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Language acquisition at different ages

1. Introduction

Amongst the various properties in which humans differs from any other species, it is perhaps the ability to convert thoughts, feelings and wishes into soundwaves, to transmit those to others and thus to influence their thoughts, feelings and wishes, and eventually their behaviour, which is most fundamental. It is language which allows human beings an orientation in their environment different from that of a monad in a world defined by the laws of prestabilised harmony, different from that of an ant in a world ruled by the rigid interaction principles of the ant heap. The verbal transmission of all sorts of theoretical and practical knowledge handed down from one generation to the next, on the one hand, and of rapidly changing, situation-bound informations, on the other, sets the stage for that particular type of behaviour which we consider to be human. It is language which makes possible all higher forms of cognition as well as that particular kind of interaction between members of a species which is characteristic of human beings. We can imagine a "mind" without language, but surely not a human mind without language. We can imagine a society without language but not a human society without language.

We are not born with a language in our head. No new-born child knows English, Chinese, or Mopan. At birth, the child is literally an "infans" - someone who does not speak. But every new-born is able to learn English, Chinese, Mopan, or any other language spoken in the social environment in which he (or she) grows up. Thus, the individual's capacity to speak and to understand a particular language - the linguistic competence -, has two quite different but equally indispensable sources:

- A. The innate, genetically transmitted language capacity, which - distinguishes us from any other species
 - seems to be more or less the same for all human beings, and
 - is neutral with respect to the properties of any particular language.

- B. The socially transmitted knowledge of what is particular to, for example, English as compared to any other language: the child's innate language capacity has to be applied to a particular "input" - - the structured and meaningful sound waves produced by parents, siblings, and other people in the social environment.

There is no doubt that both components are necessary conditions for the acquisition of a language. Opinions vary, however, with respect to their precise nature and their relative weight in this process and its final outcome.

We all learn one language in the first years of our life - our mother tongue. But the capacity

to acquire a language does not disappear with childhood. In fact, most people on earth know more than one language. It is common, therefore, to distinguish between first language acquisition (abbreviated FLA) and second language acquisition (SLA). This simple opposition is a gross simplification, however, for at least two reasons. First, whereas first language acquisition normally has a clear onset defined by biological factors, this is not the case for the acquisition of a second language: it may start at any age and, more importantly perhaps, at any point during the acquisition of the first language - including the borderline case in which two languages rather than one are learned right from the beginning ("bilingual first language acquisition"). Since we are here mainly interested in potential differences of language acquisition over the life-span, we will, a few side remarks aside, exclude all cases of temporal overlapping and contrast the child's normal first language acquisition with second language acquisition by the adult. In fact, it is not entirely clear when FLA really comes to an end. The answer varies with the particular linguistic features considered. Phonology is normally fully mastered at school age, whereas there is evidence that important syntactic regularities are not mastered before age nine or ten, and the acquisition of individual lexical items only ends with death. It seems fair, however, to assume that first language acquisition is completed at puberty. In what follows, we shall therefore consider puberty to be the dividing line between first and second language acquisition.

Second, whereas FLA is relatively uniform in that it is always directly based on the child's exposure to real language in everyday situations, this is not so for second language acquisition. It may occur, too, in everyday interaction with the speakers of the language to be learned - as is the case, for example, of a Moroccan worker coming to Holland without knowing a single word of Dutch. But it may also be the result of explicit teaching in the classroom - as in the case of Latin classes, to give a particularly extreme example. There are all sorts of transitions between these extremes of "spontaneous" or "non-guided" acquisition and "tutored" or "guided" acquisition. Most research of second language acquisition actually deals with learning in the classroom. This has practical reasons. It is much easier to record and to analyse the performance of students than to follow the erratic ways of an adult foreign worker struggling with an often hostile social and linguistic environment, and it is also felt that the results of this research are particularly useful for educational purposes. But classroom acquisition reflects not so very much the normal functioning and the regularities of the human language learning capacity rather than the effect of particular teaching procedures. The child as well as the non-guided adult learner develop their growing knowledge by an interpretation of sound waves in context - a complex process which leads, among others, to a certain order in which the various linguistic properties are learned. The class-room learner is faced with a fixed syllabus that defines the order of acquisition - perhaps totally against the "natural order". Therefore, if we want to understand the nature of the human language capacity and its functioning at various ages, we must compare first language acquisition with "natural" second acquisition outside the classroom.

Everyday experience tells us that there is at least one salient difference between first language acquisition and second language acquisition (in the narrower sense explained above; henceforth, I shall use it only in this sense, unless said otherwise). The child normally attains "full mastery" - not in the sense that no more could be learned (not every fluent speaker of English is a Shakespeare) but in the sense that there is no noticeable difference to the language of the social environment.¹ This is hardly ever the case for the adult second language learner: normally, his/her acquisition stops at a level which is still very far from the language of the "natives". Typically, SLA "fossilises" at some stage whereas fossilisation in FLA is considered to be pathological. Why this difference?

