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On the Grammatical Basis of Language Development: A Case Study.

1. Introduction.

Modern linguistics has often stressed the rapidity of the language acquisition process: when the child starts the systematic acquisition of structured domains of knowledge at school, she has already acquired the fundamental structures of her native language. Language acquisition is remarkably rapid, given the complexity of the acquired system and the fact that acquisition takes place naturally, without an explicit teaching. This remarkable cognitive achievement sets strong empirical conditions for the study of language as a cognitive capacity: linguistic models must be able to capture the fact that every normal child succeeds in acquiring language within the observed limits of time and exposure to data.

Acquisition is rapid, but not instantaneous. This is immediately obvious if we consider production: newborn babies don't talk, and when the child starts producing the first recognizable linguistic sounds, the first words, and then the first word combinations, she doesn't talk like an adult. There is observable development; for a few years the child's system will undergo systematic changes and recognizable phases, to eventually stabilize and converge to the target system.

This chapter reports on a trend of developmental research which is characterized by the use of sophisticated linguistic models of the "Principles and Parameters / Minimalism" type, and by the adoption of the comparative perspective, with full use of the theoretical apparatus of modern comparative syntax.

The theory-conscious study of language development is defined by three fundamental questions:

1. What is the nature of early grammatical systems?
2. What makes early grammatical systems change over time?
3. What is the time course of grammatical development?

The first question bears on the basic ingredients that early grammars are made of. The crucial issue is the validity and range of the hypothesis that there is a fundamental continuity in language development (Pinker 1984); this issue can be addressed through the detailed comparative study of early and adult grammatical systems: is the internalized grammar of the child cast in the same mold as adult grammars, or is it different in fundamental respects? Is continuity the prevailing factor in development, or are there critical points of discontinuity?
The second question bears on the identification and study of the causal factors of development: what is the respective role of learning (of lexical inventories, of morphological paradigms, etc.) and of inner maturational schedules in language development?
The third question aims at designing a temporal chart of the sequence of events which take place in normal language development, also in view of defining a baseline for the study of developmental pathologies.

Over the last twenty years or so, a lot of progress has been made on the first question, and the hypothesis of a fundamental continuity between early and adult systems has received strong empirical support. This progress took place under the impulse of the parametric approach to

comparative syntax, which offered a conceptual framework and formal tools well suited for comparing grammatical systems. Much work was also devoted to the second question, but the progress has been more limited, and the level of controversy is greater. This is not surprising, as conceptual and formal advances in the theory of syntax are less immediately of help for addressing this question: the motor of development must somehow lie outside grammatical theory. As for the third question, the drawing of the temporal chart has proceeded steadily for production, with the constitution and study of natural production corpora and with much experimental work on elicited production, etc.; as for comprehension, there has been progress in certain areas, but much of the experimental work remains to be done. Here we will restrict our attention to the study of early production, with only occasional reference to the (potential) relevance of the developmental study of comprehension.

This chapter is organized as follows. After a short historical excursus on the impact and relevance of the theory of parameters for the study of development, we will take a central case study for illustrating this recent research trend: the analysis of subject drop in early linguistic production. We will try to show that early subject drop is a genuine grammatical option available in early systems, not the mere effect of performance limitations. After studying in some detail the structural conditions in which subject drop is possible in early grammars, we will discuss some cases of argument drop in adult systems that are structurally akin or identical: Topic Drop and Root Subject Drop. We will then address the question of why the Root Subject Drop parameter (and other parameters connected to the dropping of material) seem to permit a delayed resetting on the negative value, thus giving rise to observable developmental effects, while other parameters appear to have already been correctly fixed when syntactically relevant production begins, in compliance with Wexler's (1998) Very Early Parameter Setting. We will try to address this split in the time course of parameter fixation within an approach in which language development is grammatically based, but keyed to the growth of the performance systems.

2. History.

The study of language acquisition is a fundamental component of the program of generative grammar ever since its origins. So much so that Chomsky's "Conditions on Transformations", the first full-fledged attempt to structure the theory of Universal Grammar, starts with the following statement: "From the point of view that I adopt here, the fundamental empirical problem of linguistics is to explain how a person can acquire knowledge of language" (Chomsky 1973).
In the same vein, about a decade earlier, Chomsky had defined "explanatory adequacy", the most ambitious level of empirical adequacy that a linguistic analysis can achieve, as the level reached when the acquisition process is captured (see, e.g., Chomsky (1964), and, for a recent discussion of this notion within the Minimalist Program, Chomsky (2001), (2002)). Nevertheless, apart from few noticeable early attempts (e.g. Edward Klima's collaborative work with Ursula Bellugi in the sixties, see Klima & Bellugi (1966)), till relatively recently, little attention was paid by theoretical linguists to the actual process of language development. The acquisition problem was rather addressed as an abstract logical problem, characterized by Chomsky(1986) (and in much related work) as the variant of Plato's problem pertaining to linguistic knowledge: what kind of inner structure should we presuppose in the learning mechanism to account for the acquisition of a system as rich and structured as the adult knowledge of language on the basis of the linguistic evidence available to the child? This question can be asked at an abstract level, abstracting away from the actual time course of acquisition, and be modeled as an achronic, or instantaneous, process; these issues are often discussed informally, but can be phrased precisely through the formal techniques of Learnability Theory (Pinker 1979, Wexler & Culicover 1980).

Models of generative grammar till the mid seventies were based on the idea that the adult speaker's knowledge of his native language is expressed by a Particular Grammar, a system of rules that are construction specific and language specific. Universal Grammars (UG) is a grammatical metatheory, expressing the general format of grammatical rules, and some very general conditions on rule application (such as the "A over A" condition, etc.). In this model, language acquisition is a process of grammatical induction: the child must figure out, on the basis of her linguistic experience, the grammatical rules of the language she is exposed to, within the grammatical space defined by UG. A major problem that this approach was confronted with was that there weren't clear and effective ideas about how grammatical induction could work.

A major change took place in the late seventies with the introduction of the Principles and Parameters model of Universal Grammar. The first step was the observation that principles on rule application gave rise to slightly different results across languages, and the variation could be expressed by assuming that they contained certain parameters (like the class of bounding nodes for subjacency, responsible for the selective violability of Wh islands in some languages: Rizzi (1978), Chomsky (1981)). Then it was quickly realized that this approach could be deemed responsible for the whole cross-linguistic variation (at least in syntax), thus making it possible to dispense with the concept of "language specific rule" altogether. In this conception, UG is a system of principles with certain choice points, the parameters, permitting a restricted variability. A particular grammar is simply UG with the parameters set in a particular way, UG plus a specific set of parametric values.

Within this model, language acquisition is an operation of parameter setting: the language learner, equipped with the innate UG structure, sets the parameters of the system on the basis of her linguistic experience. There is no process of rule induction, because there is no language specific rule system to figure out: acquiring the computational properties of a natural language amounts to selecting some internally generated options and discarding, or "forgetting", other options, on the basis of experience (on "learning by forgetting" in phonology, see Mehler & Dupoux (1992)).

This approach had an extraordinary impact on comparative syntax: the parametric models offered a theoretical language which permitted to naturally capture the cross linguistic invariants while concisely expressing the domains of variation, thus quickly enhancing the empirical and theoretical dimension of syntactic comparison.

As for language acquisition, non only did the theory of parameters lead to a radical reformulation of the logical problem of language acquisition, it also profoundly affected the study of language development. Language development raises descriptive problems that are analogous to those raised by comparative syntax: the domain involves the comparison of systems that are similar (say, the comparison between early English, early French, early Chinese, but also the comparison between these systems and their adult counterparts), but with local points of divergence; the theoretical language of parameters thus offered an attractive opportunity to address the issues of development, at the same time potentially extending the explanatory coverage of the theory, and adding a new dimension, the comparison of early and adult systems, to the comparative endeavor (see also the introductory chapters of Rizzi (2000a), Friedemann & Rizzi (2000). We will now illustrate this direction of research through a representative case study.

3. **Subject omission in the early phases of the acquisition of a non-NSL**

Some adult languages, such as Italian and most of the Romance languages, allow null pronominal subjects in tensed clauses ("*(Io) parlo italiano*" (I speak Italian)); other languages, such as English and other Germanic languages, do not have this option and require the overt expression of pronominal subjects ("**(I) speak English*"). This distinction led researchers to the postulation of a parameter of Universal Grammar, the Null Subject Parameter, the first extensively studied case of parameter, ever since the early eighties (Rizzi (1982), ch. 4, Jaeggli & Safir (1989), among much other work).

