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THE NULL SUBJECT PARAMETER IN LANGUAGE ACQUISITION

1.0. INTRODUCTION

Within a parameterized theory of grammar such as that proposed within the Government/Binding Theory of Chomsky (1981), grammatical development is viewed as a process whereby the child 'fixes' the parameters of Universal Grammar (UG) at the values which are appropriate for the particular adult language he is to acquire. The parameters of UG provide the child with a limited number of grammatical options; these options express the narrow range of variation which adult languages exhibit with respect to some aspect of grammar. Of course, in addition to fixing the parameters of UG, the child must also acquire the idiosyncratic or peripheral aspects of his language, which may be unrelated or only loosely connected to the parameters. However, it is assumed that once the child has set all the parameters, he will have acquired the 'core' component of the adult grammatical system.

The purpose of this paper is to examine the relationship between the parameters of UG and actual, real-time grammatical development. The particular parameter we will discuss is the so-called 'pro-drop' or 'null subject' parameter, intended to explain, among other things, the property exhibited by languages like Italian and Spanish of allowing phonologically-null subjects in tensed sentences. Examples are given in (1).

(1) a. Vado al cinema stasera (Italian)
b. Voy al cine esta noche (Spanish)
(I) go to the movies tonight

We will be assuming as a working hypothesis (and in fact, we take as the null hypothesis) that grammatical development is a 'continuous' process; that is, we assume that the intermediate grammars constructed by the child in the course of acquisition (though perhaps not fully specified) are constrained by the principles of UG.[1] This continuous model of grammatical development can be schematized as in (2).

(2) $G_0, G_1, G_N, \ldots, \ldots, G_S$
G_0 = UG; G_S = the adult grammar

Given the continuous model of development in (2) and a parameterized theory of grammar outlined above, there are certain predictions which follow concerning the course of actual acquisition, i.e., the set of inter-

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mediate grammars. The most obvious prediction is that the values chosen by the intermediate grammars along particular parameters will not fall outside the permitted range. For example, an intermediate grammar will not have PP as a bounding node for Subjacency, assuming this is not a 'possible' bounding node. A second, perhaps less obvious, prediction is that an early grammar of a language L may differ from the adult grammar of L with respect to the value chosen along a particular parameter, provided that both are within the permitted range. In this instance we expect that the child's language and the adult language will differ in certain systematic ways, these differences being derived from the parametric variation between the two grammars. In fact, there is good reason to suppose that the child grammar and the adult grammar will vary within well-defined limits. First, as noted by White (1980), the child does not have teleological knowledge of the adult grammar, and hence the latter is not really the 'target' from the child's perspective. Second, though the child must ultimately construct a grammar for a language L, at any point in development the data base for the child and the language generated by the adult grammar are not necessarily the same insofar as the child 'selectively attends' to data (Newport, Gleitman & Gleitman, 1977). Finally, we expect that the child grammar will differ from the adult grammar in the instance in which a particular parameter comes fixed at an 'initial' setting (i.e. a value assumed in advance of experience with a particular language) which happens not to be the correct setting for the adult grammar.

In this paper we will present an instance of this last case. Specifically, we will argue that the early grammar of English (and all other languages) is a null subject (henceforth, NS) grammar, this representing the 'initial' setting along the NS parameter. The particular formulation of the parameter which we propose explains various well-known properties of early language, notably the optionality of lexical subjects and the absence of modals and auxiliaries.

In Section 2 we outline the particular version of the NS parameter which we assume, which we refer to as the AG/PRO parameter. We will focus on the adult grammars of Italian (and Spanish) and English and thereby provide the theoretical framework within which to view the acquisition data. In Section 3 we discuss the effects of the parameter during actual grammatical development of English speaking children. In addition, we will briefly discuss some effects of this parameter in the acquisition of Italian. Also included in this section is an account of the kind of 'triggering' data which could induce a resetting of the NS parameter in the English speaking child, and hence account for the transition to the adult system. Finally, in Section 4, we examine the effects of this parameter in the acquisition of a second non-null subject (henceforth, NNS) language, German.

2.0. THE AG/PRO PARAMETER

As a point of departure, we assume the EXTENDED PROJECTION PRINCIPLE (Chomsky, 1981), i.e., the requirement that all sentences have subjects. This is expressed by the base rule in (3), which is universal (abstracting away the order of constituents).

(3) $S \rightarrow NP\ INFL\ VP$

As is well-known, however, although the subject position is obligatory, languages exhibit variation with respect to whether the subject need be phonologically realized (cf. examples in (1)). That is to say, in NS languages a lexical subject is entirely optional though the subject, even when phonologically null, has a definite pronominal reference. Rizzi (1982) proposes that this variation can be explained by assuming that in languages like Italian and Spanish, INFL may be specified as [+pronominal]. A [+pronominal] INFL licenses an empty category in subject position.[2] Following in the spirit of Rizzi's proposal, we propose that the difference between NS and NNS languges is that is the former the AG(= agreement) features contained in INFL (cf. (5) below) constitute a particular kind of pronominal, namely, the element PRO.[3] Thus, we are proposing that languages may vary as to whether AG is or is not PRO. Where AG = PRO it licenses an empty category in subject position, as in Italian and Spanish; where AG ≠ PRO a null subject is impossible, as in English. Following Chomsky (1982) we assume that the null element occupying subject position in NS languages in *pro*. On our analysis, the condition on *pro* is that it be governed by AG/PRO. The definition of government which we adopt, following Aoun & Sportiche (1983), is give in (4).

(4) α governs β in the structure $[\ldots \alpha \ldots \beta \ldots \alpha \ldots]$ where
(i) $\alpha = X^0$
(ii) where ϕ is a maximal projection, ϕ dominates β iff ϕ dominates α.

Henceforth we refer to this version of the NS parameter as the AG/PRO parameter.

The expansion of INFL which we assume is as in (5).

