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1 Introduction and Overview

It is well-known that young children may omit referential subjects regardless of whether they are acquiring a pro-drop language such as Italian or a non-pro-drop language such as English. The classic proposal of Hyams (1986) according to which these early null subjects instantiate pro in both types of languages has recently come under attack from various sides. Bloom (1990, 1993) and Valian (1991) argue that missing subjects in early child English are a non-syntactic performance phenomenon that is due to a production bottleneck which severely limits the utterance length of young children, a view which they support with an inverse correlation between subject-length (i.e. full NP, pronoun, null) and VP-length. Rizzi (1994a,b) and Hyams (1994) maintain that empty subjects in early child English are a syntactic phenomenon but relate them to adult English Diary Drop and German-style Topic Drop instead of Italian-style pro-drop. In particular, they argue that like adult Diary /Topic Drop and unlike adult pro-drop, these missing subjects in early child language are restricted to the first position of non-Wh root clauses.

In this paper[1], we present new evidence from Adam (CHILDES, Brown 1973 and MacWhinney in press) that suggests that not all missing subjects in early child English can be reduced to performance limitations or Diary/Topic Drop. Between age 2;3 and age 2;11 (files 1-18), Adam produces numerous Wh-questions without an overt subject (e.g. "Where go?") and the VP-length of these examples is not greater than the VP-length in Wh-questions with an overt subject pronoun. Adam's data moreover display a clear-cut distinction between finite (i.e. agreeing) and non-finite (i.e. non-agreeing) Wh-questions. Whereas the number of empty subjects in finite Wh-questions is negligible, there are almost as many non-finite Wh-questions without an overt subject

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[1] Portions of this paper were presented at the Workshop on the L1- and L2-Acquisition of Clause-Internal Rules at the University of Bern, the Conference on Generative Studies of the Acquisition of Case and Agreement at Essex University, at the Language Acquisition Group at the University of Massachusetts at Amherst and at the Computational Linguistics Feedback Forum at the University of Pennsylvania. We thank those audiences, Hagit Borer, Peggy Speas, Anne Vainikka, Ken Wexler and two anonymous reviewers for helpful comments and criticism. Naturally, all errors are ours. One of us (Rohrbacher) was supported by NSF grant SBR-8920230.

as non-finite Wh-questions with an overt subject pronoun.[2] In the first eleven files, there are in fact five times as many empty subjects as overt subject pronouns in non-finite Wh-questions. The same correlation between non-finiteness and lack of subject turns up in Adam's negative declaratives and has in fact been reported in the literature for many children acquiring languages other than English. Neither Bloom and Valian nor Rizzi and Hyams predict this correlation between non-finiteness and lack of subject .

We argue that the missing subjects in question are pros and that their distribution follows from the theory of Economy of Projection developed in Speas (1994). Speas argues that in order to be syntactically licensed, each maximal projection must have independent semantic or phonetic content. Therefore, semantically empty AgrSP must have either its specifier filled by an overt subject at S-structure or its head filled by an agreement affix at D-structure. The former situation occurs in languages with weak agreement like English (where pro-drop is hence impossible) while the latter scenario occurs in languages with strong agreement like Italian (where pro-drop is hence possible). Unlike languages with weak or strong overt morphological agreement like English or Italian, languages without any overt morphological agreement like Japanese do not have AgrSP. Since projections such as T(P), V(P) etc. whose heads contain independent semantic content always allow their specifier to remain empty, languages without AgrSP also permit pro-drop.

Our central claim is that Adam's non-finite Wh-questions without overt subjects have a Japanese-type structure, i.e. they lack AgrSP as long as agreement is overall rare (cf. the fact that in the first eleven files, only 4 out of 82 Wh-questions containing either an empty subject or an overt subject pronoun are finite) and the highest specifier can be occupied by pro. Once weak English agreement is used more frequently, AgrSP is added to the tree even in non-finite Wh-questions and since the head of this projection is underlyingly empty, its specifier must be occupied by an overt subject (cf. the fact that in files 12-18, 108 out of 234 Wh-Questions containing an empty subject or an overt subject pronoun are finite and there are now almost three times as many overt subject pronouns as empty subjects in non-finite Wh-questions).

