development', and 'an inherited error of metabolism producing a disease known as histidinemia which has in its wake a very high incidence of specific disturbance of language development' (1964, reprint pp.37-39).

Lenneberg further claimed that language capacity was independent of such general properties as 'intelligence' and brain weight. He cited experimental a observational evidence indicating that 'grossly defective intelligence need not implicate language; nor does the *absence* of language necessarily lower cognitive skills' (1964, reprint pp.39-42), and pointed out that nanocephalic dwarfs, whose 'head circumference and estimated brain weight barely exceed those of a newborn infant,...all...acquire the rudiments of language, including speaking and understanding, and the majority master the verbal skills as well as a normal five-year-old child' (1964, reprint pp.43-44).

A major feature of Lenneberg's 'biological perspective' is his contention 'that the appearance of language is primarily dependent upon the maturational development of states of readiness within the child' (Lenneberg 1967, p.142). In support of his view, he referred to the way in which speech develops in the normal child:

> The onset of speech consists of a gradual unfolding of capacities; it is a series of generally well-circumscribed events which take place between the second and third year of life. Certain important speech milestones are reached in a fixed sequence and at a relatively constant chronological age. Just as impressive is the age constancy is the remarkable synchronization of speech milestones with motor-developmental milestones...
>
> (1967, p.127)

and noted the fact that this speech/motor-developmental synchrony is unaffected by environmental differences such as the particular

language being acquired and the prevailing child-rearing practices (1967, pp.135-139).

The claim is not, of course, that environmental contingencies play *no* role in language acquisition, but that the way in which environmental stimulation is utilized during a particular phase of development is determined by internal biological factors. Of especial interest for the question of second language learning is Lenneberg's view that these biological factors impose age limitations on language acquisition:

> There is evidence that the primary acquisition of language is predicated upon a certain developmental stage which is quickly outgrown at the age of puberty.
>
> (1967, p.142)

According to Lenneberg, then, there is a 'critical period' for language acquisition between the onset of language around the age of two and the decay of language readiness at puberty.

The main plank of Lenneberg's argument - to which we shall return - has to do with the lateralization of language functions in the brain. However, he also cited (1967, pp.154-155) evidence with no specific bearing on the lateralization hypothesis; this concerned language development in the retarded and the effect of sudden deafness on language at various ages. In a three year observational study of fifty-four mongoloids (Lenneberg, Nicholas and Rosenberger 1964), Lenneberg and his collaborators had been able to record progress in language development only in children younger than fourteen years. This was taken by Lenneberg to constitute support for the view that the 'critical-period' for language-learning ends around puberty. He apparently did not take account of the fact that the study in question was of *abnormal* language development the relevance of which to normal language development was not beyond doubt. His evidence from

language-deafness, again based on his own observations, suggested that whereas children deafened before the age of two were no more easily trained in language skills than the congenitally deaf, those who lost their hearing after having been exposed - even for a short time - to the experience of language subsequent to the completion of their second year were much easier to train. Lenneberg interpreted this as indicating that the 'critical period' was to be seen as beginning around the age of two years.

The connexion between the 'critical period' and lateralization as proposed by Lenneberg (1967, pp.142-153) is succinctly summarized by McLaughlin as follows:

> Lenneberg reviewed the evidence for the phenomenon of cerebral dominance and concluded that in childhood the left hemisphere is ordinarily more directly involved in speech and language function than the right, though the right hemisphere is not passive with respect to verbal communication. As the child grows older, however, the two hemispheres become increasingly specialized for function, and eventually, with the completion of lateralization, the polarization of function between left and right takes place, displacing language entirely to the left and certain other functions predominantly to the right. If a lesion occurs in either hemisphere during childhood, this polarization cannot take place, and the language function - together with other functions - persists in the unharmed hemisphere.
>
> (McLaughlin 1978, p.49)

Using L. W. Basser's (1962) survey of the literature Lenneberg cited two kinds of evidence in support of his view that lateralization was complete by puberty: data from unilateral brain damage and data from hemispherectomies. He claimed that the former indicated that injuries to the right hemisphere caused more language disturbance in children than in adults, whilst the latter suggested (cf. the conclusion of Penfield and Roberts referred to above) that children were able completely to transfer the speech function to the less dominant hemisphere whereas adults

were not. Time limitations for language acquisition were thus linked by Lenneberg to 'the far-reaching plasticity of the human brain (or lack of cortical specialization) with respect to language during the *early* years of life' (Lenneberg 1967, p.154).

Lenneberg contended that cortical specialization and hence the loss of cerebral plasticity had deleterious effects on post-pubic second language learning:

> Most individuals of average intelligence are able to learn a second language after the beginning of their second decade, although the incidence of 'language-learning-blocks' rapidly increases after puberty. Also automatic acquisition from mere exposure to a given language seems to disappear after this age, and foreign languages have to be taught and learned through a conscious and labored effort. Foreign accents cannot be overcome easily after puberty. However, a person *can* learn to communicate in a foreign language at the age of forty. This does not trouble our basic hypothesis on age limitations because we may assume that the cerebral organization for language learning as such has taken place during childhood, and since natural languages tend to resemble one another in many fundamental aspects..., the matrix for language skills is present.
>
> (Lenneberg 1967, p.176)

Such sweeping statements about a post-pubic fall-off in the capacity to acquire a second language must be treated with caution. They seem to be based on personal impressions rather than hard evidence; indeed, only in the case of 'foreign accents' does the currently available evidence offer any real support to Lenneberg's position.

The above-quoted passage is reminiscent of Penfield's suggestion that second language learning in adulthood is 'unphysiological', so that Newmark and Reibel's critique of that suggestion (see above, p.22) would appear to apply. Lenneberg attempts to dodge such criticism by claiming that primary language acquisition in childhood provides a basis for a degree of second language

learning in adulthood thanks to linguistic universals ('natural languages tend to resemble one another in many fundamental aspects'). This can hardly be taken seriously, however. A command of these 'fundamental aspects' would fall very far short of enabling one to 'communicate in a foreign language'.

Actually, the whole question of the maturation of the brain and language acquisition has become highly controversial. There have been numerous challenges to Lenneberg's thesis. Krashen (1973, p.65) reanalyzed the data cited by Lenneberg from Basser, and pointed out that 'in all cases of injury to the right hemisphere resulting in speech disturbance, the lesion was incurred before five'. He further noted that 'studies that include description of children injured after five indicate that the effects of right lesions in older children is the same as in adults'. He was thus led to advance the hypothesis 'that lateralization is established around age five'. His review of the evidence concerning the ability of the minor hemisphere to take over the language function when the dominant hemisphere is disabled confirmed him in this conclusion.

> Actual data on transfer (of the language function) indicates that perfect transfer is definitely possible before five... Lenneberg (1967 : 152) notes that Basser's cases were injured "before teens" and uses this data as evidence that transfer is possible just up to puberty. Again, in all cases, the lesion was incurred before five. For lesions incurred during adulthood, complete transfer has not yet been reported...
>
> (p.67)

Marcel Kinsbourne (see, e.g., Kinsbourne 1975; Kinsbourne and Hiscock 1977) is sceptical about the whole notion of progressive lateralization:

> ...the concept that, in the course of maturation, the area of the brain involved with a given function progressively shrinks is a curious one, for which there is no model whatever

in the neurophysiological literature for any species.