Child languages would appear to be more uniform in this respect. In early linguistic productions, children tend to omit subjects even when the target language is not a Null Subject Language. Examples like the following are typically found in natural production corpora:

(1) English (Brown 1973)
  a ___ was a green one (Eve, 1;10)
  b ___ falled in the briefcase (Eve 1;10)

(2) French (Hamann, Rizzi, Frauenfelder 1996)
  a___ a tout tout tout mangé (Augustin 2,0)
  '___ has all all all eaten'
  b___ ôter tout ta   (Augustin 2,0)
  '___ empty all that'

(3) Danish (Hamann & Plunkett 1997, 1998)
  a___er ikke synd   (Jens 2,1)
  '___is not a pity'
  b___ikke køre traktor (Jens 2,0)
  '___not drive tractor'

Subject omission in early production cannot be reduced to a subcase of a general tendency to speak "telegraphically", omitting pronouns and other functional material (on the hypothesis that there may be a "prefunctional stage" in development see Radford(1990)). Subject omission is selective wrt to object omission for instance: Bloom (1990) counted subject and obligatory object omissions in the natural productions of children acquiring English (Adam (2;3-2;7), Eve (1;6-1;10), Sarah (2;3-2;7), corpus available through CHILDES, see MacWhinney & Snow (1985)) and found a huge discrepancy: 55% of subjects were omitted, while only 9% of obligatory objects were (see Hyams and Wexler (1993) for similar results and discussion). Moreover, as we will see shortly, subject omission is strongly sensitive to the structural position of the subject, a property which would be totally unexpected under a generalized strategy of deletion of pronouns and other functional elements.

Moreover, subject omission is a very stable phenomenon in development. Consider the following table, concerning omissions in non-imperative clauses in the natural production of a child acquiring French: (FN 1)

(4) Hamann, Rizzi & Frauenfelder (1996): Early Null Subjects in French (Augustin)

Age	V utt	NS	%
2;0;2	49	23	46.9
2;0;23	23	14	60.8
2;1;15	15	7	46.6
2;2;13	44	16	36.3
2;3;10	33	10	30.3
2;4;1	53	29	54.7
2;4;22	46	22	47.8
2;6;16	100	37	37.0
2;9;2	141	35	24.8
2;9;30	133	19	14.2

Subject omissions oscillates between 60% and 30% throughout the first part of the third year of life; around 2;9 it still involves about a quarter of the relevant verbal utterances, and only in the last recording, around age 2;10, it falls under the bar of 20%. The persistency of the phenomenon throughout the third year of life is not at all a peculiarity of this particular child: it appears to be the general case in the acquisition of Non-Null Subject Languages. Early subject drop thus appears to be a kind of developmental universal.

Why is it so? Hyams (1986) put forth the influential hypothesis that early subject drop results from a missetting of the Null Subject Parameter.   Suppose that the Null Subject Parameter (whatever its appropriate formulation) is initially set on the positive value, the one licensing null pronominal subjects in tensed clauses. Then nothing happens in the acquisition of Italian, Spanish etc.: the evidence available to the child is consistent with the initial value, and no development is observed. On the other hand, the child learning English, French, etc., must eventually realize that the target system is not a NSL; but this takes time, whence the developmental effect and the observed null subject phase.

This hypothesis gave rise to a major interdisciplinary debate on the relevance of theoretical linguistic tools for the study of language development, and was at the source of the current theory conscious trend of developmental studies.

One direction of research that was pursued was to verify if other parameters of UG would give rise to similar developmental effects. Another direction was to pursue a more fine-grained analysis of the structural properties of early subject drop, to verify if they matched what is observed in adult NSL's.

4. The time course in the fixation of some major parameters.

It is a rather traditional observation in developmental studies that word order properties of the target system are by and large respected when syntactically significant production starts, in the so-called two words stage, around the end of the second year of life or shortly after. Children learning English, or French, or Italian, typically produce VO structures, while children learning Japanese, or Korean typically produce OV structures, not the other way around. In parametric terminology, the headedness parameter (or its equivalent in a system like Kayne (1994)) appears to be already fixed when (syntactically relevant) production begins.

The same conclusion seems to be true for more subtle parameters, such as the amount of verb movement in the inflectional structure. So, Pierce (1989, 1992) showed that, already in the two word stage, children acquiring French raise finite verbs to an inflectional position higher than negation (*Il (ne) mange pas* ('he eats not')) and leave non finite verbs in VP internal position (*(ne) pas manger* ('not to eat')); Stromswald (1990) observed that children acquiring English never attempt to produce non-target consistent "French-like" structures with the lexical verbs raised past negation (**He eats not*); again, the V-movement parameter(s) studied in Emonds(1978), Pollock(1989) and much subsequent work appears to be correctly fixed as soon as syntactically significant production starts. The same conclusion was reached by Poeppel and Wexler (1993) on the fixation of the Verb Second parameter in Early German; and by Hamann, Rizzi & Frauenfelder (1996) on the fixation of the clitic parameter(s) (primarily, the parametric choice of the structural host of the clitic), at least in the sense that, as soon as the child acquiring French starts producing object clitics, she places them in the correct clitic position.

These observations led Wexler (1998) to postulate that parameter setting is done perceptually, before the onset of production (Very Early Parameter Setting): when syntactically significant production begins, major parameters have already been set on the target-consistent values, which are faithfully reflected by early production.

But then, what about the early null subject stage? If VEPS may well be valid for major word order parameters, it may not hold for other kinds of parametric choices. In fact there are other cases involving the dropping of material which seem to give rise to a delayed fixation.

A potential case is the dropping of the copula. Becker (2000) showed that children acquiring English tend to drop the copula honoring structural/interpretive distinctions along lines similar to those governing the syntax of copulas in some adult languages. Becker observed that four children learning English (Nina 2;0–2;2 , Peter 2;0–2;3 , Naomi 2;0-2;7 , Adam 2;7-3;4) drop copulas selectively, much more frequently when the predicate is a locative PP, as in (5)b, then when it is a DP, as in (5)a.

(5)a It (is) a dog   (overt copula: 72.4%)
   b It (is) in the garden (overt copula: 20.9%)

She interpreted this difference not as a primitive structural difference, but as a reflex of the interpretive properties of the two types of predicates, with locative PP's typically expressing a temporary property (or stage level) and DP predicates normally expressing a permanent property (individual level) of the subject. She also connected the child pattern to the fact that some adult languages formally sanction the same interpretive divide with distinct forms of the copula (Spanish *ser* vs. *estar* for individual and stage level predicates, respectively) and even with selective copula drop, a phenomenon restricted, in Modern Hebrew, to stage level predicates (with many complications discussed by Becker and in references quoted there):

(6)a ha-kli   ha-ze   hu   patis
      'The tool the this COP   hammer'
       'This tool is a hammer'

    b Dani   ___   me'od 'ayef   ha-yom
       'Dani   COP   very   tired   the day'
       'Dani is very tired today'

Other cases may be amenable to a similar analysis. The omission of the copula is often treated as akin to another characteristic feature of child language: the use of Root (or Optional) Infinitives. Around the age of two, children typically use infinitival verbs in main clauses in non target-consistent ways, for instance to describe an event that they just observed: the following examples are taken from Child French:

(7)a   Voiture partir   (Grégoire 1;11)
        'Car leave'
   b   Misette lancer la balle dans la cour (Philippe 2;1)
        'Misette throw the ball in the court'
   c   Maman faire boum sur le camion   (Philippe 2;1)
        'Mummy make boum on the truck'
   d   Michel dormir là   (Philippe 2;2)
        'Michel sleep there'
   e   Pas marcher toboggan   (Philippe 2;2)
        'Not work toboga'

According to some analyses, this major case of non-target consistency is related to a maturational process, somehow permitting the extra option of omitting the tense specification in child systems (this is a primitive option in Wexler (1994); the consequence of the option of omitting external structural layers in Rizzi's (1993/94) truncation approach; and the consequence of a more abstract computational principle, the Unique Checking Constraint, in Wexler (1998) (FN 2)); other analyses, such as Avrutin (1998), observe that some adult languages can make a rather extensive use of non-finite main clauses, even in descriptive environments. One case is the Russian construction "…[which] indicates the beginning of an action that follows immediately some event assumed to be known" (Avrutin 1998: 66):

(8)a   Carevna xoxotat
        'Princess to-laugh'
        'The Princess started to laugh, right after something funny happened'

   b   Zriteli applodirovat
        'Spectators to-applaude'
        'The spectators started to applaude right after something exciting was done'

So, even though the point is controversial, it is not inconceivable that this case too may be amenable to an initial parameter missetting (see also Lasser (1997) on main infinitival constrictions in adult and child German).

Along partly analogous lines, Chierchia, Guasti & Gualmini (2000) analyzed determiner drop in child language as akin to the parametric choice of determiner-less adult languages, again a case of initial parametric missetting.