(5) $INFL \rightarrow (AG)\ AUX$

AG is the set of features for person, number and gender associated with the subject (= PRO is NS languages). The AG features are present in tensed clauses and absent in gerunds and infinitivals. We further assume, in the spirit of the Standard Theory, that the tense specification of the sentence is contained inside AUX, as are various auxiliary elements, for

example, the English modals. As we will observe later, however, there is language particular variation with respect to whether AUX may contain lexical material, and this variation is derivable from the AG/PRO parameter.

Zagona (1982) has observed that in addition to the null subject phenomenon, there is a second property which distinguishes NS from NNS languages; this concerns the behavior the the auxiliary systems in these two language types. There is considerable evidence that in English the modals and, in certain instances, the auxiliaries *have* and *be* constitute a separate constituent from the VP, that is, they appear under AUX. Typical syntactic diagnostics for the AUX analysis include tag-formation, negative placement, VP deletion and Subject-AUX inversion, each of which is illustrated in (6).

(6) a. Peter hasn't eaten, has he?
b. John will not finish this paper.
c. Mary isn't coming tonight, but Sue is.
d. Will Robert find his sunglasses?

Moreover, the English modals distinguish themselves from main verbs by their complete lack of verbal morphology. In Italian (and Spanish) in contrast, the auxiliaries and 'modals' (e.g. **potere** (can), **dovere** (must)) exhibit all the syntactic and morphological behavior of verbs. There is no evidence to suggest that in these languages auxiliary elements appear under the separate AUX constituent. There is no process of tag-formation as such. Negative markers cannot intercede between an auxiliary and main verb, nor can pronominal object clitics. The negative marker and the clitic must precede both the auxiliary and main verb, as exemplified below.

(7) a. *Mario ha non mangiato
(cf. Mario non ha mangiato)
Mario has not eaten

b. *Mario ha lo mangiato
Mario has it eaten
(cf. Mario lo ha mangiato)

Auxiliaries cannot be stranded under VP deletion.

(8) *Maria non è arrivata ancora, ma Gianni è
Maria hasn't (= isn't) arrived yet, but Gianni has (= is)

Finally, auxiliaries and modals cannot be inverted with the subject in tensed clauses.

(9) a. *Ha Gianni mangiato
Has Gianni eaten

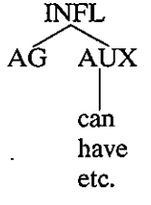
(9) b. *E Gianni arrivato
Is Giani arrived

c. *Puó Gianni aiutarci
Can Gianni help us

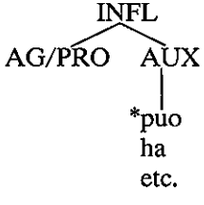
With respect to their morphology, the Italian modals (and auxiliaries) exhibit the full range of inflection for person, number and tense, in marked contrast to the English modals. Zagona has related the null subject phenomenon to the differences in the auxiliary systems of Spanish and English by proposing that in Spanish and other NS languages, the head of INFL is 'nominal' (following Rizzi's analysis) and thus licenses a null element in subject position, which in English the head of INFL is 'verbal', thereby licensing a null element inside the VP, as in subject-AUX inversion, for example. On her analysis, then, languages very according to whether INFL is 'nominal' or 'verbal' in nature. We would like to propose, in contrast, that the differences in the auxiliariy system of the two language types follows directly from the fact that in NS languages AG = PRO.

Within the theory of grammar we assume the defining characteristic of PRO is that it may only appear in ungoverned positions (cf. note 3). The impossibility of generating (or raising) auxiliaries into AUX in NS languages follows from the fact that the lexical element in AUX would govern AG.[4] Where AG = PRO (in NS languages), the resulting configuration would be in violation of the principle that 'PRO must be ungoverned' (cf. Chomsky, 1981 for discussion). This contrast between English and Italian is schematized in (10).

(10) a.



b.

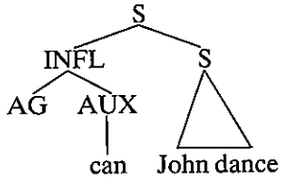


Returning to the data in (9), we assume, following Safir and Pesetsky (1981) that Subject-AUX inverted structures are generated by the rule 'Move INFL', an instatiation of 'Move α', which adjoins INFL to the left of S. We further assume, as seems optimal, that 'Move INFL' applies freely, its output being constrained solely by an independently needed PF condition blocking free occurrences of 'bound morphemes', as in (11).

(11) *X + Af(fix) + Y where X, Y = $\emptyset$

Thus, in English, 'Move INFL' will yield a well-formed output iff AUX is lexically specified, since in that instance the AG features (and tense features) may affix onto the adjacent auxiliary element, as in (12).

(12)



In Italian and Spanish in constrast, 'Move INFL' will not yield a grammatical output since no lexical element can appear in AUX, given the condition on PRO. Hence, there will be no adjacent stem onto which the AG and tense features can affix. In short, inversion in tensed sentences in Italian and Spanish is blocked by the principle that PRO be ungoverned, not by any condition on the application of 'Move INFL'.

Note now that this analysis makes the following prediction. 'Move INFL' should yield a grammatical output in Italian just in case INFL does not contain AG, since in this instance there is nothing to block the occurrence of lexical auxiliaries in AUX. As noted earlier, AG is present in tensed sentences, but not in gerunds and infinitivals. Hence, our analysis predicts that inversion will be possible in these constructions. The following data (from Rizzi, 1982) confirm this prediction.

(13) a. Avendo Maria accettato di aiutarci, potremo risolvere il problema
Having Maria accepted to help us, we can resolve the problem

b. Essendo Gianni disposto ad aiutarci, potremo risolvere il problema
Being Gianni willing to help us, we can resolve the problem

c. Gianni sostiene non essere lui in grado di dare un contributo
Gianni maintains not to be he able to make a contribution

d. Dovendo tuo fratello tornare a casa, non possiamo allontanarci molto
Having (= musting) your brother to return home, we can't go very far

e. Ritengo dover tuo fratello tornare a casa
I believe to have (= must) your brother to return home[5]

To sum up, in English the modals are generated in AUX, while *have* and *be* may raise into AUX from their base-generated position in the VP (Emonds, 1976). In Italian, on the other hand, the modals **potere** (can) and **dovere** (must) are main verbs — specifically, raising verbs cf. Rizzi, 1976; Burzio, 1986),[6] while the auxiliaries *avere* (have) and *essere* (be) form a verbal complex with the main verb inside the VP. We may assume the relevant structures to be as follows.