(Kinsbourne 1975, p.245)

He is critical of the data used by Lenneberg to justify his claim that for children damage to either side of the brain is likely to cause aphasia. In particular he calls into question the trustworthiness and the representativeness of the case material, the reliability of the evidence cited for lateralized lesion and aphasia, and the logic of the inferences drawn. On the reliability of the evidence, for example, he has this to say:

> In order to bear on the question of right-hemisphere damage, the clinician who reports the case must show two things: 1) that the right hemisphere was selectively damaged, and 2) that language was thereby affected. Cases in the literature fall short on both these counts. It is at the best of times difficult to establish lateralization of brain damage in the absence of autopsy evidence or at least highly sophisticated neuroradiological or direct neurological evidence. In fact, Lenneberg's reported cases come nowhere near meeting adequate criteria for drawing such conclusions... The evidence...that language was indeed interrupted is equally fragile. In no cases are the results of speech and language testing reported, nor indeed is much heed paid to anything other than speech output. Usually the report amounts to no more than the observation that the child was not speaking to the clinician.
>
> (Kinsbourne 1975, pp.245-246)

In his view, Lenneberg's data accord only with the weaker claim that the younger brain is more adaptable, better able to transfer particular functions from one hemisphere to the other:

> ...if children really do recover more quickly from aphasia, this does not necessarily indicate that in children the right hemisphere is more involved in ongoing language control than it is in adults. It merely illustrates the greater plasticity of the less mature organism as it compensates for functional loss due to damage...
>
> (Kinsbourne and Hiscock 1977, p.174)

As Kinsbourne and Hiscock illustrate (pp.176-188), a great deal of recent evidence suggests that the lateralization of language functions is established much earlier than Lenneberg and indeed Krashen supposed. Much of this evidence comes from 'dichotic listening' tests, in which a different stimulus is delivered simultaneously to each of the subject's ears. Since it is known that information from each ear passes primarily to the contralateral hemisphere, from an advantage discovered for a particular ear for a particular stimulus it can be deduced that information from that stimulus is protessed in the hemisphere opposite. Now, many dichotic experiments (e.g., Bever 1971; Gilbert and Climan 1974; Ingram 1975) yield a right ear advantage for verbal material in children as young as two and three. The results of studies conducted by Kinsbourne himself and his associates, involving dichotic and other techniques, (reported in Kinsbourne and Hiscock 1977, pp.177-186) point in the same direction; laterality or asymmetry of function is detectable from a very early age.

> Asymmetries are seen in children as young as 3 years, and the asymmetries remain relatively constant until age 13.
>
> (Kinsbourne and Hiscock 1977, p.186)

In fact, evidence from experiments with infants suggests that lateralization may precede the onset of language. For example, Dennis Molfese (1977) reports that in an experiment testing the auditory evoked potential - 'the very gross response of a large population of neurons to the presentation of a stimulus' (p.21) - in the left and right temporal area of infants (mean age 5 - 8 months), children (mean age 6.0 years) and adults (mean age 24 years):

> Indications of differential hemispheric responding were present, not only in the response of the adults but in those of the infants and children as well. In fact, an analysis of variance revealed that the degree of laterality in the infants was actually greater than that of the adults

for both the speech and nonspeech stimuli.

(p.23)

The general pattern for all subjects was that for nonspeech stimuli there was a greater right hemisphere response and for speech stimuli a greater left hemisphere response (cf. Molfese, Freeman and Palermo 1975).

A similar asymmetry was revealed by a dichotic listening test using music and speech as stimuli which was administered to 48 infants (Entus 1977):

> In the speech experiment, 34 of 48 infants (71%) showed a right-ear superiority; and in the music experiment, 38 of 48 infants (79%) showed a left-ear superiority.
>
> (p.68)

> These results indicate that infants between the ages of 22 and 140 days display the typical adult pattern of lateral asymmetry for dichotically presented speech and non-speech stimuli. Functional asymmetries thus appear to be present at a very early age, possibly even at birth. One conclusion to be drawn from this is that the equipotentiality of the infant brain, whereby one side can readily take over the functions of the other, must be attributed to plasticity, rather than to a lack of hemispheric specialization.
>
> (p.71)

There is some counter-evidence to this view from scores on IQ tests. For instance Bryan Woods (1980) tested the Performance and Verbal IQ of 50 patients who had sustained unilateral non-progressive lesions during infancy or childhood. He regards his results as supporting the hypothesis that lateralization develops with age:

> ...perinatal lesions of the right hemisphere lower Verbal IQ ratings, whereas childhood lesions of the right hemisphere do not affect the verbal ratings. This more limited effect of 'later' right-hemisphere lesions is found even with damage incurred early in the first decade. It is compatible

> with the hypothesis that after very early unilateral lesions both sides of the brain have the potential for a widespread functional reorganization, but that this potential is gradually restricted in extent, particularly as regards the effects of right hemisphere lesions on left-hemisphere functions, as measured by Verbal IQ.
>
> (p.69)

It has to be said that the reliability of IQ tests in predicting language impairments is questionable since, as Maureen Dennis and Harry Whitaker point out, such tests do not directly measure knowledge of language structure (1977, p.99). However, Dennis and Whitaker themselves, after reviewing research dating back to 1868, and in the light of a study of their own of three children who had undergone hemispherectomy, conclude:

> Hemisphere equipotentiality does appear to make an untenable supposition about the brain because it neither explains nor predicts at least two facts about language - that the two perinatal hemispheres are not equally at risk for language delay or disorder and that they are not equivalent substrates for language acquisition.
>
> (p.103)

An interesting compromise theory is that the brain is already assymmetrically organized in infancy, but that further lateralization occurs subsequently. Morris Moscovitch takes this line, arguing (1977, pp.206-207) that the evidence which 'favors the notion that hemispheric differences in structure and function are apparent very early in development' does not necessarily point to the conclusion that 'lateralization is complete at this early stage'. His view is that, whereas the lateralization of certain 'low-level' functions of a phonetic and/or phonological character may be 'complete by the first year of life', the sensorimotor cognitive structures underlying the child's early use of syntax and semantics may be 'represented in both hemispheres', in which case 'his meaningful linguistic utterances will be mediated by both hemispheres', although

perhaps not to the same degree'. He suggests that 'language becomes more strongly lateralized to the left hemisphere' as the child's linguistic and cognitive skills develop.

Sandra Witelson (1977, p.269) adopts a similar kind of position:

> Left hemisphere specialization may be functional at birth...but this does not necessarily mean that it remains unchanged from infancy to senescence.

She takes the view that lateralization continues through childhood as a 'secondary manifestation of cognitive development':

> ...as a cognitive function develops which requires the type of processing for which the left hemisphere is specialized, then that cognitive function and any tasks dependent on such functions will be processed more by the left than the right hemisphere.