Apparently, it must have to do either with age - child versus adult - or with the fact that in

SLA, there is already the first language which, in one way or another, blocks full acquisition of another one. The latter assumption is not very appealing, given what we know about almost unlimited storage capacities of the human brain, and it is clearly falsified by the fact that SLA **before** puberty, say at the age of six, normally does not fossilise. Hence, the difference seems to be a clear age effect -the "LA age effect": The language learning capacity does not disappear after puberty, but it changes, and apparently becomes much less efficient. As any other cognitive capacity, the capacity to learn and to use languages is stored in the brain. Therefore, it seems most natural to relate the LA age effect to changes in the brain. The most radical claim to this effect is probably Lenneberg's theory of a "critical period" during which the brain is receptive for language acquisition (Lenneberg 1967). Later research did not confirm this theory (see, for example, Lamendella 1977, Long 1990, Pulvermüller and Schumann 1993), and in fact, any account in terms of purely biological changes in the brain faces a number of problems. First, there is clear evidence that it is atypical but not impossible to learn a second language after puberty to perfection - in the sense that the natives do not notice any difference (for a recent discussion see Birdsong 1992). Over more than one thousand years, all European scholars had to learn Latin in school - as a second language. Not all of them became perfect - and in fact, there are many mediavel jokes about the bad Latin of the clergy. But very many indeed attained "full mastery". Cicero would have frowned when reading the writings of St. Thomas or Newton, but because of the content, not because of their language (except a few new words perhaps).² Second, there are many biological changes in the brain during the life span, but it is difficult to relate them causally to the phenomenon at hand. And third, the notion of an "age difference" between a child learner and an adult learner collapses at least three types of development:

(a) Biological development. It includes all physiological changes of central and peripheral organs which are somehow involved in language, that is, of some parts of the brain, but also of ears and articulatory organs.

(b) Social development. A child born in a Chinese speaking environment does not just learn Chinese as a mother tongue; in doing so, he or she becomes at the same time a member of a particular social group, with particular norms, particular convictions, particular forms of social behaviour, in brief: learning a first language means at the same time to gain a particular social identity. The adult second language learner, for example a Moroccan foreign worker coming to Holland, has such a social identity when he starts to learn Dutch. In terms of two classical definitions of a human being: for the child to learn a language does not just mean to become a "zoon logon echon" but also a "zoon politikon" whereas this is not the case for the adult learner. It is open to which extent this developmental difference affects language acquisition but it is surely a factor which has to be taken into account.

(c) Cognitive development. It is open, and a matter of much dispute, to which extent linguistic development depends on cognitive development, and vice versa (Bowerman and Choi 1991, Behrens 1993). But there are some salient examples which show that the interaction is strong. In English, as in all Indo-European languages, the finite verb is marked for tense, i.e., with each sentence, the speaker is simply forced to express a temporal marking such as past, present, or future - whether he wants this or not. This requires not only mastery of a particular morphology on the verb but also a particular conceptualisation of time which varies, within limits, from culture to culture. Therefore, children must not only learn a set of language-specific linguistic means, such as the inflectional morphology of the verb; they also have to elaborate a usually quite complex concept of time which underlies the use of the

language-specific expressions. It is complex because it not only involves temporal relations such as before, after, simultaneous but also the handling of "deixis" and other forms of context dependency. Time, as expressed by natural languages, is not absolute but varies with one or even sometimes two changing "reference points." A similar argument can be made for many other cognitive domains normally reflected in language, such as the expression of space, of possession, of modality, etc. The adult learner, by contrast, already has such a cognitive system, and many ways are imaginable in which this fact may affect his acquisition of a second language.

In short, a child's acquisition of his (or her) mother tongue and the adult's acquisition of a second language in social context share a number of features, but they also differ in many respects, and if we want to understand these processes and how they vary with age, we must have a closer look at the various determining factors. In the next section, I shall sketch, in very global terms, what these factors are and how they vary. In section 3, we present some empirical findings which exemplify the LA age effect, and in section 4, we will discuss how these differences can be explained. Given the state of our knowledge in this field, the discussion can hardly be more than a series of speculations of what may be the case, rather than solid conclusions of what is the case. The paper closes with a look at the possibility that there is specific "language module" in our brain which is responsible for first languisition but no longer available after a certain age and thus causes the LA age effect.

2. A global model

Imagine that you are a 22 years old Moroccan hired to work in a Dutch factory in the city of Tilburg. You do not know a single word of Dutch, in fact, of any other language than your home dialect, and upon arrival, it turns out that the job does not exist. For some reason, you do not want, or are not able to, return but decide to stay in Tilburg, and you are lucky enough to find some temporary occupation. In such a situation, you better learn the language. What are the factors that make the start of this acquisitional process possible?

First, there must be a reason for the learner to solve this complex and tedious task of learning the language, a kind of motivation or, as I shall say, a propensity. Such a propensity must also be present in other types of language acquisition, in particular in FLA, albeit perhaps of a very different nature. The learner need not be aware of the nature of his/her propensity, and in the case of FLA, he/she surely is not. Clearly, different types of propensity may lead to very different acquisition processes, and hence, this factor is another possible cause of the observed differences in the final outcome.

Second, the learner must possess - still possess - the capacity to acquire a language and to make appropriate use of the acquired knowledge for communicative purposes. In the psycholinguistic literature, this capacity is often called the language processor. It encompasses a number of very heterogeneous, but well-coordinated sub-faculties, such as

- the ability to discriminate speech sounds and to produce them correctly;
- the ability to decompose sound chains into smaller units and to relate these units to particular things or events in the social environment, i.e., to identify lexical units;
- the ability to remember these sound-meaning relationships and to combine them appropriately to larger units (phrases or sentences),

and so on. It is an interesting question whether these abilities are "domain-specific", i.e., whether they are only observed in the acquisition and processing of linguistic knowledge, or

whether they are just a special application of more general mental and biological capacities. Whereas this latter view seems more parsimonious, an influential school in linguistics, generative grammar, advocates the latter view - the language processor is a special, domain-specific component in the human mind, the "language module". We shall return to this question in section 5.