(14) $[_S$ Gianni$_i$ $[_{INFL}]$ $[_{VP}$ puo $[_S e_i$ andare via$]]]$
John can go away

(15) $[_S$ Gianni $[_{INFL}]$ $[_{VP}$ è andato via$]]$
Gianni has gone away

In Italian, in contrast, the modals and auxiliaries may raise into INFL (and hence undergo inversion) just in case AG is absent. Thus, certain striking differences in the auxiliary systems of NS and NNS languages follow as effects of the AG/PRO parameter. In the following section we will examine the effects of the AG/PRO parameter in actual grammatical development.

3.0. THE GRAMMAR OF EARLY ENGLISH

The early stages in the acquisition of English (and other languages) are marked by the prevalent use of what we might pretheoretically refer to as 'subjectless sentences.' The following (non-imperative) sentences (from Bloom, Lightbown, and Hood, 1975) are representative of the general phenomenon.

(16) Read bear book
Want go get it
Ride truck
Bring Jeffrey book
Want look a man
See under there

Sentences of this sort have been remarked upon by Bloom (1970), Brown, Cazden and Bellugi (1973), Braine (1973), McNeill (1966), Menyuk (1969), Gruber (1967) among others. The most important fact to note about these sentences is that they co-exist with sentences containing overt subjects. This is illustrated by the 'minimal pairs' in (17) (sentences taken from the same transcript) (Bloom et al., 1975) and the 'replacement sequences' (Braine, 1973) given in (18), that is, a subjectless sentence immediately followed by an expanded version of the sentence with a subject.

(17)

Throw it away	Mommy throw it away
Want go get it	I want take this off
Go in there	Foot goes over there
Change pants	Papa change pants
Take a nap	Mama take a nap

(18) Fall . . . Stick fall
Go nursery . . . Lucy go nursery
Push Stevie . . . Betty push Stevie
Crawl downstairs . . . Tommy crawl downstairs
Build house . . . Cathy build house

The data illustrated in (17) and (18) clearly show that the absence of subjects is not due to a performance limitation on sentence length since the child is able to produce the longer sentence. (Note in this regard that many of the sentences during this period reach four, five and six words.) Neither is it the case that the absence of a lexical subject correllates in any straightforward way with syntactic complexity. Lexical subjects may be absent in simple utterances as they may in more complex sentences, illustrated below (from Bloom et al., 1975).

(19) What Kathryn put in tank
Kathryn want build another house
Want look a man
I want kiss it

Thus, it does not appear to be the case that 'missing' subjects are due to an increased 'cognitive load' associated with greater syntactic complexity. Finally, the systematicity of the phenomenon precludes an analysis of these sentences as simple performance errors.

While 'missing' subjects are pervasive, sentences with missing objects are very rare. An account in terms of processing or cognitive limitations does not predict such an asymmetry. Note, moreover, that the 'missing' subject is not semantically restricted, i.e., it is not uniformly an 'agent of action,' for example.[7] Nor is it restricted as to grammatical person. The null subject may refer to the child himself or to some other person or object. This is best illustrated by the 'replacement sequences' in (18).

Subjectless sentences in early language share two important properties with adult NS languages. First, as has been illustrated, the lexical subjects are entirely optional. Second, as first noted by Bloom (1970), the 'missing' subject has a definite pronominal reference which can be inferred from context. This is illustrated in the following dialogue (from Bloom, 1970).

(20) (Eric has just eaten)
Mother: You ate the apple all up.
There's no more apple.
(Eric starts to cry and hits the toys)
Eric: Want more apple.

In (20) it is clearly Eric who wants some more apple and not some unspecified individual.

The optionality of lexical subjects and the definite reference associated

with the missing element constitute prima facie evidence for a NS analysis of subjectless sentences in child language. There is, however, a stronger prediction which follows from the particular analysis proposed in this paper. Recall that it follows from the AG/PRO parameter that in a NS language AUX may not be lexically specified since AG (= PRO) would be governed in violation of the condition on PRO. It is well-known that children acquiring English systematically omit modals and auxiliaries (Brown & Fraser, 1964; Bellugi, 1967; Brown, 1973). On the basis of the data we examined (from Bloom, 1970; Bloom et al., 1975, and Bellugi, 1967) the English auxiliary *be* and the modals are systematically absent during the period of subjectless sentences.[8] The modals and *be* emerge shortly after the point at which the child begins using lexical subjects consistently, that is, following the point at which the early grammar shifts away from a NS grammar towards the adult grammar of English.

In (21) and (22) we have indicated the ages and stages which correspond to the two grammar types for the children studied in Bloom (1970) and Bloom et al. (1975). The ages and stages given in (21) is the period characterized by a grammar in which AG is PRO (henceforth referred to as G_1), that is, the period in which subjectless sentences are prevalent and modals entirely lacking. Those given in (22) represent the point of shift, or the resetting of the AG/PRO parameter. (We return to this shortly.) At this point, the children begin using lexical subjects consistently and the auxiliaries emerge shortly thereafter.

(21) G_1 (AG = PRO)
Eric I → Eric V (20; 2—25; 1)[9]
Gia II → Gia V (20; 2—25; 2)
Kathryn I → Kathryn III (21; 0—24; 2)

(22) G_2 (AG ≠ PRO)
Eric VI (26; 3)
Gia VI (27; 1)
Kathryn (26; 4)[10]

Note that while the AG/PRO analysis directly predicts the impossibility of lexical material in AUX during the period of subjectless sentences, it does not explain why the auxiliaries are *entirely* absent. In principle, there is a second option available to the child, namely, he could analyze the modals and *be* as main verbs, as they are in Italian and Spanish, for example (cf. (14)). What then excludes this alternative analysis?