Evidence in support of the view that the right hemisphere at some stage participates in, or at least has the latent ability to participate in, the processing of language comes from studies of split-brain patients:

> In their studies of split-brain patients (patients whose cerebral commissures had been sectioned to prevent epileptic discharges from spreading from one hemisphere to the other), Sperry and his associates found that certain basic linguistic abilities are reflected equally in both the dominant and nondominant hemispheres. In these studies, (e.g., Sperry & Gazzaniga, 1967; Sperry, Gazzaniga, & Bogen, 1969; Gazzaniga, 1970) split-brain patients were tested for minor-hemisphere speech comprehension by being asked to retrieve unseen objects or carry out commands with the left hand. Since information from the fingers is projected on the contralateral hemisphere, such tests provide information about minor (right) hemispheric functioning. Similarly, a series of words was presented tachistoscopically to the minor hemisphere, and subjects had to indicate with the

left hand when the written word matched a spoken word.

(McLaughlin 1978, p.51)

What this appears to show is that, although the dominant hemisphere has a clear superiority in terms of verbal abilities, the minor hemisphere is nevertheless capable of certain kinds of linguistic processing. Some reaction time studies with normal subjects (Moscovitch 1973) also indicate that the minor hemisphere can perform adequately on verbal tasks that are relatively memory free. A 'strict lateralization model' which would restrict *all* language functions to the dominant hemisphere, would seem, therefore, to be ruled out.

One of Molfese's experiments also yielded results indicating developmental differences in hemispheric functioning. In this study (1977, pp.29-33) he measured the auditory evoked potential of six adults and eight neonates in response to a speech syllable into which, after fifteen repetitions, a voicing change was introduced which crossed the phoneme boundary. In five of the six adults the response came from the left hemisphere, whereas in the six infants in whom a response was registered both hemispheres responded in the same manner. This is taken by Molfese to suggest 'differences in hemispheric responding between neonates and adults'.

> Although some mechanisms may be present at birth that enable the neonate to detect certain acoustic changes, further hemispheric development and linguistic exposure may be necessary before the neonate's responses are comparable to those of adults.
>
> (p.33)

Some very recent findings appear to show that certain very specific language functions are *permanently* subserved by the right hemisphere. Eliot Ross (1980), having systematically examined patients with focal damage to the right hemisphere for disorders of prosody, comes to the conclusion that the prosodic

elements of language are a dominant feature of the right hemisphere and that the functional-anatomic organization of prosody in the right hemisphere mirrors the organization of 'propositional language' in the left hemisphere.

Finally on the question of lateralization and brain plasticity, mention should be made of Herbert Seliger's 'multiple critical periods hypothesis' (Seliger 1978). Like Moscovitch and Witelson, Seliger accepts the evidence of very early lateralization, but believes that lateralization is nevertheless a continuing process. He quotes evidence from three studies in support of this hypothesis - Alajouanine and L'hermitte 1965; Brown and Jaffe 1975; Brown and Hécaen 1976.

Alajouanine and L'hermitte found that similar cerebral lesions caused aphasic disorders which differed according to whether the injury was sustained by an adult or a child, and according to the age of the children. Brown and Jaffe found not only that different age groups exhibited different aphasias, but also that when the lesion was in the same area of the brain, types of aphasia ranged from general and widespread dysfunction at younger ages of onset to more specific types of dysfunction in later life.

> To Brown and Jaffe this indicates that there is a continuing process of specialization which is revealed by the type of aphasia. In other words, in the case of the child, no matter where the damage occurs, the disturbance to language will be much the same. In the case of the adult, the type of disturbance depends on where the lesion occurs.
>
> (Seliger 1978, p.15)

Brown and Hécaen found that anomalous dextrals (right-handers who were mixed dominant or not clearly left-lateralized) and about 30% of left-handers showed similar aphasia profiles to those of aphasic children. They concluded that these abnormal

groups were childlike in the sense that their language lateralization, as indicated by their aphasia type, represented 'a kind of arrest at the childhood stage' (Brown and Hécaen 1976, p.188).

From these findings Seliger argues that, just as each type of aphasia is determined by the state of the localization process at the moment of brain damage, so the acquirability of a particular aspect of language at a particular time may depend on the state of that same process. In other words, there may be a different time-table for the acquisition of different aspects of language, this timetable depending on the state of remaining plasticity in the brain. This would explain, says Seliger, why an authentic accent in a second language is not usually acquirable beyond puberty, whereas, for example, syntactic skills are acquirable much later in life. The evidence about the localization process being arrested in anomalous dextrals and some sinistrals is taken by Seliger to indicate that these populations maintain the state of plasticity necessary for certain kinds of acquisition far beyond what would be found in the normal population of right-handers. He proposes this latter hypothesis as an explanation for the fact that certain adult learners succeed in acquiring such subsystems as the phonology and phonetics of a second language, whilst the majority do not (cf. above, pp.4-5).

Clearly, the debate about language, lateralization and cerebral plasticity will continue. However, even at our present state of knowledge we are probably entitled to make the following observations:

(1) Any hypothesis which postulates a gradual shift from an absence of hemispheric specialization to hemispheric asymmetry in respect of language functions seems no longer to be tenable, since some degree of lateralization has been found to precede the onset of language.

(2) On the evidence, an exactly contrary position, which would rule out the participation of the minor hemisphere in language processing at any stage, would also be untenable.

(3) Those theories which appear to accord best with the evidence assume that cerebral asymmetry for language functions exists from infancy, but postulate an increasing specialization (i.e. decreasing plasticity) of these already lateralized substrates as the brain matures. Evidence from second language acquisition (and indeed from normal first language acquisition) seems to be consistent with such theories insofar as, unlike Penfield's and Lenneberg's accounts, they imply a process which 'continues through life' (Brown and Jaffe 1975, p.108) rather than a definite cut-off point for the acquisition of all aspects of language (age nine, puberty...). The evidence from the case-history of Genie also fits such theories better than earlier versions.

3. The thalamus theory

The thalamus theory, propounded by Heinz Paul Walz (1976), resembles Seliger's multiple critical periods hypothesis (see above, pp.35-36) in postulating different rates of development for areas of the brain subserving different language functions. It differs from this hypothesis in that whereas Seliger assumes a concentration of language functions in the cortex of a particular cerebral hemisphere (usually the left hemisphere), Walz places certain language functions ('grammar' and 'accent') in the limbic system (i.e. the area surrounding the brain stem), specifically in the thalamus.

Walz's argument runs roughly as follows (1976, p.101): damage to the cerebral cortex produces linguistic impairment 'with the exception of grammar and accent'; since grammar and accent are mastered 'at an early age' and, 'once mastery is

attained, the two remain virtually unimpaired', these functions are likely to be seated in an organ which is itself 'ready to function fully at a very early age' and remains 'relatively inviolate'; an organ which fulfils both these criteria is the limbic system.

Other linguistic functions (writing, spelling, comprehending, etc.) which are more vulnerable to impairment are assumed by Walz to be located elsewhere - namely in the cortex.