If these analyses are on the right track, the question arises of why certain parameters, roughly characterizable as involving the grammatically driven dropping of material, should differ from major word order parameters in not respecting VEPS and giving rise to observable developmental effects. We will go back to this important question in section 11.

5.   Early subject drop revisited: Root Subject Drop

Going back to early subject drop, one line of inquiry to test the hypothesis of the early missetting of the Null Subject Parameter is to study the fine structural properties of the phenomenon, to verify if they match the structural context in which null pronominals are licensed in Null Subject Languages.

A preliminary hint that this was not the case came from an observation in Valian (1991): in her rather extensive corpus (21 learners of English, 1;10-2;8) she found only 9 null subjects out of 552 non-subject Wh questions (1.6%). I.e., while the subject omission in environment (9)a is robustly attested, it is virtually absent in environment (9)b:

(9)a   (dis) goes there
   b   Where *(dis) goes?

Valian's observation prompted the conjecture (Rizzi 1992) that early subject drop in the acquisition of a non Null Subject language is limited to the highest position of the clause, the specifier of the root. If the sentence starts with a Wh element in the C system, as in (9)b, the subject is not the specifier of the root, and cannot be dropped.

(10) Early Subject Drop in the acquisition of a non-NSL is only possible in the Specifier of the root.

The root subject drop conjecture was quickly confirmed in other languages. Crisma (1992) observed plenty of subject drop in Philippe's corpus (2;1-2;3: see Suppes. Smith & Leveillé(1973)) in declaratives like (11)a (406/1002, or 40.5%), and virtually no subject drop in post Wh environments like (11)b (1/114, or 0.9%):

(11)   a   ___ est perdu xxx celui-la   (Philippe 2;2)
             '___ is lost that one'
        b   Où il est le fil?   (Philippe 2;1)
             'Where it is the wire?

Crisma's finding was confirmed by Levow (1995) based on a lager French corpus (Grégoire 1;9-2;3 (CHILDES), Nathalie 1;9-2;3, Daniel 1;8 - 1;11 (see Lightbown (1977))): she found 55% of null subjects in declaratives vs only 5% of null subjects in post Wh environment.

Hamann (2000) brought an interesting addendum: null subjects in French Wh *in situ* (i.e., unmoved) questions are about as frequent as in declaratives: in Augustin's corpus, in the period 2-2;4 we find that 49% of the *in situ* Wh questions have null subjects, and in the period 2;6-2;10 the proportion lowers to 26%, about as in declaratives. This observation is important because it shows that there is no inherent incompatibility between null subjects and Wh questions: what counts is the initial or non-initial position of the subject (in the following examples the final subject is presumably right dislocated):

(12)a ___ marche sur quoi Cedric? (Augustin 2;6,16)
       '___ walks on what Cedric?'
    b ___ est où maman? (Augustin 2;6;16)
       '___ is where mummy?'

Haegeman (1995, 1996a) validated the root null subject conjecture for Child Dutch. Her corpus (Thomas 2;3-2;11, Hein 2;4-3;1, Niek 2;8-3;10) shows a stable range of subject omissions in initial position ranging from 24.4% and 23%. But in non-initial position in post Wh environments (in fact

with order Wh V S …, as the language is V-2) null subjects are near absent (range from 2.8% to 1.3%).

Along similar lines, Clahsen, Kursawe and Penke (1995) looked at an extensive corpus of Child German: 134 recordings from 9 children 1;7 - 3;8. Only 4% of post Wh subjects were null. It is not possible to determine from this study the number and proportion of initial null subject in the same corpus. But initial null subjects are a robust phenomenon in Child German (e.g. Duffield (1993) reports over 2000 null subjects in Simone's files 3-22, i.e., over a quarter of the subject environments), so that it's very likely that early German will reproduce the sharp asymmetry that Haegeman found in Early Dutch.

An independent indication of the validity of the Root Null Subject conjecture comes from the study of the acquisition of subordination. Subordinate clauses become robustly attested in child corpora about at the time when subject drop is disappearing. Nevertheless, there is some overlap; in this period, we typically find examples with main subjects dropped and embedded subjects expressed, such as the following:

(13)a ___ went in the basement ... that what we do ... after supper (Eve 19)
   b ___ know what I maked (Adam 31)

Valian (1991) found no null subjects out of 123 finite embedded clauses in her corpus of Early English. The same observation was made in Roeper & Weissenborn (1990) for Early German.

The limitation to the specifier of the root strongly separates early subject drop from the null subjects resulting from the positive fixation of the Null Subject Parameter. Null Subject languages allow null subjects in initial and non-initial (post Wh, or embedded) position. In these systems, the highest subject position does not seem to have any privileged status, and the null pronominal subject is licensed under a local (Agreement) relation with the verbal inflection, regardless of the position of the *pro*-Agr complex with respect to other elements in the structure:

(14)a Dove ___ va?
      'Where ___ goes?'
   b ___ so che cosa ___ hai detto
      '___ know what ___ have said'

So, the Early Subject drop is a very different phenomenon from the licensing of *pro* in NSL's: the structural environments in which the two phenomena are legitimate are sharply different. We thus have clear evidence against the analysis of Early Subject Drop as a missetting of the Null Subject Parameter.

At this point we should ask the question: what happens in the acquisition of a NSL? Do young learners of Italian drop subjects like adult Italians? Or rather like their peer learners of English, French, etc?

In fact, in natural production corpora we find plenty of examples of subject drop in post Wh environment (the following data are from Cipriani et al. (1991)):

(15)a ov'è? (1;8)   c Pecché piangi? (2;3)
      'Where is?'   'Why (you) cry?'
   b cos'è ? (1;10)   d Quetto cosa fa? (2;5)

'What is?'   'This what does?'

Guasti (1995) calculated the proportion of subject drop in post Wh environments.   In the corpus of Child Italian she took into account (Martina 1;8-2;7, Diana 1;10-2;6, Guglielmo 2;2-2;11), she found that, out of 171 non subject Wh questions, 104 had null subjects (or 60.8%).

In conclusion: the Null Subject Parameter appears to be correctly fixed early on, as is shown by the sharp difference between Early Italian and Early English, French, Dutch, German in the non initial (post-Wh) environments. Learners of Null Subject Languages freely drop subjects in this environment, in which learners of non-NSL's virtually allow no subject drop. So, it appears that the Null Subject parameter is quickly fixed on the correct value, in accordance with VEPS. On top of the negative fixation of the Null Subject Parameter, learners of non-NSL have the independent option of dropping subjects in the Spec of the root. Once the distinct structural properties of this option are recognized, the question arises of its exact nature, and of its independent existence in adult systems. Is root subject drop an independent parameter of UG, an option adopted by some adult languages? Before addressing this question, we should introduce an important refinement in the analysis: child language seems to allow two structurally distinct kinds of null subjects.

6. Two kinds of Early Null Subjects: licensing conditions and development.

We have already seen that children can use non-finite structures more freely than adults; in particular, as main clauses. Roeper & Rohrbacher (1994) studied the distribution of null subjects in finite and non-finite clauses; they confirmed the observation that early null subjects are restricted to the initial position, but they added the important proviso that this constraint only holds in finite clauses, not in (root) infinitives: while examples like (16)a, with a clause-initial Wh element and a null subject, are virtually absent, cases like (16)b are numerous in the corpus they considered (Adam 2;3 – 2;11):

(16)a (*) Where ___ goes/went/is going?
     b   Where ___ go(ing)

This is not too surprising: non-finite clauses typically allow (or require) null subjects in the adult grammar. Children allow non-finite structures as main clauses: under continuity assumptions, we thus expect null subjects to be possible in such cases. And, also not surprisingly, we find that the kind of null subject occurring in (main) non finite clauses is insensitive to first position; its occurrence is legitimate because it is the subject of a non-finite clause, irrespective of any other positional constraint. Integrating Roeper and Rohrbacher's observation, we are thus led to conclude that two distinct kinds of early null subjects must be postulated: null subjects that are legitimate in the Spec of the root, typically occurring in finite clauses, and null subjects occurring in non finite clauses, which are legitimate both in initial and non-initial position (see also O'Grady, Peters & Masterson (1989), Hyams & Sano (1994), Bromberg & Wexler (1995) on English, and Rasetti (2000) on French).

What about the nature of the two types of null subjects? As for the kind occurring in non-finite structures, an immediate answer seems to be that it is PRO,   the null subject typically occurring in untensed structures in adult grammars. We may then assume that PRO will be licensed in the Spec of an untensed I, as in the adult grammar (via the PRO theorem, or the Null Case approach of Chomsky & Lasnik (1995)), the only relevant difference being that children in the Root Infinitive phase permit untensed structures more liberally than in the target systems.