These two conditions, propensity and language processor, do not suffice, however. Should you avoid any contact with the Dutch community, or should they refrain from talking to you, it is not very likely that you will make much progress with your acquisition of Dutch. A further, obvious condition is therefore access to the language to be learned (the target language), and that means here: access to specimen of sound waves structured according to the regularities of the target language, and used appropriately in context for communicative purposes.³

Each of these three components is indispensable for language acquisition, each of them may vary considerably. The propensity may be very different for child and adult. In the adult's case, it varies with the learner's particular communicative needs and life plans, it is also very different for language in the classroom and outside the classroom. The language processor may undergo considerable changes with age, some of which were mentioned already: biological changes in the brain, but also deteriorating capacities of audition or muscular control of the articulatory organs, or simply expanding knowledge which make some things easier, and others more difficult. Access may vary both in amount and type. In the child's and in the foreign worker's case, it is given by sound waves and accompanying information; in the classroom case, an essential part - if not the largest part - consists of a metalinguistic description of the target language. If we want to understand why some types of language acquisition differ substantially from others, we must carefully determine the particular constellation of these three factors.

Suppose now all three components are given; then, the process of language acquisition will begin. It will last for many years, and its course will be characterised by a certain structure - the many phonological, syntactical, morphological, lexical properties of the target language, Dutch in this case, will be acquired in a certain order. This order, and hence the structure of the acquisitional process, may vary considerably - depending on factors such as frequency of occurrence, communicative importance of certain forms and constructions, the ease with which they are perceptually or cognitively processed, and perhaps others.

What also varies, is the speed of the acquisitional process; it depends on factors such as the strength of the propensity, the excellence of the language processor (there are gifted and less gifted learners), the amount and perhaps type of access, and the like. Speed may also change during the acquisition process, for the very reason that the three factors access, propensity and language processor change. After some time, the most vital communicative needs are perhaps satisfied, and hence, the tempo slows down; then, for some change in the social conditions, it might speed up again. In any event, the process ceases at some point: the learner has reached a certain end state. This end state is normally not absolute: little changes may still occur, for example some new words may be learned. But basically, the acquisitional process has come to a close. As was said above, in FLA, this point is normally reached when the learner's language does not significantly differ from that of his or her social environment, whereas in SLA, it normally ends much before.

The question naturally arises whether the premature end of SLA is the only substantial difference between FLA and SLA, or whether we observe a similar variation also in structure and in speed. We shall now discuss all three cases in more detail.

3. The LA age effect: Where are the differences?

3.1 Speed: a common myth

There is hardly any comparative research on the speed of language acquisition. Therefore, the question as to potential differences between FLA and SLA in this respect is largely a matter of speculation. What can be said, however, is that a common view held by the layman but also by numerous linguists is false - the view that first language acquisition is an amazingly rapid process, given the complexity of the task. We all are usually surprised and pleased to see this sudden explosion in the linguistic skills of children between about one and three years of age, especially if it is our own children. But this impression is somewhat misleading. Even though a child at school age is normally very fluent in his or her language, closer inspection shows that many important structural features are not mastered before nine or ten⁴. This means that the entire process of FLA extends over at least ten years; counted by the hours of exposure to the target language and the possibility to use it in social context, this is much more time of access than is given to the average second language learner. Hence, the common notion that FLA is much faster than SLA is somewhat doubtful, to say the least. If there are strong differences between FLA and SLA, speed is not the likeliest place to look for.

3.2 End state: the selectivity of fossilisation

The mere fact that SLA normally ends far before complete mastery is beyond any doubt. But this "fossilisation" does not affect all aspects of linguistic knowledge in the same way. Mastering a language requires, among others, knowledge of

- phonological rules, segmental (correct sound structure) as well as suprasegmental (correct intonation and stress patterns);
- morphological rules, in particular inflection of nouns and verbs;
- syntactical rules, such as word order, phrase structure, government relations, etc.
- lexical items (vocabulary) and their correct use.

Fossilisation affects these components to a different extent. There are no really reliable comparisons of lexical richness between children and adults after the same exposure to the target language. It appears, however, that adults normally have no problem to learn a lexical item whenever there is need; apparently, there is no substantial fossilisation in the growing vocabulary (cf. Broeder et al 1988).

The extreme opposite is phonology; even on a very advanced level of syntax or vocabulary, the adult learner is typically identified as such by his or her "foreign accent". The point is strikingly illustrated by cases such as the Polish-born writer John Conrad, whose mastery in written English was far beyond that of the normal English speaker of his time but who never acquired an authentic English pronunciation.

Fossilisation also strongly affects morphology; in fact, many second language learners stop at a level where the words are strung together without any sign of inflection. This has consequences for the syntactical organisation of their utterances as well. We shall return to this phenomenon in the next section.