One advantage of this analysis is that it does not run into certain learnability problems that are often raised in connection with syntactic treatments of the missing subjects produced by children which are acquiring non-pro-drop languages. Although the child proceeds from a superset (containing both overt and empty subjects) to a subset (containing overt subjects only), this step is triggered by the acquisition of overt agreement morphology and no recourse to negative evidence is necessary. Neither do

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2 Wh-questions in which the Wh-word is the subject were excluded from the survey.

we have to appeal to the notion of parameter-resetting, since there is in fact no pro-drop parameter. Instead, the distribution of overt and empty subjects follows at any stage during the development from overt morphological properties of the particular grammar at that stage and from universal principles such as Economy of Projection.

The paper is organized as follows. Section 2 summarizes previous approaches to null subjects in early child English (pro-drop, Diary/Topic Drop and performance limitations). Section 3 introduces data from Adam which are problematic for two of these approaches (Diary/Topic Drop and performance limitations). Section 4 discusses root infinitives, the environment in which Adam frequently omits the subject. Section 5 sketches the theory of Economy of Projection which in section 6 is applied to Adam's data. The last section embeds our findings into a general view of syntactic theory and its acquisition by children.

2 Early Null Subjects: Competence or Performance, Pro-Drop or Diary/Topic Drop?

It is unsurprising that referential subjects are often absent in the earliest utterances of children acquiring pro-drop languages such as Spanish (cf. (1)), where the adult grammar generally allows empty referential subjects. But such omissions are also widely attested in the earliest utterances of children acquiring non-pro-drop languages such as English, Dutch, German, Swedish or French[3] (cf. (2)), where the adult grammar generally does not allow empty referential subjects.

(1) puede abrir
can-3S open (Spanish, Rafael 1;6-2;0 from Pierce 1992)

(2) a. eating popcorn (English, Eve 1;9 from Pierce 1992)
b. kan niet slapen op een schaap (Dut
can not sleep on a sheep de Haan & Tuijnman 1988)
c. medizin drauftun mag nicht (Ger
medication apply like not
d. satt fel
sat wrong (Swedish, Embla 2;0 from Platzack 1993)
e. avant veux chocolat
before want chocolate (Fre

[3] The status of French as a non-pro-drop language is under dispute. See footnote 34 for a brief discussion.

Examples like those in (2) have led Hyams (1986) to the conclusion that UG comes with the pro-drop parameter set to its positive value, i.e. that all children start out speaking a pro-drop language, and that this parameter is reset to its negative value only in the face of positive triggering evidence such as overt expletive subjects in the target non-pro-drop language.

Bloom (1990,1993) and Valian (1991) argue against this view. In her comparison of the speech of 21 American children ranging in age from 1;10 to 2;8 and 5 Italian children ranging in age from 1;6 to 2;5, Valian (1991) observed that the American children with the lowest MLU (and the highest rate of subject omissions) included overt subjects in almost 70% of their utterances and that over 70% of these subjects were pronouns whereas Italian children included overt subjects in about 30% of their utterances and about 20-35% of these subjects were pronouns.[4] These findings suggest that empty subjects in the early speech of children acquiring pro-drop and non-pro-drop languages are not the same phenomenon. Both Bloom and Valian also point out that there is no abrupt decline in the rate of null subjects at any point during the development of children acquiring English, contrary to what would be expected if parameter (re)setting were involved. Instead, the rate of overt subjects gradually increases over time, apparently independently of possible triggers such as overt expletive subjects. Bloom and Valian conclude that the pro-drop parameter is initially set to its negative value which it retains throughout the development of children acquiring English and which is reset very early to the positive value by Italian children on the basis of positive evidence in the adult language. On this view, English children always have a non-pro-drop grammar but initially omit subjects because they simply cannot produce utterances beyond a certain length and subject omission is the least costly way to reduce utterance length given that the subject often represents old information. In other words, early English null subjects result not from a competence deficit, but from a performance deficit. This conclusion seems to be supported by a correlation between subject type and VP-length in the speech of Adam 2;3-2;7, Eve 1;6-1;10 and Sarah 2;3-2;7 reported in Bloom (1990).[5] On average, the VP is shortest with full NP subjects and longest when the subject is missing. Pronominal subjects co-occur with VPs of intermediate length (cf. table 1). Valian (1991) partially reproduced these

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[4] Valian reports that the American child with the lowest MLU used overt subjects in only 38% of its non-Wh-utterances and admits that this child may be best analyzed as having a pro-drop grammar. In fact, the same child (and it alone) also lacks modals and semi-auxiliaries (*gonna*, *wanna*, *hafta* and *gotta*), elements that are usually associated with higher functional projections. This suggests that this child is amenable to an analysis such as the one developed below according to which pro is possible when AgrSP is absent. The other American children in Valian's study may simply be too advanced in their development (as indicated by their higher MLU) to reflect this stage.