Let us begin with the modals, reserving discussion of *be* until section 3.2. Note that in order for the child to (mis)analyze the modals as main verbs he must be able to identify them as verbs. In English, one of the essential properties which distinguishes modals from verbs is the lack of morphological marking on the former. Thus, if the child is sensitive to the

relationship which exists between particular inflectional forms and particular grammatical classes, it is unlikely that he will (mis)analyze modals as main verbs. There is evidence from both naturalistic and experimental studies that children do in fact have knowledge of form-class relationships at a very early age. Maratsos (1982) points out that early language is generally lacking in form-class errors, that is, children do not attach verb inflection to members of other grammatical categories. He notes, for example, that although children use terms like *away off bye-bye* to denote actions, they do not produce errors such as the following.

(23) Gia awaying (unattested)
Car outing (unattested)

In addition to this negative evidence, there is also cross-linguistic experimental evidence that very young children use the information provided by inflection in comprehending sentences whether or not they use these inflections productively in their own speech (Slobin, 1982). Finally, children acquiring richly inflected languages such as Italian, Polish, etc. have little difficulty achieving productive control of inflection at a very early age (Hyams, 1986; Smoczynska, 1986). Thus, the acquisition data from production and comprehension support the hypothesis that children are sensitive to inflectional morphology and that this information is used by the child in determining category membership. To the extent that this is so English speaking children will not analyze modals as verbs. Thus the two analyses for the English auxiliaries which are in principle available to the child are in fact excluded. The absence of inflection on the modals blocks a main verb analysis, while the presence of AG/PRO in INFL blocks the modals from appearing under AUX. In effect, the early grammar 'filters out' input data which is unanalyzable.[11] It is expected, however, that once AG is no longer pronominal, the modals will emerge since at that point a possible analysis presents itself, namely, the AUX analysis. As noted earlier, this is the case. The modals emerge only after the AG/PRO parameter has been reset, as evidenced by the fact that the child is using lexical subjects consistently.

The analysis we are suggesting makes two further predictions. First, it follows from this account that once the auxiliaries emerge they will appear simultaneously in declarative and interrogative (i.e. inverted) structures. Recall that what blocks AUX inversion (i.e. 'Move INFL') in NS languages is the impossibility of lexical material in AUX; the rule is otherwise free to apply. As noted by Bellugi (1967) the auxiliaries are introduced in declarative, negative and interrogative sentences at the same point in development. Bellugi (1967) identifies this stage as Stage C. Some examples follow (from Bellugi, 1967).

(24) He won't come
I can't see it
The sun is not too bright
Could I use this one?
Will you help me?
Did you make a great big hole in there?

The second prediction concerns the relative acquisition of the English modals and the modals in a NS language. Recall that in Italian the modals receive the full range of verbal inflection. We thus expect that the Italian modals, **potere** (can) and **dovere** (must), will be acquired earlier than the English modals since the former can be identified and analyzed as main verbs. In contrast to the English situation, the Italian child need not await the availability of the AUX node for these elements. This second prediction is also confirmed by the acquisition data. The Italian modals are acquired significantly earlier than the English modals and in fact they are acquired at roughly the same point at which English speaking children acquire the semi-auxiliaries *have to* and *going to* (Hyams, 1986). In the section that follows we discuss the acquisition of the English semi-auxiliaries and the Italian modals. As we will see, these data provide further evidence for the analysis presented in this paper.

3.1. *English Semi-auxiliaries and Italian Modals*

On the analysis proposed in this paper the late appearance of modals is explained by strictly grammatical factors — the impossibility of lexical material in AUX on the one hand, and the morphological differences which exist between verbs and modals on the other. A priori, there is a plausible alternative explanation which is that the modals are late acquired because of their semantic or conceptual complexity. There are, however, two immediate problems with a semantic/conceptual account. First, as Bellugi (1967) and others have noted, the English semi-auxiliaries *hafta* and *gonna* are acquired significantly earlier than the 'real' modals. They appear during the period which we have characterized as G_1. Bellugi places the acquisition of the semi-auxiliaries during her Stage B — 3 to 8 months prior to Stage C[12], which, as noted previously, marks the emergence of the modals). Examples are given below (from Bellugi, 1967; Bloom et al., 1975).

(25) a. I gonna cut some more
b. I going give it to somebody
c. I hafta eat my ice cream

The semi-auxiliaries *hafta* and *gonna* are semantically equivalent to the modals *must* and *will*. Thus, a semantic account cannot explain the real-time lag which exists between the acquisition of modals and semi-auxiliaries in English. Moreover, as noted above, Italian speaking children acquire the modals **potere** (can) and **dovere** (must) significantly earlier than their English cohorts; the Italian modals appear at roughly the same point as the the English semi-auxiliaries, that is, during Bellugi's Stage B. Some examples follow (from Hyams, 1986).

(26) Io deo lavorare co cacciavite [deo = devo]
I must work with (the) screwdriver

Non posso più chiamare nonnina
I cannot call Grandma anymore

Again, an account along semantic/conceptual lines would fail to explain the lag between the emergence of the English and Italian modals.