> In other words, the brain functions basically in discrete linguistic compartments, and not in terms of a comprehensive unit, which we call language. So far nobody has yet discovered the mechanism by which the brain turns the components into a synthesis of the final product.
>
> But basically it means that our linguistic faculties probably develop separately from each other at different stages and under different conditions and this will, among others, explain why a child can pick up the accent of a foreign-language without difficulty whereas an adult will only do so in exceptional cases.
>
> (1976, p.104)

The difficulty with this theory is that it predicts that the critical period for the acquisition of accent and grammar will end before the age of five, since 'the Limbic System is almost fully developed at the age of about four' (Walz 1976, p.101). This prediction is not borne out by the evidence. If there is a critical period for accent acquisition, it would appear to terminate around puberty, and as far as the acquirability of grammar is concerned, there is no real evidence of any cut-off point. Furthermore, as Ekstrand points out (1980), other neurological findings suggest that thalamic language functions are very primitive, and that language functions are, in fact, predominantly processed by cortical areas.

4. The cognitive developmental hypothesis

Some researchers, notably Stephen Krashen and Ellen Rosansky, have clung on to the notion that puberty marks the end of the critical period of language acquisition in general – almost despite the evidence. Krashen (1975) in what is arguably a rather selective review of research findings, claimed:

> The evidence *cited here* in general supports the existence of the critical period...
>
> (p.219; italics added)

The force of this statement is undermined somewhat by the qualifications that follow:

> The effects of puberty on language learning, however, may not be entirely devastating. The adult LAD [language acquisition device] still functions in some ways similar to those of the prepuberty learner, as evidenced by the occurrence of overgeneralization errors and the Bailey et al. result of invariant difficulty of function words in learners of English as a second language. When certain crucial elements of formal instruction are made available to the adult, his LAD is apparently able to function, at least in some ways not dissimilar to the child's.
>
> (p.219)

On the basis of a reanalysis of clinical data, Krashen had earlier (1973; see above, p.28) thrown doubt on Lenneberg's hypothesis that the critical period coincided with the process of lateralization, and had concluded that this process was complete at around five. He also noted (1975, p.219) the evidence that cerebral dominance had been detected in infants. The question he then posed was: if lateralization is not the basis for the critical period, what is? Rosansky (1975) followed a similar route; she also found persuasive the evidence against the hypothesis that lateralization continued until puberty, but placed her trust in the widespread 'solemn belief

in a critical period for language acquisition which ends around puberty' and in the 'anecdotal evidence and the personal experience of ESL teachers and researchers' which 'tell us that children learn second languages with greater facility and with better accents than do adults' (Rosansky 1975, p.94).

Krashen and Rosansky both found a possible basis for the close of the critical period in the work of Jean Piaget and his followers. According to Piaget, intelligence develops in an age-related sequence of stages. The new mental abilities which emerge at each of these stages are seen as determining the character and limits of what can be learnt during that period. David Elkind summarizes the Piagetian account of child development as follows:

> The first stage in the development of intelligence (usually 0 - 2 years) Piaget calls the sensory-motor period and it is concerned with the evolution of those abilities necessary to construct and reconstruct objects... The second stage (usually 2 - 7 years), which Piaget calls the pre-operational stage, bears witness to the elaboration of the symbolic function, those abilities which have to do with representing things. The presence of these new abilities is shown by the gradual acquisition of language, the first indications of dreams and night terrors, the advent of symbolic play... and the first attempts at drawing and graphic representation... at the next stage (usually 7 - 11 years) the child acquires what Piaget calls concrete operations, internalized actions that permit the child to do 'in his head' what before he would have had to accomplish through real actions... During the last stage (usually 12 - 15 years) there gradually emerge what Piaget calls formal operations and which, in effect, permit adolescents to think about their thoughts, to construct ideals and to reason realistically about the future. Formal operations also enable young people to reason about contrary-to-fact propositions.
>
> (Elkind 1970, pp.18-20)

For Krashen the relevant aspect of formal operations is the emergence of abstract thinking in the adolescent, the development of an interest in general 'systems' or 'theories' rather than *ad hoc* solutions (Inhelder and Piaget 1958, p.339). Krashen suggested

that this 'general tendency of adolescents to construct theories' (Inhelder and Piaget 1958, p.336) might inhibit the 'natural' and complete acquisition of a second language:

> ...the person who has reached the stage of formal operations may have not only the ability but also need to construct a conscious theory (a grammar) of the language he is learning.
>
> (Krashen 1975, p.220)

This, according to Ktashen, might cause the adult to adopt a rule-by-rule approach to language learning, and, since it is difficult to express all of a natural language in terms of isolated rules, might thus limit the adult's access to competence in the target language.

Rosansky's approach involves a more detailed examination of the relationship between language acquisition and 'decentration' - the process by which the development of thought, according to Piaget, 'moves from the egocentric to the sociocentric or from the highly personal and idiosyncratic ideas of young children to the socially validated and tested ideas held by older children and adults' (Elkind 1970, p.34). She apparently accepts the Piagetian view that language development is parasitic on general cognitive development:

> Language...begins to develop at the end of the sensorimotor period along side of other symbolic functions, that is other means of abstractly representing what the child knows. From the sensorimotor period the child continues to assimilate and accommodate his cognitive structures to new content. It is presumably during the course of progressive cognitive development with its gradual trend toward decentration that the child is also acquiring new linguistic forms - not as forms to be learned per se, but as vehicles for expressing his thoughts.
>
> (Rosansky 1975, p.95)

Initial language acquisition, on this interpretation, is associated with a self-centred, very limited perspective:

> ...initial language acquisition takes place when the child is highly centered. He is not only egocentric at this time, but when faced with a problem he can focus (and then only fleetingly) on one dimension at a time.
>
> (Rosansky 1975, p.96)

Piagetians claim that at later stages of development there is a growing tendency to compare and contrast:

> The awareness of contradictions seems to act as an incentive to decentration; the child begins to search for both the similarities and the differences between two problems...
>
> (Inhelder and de Zwart 1969, p.20)

It is this aspect of decentration that is postulated by Rosansky to be deleterious to language acquisition:

> We may speculate that if decentration is somehow inversely related to language acquisition ability (the ability to extract similarities in generative principles between 2 languages, in the case of second language acquisition), and if awareness of contradictions acts as an incentive to decentration, then perhaps what acts as a 'block' to language learning, is precisely the *awareness* of differences. This new consciousness of differences seems to supplant the child's previous limitation of being able to only focus on the underlying similarities.
>
> (Rosansky 1975, p.98)

There are a number of problems with the cognitive developmental perspective on the critical period - not least of which is its vagueness. This is symptomized by the fact that Krashen and Rosansky respectively isolate different aspects of cognitive growth as pertinent to the decline of the language learning faculty. For Krashen the operative phenomenon is the theorizing tendency of adolescents; for Rosansky it is their new awareness of

contradictions. Admittedly these two proposals are not incompatible, but the variation of emphasis exposes the fact that the modalities of the relationship between cognitive development and language development have yet to be worked out in the Piagetian scheme.