[5] Bloom excluded Wh-questions and negative declaratives from his sample, i.e. exactly those environments where we will claim subject omissions are most telling.

results for 6 of the 10 American children in her groups with the two lowest MLUs. These results are just what we would expect if a restriction on utterance length were responsible for the distribution of overt and empty subjects, but they are surprising if pro is a grammatical option for these children.

	VP-Length (Words)		
	Full NP Subject	Pronoun Subject	Empty Subject
Adam	2.19	2.54	2.604
Eve	1.92	2.24	2.723
Sarah	1.47	1.88	2.462

Table 1: Average VP-Length and Subject Type in Child English (after Bloom 1990)[6]

It is however far from clear why phonetic length, number of words or (as is the case in Bloom's work) both of these factors should determine sentential complexity. Hyams & Wexler (1993) raise a number of other objections against Bloom (1990) and, less directly, Valian (1991). In their analysis of five transcripts from Italian-speaking adults, they found the same trend that was found for English-speaking children, i.e. VPs in sentences with full NP subject tend to be shorter than VPs in sentences with pronominal subjects which are themselves on average shorter than VPs in sentences with missing subjects. Yet Italian is standardly analyzed as a pro-drop language, and it would indeed be absurd to claim that adult Italians elide subjects because they suffer from a performance limitation on the length of their utterances. If this is correct, then the existence of a similar correlation between subject type and VP length in early stages of English does not bear on the question whether or not children at these stages have a pro-drop grammar. Another objection concerns the fact that according to the performance limitation theory, "lexical subjects will be omitted at lower processing loads (VP lengths) than pronouns" (Hyams & Wexler 1993: 442), hence "the probability of omitting a lexical subject is greater than the probability of omitting a pronominal subject", while according to the pro-drop theory, pronouns but not full NP subjects are omitted. On the basis of file 30 in which overt subjects are more or less obligatory, Hyams and Wexler hypothesize that at any stage of his development, Adam intends to produce

6 Bloom does not give separate raw numbers for the average VP-length of sentences containing a full NP subject and the average VP-length of sentences containing a pronoun subject. The relevant numbers in table 1 have been estimated on the basis of Bloom's figure 1. The combined raw numbers for the average VP-length of sentences containing either a full NP subject or a pronominal subject are 2.333, 2.024 and 1.800 for Adam, Eve and Sarah, respectively.

roughly one third full NP subjects and two thirds pronominal subjects. They find that in file 06, Adam uses full NP subjects in 33% of his utterances and pronominal subjects in 11% of his utterances. In other words, Adam early (null subject) files contain the same proportion of lexical subjects as his later (obligatory subject) files, but these early files contain a dramatically lower proportion of pronominal subjects than the later files, thus supporting the pro-drop theory over the performance limitations theory.[7]

A look back at table 1 reveals that for Adam, the child we will be concerned with below, the difference in VP-length between sentences with pronominal subjects and sentences without overt subject is very small (approximately 2.54 vs. 2.604 words) and in all likelihood not statistically significant (Bloom (1990) tested his results for a linear trend but did not perform tests on the individual pairs of means). Moreover, we will see in section 3 that Adam's Wh-questions (which Bloom excluded from his corpus) exhibit a difference of the same magnitude, but in the opposite direction. Adam's empty subjects therefore do not support the performance limitation theory, and in as far as the latter cannot capture the non-finiteness effect to be discussed below, they contradict such a theory.