Given the analysis proposed in this paper the prior appearance of the English semi-auxiliaries and the Italian modals relative to the English modals receives a straightforward explanation. Both the Italian modals and the English semi-auxiliaries bear verbal inflection and hence may be analyzed by the child as verbs.[13] While the English semi-auxiliaries are not inflected as heavily as the Italian modals, they are nevertheless morphologically distinguishable from the English modals which bear no inflection whatsoever. The semi-auxiliary *have to* has three forms — *hafta, hasta* and *hadta*. Similarly, the semi-auxiliary *going to* bears the progressive suffix *ing*, one of the first verbal inflections to be acquired by English speaking children (Brown, 1973). Young children use both the contracted and non-contracted form of *going to* (cf. 25a, b)). It is thus expected that these verbal elements will appear prior to the modals. In particular they may emerge prior to the shift away from G_1 since they are analyzable as main verbs.[14]

3.2. *The English Auxiliary Be*

The analysis of semi-auxiliaries proposed in the previous section raises an immediate question with respect to the acquisition of the auxiliary *be* in English. Unlike the modals, *be* does bear inflectional affixes (although the inflection is highly irregular). Our analysis predicts that the child will analyze this element as a verb. This prediction is only partially confirmed, however. Brown (1973) notes a curious asymmetry in the child's use of this verb. While *be* is systematically absent in progressive and predicative constructions, as in (27), it is never omitted in presentational sentences like those in (28). The sentences in (27) and (28) co-occur in the acquisition data during the period characterized by G_1.

(27) You so big
Adam home
No the sun shining
He eating ice cream

(28) Here it is
There it is

As Brown notes, children fail to omit *be* in precisely those cases in which it is impossible to contract *be* in the adult language (cf. *Here it's. *There it's).[15] Summing up Brown's results, the 'uncontractible *be*' emerges significantly earlier in development than the 'contractible *be*'; the latter appearing at the same point as the modals. On our analysis, the appearance of *be* in (28) is expected. By hypothesis, the inflection on *be* enables the child to identify it as a main verb. The alternative analysis, in which *be* is in AUX is excluded by AG/PRO. Strictly speaking then, it is the non-occurrence of *be* in examples like (27) which needs to be explained. We believe that the absence of *be* in these cases is directly related to its contractibility in the adult language, which constitutes the input data for the child. Note that in those contexts in which *be* may undergo contraction, namely, in progressive and predicative constructions, (cf. It's raining, He's happy) the status of *be* as a main verb is less than obvious. Assuming that for the child, as for the adult, there is a strict locality condition on contraction, (i.e. *be* must be in AUX (Emonds, 1976)), a main verb analysis is impossible in these cases. At the same time, however, the presence of AG in INFL excludes an AUX analysis. Thus, the 'contractible' *be*, like the modals, is filtered out of the input data. It emerges alongside the modals at the point at which it may appear in AUX, that is, following the restructuring of G_1. As with the modals, *be* appears simultaneously in declarative, negative and interrogative structures (Bellugi, 1967).

In the section that follows we discuss the restructuring of G_1.

3.3. *The Resetting of the AG/PRO Parameter*

It is obvious that if an early grammar differs from the adult 'target' grammar, there must be mechanisms which insure a restructuring in the proper direction. In short, the early grammars must be 'delearnable' in the sense of Klein (1982). One kind of mechanism is the availability of 'triggering' data, that is, data which are inconsistent with a current grammar and which serve to force a resetting of a parameter. In this section we will consider the kinds of triggering data which might induce a resetting of the AG/PRO parameter in the development of English.[16]

There are at least two possible triggers, the expletive pronouns *it* and

there, and what we refer to as 'infelicitous referential pronouns.' We discuss each of these in turn.

NS languages like Italian and Spanish lack expletive pronouns.[17] It seems reasonable to assume that the absence of expletive pronouns is related to the fact that in most NS languages the use of pronouns is reserved for purposes of contrast, emphasis, or to introduce a change of discourse topic.[18] Given that expletives cannot be used contrastively, emphatically, etc. (since they are semantically empty), we do not expect them to occur in languages in which pronouns have a pragmatic, as opposed to strictly grammatical function. It is thus possible that once the English speaking child learns the English expletives the latter trigger a restructuring according to (roughly) the following line of deduction. *It* and *there* are not being used for pragmatic purposes since they do not contribute to the meaning of the sentence. Thus they must be present for strictly grammatical reasons, namely, a null subject is impossible. If a null subject is impossible, AG ≠ PRO. This hypothesis is supported by the acquisition data. Expletives are absent prior to the point of restructuring and then appear in the data at the time which we have identified as the point of restructuring (cf. 22). The sentences in (29) occur during the period referred to as G_1. These are sentences which would require expletives in the adult language (from Bloom *et al.*, 1975).

(29)

Outside cold	('It's cold outside')
That's cold	(referring to the weather)
No morning	('It's not morning')
Is toys in there	('There are toys in there')
No more cookies	('There are no more cookies')

The following sentences, which occur at the point of restructuring, contain the first occurrences of expletives.

(30)
No, it's not raining
It's not cold outside
There's no more
There's no money

Given the logic of a parameterized theory of grammar, we expect that restructuring will be triggered by relatively simple data which are readily available to the child. Ideally, we would like a theory in which the class of 'triggering data' is restricted in a principled fashion. A very strong claim (certainly too strong) is that all restructuring is induced by the acquisition of particular lexical items and their associated properties. For this reason the hypothesis that lexical expletives trigger restructuring is attractive. There is, however, another set of potential triggering data for the particular parameter under discussion. This is the use of referential pronouns, eg. *he, she*, etc., in 'pragmatically infelicitous' circumstances.

At some point in development the English speaking children must learn that in English contrast and emphasis are indicated by stress. Let us call this point P. Following point P the child will continue to hear in the language spoken around him referential pronouns which are unstressed, as is standard in English. Now, however, he will know that they are not present for pragmatic purposes. Thus, again, according to the same line of deduction used in the case of expletives, the AG/PRO parameter will be reset. On this account as well, the emergence of lexical expletives at the point of restructuring is predicted since a null subject is no longer licensed anywhere. The expletives would not, however, constitute the triggering data in this instance. In short, there are various lexical pronouns in English which do not serve any pragmatic function, either because they are semantically empty or because they are unstressed. Their presence in the sentence is necessitated by strictly grammatical factors, i.e., that the grammar of English does not license phonologically null subjects. Thus, in principle either class of elements (or both) could trigger a resetting of the AG/PRO parameter.[19]

We turn now to some comparative data from the acquisition of German.