This selectivity of fossilisation is well-attested. How can it be explained? It is apparently

incompatible with the notion that the language processor as a whole deteriorates. Hence, we either assume that the language processor is selectively affected by aging processes - not just for phonology but even for special parts of phonology -; or else we assume that there are other factors which contribute substantially to fossilisation. Such reasons could be, for example

- the learner simply no longer notices the difference between his own production and that of his social environment, especially for sound features which are not distinctive (for example the degree of aspiration which distinguishes French and English unvoiced consonants, or the varying diphthongisation of English and German long vowels: the German word rot when spoken with a diphthongised "o" is easily understood - it just "sounds English");
- the learner is aware of his imperfection but "intuitively feels" that it is unnecessary to improve his pronunciation any further, because he understands and is understood by others; in other words, his communicative needs are satisfied, and any further approach to the target would seem an unnecessary "mimicking" of his social environment;
- taking this feeling one step further, the learner may even feel the need - perhaps without being aware of it - to maintain a minimal distance from his social environment, that is, to keep at least some part of his previous social identity. Children, obviously, do not have this fear when learning their mother tongue because they have no social identity to lose - they have to develop a social identity.

Clearly, these possibilities do not speak against the idea that the different end state in FLA and SLA is influenced by biological aging of the brain or of the peripheral organs. But they should make us aware that other factors might be involved; we shall return to this point in section 4.

3.3. The structure of acquisition: the Basic Variety

Both the child and the adult learner must derive the particular structural regularities of the target language from an analysis of the input - the sound waves used for communicative purposes in communicative contexts. To some extent, their input differs in structure; the caretakers' language is sometimes very idiosyncratic, and so may be, albeit in a different way, the language of the natives when talking to what they take to be a foreigner. But as a rule, the language to which the learner is exposed exhibits all of the normal characteristics of the target language. In particular, its morphology and syntax are normal. Nevertheless, the way in which morphology and syntax are learned typically shows some salient differences in SLA and FLA - irrespective of speed and end state. In a nutshell, the difference is this: Children pick up morphology very rapidly, both regular and irregular forms; they tend to make a few overgeneralisations (swimmed instead of swam), but those are rapidly corrected. Adult learners, by contrast, often develop no morphology at all. If they do, then only after having passed through a "learner variety" which is very fluent and efficient but lacks any morphology and exhibits a number of very specific syntactic regularities - a type of language which we shall call here the "Basic Variety".

The existence of such a pidgin-like interim language has been observed very early in the first systematic empirical investigations of adult SLA outside the classroom (Heidelberger Forschungsprojekt 1975; Schumann 1978, von Steudtner 1986). More recent cross-

linguistic work has uncovered a number of its structural properties (Klein and Perdue 1992; Perdue 1993).

In what follows we shall discuss one component of the Basic Variety - the expression of temporality.⁵ In all Indo-European and in most other languages, temporality is systematically expressed by two verbal categories - tense and aspect. Their precise encoding varies, and hence has to be learned by analysis of the input. But the main device is always the inflectional morphology of the (simple or compound) verb. In some languages, such as Polish, Spanish, French, this system is very complex; in others, as in German or Dutch, it is relatively simple. But no matter how simple or complex - children normally have no problems to learn the various morphological forms (see the survey in Weist 1984). This does not necessarily mean that children rapidly know how to express temporality. For a very long time, they may have problems with the underlying time concepts, such as the various tense and aspect differentiations - just as they often have odd ideas about yesterday, later, and tomorrow. In a word: children easily pick up the **forms** which they hear, but they may have problems in using them appropriately for **conveying temporal information**.

The way in which adult learners approach the problem of expressing temporality is fundamentally different.

Whatever the learner's first language and the target language may be, the acquisitional process always centers around a learner variety with very distinct features - the "Basic Variety". It is characterised by the following four properties:

1. Utterances typically consist of uninflected verbs, their arguments and, optionally, adverbials. There is no case marking, and, except rote forms, there are no finite constructions. In contrast to "pre-basic varieties", the way in which the words are put together follows a number of clear organisational principles which are neither those of the source language nor those of the target language.

2. Lexical verbs show up in a "base form", and there is normally no copula. Most learners of English use the bare stem as their base form, but also V-ing occurs. Learners of other languages may use the infinitive (German, French) or an even a generalised inflected form (as often in Swedish). Turkish learners of Dutch, for example, use the infinitive, Moroccan learners of Dutch use the bare stem.

3. There is a steadily increasing repertoire of temporal adverbials. Minimally, this repertoire includes: (a) the calendaric type adverbials (sunday, (in the evening)); (b) anaphoric adverbials which allow to express the relation AFTER (then, after), and also typically an adverbial which expresses the relation BEFORE; (c) some deictic adverbials such as yesterday, now; (d) a few frequency adverbials, notably always, often, two time, etc; (e) a few durational adverbials, normally as bare nouns, such as two hour, etc. Temporal adverbials such as again, still, already do not belong to the standard repertoire of the Basic Variety.

3. There are some boundary markers, which allow to mark the beginning and the end of some situation, as in constructions like work finish, "after working is/was/will be over".

The Basic Variety does not allow for tense or aspect marking. Compared to the rich expressive tools for temporality in fully developed languages, this seems to impose strong restrictions on what can be said. This impression, however, is premature. At this stage, learners are often extremely good story tellers, and telling a story requires the expression of all sorts of temporal information. Their guitar, so to speak, has only one string, but they play it masterly. How is this possible?