As for the empty category allowed to occur in the Spec of the Root, things are less straightforward. When the distributional generalization was discovered, syntactic theory didn't offer an obvious theoretical principle, based on adult models, to deduce a descriptive statement like the following:

(17)   *ec* is licensed in Spec of the root.

One possibility which was explored was to capitalize on the fact that the Spec of the Root is the highest position in the structure, the one which c-commands everything else, and isn't c-commanded by any other category. In the general case, a null element must satisfy a requirement of identification clause-internally. For instance, one cannot leave an unidentified gap in an object position, as in (18)a; (18)b is fine because the gap is connected, through a syntactic chain, to the head of the relative, which recovers the content of the null object:

(18)a * John put ___ on the table
     b   The book which John put ___ on the table

The null elements which are locally licensed in a Spec-head configuration, are identified by the licensing head (*pro* is identified by the Strong Agr of Null Subject Language in the analysis of Rizzi (1986), and PRO is arguably identified by the local Agr under the Anaphoric Agreement approach of Borer (1989)); other types of null elements need a c-commanding identifier, as in (18)b. This requirement has sometimes been expressed as the identification component of the Empty Category Principle:

(19) ECP (Identification): *ec* must be identified through chain-connection to a c-commanding antecedent.

This suggests a possibility to capture the special property of the Spec of the root. Suppose that principle (19) must be met up to virtual satisfiability: it must be satisfied if it can be satisfied, i.e. if the structure offers the ingredients for a possible satisfaction (this interpretation is inspired by the approach to the theory of Binding in Chomsky(1986): the local domain of an element is the smallest category with a subject in which the element's binding requirement is virtually satisfiable). The Spec of the root is not c-commanded by any category, so that there is no potential identifier for it, under (19); then, under the "virtual satisfiability" interpretation, it is the only position exempted from the clause internal identification requirement: it can host a null element not identified clause internally, and available for identification in the discourse.

We now have to deal with the fact that both types of null subjects disappear in the development of a non NS Language. What is the causal factor of development? As for null subjects in main clause infinitives, things are rather straightforward: they disappear when RI disappear. The disappearance of RI in development is no trivial issue in and of itself, but it is pretty obvious that this developmental event will determine the loss of the structural environment for this kind of early null subject.

As for the loss of root null subjects in finite main clauses, some additional assumption is needed. Why are they impossible, e.g., in adult French? Suppose that the following principle holds in adult grammars:

(20) Root = CP

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If not only questions, but also declaratives are CP's, the subject position (Spec IP) never is the specifier of the root, hence it cannot host a root null subject. In terms of this approach, one is led to identify the factor triggering development in principle (20): perhaps this principle is not operative in early grammars; as soon as it becomes effective, in accordance with an inner maturational schedule, the subject position ceases to be a possible host for an unidentified null element, in terms of the approach presented in this section, and the early null subject option is lost. This is the proposal in Rizzi (1992), which we will come back to and revise in section 10 (see also, for relevant discussion on this approach, Prévost & White (2000) and other chapters in Friedemann & Rizzi, eds., (2000)).

7. Against extra-grammatical explanations

In the previous discussion we have followed Hyams' (1986) original hypothesis that early null subjects are a grammatically based phenomenon: there is a property in the early grammars which makes subject drop grammatically licit in certain positions.

An alternative view has often been proposed, based on the competence-performance divide. Perhaps early grammars are even closer to the target systems than early production suggests. Linguistic production is a complex task, involving the fine coordination of different systems, the system computing abstract linguistic representations and the articulatory system, with its complex motor programs. Fine-tuning, automatization and short term memory growth (to integrate the different kinds of relevant information) take time, so that production may start with a production system which is not fully up to its tasks. So, it could be that early production does not fully mirror the underlying grammar because of performance limitations. It could be, for instance, that subject drop and other non-target consistent omissions of material are dictated by performance limitations, rather than grammar based.

This line of argument raises immediate questions, though. As we have seen, the dropping of material is not generalized and unstructured: it appears to obey certain structural patterns. So, extragrammatical approaches must rely on grammar-independent factors to address such regularities. One particular extragrammatical approach relies on pragmatics (Greenfield & Smith 1976). Perhaps, in order to facilitate the task of the immature production system, the child tends to produce only new, focal information, freely omitting old information even when it is grammatically required. Subjects tend to express old information more than objects do, and this may account for the fact that subjects are more frequently omitted, quite independently from grammar-driven options, so the "pragmatic" account of subject drop goes.

But, as soon as a more detailed analysis of the structural properties of the phenomena is available, this approach appears untenable. Consider the root null subject generalization, and in particular the fact that subject drop is virtually absent in post Wh environments. In such structures as *Where DP goes, Où DP est*, etc., the Wh element takes up the focus of the structure (as is directly shown by the fact that Wh consituents are often overtly marked as focal in languages using overt focus particles, such as Gungbe, see Aboh (1998)), so that the rest of the structure, and the subject position in particular, is presupposed, old information. So, the post Wh environment should be a particularly favorable environment for subject drop, contrary to fact. Clearly, the relevant generalization is not naturally expressible in informational terms.

Or, consider Roeper and Rohrbacher's observation that in post Wh environments only non-finite, uninflected clauses allow null subjects: again, an information-based approach does not seem to have

anything to say on this distributional constraint. So, this variant of the extragrammatical approach seems unable to capture the basic structural patterns of early subject drop.

A different kind of extragrammatical approach appeals directly to the fact that different positions in the clause may involve different levels of processing difficulty, thus determining selective droppings of material in the positions in which the production system is more heavily solicited. Along such lines, Bloom (1990) assumes a processing theory according to which "the processing load at every point is proportional to the number of yet-to-be-expanded nodes that must be kept in working memory" (Bloom, cit., 501), so that the processing load will be maximal at the beginning of the sentence, and decrease from left to right. Then, Bloom argues, subjects are more likely to be dropped than objects because they occur earlier in the sentence, in the structural environment in which the processing load is maximal. This approach would seem to predict a slow decrease of the frequency of pronoun drop from left to right, in parallel with the decrease of "yet to be expanded nodes". But this is not what the detailed structural study has observed: rather, what has been observed is a sharp distinction between the first position, freely allowing pronoun drop, and every other position, basically banning it (in inflected clauses). In particular, the processing account seems to be unable to account for the obligatory overtness of subjects in post Wh position like (16)a: here the "yet to be expanded nodes" after the subject involve the whole IP structure, exactly as in the corresponding declarative, so that there seems to be no basis to expect the impossibility of subject drop in this environment. Or, consider again Roeper and Rohrbacher's observation. Inflected and uninflected clauses have the same configurational structure, under standard assumptions, so that there is no basis to predict the sharp observed difference between the two cases. (FN3)

These indications seem to me to strongly argue against an extra grammatical account: early subject drop takes place in initial position and in the subject position of uninflected clauses, a state of affairs that can be naturally traced back to grammatical principles and parameters.

Nevertheless, Bloom(1990) provides interesting evidence for the relevance of processing considerations in early subject drop. He shows that sentences with null subjects tend to have longer VP's in Child English: perhaps, the child planning a more complex VP is more likely to drop the subject, thus reducing the processing load. Other indications that early subject drop may correlate with other factors of syntactic complexity come from previous work. For instance, L. Bloom (1970) had observed that early subject drop is more frequent when certain factors of complexity are added, for instance in negated vs. non-negated sentences. Mazuka, Lust, Wakayama and Snyder (1986), Valian(1991) also argued for the relevance of processing limitations in the dropping of structural material.

All these observations give plausibility to the idea that early subject drop is somehow connected to the facilitation of the task of an immature production system; but they must be reconciled with the clear evidence for the grammatical nature of the phenomenon. In fact, in my opinion, there is no contradiction between the two findings: it could very well be that early subject drop is a genuine grammatical option of the early system *and* that the child may use it to alleviate a processing problem; this functional role is responsible for the effects found by Bloom and others, but does not affect the status of subject drop as a grammatical option, a formally legitimate computational operation allowed by the early grammatical system.