Schumann (1978) reports the view of Hakuta (1975) as follows:

> ...in order to test the formal operations hypothesis empirically, the exact aspects of the second language acquisition process that became difficult as a function of age would have to be specified. This has yet to be done.
>
> (p.105)

Significantly, Chomsky's criticism of the Piagetian approach to language acquisition in general has a similar basis. For example:

> As for Piaget's...claim that the facts for which an explanation has been offered in terms of a postulated genetically determined universal grammar can also be explained as the 'necessary' results of constructions of sensorimotor intelligence I will only say the obvious: The literature contains no evidence or argument to support this remarkable factual claim, nor even any explanation of what sense it might have.
>
> (Chomsky 1976, p.17)

Nor does the adoption of a Piagetian approach provide an escape-route from neurophysiological questions. Piaget certainly regards his model of cognitive development as biologically based:

> ...could we not say that...[the appearance of formal thought] is a manifestation of cerebral transformations due to the maturation of the nervous system and that these changes do have a relation, direct or indirect, with puberty? Given that in our society the 7-8 year old child (with very rare exceptions) cannot handle the structures which the 14-15 year old adolescent can handle easily, the reason must be that the child does

> not possess a certain number of coordinations whose dates of development are determined by stages of maturation. In a slightly different perspective, the lattice and group structures are probably isomorphic with neurological structures... For these reasons, it seems clear that the development of formal structures in adolescence is linked to maturation of cerebral structures.
>
> (Inhelder and Piaget 1958, pp.336-337)

Thus the problem of how cerebral structures are linked to language acquisition, remains - but at one remove.

Three further difficulties with the Krashen-Rosansky hypothesis have to do with its predictions. The first is aired by Krashen himself (1975, p.220). It is this: if, as Lenneberg claims (see above, p.25) the linguistic development of some mentally retarded children ceases at puberty, and if, as Krashen and Rosansky claim, the close of the critical period is caused by the onset of formal operations, then the implication is that these mentally retarded children reach the highest stage of cognitive development at puberty, i.e. at the same time as unretarded children.

The second difficulty is that, since the Krashen-Rosansky hypothesis claims that success at language learning depends on one's stage of cognitive development, it appears to suggest that people at roughly the same developmental stage should be more or less equally successful language learners. Schumann's findings, however, do not bear out this prediction:

> ...the results of the Piagetian testing that was done on the subjects in our study placed Jorge, Juan and Alberto at approximately the same developmental stage. However, both Jorge and Juan were considerably more successful language learners than was Alberto.
>
> (Schumann 1978, p.105)

The third difficulty is, of course, that the Krashen-Rosansky hypothesis predicts or assumes a marked change for the worse in overall language learning ability at puberty. As we have seen, the evidence for such a change is not overwhelming.

In addition to its logical aspects, Piaget's theory of cognitive development also has an affective dimension. The way in which Krashen and Rosansky take account of this latter is dealt with in the next section, which also covers a number of other proposals of an affective-motivational nature.

5. Affect and motivation

Apart from the most obvious physiological differences between children and their elders, probably what separates these groups in the popular mind is as much a matter of *feeling* as of *thinking*. The emotional life of adolescents and adults is widely assumed to differ from that of children. A number of researchers have invoked this affective difference in their attempts to explain the putative language learning superiority of children.

For those taking a Piagetian line on language learning, such as Rosansky and Krashen, affective factors are inextricably bound up with cognitive development (cf. above):

> ...it is the bias of this writer that...[affective and cognitive] factors cannot in any meaningful way be divorced one from the other, since it is likely that they interact in determining the receptivity of the language learner.
>
> (Rosansky 1975, p.94)

> Several scholars have linked the close of the critical period to so-called 'affective variables' (Taylor 1974; Stevick 1974). It may be the case, however, that certain of these personality changes occurring at puberty may themselves be a consequence of formal operations... According to Elkind (1970) 'the ability to think abstractly,

> a characteristic of formal operation, leads the child to conceptualize his own thought...' (p.66)... Another consequence, according to Elkind, is that the adolescent can now 'conceptualize the thought of other people...' (p.67). The adolescent's resulting self-consciousness, his reluctance to reveal himself, his feeling of vulnerability, may have a great effect on second-language learning.
>
> (Krashen 1975, pp.220-221)

The claim is, in other words, that insofar as the ending of the critical period has to do with affect, it is related to the egocentrism induced by the onset of 'formal operations' during early adolescence. One possible problem with such a claim is that this period of intense egocentrism is, according to Piagetian psychologists, transitory and quite short-lived:

> After the appearance of formal operational thought, no new mental systems develop and the mental structures of adolescence must serve for the rest of the life-span. The egocentrism of early adolescence nonetheless tends to diminish by the age of 15 or 16, the age at which formal operations become firmly established.
>
> (Elkind 1970, p.70)

If, therefore, this particular type of egocentrism is fastened on as the critical affective factor inhibiting language learning, the implication is that the language learner is thus inhibited for only two or three years. What seems to be further implied is that the language learner is less inhibited at sixteen than at fourteen years and that, accordingly, one is likely to be a more successful language learner in one's late teens than in one's early teens. This does not appear to be entirely consistent with Rosansky's and Krashen's general assumptions about the critical period (see above, pp.39-40) or indeed with such scant empirical evidence as there is in support of the critical period hypothesis (e.g., the evidence on accent acquisition; see above, pp.1-4).

An alternative account of age-related affective factors operative in second language learning is provided by the Freudian perspective. This links affective variables in language learning to the general development of the 'ego' and the 'super-ego'. The Freudian psychologist Erwin Stengel, for example, proposed an explanation of age-related differences amongst language learners - differences which he apparently regarded as self-evident - in terms of 'identification', 'super-ego' development, 'libidinal relations to objects' and 'narcissism' (Stengel 1939).

The process of 'identification' was described and illustrated by Freud as follows:

> ...the assimilation of one ego to another one, as a result of which the first ego behaves like the second in certain respects, imitates it and in a sense takes it up into itself... If a boy identifies himself with his father, he wants to *be like* his father...his ego is altered on the model of his father...
>
> (Freud 1964; reprint pp.94-95)

According to Stengel, identification, the desire to be like others, underlies the phenomenon of 'echolalia', i.e. the quasi-automatic repetition of words by children learning (and aphasics re-learning) language, but plays no role in normal adult language learning:

> In the process of the acquisition of a new language by an adult, we find hardly any trace of this involuntary repetition. The adult lacks this primitive mechanism of identification. In the child who is learning a new language it is often pronounced and the pleasure in a senseless repetition of words is characteristic.
>
> (Stengel 1939, pp.471-472)

In the Freudian scheme the process of identification is the basis for the development of the 'super-ego'. The child's tendency to identify with his parents (and, later, with other

authority-figures) leads to the formation of a set of internal inhibitions - in traditional terms, a conscience:

> Parental influence governs the child by offering proofs of love and by threatening punishments which are signs to the child of loss of love and are bound to be feared on their own account. This realistic anxiety is the precursor of the later moral anxiety. So long as it is dominant there is no need to talk of a super-ego and of a conscience. It is only subsequently that the secondary situation develops...where the external restraint is internalized and the super-ego takes the place of the parental agency and observes, directs and threatens the ego in exactly the same way as earlier the parents did with the child.
>
> (Freud 1964; reprint pp.93-94)