4.0. THE GRAMMAR OF EARLY GERMAN[20]

In the previous sections we suggested that the early grammar of English is a NS grammar, or more to the point, that at the initial setting of the AG/PRO parameter AG is specified as pronominal. Given that children do not come 'prewired' to learn a particular language, i.e., that initial parameter settings are invariant across children, we expect that the early language of non-English speaking child also will exhibit the essential properties of a NS grammar. In this section we will consider the effects of the AG/PRO parameter in the acquisition of a second NNS language, German.[21]

Various researchers (Roeper, 1973; Clahsen and Muysken, 1983; Clahsen, 1986) have observed that lexical subjects are optional in the early stages of the acquisition of German. Interestingly, they have further noted that young German children also produce fairly consistent word order 'errors.' Specifically, a large percentage of their monoclausal sentences have an SOV word order, even though the correct word order for root declaratives in the adult language is SVO. Roper (based on data in Park, 1970) reports that 2-year old German speaking children consistently place the direct object before the verb in 2-word utterances (80% of the subjectless sentences are OV), and do so to a significant degree in 3-word utterances (50% are SOV). Similarly, Clahsen and Muysken (1983) and Mills (1987) found that during the two-word phase approximately

70% of the verbs appear in sentence final position. Some examples of sentences containing the erroneous verb-final order are given below (from Mills, 1987).

(31) a. teddy holen
teddy fetch
('Fetch teddy')

b. hause gehen
home go
('go home')

c. meike ab- machen
Meike off take
(take (it) off Meike)

d. teddy sofa fahren
teddy moped drive
(teddy drives the moped)

e. meike fenster gucken
Meike window look
(Meike is looking out the window)

Mills reports that around the age of three the verb-final rule is replaced by the correct verb-second patterns. At this point the children also place auxiliary verbs correctly in second position and produce subject-verb inversion in interrogatives and after preposed complements. Finally, Clahsen (1984), based on an extensive longitundinal study of three German speaking children, reports that during his Phases II and III "verb-final patterns are dominant for all children" (p. 36). He observes a clear developmental shift in the transition from Phase III to Phase IV, in which verb-second patterns become dominant. Specifically, Clahsen's results show that the use of verb-second jumps from 40% to 90% in the period of one month — an extremely rapid transition by acquisition standards.

The word order errors produced by young German children are particularly striking in light of the fact that Brown (1973) and others have found that in general correct word order is one of the earliest aspects of syntax which the child controls. English speaking children, for example, produce virtually no word order errors. In this section we will propose that the German word order errors are a language particular effect of the initial 'missetting' of the AG/PRO parameter. However, before presenting the acquisition analysis, it is necessary to briefly review the syntax of word order in the adult language.

It has been argued extensively that the underlying word order in German is SOV (Emonds, 1970; Koster, 1975; Thiersch, 1978; Safir and Pesetsky, 1981, and others). They have proposed that the expansions of S and VP are as follows:

(32) S → NP VP INFL
VP → NP V

This basic word order is reflected in the SOV word order of subordinate clauses, as illustrated below.

(33) Hans sagte dass [$_S$ Maria das Buch gelesen hat]
Hans said that Maria the book read has
(Hans said that Maria has read the book)

In order to account for the SVO constituent order of matrix clauses in the adult language Safir and Pesetsky, following Thiersch, propose that the tensed verb (or auxiliary) moves into INFL. INFL is then preposed by the transformational rule 'Move INFL' ultimately yielding the SVO order given below.[22]

(34) a. Hans $[_{\text{INFL}_j}$ liebt$_i]$ $[_{\text{VP}}$ Maria $e_i]$ $[_{\text{INFL}}$ $e_j]$
Hans loves Maria

b. Hans $[_{\text{INFL}_j}$ hat$_i]$ $[_{\text{VP}}$ das Buch gelesen $e_i]$ $[_{\text{INFL}}$ $e_j]$
Hans has the book read
(Hans has read the book)

The raising of the verb into INFL, or more precisely, into AUX in INFL, is analogous to the raising of *have* and *be* in English. In German the process is more general in that it affects the tensed main verb if there is no auxiliary. It is important to recall at this point that by our hypothesis, INFL must contain lexical material in order for 'Move INFL' to apply (see Section 2). If raising into AUX is blocked, inversion is blocked.

Although the above description is extremely sketchy, it is sufficient to allow us to return to the acquisition data. Concerning the initial SOV order adopted by German children, Roeper (1973) has suggested that the children adopt a 'head last' constituent order based on the order of elements in adult subordinate clauses.[23] If this is so (and we assume that it is) we might expect German children to adopt an SOV order in subordinate clauses (although they are still too young to produce them). Moreover, given certain assumptions about the Language Acquisition Device (see note 23) we might also expect German children to assume SOV order as basic. What is unclear is why they incorrectly 'generalize' this order to simple (or root) sentences. More to the point, why do they fail to 'learn' that root sentences have a transformationally derived SVO order, when this information is immediately available in the input data? We will not attempt to answer this question.

Given an intial setting of the AG/PRO parameter in which AG is pronominal, we expect that German speaking children, like their English counterparts, will produce subjectless sentences. Roeper (1973), Clahsen & Muysken (1983) and Clahsen (1986) all observe a significant use of subjectless sentences during the early stages of acquisition. In a detailed description of the phenomenon, Clahsen notes that German children omit lexical subjects in approximately 60% of their utterances throughout Phases II and III. Some examples of NS sentences are given in the acquisition data in (31). Let us now turn to the second acquisition phenomenon under discussion — SOV word order in root sentences.