That a genuine grammatical option may be used to alleviate a performance problem is obvious and uncontroversial. Consider for instance a classical performance problem, the difficulty of parsing center embedded structures (Miller & Chomsky 1963): (21)a is as unparsable in Italian as the

English gloss is. But Italian has the option of leaving subjects in VP final position. If we use this option and place the subject of the first relative clause *L'editore che il governo ha finanziato* (the publisher that the government funded) after its predicate *ha pubblicato* (published), we obtain the much more parsable sentence (21)b:

(21)a   Il libro che l'editore che il governo ha finanziato ha pubblicato ha vinto un premio (UNPARSABLE)
     'The book that the publisher that the government funded published won a prize'

    b Il libro che *pro* ha pubblicato l'editore che il governo ha finanziato ha vinto un premio (PARSABLE)
     'The book that *pro* published the publisher that the government funded won a prize'

What happens in inverted structures? Consider the two representations:

(22)a   Il libro$_i$ [che [l'editore$_k$ [che [il governo ha finanziato ___$_k$] ha pubblicato___$_i$]]] ha vinto un premio
     'The book that the publisher that the government funded published won a prize'

    b Il libro$_i$ [che [*pro* ha pubblicato ___$_i$ [l'editore$_k$ [che il governo ha finanziato ___$_k$]]] ha vinto un premio
     'The book that *pro* published the publisher that the government funded won a prize'

What seems to be problematic in (21)a is that we have an antecedent-gap dependency embedded within a dependency of the same kind: in Miller and Chomsky's terms, the procedure for relative clause interpretation cannot be called upon a second time while it is being used. Subject inversion in (21)b has the effect of putting the two antecedent-gap dependencies in linear succession, a configuration which is not problematic for the human parser:

(23)   NP$_i$ NP$_k$ ___$_k$ ___$_i$

(24)   NP$_i$ ___$_i$ NP$_k$ ___$_k$

Clearly, subject inversion is a grammatical option, a property that some languages have and others (English, for instance) don't have. It is a grammatical option which may be used to alleviate a performance problem, such as the difficulty with center embedding, an interpretation which seems to be fully legitimate and uncontroversial for the case of subject inversion. I would like to claim that the case of early subject drop is entirely analogous.

8. Some Adult Manifestations of the "Privilege of the Spec/Root"

Under continuity assumptions, we expect adult languages to manifest in some form the special status that the Spec of the root appears to have in child language. So, continuity assumptions led researcher to look for adult analogues of the privileged status that the specifier of the root appears to have in licensing null elements in child grammars.

The first case that was discussed in direct connection with early subject drop concerned certain special written registers of adult languages. In previous work Liliane Haegeman had observed that

initial subject drop is possible in special abbreviated registers of adult English, French etc., such as the "diary register"; the limitation to the main subject position suggested an immediate parallel with the child phenomenon (see Haegeman (2000) and references quoted there; see also Haegeman & Ihsane (2000) for the identification of a more "liberal" diary register, permitting subject drop also in internal positions).

(25)a   A very sensible day yesterday. ___ saw noone. ___ took
      the bus to Southwark Bridge.
   b ___ walked along....   (Virginia Woolf, <u>Diary</u>, from Haegeman 1990)
   c ___ m'accompagne au Mercure, puis à la gare...
    '(he) takes me to Mercure, then to the station...'
   d ___ me demande si ... je lui eus montré les notes...
    '(I) ask myself if ... I would have shown him the notes'
  (Paul Léautaud, <u>Le</u> <u>Fléau</u>, Journal Particulier, 1917-1930, pp. 60-70) from Haegeman (1990))

At least partial analogues where quickly observed also in spoken registers. A relevant case is Topic Drop, e.g. as it manifests itself in colloquial German, Dutch and other Germanic languages, as per Ross' (1982) original discussion. The option of a null pronominal topic is found when the pronoun is in the left periphery, as in (26)a, and excluded when the pronoun is in IP internal position, with the left peripheral position in a V-2 configuration filled by another constituent, as in (26)b-c; in embedded clauses (whether V-2 or not) a null topic is disallowed (as in (26)d-e). So, only the Spec of the root appears to be a possible position for a null topic in these languages.

(26) Topic Drop in Colloquial German (Dutch, Swedish, but not Flemish):
   a (Ich) habe es gestern gekauft
    '(I)   have it yesterday bought'
   b Gestern habe *(ich) es gekauft
    'Yesterday have (I) it bought'
   c Wann hat *(er) angerufen?
    'When has   he telephoned?'
   d Hans glaubt *(ich) habe es gestern gekauft
    'Hans believes I   have it yesterday bought'
   e   Hans glaubt dass *(ich) es gestern gekauft habe
    'Hans believes that I   it yesterday bought have'

Topic Drop differs from the child phenomenon in that it can involve not just subjects, but other topicalized constituent, for instance object topics, as in (27); moreover, it is restricted to topics, and as such it does not extend to non-topic elements such as expletives (see (28)), which are typically dropped by children (this is true in the varieties exhibiting a restrictive version of Topic Drop, such as the one described by Cardinaletti (1990); other less restrictive varieties of German and other Germanic languages also admit expletive drop: consider, e.g., the paradigm in colloquial Swedish discussed in Rizzi(1992) and the detailed discussion in Haegeman (1996b)):

(27)   ___ habe ich t gestern gekauft
    '___have I yesterday bought'

(28)a *___ wurde viel getanzt
    '___ was a lot danced'
   b *___   hat viel geregnet
    '___ has a lot rained'

The option of dropping material in the Spec of the Root is not found in all V-2 languages: it does not seem to exist in West Flemish (Haegeman 1996b:141). It is also not limited to adult V-2 languages. For instance, Brazilian Portuguese lost the status of Null Subject Language in the XX century (see Kato and Negrão (2000), and section 11 below); nevertheless, Figueiredo (1996) observes that the language retained the possibility of dropping a referential subject in initial position:

(29)   a   ___ comprei um carro ontem
          '(I) bought a car yesterday'
       b * O que que ___ comprei ontem?
            'What that (I) bought yesterday?'
       c * A Maria disse que ___ vendi o carro muito caro
            'Maria said that (I) sold the car too expensive'

Along similar lines, Kenstowicz (1989) observed that Arabic dialects, such as Levantine Arabic, while disallowing Infl-licensed null subjects, permitted null subjects in main declaratives:

(30)a   ___ istarat l-fustaan
          '___ bought the dress'
     b * Fariid kaal innu ___ istarat l-fustaan
          'Fariid said that ___ bought the dress'
     c   Fariid kaal inn-ha istarat l-fustaan
          'Fariid said that she bought the dress'

And De Crousaz & Shlonsky (2000) pointed out that in Gruyère Franco-Provençal the subject clitic, obligatory in post-Wh environment (31)b, is optional both in main declaratives and in situ Wh questions (31)a-c, much as in Child French:

(31)a   (i) travayè pra
          '(s/he) works a lot'
     b   Portyè *(i) travayè?
          'Why s/he works'
     c   (i) travayè kan?
          'S/he works when?'

In fact, the option of dropping initial subjects (and, more generally, clause initial material) is found also in oral colloquial registers of English. Thrasher (1977) describes such a register with the following properties:

(32)a   (I) thought I heard something
     b   I thought *(I) heard something
     c   ___ can't do it, can I/you/he/she/they/we?
     d   More problems, *(I) don't need
     e   What do *(you) want?

In this colloquial register, subject drop is possible in main but not in embedded environments; may concern any subject personal pronoun, as the tag in (32)c shows; it is not possible when the subject is preceded by a topic or by a Wh element.

9. Back to parameter setting: Topic Drop Languages and Root Subject Drop Languages

The existence of adult systems like those analyzed in the previous section, which take advantage of the "privilege of the Spec of the Root" to allow a null element not identified clause-internally, has a number of consequences for the analysis of the developmental phenomenon. On the one hand, it lends further support to the grammatical nature of the process: children seem to use a grammatical option, one that some adult systems also exploit. On the other hand, the existence of such adult systems makes a maturational account of the child phenomenon implausible, and suggests that genuine parameters of UG are involved. So, starting from the latter point, the first step of the analysis should be to explore possible parametric accounts to express the fact that different adult languages make different uses of the "privilege of the root".

Let us start from Topic Drop languages. How can one formally express the Topic Drop Parameter? Say, how can one formally distinguish Dutch and West Flemish, two very close grammars sharing core formal properties (e.g. both languages are V-2, etc.) but distinct, among other things, in that only the first allows Topic Drop? One could argue that this is a simple lexical difference: perhaps, only Topic Drop languages have, in their functional lexicon, a null pronoun licensed in topic position, in the left periphery of the clause. But this account would not express the fundamental structural property of the phenomenon, the fact that it appears to be restricted to the left periphery in main clauses: why should the licensing of the null topic be restricted to the unselected C system, and excluded from embedded clauses (which in general can host overt topics)? The traditional one-layer theory of CP does not offer a natural way to express the parametrisation.

More recent approaches to the C system, assuming a richer structure for the left periphery of the clause, appear to be more promising in this respect.