Stengel attributed to the super-ego a monitoring role in language use:

> It is obviously one of the functions of the super-ego to watch over the strict rules which regulate the relations between words and objects. In a state of weakness of the ego the severity of the super-ego relaxes. The ego is allowed to infringe these laws.
>
> (Stengel 1939, pp.472-473)

It is, according to him, the relaxing of the severity of the super-ego that is responsible for the kinds of aphasia which cause individuals to 'produce either wrong words or newly created words' (Ibid., p.472). A strict super-ego was claimed to be damaging in other ways:

> Each of us, and especially those of us with some traits of obsessional neurosis, is often haunted by doubts whether some chosen word really reflects the idea of the object. The obsessional neurotic character therefore slows down the acquisition of a new language... But even the normally developed super-ego of the adult has a retarding effect on the development of speech.
>
> (Stengel 1939, p.473)

Children, on the other hand, are not hampered by such inhibitions:

> The feeling that the relations betweeen the word and the idea of the object are bound by strict rules is a comparatively late acquisition of the super-ego... The young child does not suffer from such doubts. It is not afraid of wrong words and does not shrink from forming new expressions on the spur of the moment, if the one generally used is not at hand.
>
> (Stengel 1939, p.473)

By 'libidinal relations to objects' is meant the way in which the 'libido', in its later, comprehensive sense of 'life instinct,... all drives to survival as well as the instinctual sexual drive itself' (Stafford-Clark 1965, p.194), apprehends and assesses aspects of external reality in relation to its own needs and wants. Stengel assumed that 'our libidinal relation to an object denoted by a word in a foreign language is somewhat different from our relation to the same object denoted by a word in the native language' (1939, p.474), and suggested that this difference might have a connexion with the following phenomenon:

> ...the word 'slaughter-house', spoken in the native language, may produce the picture of a house, but in the new language the picture of the act of slaughtering an animal... Words in the native language call up a picture of a simple lifeless pattern, while the corresponding words in the foreign language are more primitive and concrete.
>
> (Stengel 1939, pp.473-474)

More generally, he saw libidinal relations to objects as a factor in the adult's resistance to a new language, and their less developed state in children as a factor in younger learners' greater openness to new languages:

> We feel an initial resistance against objects which we are compelled to denote by new names. Or, to put it another way, our resistance to every change in our libidinal relations to objects causes a certain amount of resistance to their new names. This resistance is naturally strongest

> in connection with objects which are nearest to our feelings. For children this source of resistance against a new language exists to a lesser degree. For here the change is not opposed by a rigid system of object relations.
>
> (Stengel 1939, pp.474-475)

In addition to the libido's relations with external reality, the Freudian psychologist also recognizes the existence of relations between the libido and the ego. The latter are subsumed under the label 'narcissism', which covers roughly what in layman's terms would be described as 'self-esteem', 'self-love', etc. For Stengel, narcissism permeates attitudes towards language and is operative in the different perspectives adults and children have in regard to their performance in a new language. Many adults, according to Stengel (pp.475-476) harbour the hope of 'converting the strangers to their own language', which they think of as more universal, richer, more advanced, even somehow truer than foreign languages.

Narcissism also, for Stengel, underlies the 'sense of shame' many adults feel when they start to use a new language

> This can be explained by the feeling of insufficiency. Acquiring a new language in adult life is an anachronism and many people cannot tolerate the infantile situation; their narcissism is deeply hurt by the necessity for exposing a serious deficiency in a function which serves as an important source of narcissistic gratification.
>
> (Stengel 1939, p.476)

Another factor related to narcissism is the existence of 'exhibitionistic impulses', which, in Stengel's view, are powerful motives both in encouraging and inhibiting language learning:

> Some persons in the first stage of using a foreign language, have a feeling as though they were wearing a fancy dress. Thus it is very probable that the feeling of shame...which often appears after a successful linguistic act, originates

> in exhibitionism. The child's position with regard to these difficulties is quite different. To give a young child a second language means to give him a second method of play. The impulse to communicate...makes use of the new language with pleasure. There is no fear of talking nonsense, for talking nonsense is a source of pleasure. Nor is there any fear of fancy-dress - the child loves to wear it. The adult will learn the new language the more easily, the more of these infantile characteristics he has preserved.
>
> (Stengel 1939, p.477)

Whilst Stengel's account, like many others, goes beyond what seems to be justified by the evidence in assuming differences between child and adult language learners, it does not postulate a rigidly defined critical period or cut-off point. Nor does it set hard and fast boundaries between what is possible for a child and what is possible for an adult. Rather, it suggests that the degree to which the child's approach to language learning persists into adulthood depends on general psychological development, and, indeed that this approach may be largely reverted to in certain (pathological) circumstances. Some measure of variability is also predicted by Alexander Guiora's proposals, which like Stengel's have a Freudian basis.

Guiora (1972) introduced a new construct - 'language ego' - which was represented as a sort of specialized linguistic version of the Freudian notion

> In a manner similar to the concept of the body ego, language ego too is conceived as a maturation concept and refers to a self-representation with physical outlines and firm boundaries.:. The permeability of the language ego boundaries, specifically the flexibility of the pronunciation boundaries is developmentally and genetically (in the psycho-analytic sense) determined. That is to say, pronunciation permeability will correspond to stages in the development of the ego; in the early formative stages of general ego development greater flexibility is allowed. Thus a child can assimilate native-like speech in any language. Once ego development is concluded, flexibility will be sharply restricted forever.
>
> (Guiora, Brannon and Dull 1972, p.112)

> In the early stages of development the boundaries of the language ego are in a state of flux and, hence, pronunciation ability is quite malleable... Once these boundaries become set...the ability to approximate authentic pronunciation in a second language will be drastically reduced.
>
> It is our contention that second language learning in all of its dimensions exerts a very specific demand with regard to self-representation. Essentially, to learn a second language is to take on a new identity. Since pronunciation appears to be the aspect of language behaviour most resistant to change, we submit that it is therefore the most critical to self-representation. Hence, we propose that the most sensitive index of the ability to take on a new identity, i.e., the degree of permeability of language ego boundaries, is found in the ability to achieve nativelike pronunciation in a second language. Considering the empathic capacity is also dependent upon the ability to partially and temporarily give up one's separateness of identity, we propose that individual differences in the ability to pronounce a second language should reflect individual differences in empathic ability.
>
> (Guiora, Beit-Hallahmi, Brannon, Dull and Scovel 1972, p.422)

John Schumann (1975b) suggested that Guiora's concept of ego permeability might, insofar as it was seen as an 'internal' as well as an 'external' phenomenon, be related to a notion expounded by another Freudian theorist, Ernst Kris. Kris'(1952) proposed the idea that in many types of creative processes the ego undergoes a controlled or adaptive 'regression', that is to say, relaxes and reverts from 'secondary process' to 'primary process' thinking.