What the Basic Variety allows, is the specification of some time span X, its position on the

time line, its duration and (if iterated) its frequency. The event, process or state to be situated in time is then simply linked to this time span X. All the speaker has to do now, is to shift X, if there is need. More systematically, the functioning of the Basic Variety is described by the following three principles:

I. At the beginning of the discourse, a time span T_{Ass_1} is fixed. T_{Ass_1} is not the time at which the event, state, process obtains - this time we shall call "time of the situation" (TSit) - but the "time of assertion" ; this is the span about which an assertion is made by the utterance in question.⁶ T_{Ass_1} can be introduced in three ways:

- (a) By explicit introduction on the informant's part; this is usually done by a temporal adverbial in initial position;
- (b) by explicit introduction on the interviewer's part (e.g., what happened last Sunday?);
- (c) by implicitly taking the "default topic time" - the time of utterance; in this case, nothing is explicitly marked.

T_{Ass_1} is not only the assertion time of the first utterance. It also serves as a point of departure for all subsequent assertion times in the text.

II.If T_{Ass_i} is given, then $T_{Ass_{i+1}}$ is either maintained or changed. If it is maintained, nothing is marked. If it is changed, there are two possibilities:

- (a) The shifted assertion time is explicitly marked by an adverbial in initial position;
- (b) The new assertion time follows from a principle of text organisation. For narratives, this is the classical principle of chronological order "Unless marked otherwise, the order of mention corresponds to the order of events". In other words, $T_{Ass_{i+1}}$ is some interval more or less right-adjacent to T_{Ass_i} .

This principle does not obtain in all text types. It is only characteristic of narratives and other texts with a similar temporal overall organisation - texts which answer a question like What happened next?. Even in those texts, it only applies to "foreground sequences", i.e., those parts which represent the plot line. In other text types, such as descriptions or arguments, the principle of chronological order does not apply, nor does it hold for side structures in narratives, i.e., those sequences, which give background information, evaluations, comments etc. For those cases, change of T_{Ass} must be marked by adverbials.

Principles I and II provide the temporal scaffold of a sequence of utterances - the time spans about which something is said. The "time of situation" is then given by a third principle:

III.The relation of TSit to T_{Ass} in the Basic Variety is always "more or less simultaneous". T_{Ass} can be contained in TSit, or TSit can be contained in T_{Ass} , or T_{Ass} and TSit contained in each other. In other words, the Basic Variety allows no aspectual differentiation by formal means.

This system is very simple, compared to what we find in all source and target languages; but extremely versatile. It allows an easy expression of when what happens, or is the case - provided (a) there are enough adverbials, and (b) it is cleverly managed. Therefore, one way to improve the learner's expressive power is simply to enrich his vocabulary, especially by

adding temporal adverbials, and to learn how to play this instrument. And exactly this is done by very many adult second language learners. In the project mentioned in footnote 5, about one third of the 40 learners whose acquisition was investigated does exactly this: they do not go beyond the Basic Variety, but they steadily improve it in these two respects - more words, better practise. The other two third indeed move towards the target language, and some of them actually come very close to it, although no one really attains native-like proficiency.

3.4 Summary

As was said above, the state of acquisition research does not provide us with a really comprehensive picture of the differences between FLA and SLA in social context; in particular, we hardly know anything about the potential variation in speed between the child learner and the adult learner. Still, we can sum up some salient LA age effects regarding end state and structure. These are:

1. Adult SLA learners normally stop at a level where their language is more or less far from the target variety - the language of the social environment in which they learn. This is hardly ever observed for children, and where it occurs, it is considered to be pathological.

2. This difference in end state is not observed for children who learn a second language: if there is sufficient access, they normally do not fossilise.

3. The adult's fossilisation is highly selective:

(a) adults regularly have problems with phonological features of the target language - distinctive as well as non-distinctive segmental properties, but also, and particularly so, with prosody ("foreign accent").

(b) Fossilisation affects not so very much the acquisition of lexical items; adults can easily learn all the words they need for their communicative purposes. If there are differences in this regard, then they are minor.

4. Less known but no less salient are differences in the **structure** of acquisition, rather than in final attainment. We have illustrated this with the way in which child and adult learners learn the means to express temporality. This is, of course, only one of the various cognitive domain which are regularly expressed in language, but it is a particularly important one in that in all Indoeuropean languages, temporal marking is obligatory for most sentences: the finite verb automatically carries temporal information. In a nutshell, the main differences are:

(a) Children have no problems with the various morphological forms, even when these are extremely complex; they soon reproduce exactly the precise verb forms of their social environment.

(b) They often have problems with the exact meaning of these forms - that is, with the underlying time concepts encoded by the various forms. Their language **sounds** like the language of their social environment, but it does not always express the same **contents**.

(c) Adults invariably pass through a particular language form, the Basic Variety, which lacks any morphology, hence the usual devices to express tense and aspect. In many ways, the Basic Variety resembles a pidgin, and in fact, it is plausible that this

is the way in which pidgins originate - they are fossilised Basic Varieties.

(d) Communicatively, the Basic Variety is very efficient - at least as for the expression of temporality: if there is enough vocabulary, and if it is cleverly managed, then virtually everything that is needed can be expressed. Therefore, going beyond the Basic Variety does not so very much increase the expressive potential - it only makes the language more look like the language of the social environment.

These findings are selective and preliminary. They leave little doubt, however, that there are some salient differences between the child's first language acquisition and the adult's second language acquisition. What causes these differences? There is a number of possibilities which we shall now discuss in some detail.