The AG/PRO hypothesis predicts straightforwardly that verb-raising into AUX will be blocked during the period in which AG is pronominal, as is the case for English auxiliaries. Note, however, that in German this has a further consequence: if raising is blocked, inversion is blocked (as noted above), and hence it is the underlying (S)OV order which surfaces during this period. In short, despite the presence of SVO sentences in the input data, the early grammar cannot generate this order since the derivation requires raising and inversion, and the first of these operations is blocked by AG/PRO. As is the case in the acquisition of English, the early grammar of German filters out input data which are unanalyzable. We expect that the correct SVO order will emerge at roughly the same point as the subjectless sentences disappear, signalling the shift away from a NS grammar towards the adult grammar of German. This is precisely the case. Clahsen (1986) observes that the transition from Phase III to IV is marked by (i) a dramatic decrease in the number of 'deleted' subjects (from 45% to 10%), and (ii) an equally dramatic increase in verb-second sentences (40% to 90%). These figures provide rather striking support for the analysis proposed in this paper.[24]

The German acquisition data are of particular interest for several reasons. First, they provide cross-linguistic support for the claim that at the initial setting AG is identified as PRO, and thus constitute further evidence that some parameters come 'fixed' at an initial setting which may or may not be altered at some later point of development. Second, the German data illustrate how the effects of a particular parameter setting may vary depending on certain language particular properties, for example, the fact that word order is affected in early German though not in English.

5.0. CONCLUDING REMARKS

The parameterized theory of grammar (Chomsky, 1981 and references cited there) and especially the NS parameter has had considerable success in describing certain differences which exist in natural language. More importantly, the theory provides an explanatory model of how language acquisition might proceed in principle. In this paper, we have attempted to explain certain aspects of actual real-time acquisition within this same framework. We believe that such an approach enables us to provide a principled account of various (apparently unrelated) acquisition phenomena and of the general process of grammatical development. At the same time we hope to have broadened the empirical base of the parameterized theory of grammar and of the NS parameter in particular.

NOTES

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[1] Pinker (1984) also argues for a continuous model of development. He refers to this as the 'continuity hypothesis.' The version of continuity which we assume does not require that all principles of UG be available at the initial state. It is possible that certain principles are maturationally determined to emerge at later points in development. For discussion of this issue, see Borer & Wexler (1987) and Hyams (1986).

[2] More specifically, Rizzi proposes that a pronominal INFL functions like a clitic which 'properly governs' an [e] in subject position. See Rizzi (1982) for further discussion.

[3] PRO is the element typically found in subject position of tenseless classes, as follows:

(i) I want [PRO to go]
(ii) I persuaded Mary [PRO to leave early]
(iii) [PRO drinking turtle blood] is disgusting
(iv) *I hit [PRO]

There are three defining characteristics of PRO (Chomsky, 1981). First, it is subject to control. This is illustrated in the sentences in (i) and (ii), where the reference of PRO is determined by the matrix subject and object, respectively. The second property of PRO is that it may be arbitrary in reference. This is illustrated in (iii). The final property of PRO is that it can only appear in ungoverned positions. This is shown by the contrast in (i)–(ii) vs. (iv), where the latter sentence ungrammatical because PRO is governed by the verb.

In Hyams (1986) it is argued that AG in NS languages functions like PRO with respect to these three properties; that is, it may be controlled; it may be arbitrary in reference; and it must be ungoverned. In this paper we discuss only the latter property since this is the one which is most directly relevant to the acquisition analysis.

[4] On our analysis the head of INFL is determined according to the following 'head assignment principle':

(i) Where AUX is lexically specified AUX heads INFL; otherwise AG heads.

[5] Rizzi (1982) notes that inversion in these cases is not only possible but in fact obligatory. He proposes that the obligatoriness can be accounted for by assuming that Italian has a marked rule of nominative Case assignment as follows:

(i) Assign Nominative Case to NP in the context of AUX __

If the rule fails to apply, the structure is ruled out by the Case Filter. Henceforth we assume Rizzi's account of the obligatoriness of inversion in these instances. Our analysis focuses on the fact that inversion is possible in these cases but not with tensed auxiliaries.

Rizzi notes that these inverted sentences are of a rather formal style, the gerunds being less formal than the infinitives.

[6] Picallo (1985) presents some compelling evidence that modals in pro-drop languages, specifically Catalan, do appear in INFL when they are used in their epistemic sense. At present we are unable to reconcile our own analysis of modals with the data and analysis proposed by Picallo. We leave this for future research.

[7] This suggests that an adequate characterization of the null subject phenomenon in early language cannot be stated in terms of semantic roles without a significant loss of generality. Indeed, facts such as these provide empirical evidence against the semantically-based child grammars proposed by Bowerman (1973) and Schlesinger (1971). For further discussion of this issue, see Hyams (1984).

[8] Participial forms (eg. *eaten, gone*, etc.) are absent from the data through Stage V (Brown, 1973), suggesting that young children simply do not know the present perfect tense. We will therefore not discuss the English auxiliary *have*.

[9] We adopt the convention of reporting the child's age in months and weeks. Thus 20; 2 means the child is 20 months, 2 weeks old.

[10] Bloom (1970) and Bloom et al. (1975) do not report the data for Kathryn beyond Time III (age 24; 2). Thus, the point of shift for this child is a projection based on the fact that her language at Time III exhibited many of the properties which usually precede the shift (found in Gia V and Eric V).

[11] This is reminiscent of Roeper's 'input filter.' See Roeper (1978) for discussion.

[12] The length of time between Stages B and C varies considerably from child to child. As noted in the text, the children studied by Bellugi ranged from a 3 to 8 month interval between the two stages.

[13] Interestingly, Smoczynska (1987) reports that modal constructions in Polish "seem to appear a little earlier than in English." (p. 654) This is predicted on our analysis since in Polish, as in Italian, the modals are inflected like verbs.

[14] Two other 'modal-like' elements which occur during Bellugi's Stage B are *can't* and *don't*. Following Bellugi, we assume that these elements are not in fact analyzed as negated modals by the child. Rather, they are simple negative markers analogous to *n* and *not* which are also used by the child at this stage. See Bellugi (1967) and Hyams (1986) for further discussion.