> Secondary process is the normally dominant mode of thought for the mature ego. It is primarily verbal and follows the usual laws of syntax and logic. Primary process thinking, on the other hand, is an attribute of those childhood years when the ego is still immature. Primary process is characterized by the absence of negatives, conditionals or other qualifying conjunctions. It has no sense of time and does not distinguish among past, present and future. Opposites can appear in place of one another and mutually contradictory ideas can exist in harmony. Also, a part of an idea or an object can represent the whole and several different thoughts can be represented by a single thought or image (Brenner 1957). It is possible that primary process

> modalities provide an appropriately unbiased mental set in which the second language can be acquired, and that successful adult second language acquisition is accomplished by the learner's access to primary process through an ability to undergo an adaptive regression.
>
> (Schumann 1975b, pp.223-224)

As far as the 'external' dimension of ego permeability is concerned (i.e. the way it relates to what lies outside the individual organism), the above quotations from Guiora *et al.* make it clear that this is conceived as very much bound up with 'empathic capacity'. For Guiora, second language learning 'poses a challenge to the integrity of basic identifications', since it demands that the learner 'step into a new world' and 'take on a new identity' (Guiora, Brannon and Dull 1972, pp.111-112). He defined 'empathy' as

> a process of comprehending in which a temporary fusion of self-object boundaries, as in the earliest pattern of object relation, permits an immediate emotional apprehension of the affective experience of another, this sensing being used by the cognitive functions to gain understanding of the other
>
> (Guiora 1972, p.142)

and claimed that people

> who are more sensitive in their interactions with others, who are more receptive to subtle cues of behavior and feelings, would have an enhanced capacity to discern those clues and nuances which, when incorporated in speaking, produce authentic native-like pronunciation.
>
> (Taylor, Guiora, Catford and Lane 1969, p.463)

Some of the experiments carried out by Guiora and his collaborators to test this hypothesis (Guiora, Lane and Bosworth 1967; Taylor, Guiora, Catford and Lane 1969; Guiora, Brannon and Dull 1972) were rather inconclusive in their results. However,

one of Guiora's experiments did seem to confirm at least his general line of thinking (Guiora, Beit-Hallahmi, Brannon, Dull and Scovel 1972). It involved assessing subjects' pronunciation of a second language after the ingestion of alcohol. Guiora viewed the lowering of inhibitions through alcohol as a means of 'operationally inducing a state of greater permeability of ego boundaries or the ability to partially and temporarily give up one's separateness of identity' (Guiora, Beit-Hallahmi, Brannon, Dull and Scovel 1972, p.427). In fact, Guiora and his associates found that the consumption of small amounts of alcohol did actually improve their subjects' pronunciation of the second language.

Such findings cannot be taken as anything like proof of Guiora's hypothesis. His 'chain of reasoning (lowered inhibitions induced by alcohol produce permeability of ego boundaries which is the essential component of empathy)...may be intuitively appealing, but...nevertheless must be seen as an unsubstantiated assumption' (Schumann 1975, p.224). In any case, it has to be said that the precise terms of Guiora's hypothesis are not entirely clear. There seems to be some uncertainty as to whether 'empathic capacity' is seen as related to authentic pronunciation alone or to second language performance in general:

> ...we believe that the findings lend conclusive support to our view *that pronunciation ability is indeed a unique feature of second language learning in that individual differences in that skill appear to be directly related to flexibility of psychic processes as contrasted with highly integrated ego functioning which plays a major role in learning and manipulating grammar, syntax and vocabulary.*
>
> (Guiora, Beit-Hallahmi, Brannon, Dull and Scovel 1972, p.427; italics added)

> ...I would submit *that empathic capacity is related not only to pronunciation ability, but also, in yet to be determined ways, to the overall capacity to acquire a second language,* i.e. to incorporate a new system of communication.
>
> (Guiora 1972, pp.145-146; italics added)

If the hypothesis posits a unique relationship between empathic capacity and pronunciation, then, taken together with the claim that 'pronunciation permeability will correspond to stages in the development of the ego' (Guiora, Brannon and Dull 1972, p.112), this might provide an alternative to the 'multiple critical periods hypothesis' in accounting for the evidence which suggests that the capacity to acquire an authentic accent is uniquely vulnerable to age-related deterioration (see above, pp.1-9). If, on the contrary, empathic capacity is linked to overall language learning capacity, this may have relevance to the phenomenon of successful adult second language learning in general and to the view that, in principle, *any* adult can become a successful language learner:

> If we accept that 'lowering inhibitions' is necessary for the acquisition of a second language in general, then the fourth experiment [i.e. the one involving the ingestion of alcohol] assumes a special importance because it does not view ego flexibility and hence empathic capacity as a stable state found in certain adults but not in others. Instead it views ego flexibility as inducible. If artificial agents such as alcohol can foster permeability of ego boundaries and reduce inhibitions then it would not be unreasonable to assume that given the right concatenation of natural psychological factors, permeability of ego boundaries might be possible for everyone.
>
> (Schumann 1975b, p.226)

John Schumann (1975a, 1975b, 1978) has placed Guiora's work on 'ego permeability' and 'empathic capacity' in the perspective of other research and speculations concerned with acculturation and with attitudes and motivation. Collating material from these various lines of investigation Schumann finds 'several indications...that language learning difficulties after puberty may be related to the social and psychological changes an individual undergoes at that age' (1975b, p.229).

Acculturation is relevant to the case of the second language learner actually living in a community where the language in use is not his own first language:

> ...upon entering the community the learner is faced with several problems that can produce negative reactions to the new language and its speakers. These reactions often interfere with second language learning.
>
> (Schumann 1975b, p.210)

> Within the area of acculturation (Larsen and Smalley 1972, Nida 1957-58) are such factors as culture shock and culture stress; these can be defined as anxiety resulting from the disorientation encountered upon entering a new culture.
>
> (Schumann 1975a, p.25)

As long as such anxiety persists it is likely to hinder its sufferer's learning of the language associated with the culture in question.

Various researchers have identified the crucial factor in overcoming 'culture shock', 'culture stress' and indeed 'language shock' (cf. quotations from Stengel, above pp.49-50) as the degree of willingness of the learner-alien to accept for a time a position of child-like dependence on others. Such researchers have assumed that children are more willing to accept this kind of position than adults, and that herein lies an explanation for the supposed superiority of children as second language learners. This is certainly the view of Larsen and Smalley:

> What the learner needs is a small community of sympathetic people who will help him in the difficult period when he is a linguistic and cultural child-adult. He needs a new family to help him grow up.
>
> (Larsen and Smalley 1972, p.46)

> As puberty approaches and the individual is concerned with the consolidation of his personality, it apparently becomes more difficult for him to submit to the new norms which a second language requires. As an individual's dependence on others gives way to his own independence in satisfying needs, there seems to be less pull toward the internalization of new norms required by a second language.
>
> (Larsen and Smalley 1972, p.160)

Such considerations may be relevant to the generality of second language learners. According to C. A. Curran (1961),

> ...children acquire second languages more easily than adults because they are less threatened by the sounds of the new language and because they are willing to depend on others for support in learning. The adult, on the other hand, has acquired a basic security in his own language and is not ordinarily threatened by rejection when he speaks it. But when he attempts to communicate in the new language his normal linguistic securities are undermined, and he finds himself in a dependent state which he may resist.
>
> (Reported by Schumann 1975b, p.230)