4. The LA age effect: What accounts for the differences?

As was said in section 2, essentially three components are involved in language acquisition: Access, language processor, propensity. Each of them may vary with age and hence be responsible for the observed differences. They will now be discussed in turn.

4.1 Access

Essentially, child and adult have the same kind of access to the language to be learned - sound waves, and the accompanying information in which these sound waves are functionally used. This rules out access as a main causal factor. But this general statement must be relativised in some respects:

(a) Children may have the same but simply **more** access to the target language. This is probably true but can hardly account for the differences (except for the fact perhaps that some rarely used words are not learned by the adult, for the very simple reason that they do not occur in the input). Phonological features are very recurrent, and after three years, the adult learner must have heard all of them ten thousand times. Still, he does not pick them up whereas the child does.

(b) Adults often have additional access, for example to the written language. But it is hard to see how this additional input should lead to the particular differences in structure and end state. If anything, one would predict that it facilitates acquisition, for example because it can be of some help in the identification of words.

(c) Both children and adults are sometimes exposed to a particular simplified version of the language - "motherese" and "foreigner talk". But motherese is only used by some caretakers, notably old aunts, for quite a limited time, and it is uncontroversial in language acquisition research that children learn up to perfection with and without motherese. Foreigner talk, on the other hand, is relatively rare, compared to the huge amount of "normal input" to which the adult learner has access (Roche 1989).

Summing up, it does not seem that differences in access play a significant role in the explanation of the LA age effect.

4.2 Language processor

The language processor is the individual's capacity to acquire and to use it appropriately for communicative purposes. This capacity is species-specific, it is innate, it changes over the life-span. The way in which it operates at a particular time, depends on two factors: on certain biological determinants, and on the knowledge available at that time.

The biological component of the language processor includes several peripheral organs (the articulatory apparatus ranging from the larynx to the lips as well as the aural tract), and some parts of the central nervous system - those which are responsible for perception, memory, and various higher cognitive functions (for example the ability to generalise from individual cases and to withdraw from false generalisations). A precise classification and characterisation of the various cognitive capacities involved in language acquisition and language processing is a difficult issue, far beyond the scope of the present paper. There is no doubt, however, that the ones just mentioned belong to them.

The other component of the human language processor is much more dynamic: It is the more or less rich knowledge which the human mind has stored at a given point in time. This "available knowledge" includes

- All sorts of factual knowledge, which is not directly related to a particular language - knowledge about persons, objects, the courses of events, and so on.
- Partial knowledge about the target language - the first language in FLA, the second language in SLA; the process of acquiring a language is always step by step, and whatever is known at a particular point in time about the language to be learned is exploited to further this process.
- Knowledge about other languages, notably knowledge of the first language in SLA.

This knowledge constantly changes during the life span - to a higher or lesser degree, and for very different reasons - and any of these changes could be responsible for the differences described in section 3.4 above.

In examining their relative impact, it should be kept in mind that the relevant watershed is around puberty. Five-year olds normally never fossilise, young adults of, say, twenty, hardly ever attain full mastery.

Beginning with the peripheral capacities, it is well-known that audition deteriorates with age. But heavy-metal rocks fans aside, it is doubtful whether these changes are so dramatic at the age of twenty as to affect the perception of a new sound system. In fact, there is clear evidence to the opposite. In a series of studies, Neufeld (1979) has shown that American college students at age 20 are able to learn the phonology of languages such as Quechua, Japanese or Eskimo to the extent that native speakers of these languages cannot distinguish these learners from native speakers. The subjects of these studies were systematically and intensively taught, and similar findings are normally not observed outside the classroom (nor are they normally observed inside the classroom). Hence, these findings do not directly bear on the LA effects from section 3.4, since these relate to SLA outside the classroom. But they demonstrate one point: at that age of 20, there are no absolute biological constraints to the acquisition of phonology. This applies analogously to the articulatory organs. It is well-known, again, that complex and fine-tuned motor control becomes increasingly difficult with age. But is doubtful whether the relevant threshold has been passed at age 20. Still, we cannot exclude that these peripheral changes contribute to the fact that the acquisition of phonology **normally** fossilises in the adult's case. But it seems unlikely that they fully explain this fact.

Turning now to the central components of the language processor, we know of a number of cortical changes over the life span which, in principle, could be held responsible for the

selective LA effects from section 3.4. In fact, the probably best-known explanation of the deteriorating language learning capacity, Lenneberg's "critical period theory", argues along these lines (cf. section 1). But any such account, attractive as it is, faces three major problems. First, the major cortical changes over the life-span do not typically occur during the age period considered here. Second, there is no evidence that central capacities such as memory, concept formation, or the various reasoning abilities which may be involved in language learning significantly deteriorate from say five years of age to twenty years of age. Third, as we look more closely at the characteristic differences described in section 3.4, it becomes clear that they are not primarily related to these central capacities. Vocabulary learning, for example, is largely a memory problem, phonology does not require much memory; but adult learners - except at a much more advanced age - have no substantial problems with lexical learning; they have problems with phonology. Apparently, those parts of linguistic knowledge which require "higher cognitive abilities" are much less affected than more peripheral properties, such as accurate pronunciation, authentic prosody, correct morphological forms, and the like.