[15] In his study of the acquisition of 'the 14 grammatical morphemes' Brown (1973) distinguishes the 'contractible *be*,' the element which can be contracted in the adult language, from the 'uncontractible *be*' which cannot be contracted. In terms of the order of emergence of these forms in child language, the uncontractible form ranks 6.50 while the contractible form is the last of the 14 morphemes to appear.

[16] We assume, following Baker (1979) that the triggers are 'positive' data, that is, data in the environment which cannot be generated or is somehow incompatible with the child's current grammar.

[17] Not all NS languages lack overt expletives. Modern Hebrew, for example, has the expletive ze (it) which is used optionally in extraposition contructions as in (i) (from Borer, 1984).

(i) (ze) margiz ʔoti she Itamar tamid me ʔaxer.
(*It*) *annoys me that Itamar is always late.*

Hebrew differs from Spanish and Italian in that the null subject phenomenon is not as general. In Hebrew we find phonologically null subjects only in 1st and 2nd persons in the past and future tenses. The presence of a lexical expletive is most probably related to the fact that Hebrew is in some sense not a 'pure' NS language, although at present we do not know how to formalize this notion. (See Borer, 1984 for discussion of pro-drop in Modern Hebrew.)

The existence of lexical expletives in some pro-drop languages poses important questions for the triggering analysis proposed here. For example, is it the case that because of ze the Hebrew speaking child is at some point 'misled' in analyzing Hebrew as a NNS language, or are there other factors which can neutralize this effect of the lexical expletive?

We should also note that there are languages which, although they do not allow 'thematic pro-drop', i.e., phonologically null referential subjects, do have null expletives. German is such a language. See note 21.

[18] Chomsky (1981) suggests that the use of pronouns is governed by an Avoid Pronoun Principle which states (roughly) 'Avoid pronouns where a null pronominal is possible.'

[19] K. Wexler and L. White (p.c.) have independently suggested a third possible trigger — modals and *be* in sentence initial position in yes/no questions. Wexler and White note the results of Newport, Gleitman & Gleitman (1977) who found that sentence initial auxiliaries are particularly salient to the child in that the frequency of yes/no questions in the input data seem to be one of the few environmental factors which has a direct effect on language development in young children. It is thus possible, as suggested by Wexler and White, that when the child begins to attend to sentence initial auxiliaries, he is forced to an analysis in which these elements appear in AUX, and hence AG ≠ PRO.

[20] The analysis of German acquisition proposed in this section is based predominantly on the work of H. Clahsen. Based on a longitudinal study of three German speaking children (ages 1; 6 to 3; 6 and 1; 2 to 2; 6), Clahsen identifies four phases (i.e. developmental stages) in the acquisition of German. The phases which I refer to are described in detail in Clahsen (1986).

[21] Safir (1985) and others have argued that German is a NS language. On Safir's analysis the fact that the null subject phenomenon is restricted to expletives (see note 17) follows from independent principles of grammar and need not be stipulated as such. It has proved useful to distinguish languages like Italian and Spanish which allow 'thematic pro-drop', and cases such as German which allow 'non-thematic pro-drop.' In this paper when we refer to null subject or pro-drop languages we intend languages of the former type.

Although we have nothing to say about the German null subject phenomenon, it is important to note that the presence of null expletives in a language which does not otherwise allow null subjects has implications for the triggering hypothesis presented in this paper. For example, if it is the case that children rely uniquely on lexical expletives to trigger the shift from NS to NNS grammar, we expect that German speaking children might take longer to restructure their grammars given that the triggering data are less robust in the input data. Unfortunately, we do not have sufficient comparative data to determine whether this is the case.

[22] We have greatly simplified the inversion analysis proposed by Safir and Pesetsky for expository purposes. See their paper for a detailed discussion of inversion.

[23] Roeper suggests that the Language Acquisition Device may be sensitive to the fact that subordinate clauses, unlike matrix sentences, are affected only by operations that are structure-preserving in the sense of Emonds (1976) and hence will look only to subordinate clauses for basic word order. Although we are not convinced that this is in fact the reason that children attend to subordinate clauses, we do not have an interesting alternative explanation.

The claim that German children adopt an SOV order based on subordinate clauses has been questioned by a number of people on the grounds that young children do not themselves produce complex sentences nor do adults often use complex sentences in speaking to very young children. While it is true that children do not use embedding (either due to performance constraints or because the early grammar does not yet have this particular form of recursion), it is simply not true that children do not receive complex sentences in the input data. Such constructions are available both in adult-child interactions and adult-adult interactions which the child presumably hears. Sentences such as 'I think that X' or 'Mommy said that X' and so on are not uncommon. Again, however, the question of why the child chooses to attend to the order in the subordinate clause is an open question.

It has also been suggested to me that the child hypothesizes SOV word order based on order of main clauses containing compound tenses, as in (i), where the auxiliary is disregarded.

(i) Er (hat) das Buch gelesen
He (has) the book read

Interestingly, the problem of 'selective attention' still remains even on this alternative, that is, why does the child attend to the above SOV cases rather than the simple SVO cases like (ii)?

(ii) Er lisst das Buch
He reads the book

[24] Clahsen (1986) proposes a different account of the German word order errors. He notes that the emergence of the correct SVO order co-occurs with the emergence of the full range of agreement markings on verbs. During Phases I and II children have only a subset of the class of verbal inflections (which are not necessarily used correctly). By Phase IV they have acquired the full set. According to Clahsen, the early grammar fails to distinguish finite from non-finite verbs; this distinction emerges during Phase IV and triggers the V2 rule (which affects only tensed verbs).

Following in the spirit of Clahsen's proposal, a reviewer of this paper suggests that the shift away from a NS grammar to a NNS grammar may also be related to the emergence of the [+/− finite] distinction. (See also Guilfoyle, 1985 for a proposal along similar lines for English speaking children.)

In principle the 'finiteness hypothesis' represents an interesting alternative to the analysis proposed in this paper, though the theory needs to be fleshed out in considerable more detail. It is not difficult to see, however, how such an analysis might account for the acquisition of modals as well.

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