In Rizzi (1997), (2002a) it is argued that the C system is a structural zone delimited by two heads and their projections: Force expresses the clausal type (declarative, question, imperative, exclamative,…) and delimits the system upwards; Fin agrees in finiteness with the adjacent IP, and delimits the C system downwards. In between, the Topic-Focus field is generated, which hosts topic, focus and various types of left-peripheral operators. For instance, the finite complementizer in Romance is typically expressed under Force, while the prepositional infinitival complementizers are in Fin, so that topics typically precede the latter and follow the former in languages like Italian:

(33)a Credo che dovrei parlare a Gianni domani
          'I believe that I should talk to Gianni tomorrow'
      b Credo di   dover parlare a Gianni domani
          'I believe of to have to talk to Gianni tomorrow'

(34)a Credo che, a Gianni, gli dovrei parlare domani
          'I believe that, to Gianni, I should talk to him tomorrow'
      b Credo, a Gianni, di dovergli parlare domani
          'I believe, to Gianni, of to have to talk to him tomorrow'

Languages may differ on which head(s) of the C system they choose to lexicalize. Irish appears to lexicalize Fin also in finite clauses, so that the element translated as *that* appears after the Topic-Focus field; Welsh appears to lexicalize both Force and Fin, so that the Topic-Focus field appears sandwiched in between the two particles:

(35)   Is doíche   [faoi cheann cúpla lá   [*go* bhféadfaí imeacht]]

'Is probable at-the-end-of couple day that could leave'   (Irish: McCloskey 1996)

(36)   Dywedais i [*mai* 'r dynion fel arfer *a* [werthith y ci]]
         'Said   I   C   the men   as usual C will-sell the dog'   (Welsh: Roberts 2002)

So, according to this approach, the theory of the left periphery includes at least the following structure:

(37)   Force … Top … Foc … Fin   IP   (Rizzi 1997, 2002a)

Some parametrisation on the arrangement of left peripheral projections is necessary. For instance, Italian appears to allow for a Top position lower than Foc, while other languages, e.g. Hungarian, or Gungbe, require a strict ordering Top Foc (see also various papers in Rizzi (2002b) for different views on the nature of this lower position).

This approach to the left periphery offers an immediate possibility for expressing the Topic Drop parameter, while capitalizing on the theoretical analysis of the "privilege of the root" sketched out in section 6. It is conceivable that languages may vary in the set of categories which may be taken as the root of the syntactic tree. Suppose that some languages may allow the TopP to be the root: in this case, the topic would be the highest position of the clause, a possible site for a null element not identified clause internally, whence the Topic Drop property. A language requiring root clauses to be ForceP's would not allow topics to appear high enough to be null, in the terms of the proposed approach to the "privilege of the root".

Consider now a system allowing null subjects in root environments, not as a subcase of the null topic option (i.e., if no object topic drop is allowed, and subject drop extends to expletives, which cannot occur in TopP): colloquial English as described in paradigm (32) may be a good approximation to this case. Following the logic of the proposal for Topic Drop languages, we could assume that this case involves the option of taking the bare IP as the root, so that the canonical subject position (the Spec of the highest head of the IP system) will enjoy the "privilege of the root".

This approach has been called elsewhere the "truncation" approach. Updating and integrating it with recent theoretical work, we can phrase it as follows: UG defines the clausal structure as a hierarchy of positions, starting from the left periphery, along the lines investigated by the "cartographic" approach (Cinque (2002), Rizzi (2002b), Belletti (2002) and references quoted there): in its maximal expression, the system starts from the Force position, continues with the positions of the left periphery investigated in Rizzi (1997) and related work, and then with the positions of the IP system investigated in Cinque (1999) and related work, with some obligatory positions which form the structural backbone of the clause (Force, Tense, etc.) and other positions that are there only if called for by the content to be expressed (Top, Neg, etc.).

The truncation parametrisation is now expressible as follows. Suppose that languages can vary in the inventory of categories which can be taken as the root, Force being the unmarked case always available to function as the root, but other categories (TopP, IP,…) being admissible options which some languages may choose. Then, external slices of the universal structure (including the obligatory backbone) may be omitted, while the hierarchy is respected from the first expressed element downward. So, what we are now suggesting is that languages may vary in the amount of "truncation" permitted in root clauses, as a matter of parametric choice. Topic Drop languages allow the root category to be TopP, and Root Subject Drop languages allow the root to be IP (or,

more accurately, the higher projection of the inflectional system, hosting the subject in its Spec). Notice that no actual deletion of structure is involved in this approach: different languages simply have the option of starting the generation of a structure at different levels of the universal hierarchy, thus "truncating" the portion of the hierarchy higher than the category selected as the root. (FN 4, 5)

10. Development Revisited.

This generalized truncation approach raises the possibility of the following scenario for the observed development of early subject drop. When syntactically relevant production starts, children uniformly entertain the parametric value allowing root subject drop (in the proposed terms, the possibility of selecting a bare IP as the root). This gives rise to a phase of systematic omissions of root subjects throughout the third year of life, presumably a developmental universal. If the target language is RSD (the variety of colloquial English described by Thrasher (1977),…), nothing changes; if the target language is not RSD (French,…) the learner must reset the parameter on the negative value, but this takes time, whence the developmental effect.

So, we are back to the logic of Hyams (1986), except that the Null Subject Parameter is replaced by the empirically more accurate parametrization involved in the choice of the root, and the different truncation options. (FN 6)

A number of questions are immediately raised by this scenario.

The first question has to do with the initial parametric value: why is it that all early systems start out with the RSD option? What is the principled basis for selecting the positive value as the initial value? Learnability considerations, such as the Subset Principle, would lead to the opposite expectation (see below). (FN 7)

The second question has to do with the time course of parameter fixation: why does it take so long for the child learning French, etc., to abandon the RSD option, while other parameters (involving basic word order, V movement to I and C, cliticisation, etc.) appear to be fixed correctly from the start of syntactically relevant production, in accordance with Wexler's (1998) Very Early Parameter Setting (VEPS)? In particular, both the Null Subject Parameter and the Root Subject Drop parameter have to do with subject drop, and their empirical consequences overlap to a certain extent, along the lines discussed in the previous sections. So, why is it that the former is set quickly in accordance with VEPS, while the latter is not? The same question arises for copular drop, and possibly for the Root Infinitive construction, determiner drop, and possibly other parameters involving the dropping of functional material, if these early options also correspond to genuine parametric values.

So, we seem to need a principled way to split parameters into two classes, those which are set in accordance to VEPS and those which show a delayed fixation on the negative value. (FN 8)

The third question has to do with delearning in a counter subset situation. On what basis does the child learning French, etc., delearn the positive fixation if the RSD parameter (and the other delayed parameters involving the dropping of functional material)?

While answering these questions, we would like to express the fact that subject drop seems to have the effect of facilitating performance, as Bloom's observation on the inverse correlation between

overtness of the subject and VP length, and other similar observations from the developmental literature, would seem to indicate.

11. A conjecture

When production begins, the production system is immature in a number of respects. Certain fine coordinations between the abstract computational system and the articulatory system require time and practice to be fully in place, fine tuned and fully automatized. And there are working memory limitations, affecting the rapidity of the integration of different kinds of information, as efficient linguistic production requires. I would like to put forth the conjecture that, in order to cope with such limitations, the child adopts the following strategy:

(38) When production begins, the child initially assumes all the parametric values which facilitate the task of the immature production system by reducing the computational load, and which are consistent with her current grammatical knowledge.

So, the system of linguistic knowledge that the child possesses is set up in such a way that all the parametric values are recruited which can facilitate the task of the immature production system. In particular, the grammatical options involving the dropping of material considerably facilitate the task of the production system by saving the activation of motor programs and various complex instructions to the articulatory system. So, under (38), parametric values allowing pronoun drop, the dropping of functional verbs and, possibly, of finite inflections, perhaps the dropping of determiners, etc., are recruited and shape the properties of early linguistic production. (FN 9)

The dropping options are grammatically based, but their initial choice is dictated by the immaturity of the performance system. We thus intend to capture Bloom's observations and integrate them into a grammatically based account. There are two kinds of grammatical constraints, according to (38). The first is provided by Universal Grammar: the facilitating options are parametric options offered by UG, so there is no wild dropping of material, but grammatically based omissions. The second constraint is provided by the knowledge that the child has already acquired on the particular grammar of the target language, under (38). This is crucial, among other things, for understanding why RSD and NSP are fixed with such different time courses.