There is the possibility that in addition to the domain-neutral central capacities of the language processor which have been mentioned and which are in fact indispensable - without memory, concept formation, or the capacity to make appropriate generalisations, it is very difficult to learn a language -, there is also a domain-specific "language module" somewhere in our cortex. Then, cortical changes in just this component from before to after puberty could be responsible for the observed differences. The assumption that there is such a component is not very parsimonious but cannot be excluded a priori. We shall return to this assumption in section 5 below.

Summing up, it appears that age-related changes in the biological components of our language processor may contribute to the LA age effect; but at present, there is little evidence that this contribution is substantial. Future research in the neurobiology of the changing brain might force us to re-evaluate the impact of this contribution (see, for example, the still speculative but highly interesting considerations to this effect by Pulvermüller and Schumann 1993).

The other, much more dynamic component of the language processor is the knowledge available at a given time in the acquisitional process; this knowledge is constantly changing, and in fact, language acquisition **is** part of this knowledge change. There are two crucial differences here between FLA and SLA learner. First, the adult's general knowledge is normally much richer. It is hard to see, however, how this should hamper the acquisition of another language (although experience of life shows that excessive knowledge can be detrimental in many ways). Second, in SLA, the available knowledge includes knowledge of (at least) one other language. This may have positive and negative effects, which were extensively studied under the label of (positive and negative) "transfer" (see, for example, Kellerman 1986). Unfortunately, most of this research deals with language acquisition in the classroom, and therefore is not directly comparable. Still, one general finding seems beyond doubt: The fossilised language even of the advanced adult learner typically shows distinct traces of the first language - ranging from the wrong choice of gender to the "French, German, Swedish foreign accent" which we all know from everyday experience. In this sense, the difference of available knowledge might indeed be a major reason for the LA age effect.

But there are three problems with this explanation. First, the mere fact that knowledge of the first language somehow **influences** the precise form, for example the pronunciation, of the learner's performance in the second language does not necessarily mean that it is an **obstacle** or even blocks its acquisition. It could simply mean that the learner "works" with his old

pronunciation until the new pronunciation is acquired. Somehow, he or she must articulate the words, so why not in the old way - for a while. The problem is that in the adult's case, this "while" lasts forever, and this is what has to be explained.

Second, while some of the differences from section 3.4 can be traced back to first language influence, this is not so for others. The "Basic Variety" described in section 3.3 is found in many source language-target language pairs, for example Turkish-Dutch, Moroccan-Dutch, Spanish-French, Italian-English. None of the source languages is even remotely structured like the Basic Variety, hence, the particular form of the Basic Variety cannot be due to the influence of, in these cases, the structure of Turkish, Moroccan, Spanish, or Italian.

Third, children at the age of, say, six or seven have already acquired most - though not all - of their first language. In particular, their phonology acquisition is usually completed. Hence, when learning a second language at that age, they should be subject to the same influences. But they are not. Normally, children at that age have no problem picking up a second language when transplanted into a new social environment in which this language is spoken.

The conclusion seems clear: The fact that there is already a language stored in the brain may affect, and in fact does selectively affect, the acquisition of another language. Hence, just as with changes in the "hardware component" of the language processor, differences in its "software component" may contribute to the LA age effect in one way or another, but they cannot fully explain it.

4.3 Propensity

This leaves us, somewhat unexpectedly, with a last causal factor, the different motivations which push a learner forward in the acquisition of the mother tongue and in the acquisition of a second language. It seems indeed, that the Moroccan worker coming to Holland at the age of 22 is driven by other forces to learn Dutch than the child born in a Dutch family by Dutch parents and with Dutch siblings and peers. In a slogan, one might say that the adult's motive is: **Understand others and make yourself understood for concrete purposes**, whereas the child's motive is: **Become - with little differences - like the others**. These two motives are not mutually exclusive. It is impossible to understand and to be understood without becoming to some extent like the others, and vice versa, becoming like the others includes normally the capacity to understand and to be understood (although one sometimes wonders whether a social group is more built on understanding or on misunderstanding). But the priorities are set in very different ways. If someone with a thick French accent asks you in the street: Station where?, then you will most likely understand him. But at the same time, you will immediately identify him as an outsider, as someone who does not belong to your social group. For the child, language acquisition is more than building up knowledge about phonological, syntactical or lexical rules: it is but one aspect in becoming a social being with all the convictions, norms and habits of a particular social group. To this end, it is not enough to get the intended meaning across. It is vital to exactly reproduce the form of the language. The form He leaved yesterday is no less understandable as He left yesterday. But the social environment only uses the second form, and stigmatises the first. In fact, the least redundant way to express this very meaning would be to say He leave yesterday, since the information "past", as expressed by the irregular tense form or the ending -ed, only duplicates in less specific form what is more precisely said by the adverbial yesterday. Therefore, if the task were only to express the intended meaning, the Basic Variety form he leave yesterday is **optimally adapted to the communicative needs**. But it deviates from the established way to

express this meaning in the particular social community. Lexical items are indispensable, if certain meanings are to be expressed, if certain communicative needs are to be realised; but their exact pronunciation is not mandatory to this end. Therefore, we typically find fossilisation in phonology, or some parts of it, but not in the lexicon.

Depending on whether you primarily want to realise some clear, limited, well-defined communicative needs, or whether you want to become a non-salient, non-stigmatised member of a social group, structure and end state of your acquisitional process are pushed into quite different directions. This, I believe, explains most of the peculiarities of the LA age effect. It does not exclude, though, that the other factors discussed above, access and the various components of the language processor, contribute to this effect, as well. But judging from the limited evidence we have at this point, this contribution seems to be comparatively small.