The influence of attitude and motivation on second language learning has been the subject of a series of investigations carried out by Wallace Lambert, Richard Gardner and their collaborators (see, e.g., Lambert and Klineberg 1967; Gardner 1968; Lambert, Gardner, Olton and Tunstall 1970; Gardner and Lambert 1972; Gardner, Smythe, Kirby and Bramwell 1974). Lambert and Gardner were led by their research to the view that intelligence and aptitude on the one hand and attitudes and motivation on the other operate as independent variables in second language learning. As far as attitudes and motivation were concerned, they isolated two orientations - instrumental and integrative:

> Social psychologists would expect that success in mastering a foreign language would depend not only on intellectual capacity and language aptitude but also

> on the learner's perceptions of the other ethnolinguistic group involved, his attitudes towards representatives of that group, and his willingness to identify enough to adopt distinctive aspects of behavior, linguistic and non-linguistic, that characterize that other group. The learner's motivation for language study, it follows, would be determined by his attitudes and readiness to identify and by his orientation to the whole process of learning a foreign language. We saw many possible forms the student's orientation could take; two of which we looked at in some detail: an 'instrumental' outlook, reflecting the practical value and advantages of learning a new language, and an 'integrative' outlook, reflecting a sincere and personal interest in the people and culture represented by the other group. It was our hunch that an integrative orientation would sustain better the long-term motfvation needed for the very demanding task of second-language learning.
>
> (Gardner and Lambert 1972, p.132)

This hunch was confirmed:

> ...we find that an integrative and friendly outlook toward the other group whose language is being learned can differentially sensitize the learner to the audio-lingual features of the language, making him more perceptive to forms of pronunciation and accent than is the case for a learner without this open and friendly disposition. If the student's attitude is highly ethnocentric and hostile, we have seen that no progress to speak of will be made in acquiring any aspects of the language. Such a student not only is perceptually insensitive to the language, but apparently is also unwilling to modify or adjust his own response system to approximate the new pronunciational responses required in the other language.
>
> (Gardner and Lambert 1972, p.134)

However in certain types of setting the instrumental orientation was quite adequate:

> For example, we found that Filipino students who approach the study of English with an instrumental orientation and who receive parental support for this outlook were clearly successful in developing proficiency in the language. Thus, it seems that in settings where there is an urgency about mastering a second language - as there is in the Philippines and in North America for members of linguistic

> minority groups - the instrumental approach to language study is extremely effective. Nevertheless, for another subgroup of Filipino students an integrative orientation toward the study of English had a striking effect on proficiency, especially the audio-lingual aspects.
>
> (Gardner and Lambert 1972, p.141)

Age may well play a role in this integrative-instrumental polarity. There is evidence to suggest that children of around the age of ten are less likely to be hostile to cultures other than their own (i.e..more likely to be integratively oriented) than older (or indeed younger) children:

> In a cross-national study of children's views of foreign peoples Lambert and Klineberg (1967) found that the age of ten or so is perhaps the most beneficial developmental period for introducing cultural differences. It is at this age level that children are more likely to view foreign people as different but at the same time interesting. After the age of ten (and before it) children tend to associate 'different' with 'bad'.
>
> (Schumann 1975b, p.230)

According to Schumann (1975b, p.230) the findings from these various areas of research converge, at least in general terms, and conspire to suggest 'that social and psychological maturation may be as important or even more important than neurological maturation in accounting for difficulties in adult second language learning'. If this is indeed the case, then cases of successful adult second language learning may be explained by the fact 'that under certain conditions adults can overcome the social and psychological barriers of their learning'.

Schumann has been led by this apparent convergence - as well as by the deficiencies of neurological and cognitive accounts - to claim that age-related differences amongst language-learners are best explained in terms of the 'affective argument'

The affective argument assumes that when the learner has empathic capacity, and motivation and attitudes which are favorable both to the target language community and to language learning itself, the psychological distance between the learner and the TL group will be minimal and the learner's cognitive processes will automatically function to produce language acquisition. The affective argument would claim that in children empathy, motivation and attitudes are generally favorably tuned or at least sufficiently neutral so that when exposed to the target language, the child's cognitive processes will function to produce language learning. In adults, however, the development of firm ego boundaries, attitudes and motivational orientations which is concomitant with social and psychological maturation, places the learner at a psychological distance from the TL group such that the cognitive processes may be blocked or at least inhibited from operating on the target language data to which the adult learner is exposed. Unlike biological maturation, however, social-psychological maturation is not unalterable. As suggested above, under the right conditions the affective factors in the adult can be ameliorated to permit successful second language acquisition. It should also be noted that since affective influences on second language learning are not strictly related to maturation, unfavorable parental attitudes toward the target language or its speakers can influence the child's affective factors and also inhibit his acquisition of the second language.

The affective argument would maintain that children are no better equipped cognitively to learn a second language than are adults. Thus in terms of cognitive ability both are equally capable of becoming bilingual. Macnamara (1973) takes the same position. He argues that children exposed to speakers of the target language learn better than adults because they get involved in *real communication* in order to understand what their peers are saying to them and in order to make what they want to say clear to their peers. He feels that adults do not learn second languages to the extent they do not get involved in such vital communication. If this is true, then the question becomes why don't adults become involved in real communication? The position most consonant with the affective argument is that problems with the adult's attitudes, motivation and/or empathic capacity which are brought about by either general social-psychological development or language and culture shock prevent him from getting involved in communication which will lead to successful second language acquisition.

(Schumann 1978, p.107)

The 'affective argument', like other hypotheses relating to the age factor in language learning, is vulnerable to the criticism that what it sets out to account for may not actually exist (except to a very limited extent). Proponents of this kind of argument are also faced with the difficulty that 'empathy', 'anxiety', 'attitude', etc. may be less accessible to scientific description than, say, the physiology of the brain.

The main advantage of the 'affective' approach has already been mentioned in regard to Stengel's account (cf. p.51 above). It is that, since such an approach does not postulate a rigid maturational programme for language learning, it allows for the possibility of completely successful second language learning at pretty well any age. This is an advantage in two senses: on the one hand, it accords with the observed fact that some adults do learn second languages very successfully; on the other, of all the theories presented above, it is the one that is likely to hold most appeal for those trying to teach languages to adults and indeed for the adult learners themselves!

Concluding remarks

Scientific evidence for a general age-related deterioration in the capacity to learn a second language is scanty. Indeed, most of the available hard evidence seems to point in precisely the opposite direction, except in respect of accent acquisition. Whether or not age has any real or substantial influence on second language learning remains, therefore, very much an open question.

Of the theories that have been proposed to account for the age factor in second language learning - if it exists - those which seem to be most consistent with the evidence are those which do *not* sssume a sharp cut-off point for all aspects of language acquisition. The 'multiple critical periods' hypothesis favoured

by researchers such as Herbert Seliger and 'affective' approaches of the kind adopted by John Schumann have in common the fact that they meet this criterion, albeit in different ways.

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