It is a traditional observation that the NSP can be set positively (at least for referential null subjects: we omit here, for the sake of brevity, the distinction between formal licensing and identification of *pro*; see Rizzi (1986)) only if the verbal morphology manifests "rich agreement", with distinct morphological forms for different persons and numbers, at least a good approximation to a full differentiation (with some degree of morphological overlap tolerated by the system); this is Taraldsen's generalization (cf Taraldsen (1978)). This view was questioned by the observation that a subject drop option exists in languages lacking morphological agreement altogether, such as Chinese and Japanese (Huang 1984); but in these languages subject drop appears to be a particular case of more general argument drop options, of the topic drop type, which casts doubts on the relevance of such cases for Taraldsen's generalization. On the other hand, the evidence for the validity of the generalization is strong and varied. Of special relevance is the study of language change, illustrating the concomitance between the loss of rich agreement and the loss of an Infl-licensed referential null subjects.

One case which has recently been discussed in great detail is the progressive loss of the Null Subject option in Brazilian Portuguese in the course of the XX century. (Kato & Negrão 2000,

Duarte 2000). The agreement paradigm was simplified not because of a phonological change (as in the history of French) , but because of a simplification in the paradigm of personal pronouns, with 2p pronouns *tu* and *vós* replaced by the indirect form *você(s)* (from *Vossa Mercê*, Your Grace) triggering 3p agreement (singular or plural), and, later in the XX century, with 1pp *nós* replaced by the pronominal expression *a gente* (akin to French *on*, Italian *si*, etc), also triggering 3ps agreement. This triggered an impoverishment from a 6 forms paradigm (*amo, amas, ama, amamos, amais, aman* in the present indicative) to a 4 forms paradigm (*amo, ama, ama, amamos, aman, aman*), and then to a 3 forms paradigm (*amo, ama, ama, ama, aman, aman*). Concomitantly, the option of null pronominal subjects progressively shrank. Duarte(2000) calculated the proportion of overt subjects in popular plays, supposed to somehow capture the way people speak, over the century; she found that overt subjects shifted from 20-25% at the beginning of the century, to 46-50% around the middle of the century, to 67-74% in the second half of the century. (FN 10)

Synchronic evidence supporting the same conclusion is offered by certain contrasts found in different verbal paradigms with varying morphological richness within the same Null Subject Language: for instance, in Italian, the infinitival construction permitting (at a literary stylistic level) lexical nominative subjects with Aux to C does not allow referential null subjects, which are possible in the corresponding finite construction carrying agreement:

(39)   Ritengo che (lei) sia disposta ad aiutarci
        'I believe that (she) is ready to help us'

(40)   Ritengo esser *(lei) disposta ad aiutarci
        'I believe to be (she) ready to help us'

Even more minimal is the contrast between present and past subjunctive: the first involves identical forms for 1,2 and 3s (*parta parta parta*), the second involves a distinct form for the 3s (*partissi, partissi, partisse*). The double ambiguity of the past subjunctive is perfectly tolerable, (41) is acceptable on both interpretations, while the triple ambiguity of (42) is not, and an overt second person pronoun becomes obligatory here:

(41) Credevano che ___ partissi
        'They believed that I/you would leave'

(42) Credono che ___ parta
        'They believe that I/*you/he leave(s)'

(43) Credono che tu parta
        'They believe that you leave'

The minimal contrast between present and past subjunctive thus offers a cue as to what "rich agreement" means: one syncretism is tolerable, two are not. An isolated case like the paradigm of Italian present subjunctive can be solved by locally reducing the ambiguity, i.e. by making the overt subject obligatory for some morphological specifications without affecting the global positive fixation of the Null Subject Parameter; if verbal paradigms are more massively impoverished the effect will be global, a negative fixation of the parameter. (FN 11)

The properties of partial Null Subject languages (Irish, Modern Hebrew) also provide indications along similar lines; see   Hale and McCloskey (1984), Borer (1989), Rizzi (1993) for discussion.

In conclusion, there seems to be clear evidence that the positive setting of the Null Subject Parameter (at least as far as the option of referential null subjects is concerned) is causally linked to the richness of the agreement paradigm. Now, it has been observed that the child figures out the basic properties of the Agr system very early on. Guasti (1993/4) observed that the use of agreement in Italian is virtually error-free. Weak agreement of the English kind (the use of –s for 3ps of present indicative) is frequently omitted, but when it is used it is almost always correct (Wexler 1994), so the child appears to have knowledge of the agreement paradigm very early on, basically from the onset of syntactically significant production (the vast majority of agreement errors being cases of omission, not of inappropriate use).

Then we have an answer for why, under (38), the child does not misset the NSP; her early knowledge of the impoverished agreement system of languages of the English type makes it impossible for her to entertain the positive value of the NSP, because, under (38), that hypothesis would violate already acquired language-specific knowledge. So, the fixation of the NSP takes place in accordance with   VEPS.

The situation of RSD is different. Here assuming a positive value is not in contradiction with any element of knowledge of the target language that the learner may have (the evidence available to the child, sentences always with overt subjects, does not support the RSD option, but does not overtly contradict it either): therefore the positive value is assumed, under (38).

12. Delearning.

What about development? We may assume that when the production system is fully in place, strategy (38) ceases to be operative; what happens at this point is that the positive fixation is kept if supported by experience (sentences manifesting RSD, as, say, in Gruyère Franco-Provençal,…), and abandoned otherwise (French,…).

This latter step, the "delearning" of the positive fixation, would seem to be problematic given certain restrictive assumptions on the acquisition process. We are in a counter-subset situation, the positive evidence that the learner has access to (sentences always with overt subjects) is compatible with both parametric values of the RSD parameter (also the positive fixation is consistent with the expression of the subject). So, on what empirical basis can the language learner decide that the target language is not RSD, if she starts with the assumption of a positive fixation of the parameter? (FN 12).

I will sketch out a possibility, partly along the lines of Rizzi (2000). The following is a plausible principle concerning the syntax-semantics interface:

(44) Categorial Uniformity: Assume a unique canonical structural realization for a given semantic type.

This is a rather natural economy principle ruling the mapping from meaning to categories. The mapping should be as transparent as possible, ideally a one to one correspondence: individuals correspond to the category DP, propositions to the category CP (ForceP), etc., i.e., what has been called the Canonical Structural Realization of semantic types (Grimshaw 1979). We also know that (44) defines the unmarked case: marked categorial realizations are possible. For instance, we have bare IP complements (in Exceptional Case Marking environments), and Small clauses as possible categorial realizations of propositions (alongside the unmarked realization as ForceP), depending on the lexical selectional requirements of the main verbs:

(45)   I say that Mary is happy
(46)   I believe Mary to be happy
(47)   I consider Mary happy

(see Granfeld & Schlyter (2000) for an application of this principle to the study of the acquisition of clitics in L2).

So, Categorial Uniformity (CU) defines the unmarked case, but it is violable, e.g. if lexical selection dictates otherwise. I am assuming that CU is a principle governing the form-meaning interface through the definition of the unmarked cases, very different from the principles operative in the computational system proper, which I assume to be inviolable. CU is operative in the absence of a countering force, in which case it enforces the choice of the unmarked case; but, as soon as it encounters an opposing pressure (by a lexical requirement, by a competing principle pushing in the opposite direction, by overt evidence that the unmarked case must be abandoned,…) CU gives in and a marked case arises.

Consider now the issue of the categorial status of main clauses from the vantage point offered by Categorial Uniformity. Embedded clauses, with their overt complementizer system, provide direct evidence that propositions are CP's (ForceP's) in the unmarked case. Thus, CU creates some pressure for analyzing also main clauses as ForceP's, and in the absence of overt indications opposing this pressure, this will be the assumption made by the speaker of French, Standard English, etc.; whence, the lack of root subject drop and other phenomena taking advantage of the privilege of the root in such systems.

Colloquial German, Dutch, etc. manifest Topic Drop, which provides evidence for truncation at the TopP level; Gruyère Franco-Provençal, colloquial English, etc. manifest Root Subject Drop, providing overt evidence for truncation at the IP level (here I am simplifying: see fn. 5). Hence in these systems CU is countered by overt evidence enforcing a departure from the unmarked case; therefore CU can be violated to allow root categories permitting these phenomena (truncation at the TopP level and IP level, respectively, according to the proposal of section 10).

What about child French, child Standard English, etc.? We have assumed that Categorial Uniformity is a weak principle, not an inviolable computational principle, but an interface principle optimizing the form-meaning mapping in the unmarked case, operative only when no other force counters it, and violable otherwise. As long as strategy (38) is operative, Categorial Uniformity is silent, because the need to adopt grammatical options facilitating the production system counters its effects. When the production system is fully in place and (38) ceases to be operative, nothing counters CU in French, Standard English, etc., hence, under CU, main clauses must now project up to ForceP and the conditions for RSD cease to exist: then, the dropping option gets out of the system. Topic Drop and Root Subject Drop languages provide positive evidence for assuming the appropriate levels of truncation (at TopP and IP, respectively), hence, after (38) has ceased to be operative, the learner of a Topic Drop or of a Root Subject Drop language has evidence for assuming/keeping the relevant parametric values, thus departing from the unmarked case defined by CU. (FN 13)

Conclusion.