5. Conclusion

In this final section, I will not sum up what has been said so far but briefly address one remaining issue - the possibility that there is a special "language module" in our cortex whose change over the life-span might be responsible for the LA age effect.

In FLA as well as in SLA, whatever is acquired, is acquired step after step by successive analysis of sound stream and accompanying information in the communicative setting. But one might ask whether indeed all components in the mature speaker's linguistic knowledge are acquired in this way. At least part of the final knowledge of the mature speaker could be there by birth.

This is indeed assumed by acquisition researchers who work in the "generative paradigm" (Chomsky 1985). It leads to an interestingly simple theory of language acquisition. Essential parts of the speaker's linguistic knowledge are innate, and only some open slots, so to speak, must be filled by input analysis. This general idea has been worked out in some detail in the so-called "parameter setting approach" (Weissenborn, Goodluck and Roeper 1992). In this view, there is a "peripheral part" of linguistic knowledge, which has to be learned by input analysis, and a "core part", which is innate but contains by birth some "open parameters" with a limited number of options. All the child has to do is to choose one of the options, and this is done by input analysis. This view assigns a very minor role to the access, and it does not consider the potential role of different types of propensity. This innate part with the open parameters is called "Universal Grammar", and it is assumed that Universal Grammar is a domain-specific cognitive ability, which interacts with, but is in principle separated from, other mental abilities, such as memory, concept formation, or deductive reasoning.

If we now assume (a) that there is not only such an innate "Universal Grammar" but also (b) that, for biological reasons, it is only "available" for some time - say roughly up to puberty -, then this could explain the LA age effect (see, for example, the papers in Anderson 1990). Both assumptions, though, are not particularly plausible.

Consider first the idea that not only the language capacity but a significant part of the individual's linguistic knowledge is innate, or, as we may say, genetically transmitted. Clearly, this can apply only to those components of linguistic knowledge which are common to **all** languages. No one is born to learn just Tzeltal or Kiksh, every new-born can learn any language, even German. Hence, whatever distinguishes Tzeltal from English, for example, must be learned by input analysis. This includes

- the entire vocabulary (except the expression Coca Cola)
- the entire morphology
- the entire syntax to the extent to which it is covered in descriptive grammars
- most (if not all) of phonology,

in a word, practically everything. This does not necessarily exclude that, on some abstract level, there are also some universal properties. But if this is the case, then it remains to be shown that these universal properties go in any way beyond the constraints on perception, motor control, and cognition which are characteristic of the human mind in general. At present, there is not enough empirical evidence to settle this issue. But clearly, a theory which only operates with general, not domain-specific constraints on the human mind rather than with a specific "language module", characterised by domain-specific mental principles, is more general. Hence, it is preferable - so long as there is no convincing evidence to the opposite.

Second, if there is such an innate "language module", then why should it be no longer active after a certain period? It is true that some functions of the human body are limited to a particular age range. The various processes around puberty illustrate the point. But in all of these cases, there is palpable biological evidence - changes in cell structure, hormone production, and the like. No such evidence has been given so far for the "language module". This does not exclude that such evidence may be found in future research. But at present, any explanation of the LA age affects in terms of a "language module" and its changing availability resembles the explanation of life and death by the existence and the fading of the vis vitalis. Still, it may be correct.

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Notes

1. Even within a small social group, the linguistic competence of its members is usually not fully homogeneous; there are differences in vocabulary size, in discourse rule, even in

grammatical features. Therefore, the notion of "full mastery" should rather be understood in the sense that the linguistic competence of the speaker is within a certain range observed within and tolerated by the social environment.

2. What we do not know, of course, how perfect the pronunciation of these scholars was. But at any time in its history, the pronunciation of Latin exhibited a rich variation. - Note, incidentally, that we are speaking here of classroom acquisition, and the argument does not show that "full mastery" can be attained outside the classroom. But it suffices to show that there are no absolute biological obstacles.

3. It is crucial that the input does not only consist of the sound waves that hit the learner's ear. It is impossible to analyse these sound waves - to decompose them, to combine them with meaning etc. - unless they are embedded in all sorts of accompanying information from the situational context. If you just listen to radio programs in Chinese, you will simply not learn it (except some of its phonological features), because all of this parallel non-linguistic information is missing.

4. An excellent survey of what children in various languages have learned at a certain age is found in Slobin's voluminous "The cross-linguistic study of language acquisition" (Slobin 1986, 1992; the contributions in Fletcher and Garman (1984) give a concise picture of the various domains of first language acquisition.

5. The findings briefly summarised here result from a larger cross-linguistic project on the second language acquisition of adult immigrant workers. Forty speakers were observed and recorded over a period of about three years; source language-target language pairs were Punjabi-English and Italian-English, Italian-German and Turkish-German, Turkish-Dutch and Moroccan-Dutch, Moroccan-French and Spanish-French, Spanish-Swedish and Finnish-Swedish. Analysis included a number of aspects, such as syntax, lexicon, the expression of time and space, feedback processes, and others. More detailed accounts are found in Perdue (1993), Klein and Perdue (1992) and, specifically on the acquisition of temporality, in Dietrich, Klein and Noyau (1994).

6. We assume that tense expresses the relation of TAss to the time at which the utterance is made, and aspect expresses the relation between TAss and TSit (Klein 1994).