Early grammatical systems are UG constrained systems. They are accessible to comparison with other early systems and with the target systems through the basic tools of adult comparative syntax: the theory of principles and parameters. We have illustrated this research trend through the analysis of subject drop in child language. Early subject drop in the acquisition of non Null Subject Languages is not a mere performance effect. It is possible in selective structural environments: the specifier of the root and the specifier position of uninflected clauses. None of these cases is amenable to the Null Subject Parameter, licensing referential null subjects in local construal with rich verbal inflections. Nevertheless, continuity guidelines raise the expectation that some adult systems may license null subjects in the same structural environments as in child grammars. This is obviously true for PRO null subjects in uninflected clauses; but there are also adult systems taking advantage of the "privilege of the root" for the licensing of null arguments in the highest Spec position of the clause. The case of root subject drop raises he issue of parameters which apparently can be reset: it seems to be the case that some parameters are already correctly set when syntactically relevant production starts, while others are not, and give rise to observable developmental effects. A principled way to distinguish between the two kinds of parameters seems to be in order. We have speculated that the persistency of certain non target consistent parametric values is amenable to a grammatically driven strategy to alleviate the task of the immature production system. If this is correct, language development is grammatically based, but performance driven: non-target consistent properties observed in language development correspond to genuine UG options, but the factors determining their temporary adoption by the child lie in the growth of performance systems, outside the grammatical system proper.

Footnotes.

FN 1. The first column expresses the age of the child (years; months; days); the second gives the number of non-imperative verbal utterances; the third the number of null subjects; and the fourth the proportion of null subjects.

FN 2. The Unique Checking Constraint (UCC) states the following: "The D-Feature of DP can only check against one functional category" (Wexler 1998:59); it is assumed to hold in the grammar at age two, and to cease to be operative at later stages according to a maturational schedule. If the clausal structure involves both Agr and T projections, both endowed with EPP features, the subject normally has to pass through both Spec's, thus violating UCC. According to this approach, one option that the child has is to omit either Agr or T projection (the Agr/T Omission Model of Schuetze & Wexler (1996)), thus giving rise to a structure which is then "read" by the morphology as uninflected. On truncation, see below.

FN3: In fact, as Schuetze (1997) points out, uninflected clauses are simpler than inflected clauses, at least in terms of overt morphemes; so a processing account would expect more subject drop with the more complex inflected structure, in sharp contrast with what Roeper and Rohrbacher found.

FN 4. In fact, in terms of the structure building algorithm based on "merge at the root", as in Chomsky (1995) and subsequent work, the root category is the one at which the last application of "merge" applies: so the relevant parameter can be seen as involving the inventory of categories at which the syntactic computation can stop.

FN 5. A V-2 language allowing for expletive subject drop would then differ from a "pure" topic drop language in allowing truncation at the level occupied by local subjects in V-2 contexts, a level lower than Top. This may be the regular subject position, if an asymmetric theory of V-2 is adopted, à la Zwart (1997). Under a symmetric theory of V-2, with the finite verb always moving (at least) to Fin, the position of initial subjects in V-2 structures could be Spec Fin, or an argument position in the C-system immediately above Fin, and truncation could take place at this level.

FN 6. For some of the systems discussed in section 8, we do not have enough evidence to decide if they are Topic Drop or Root Subject Drop languages, or have both properties, but this doesn't affect the logic of the approach, as the diagnostic properties are clear: a "pure" RSD language allows dropping of both referential and expletive root subjects, but no dropping of object topics; a "pure" Topic Drop language cannot drop expletive subjects, which can never reach the Top position, but can drop both subject and object topics; a mixed language combines the latter property with the possibility of dropping expletive subjects. In terms of the proposed truncation parametrisation, a Topic Drop language allows TopP as the root, a RSD language allows IP as the root (with the possible extra option of truncation at the CP projection hosting local subjects in V-2 languages, see fn. 4), and a mixed language has both options.

FN 7. The Subset Principle claims that when two options generate languages that are in a subset-superset relation, the option generating the smaller language is the unmarked option, assumed by the learner by default, while the option generating the larger language is adopted only in presence of overt evidence supporting it. See Berwick (1985), Manzini and Wexler (1986).

FN 8. If some adult languages allow genuine cases of root infinitives (see the discussion in section 4) we could extend the proposed parametrisation to permit a deeper truncation within the IP system, allowing the choice of a root category lower than Tense in the universal hierarchy. This is, in essence, an extension of the analysis of root infinitives in Rizzi (1993/4) to potential adult analogues.

FN 9. Does this strategy affects grammatical knowledge tout court, or grammatical knowledge "as implemented in the production system"? This question could only be addressed by studying language production and perception in parallel. Do children producing early null subjects have this option in their receptive grammar, i.e., does their receptive system naturally integrate subjectless sentences? This can only be determined by a detailed experimental study of the receptive system. Notice that if it turns out that the receptive system is more "advanced" than the production system, as is quite plausible, this would not affect at all the conclusions we have reached on the grammatical basis of the phenomena. Rather, it would show that grammatical knowledge is implemented in partially distinct forms in production and perception, and following partially distinct developmental courses, hardly a surprising conclusion.
I will not try, in this paper, to compare and connect the present attempt to other proposals to relate grammatical development to the growth of performance systems, most notably Phillips (1995).

FN 10. The process of change was also visible in generational differences at the same time. Duarte calculated that around 1995, speakers over 45 expressed subjects between 50% and 80% of the time

(depending on the person), while speakers between 25 and 35 years expressed subjects between 71% ad 92%.

FN 11. Certain details remain to be understood: why is second person selected to regularize the Italian subjunctive paradigm? Poverty of stimulus consideration suggests that this choice is dictated by principled reasons. A possible link may exist with the fact that the Northern Italian Dialects, exhibiting a large range of variation in the systems of subject clitics, converge in requiring 2 person singular clitics, while the obligatoriness or optionality of other subject clitics varies considerably from dialect to dialect (see Renzi & Vanelli 1982).

FN 12. Notice that the problem exists if the evidence the child has access to is strictly limited to positive evidence (as in Wexler and Culicover's (1980) approach to the logical problem of language acquisition) and she has no way of inferring a negative fixation from the non-occurrence of a given structure: this kind of inference is what is sometimes called indirect negative evidence, which could be available through statistical considerations (if a structural option is selected by the target system, there will be a certain non-null probability that it will be manifested in the primary data; if I don't hear any such manifestation in a sizable body of data, I can conclude that the option is not selected). If the child has access to some form of indirect negative evidence, the delayed refixation of RSD parameter, once strategy (38) ceases to be operative, is not problematic.
I believe the access to some kinds of indirect negative evidence in the acquisition process is not implausible; if assumed in the case at issue, it would provide a solution to the delearning problem. Nevertheless, the point is controversial, so it is worthwhile to explore other possible reasons that may lead the child to reset the parameter, once the production system is fully mature.

FN 13. In terms of the proposed analysis, the gradual character of the abandonment of the RSD in the acquisition of French, etc., may be understandable. The maturation of the production system, triggering strategy (38) clearly is a gradual process, e.g. the working memory capacity grows gradually, the fine tuning and coordination of the complex motor programs get progressively automatized, etc., so it is conceivable that the recruitment of grammatical options to alleviate the burden of the production system decreases in a symmetrically gradual fashion. This may be formally expressed, e.g., in terms of grammar competition: for instance, it could be that the child simultaneously entertains two grammars, one with a positive fixation of RSD, in compliance with strategy (38), and one with the negative fixation, in compliance with CU. As the production system matures, the grammar built in accordance with (38) weakens and the grammar complying with CU progressively takes over.
Does the child entertain the Topic Drop option under (38), on top of the RSD option? The low rate of null objects in Child English (see section 3) suggests that the answer is no. Perhaps Topic Drop does not fall within the parametric values recruited under (38) because the facilitating effect linked to the possibility of not pronouncing the object may be counterbalanced by the added computational load of necessarily displacing the object to the left periphery (hence this option does not globally "reduce the computational load").
We will not address in this paper the developmental curve of root infinitives and other developmental effects possibly related to parameter setting under strategy (38). Let us just notice that if root null subjects in finite clauses and root infinitives are developmentally related, as was shown in a particularly clear way by Hamann and Plunkett (1998) for Child Danish, the link should be found in the weakening and disappearance of (38) in concomitance with the growth of the production system.

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