De Haan & Tuijnman (1988) observe that David, a Dutch child recorded at age 2;2, omits not only subjects, but also objects, and that he omits either of these elements only from utterance initial position, thus creating superficial V1 structures (cf. (2b)).[8] Poeppel & Wexler (1993: 14) also report for Andreas, a German child recorded at age 2;1 that "subjects are never dropped when they are not in clause-initial position... If there is a non-subject in first position, then there is an overt post-verbal subject" (but cf. (2c)). On the basis of this generalization, de Haan & Tuijnman identify the null subjects in the speech of young children acquiring non-pro-drop languages with Topic Drop, a process familiar from adult Dutch and German which is subject to the same V1-restriction. Consider the (colloquial) adult German responses in (4-6) to the question in (3). A subject or object of a matrix clause can be elided if it precedes the finite verb, but not if it follows the latter (cf. (4)). In V2 languages, this pre-verbal position is usually taken to be CPSpec, which

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7 Bloom (1993) discounts both of these counter-arguments. With respect to the first argument, he notes that Hyams & Wexler's adult Italian corpus contains types of utterances not included in the child English corpus of Bloom (1990), a difference which allegedly renders Hyams & Wexler's results irrelevant. With respect to the second argument, he points out that the proportion of Adam's intended full NP and pronominal subjects is determined in an arbitrary fashion and that in files 12-20, Adam uses much lower proportions of lexical subjects than in the reference file 30 (11-16% vs. 30%), as predicted by the performance limitation theory. We will not attempt to determine the matter, since the evidence presented in section 3 stands on its own.

8 De Haan & Tuijnman (1988: 108) also report that "it is not the case that subjects/objects are more often absent in long sentences ... or in sentences that are in some sense syntactically complex", contrary to the predictions of the performance limitations theory of Bloom (1990,1993) and Valian (1991).

among other things is a topic position (hence the name Topic Drop). Since CPSpec also hosts fronted Wh-elements, it follows directly that Topic Drop is excluded from Wh-questions (cf. (5)). It is somewhat more mysterious why Topic Drop is impossible in all embedded clauses, even those which allow topicalization (cf. (6)).

(3) *Hans:* Willst Du in den Zoo gehen, Nackratten angucken?
want you in the zoo go naked mole rats at-look
"Do you want to go to the zoo and look at naked mole rats?"

(4) *Fritz:* a. Nee, (ich) hab' *(die) schon gesehen.
no I have them already seen.
b. Nee, (die) hab' *(ich) schon gesehen.
no them have I already seen.
"No, I have already seen them."

(5) *Fritz:* Warum sollte *(ich) *(sie) angucken gehen woll
why should I them at-look go wan
"Why should I want to go look at them?"

(6) *Fritz:* a. Nee, ich glaub' *(ich) hab' die schon gesehen.
No, I believe I have them already seen
b. Nee, ich glaub' *(die) hab' ich schon gesehen.
No, I believe I have them already seen
"No, I think I've already seen them." (German)

De Haan & Tuijnman suggest that the Topic Drop analysis be extended to Early Child English although the latter does not allow object omissions (or allows them less frequently then Dutch and German). In fact, adult English has a process with apparently just the right properties. Like Topic Drop, Diary Drop (Haegeman 1990) elides the clause-initial subject of a matrix declarative (cf. (7)) but not the clause-medial subject of a Wh-question (cf. (8a)) or embedded sentence (cf. (8b)). Unlike Topic Drop, Diary Drop never elides objects (cf. (8c)), a difference that is probably due to the fact that English is not a V2 language.

(7) A very sensible day yesterday. Saw no-one.
(Virginia Woolf, *Diary* Vol. 5, cited after Rizzi 1994a)

(8) a. Why should *(I) see anybody?
b. I'm glad that *(I) saw no-one.
c. No-one saw *(me).

The impossibility of Diary/Topic Drop in Wh-questions (cf. (5) and (8a)) and embedded clauses (cf. (6) and (8b)) distinguishes these processes from Italian-style pro-drop, which is possible in both constructions (cf. (9)).

(9) a. Quante pietre hai preso?
how-many stones have-2SG taken
"How many stones did you take?"
b. Gianni mi ha chiesto se pensavo che tu avessi contattato
G. me has asked whether thought-1SG that you had contacted
nessuno.
anybody
"John asked me whether I thought that you had contacted anybody."
(Italian, Rizzi 1982:125 & 150)

Let us now briefly turn to the technical details of two Diary/Topic Drop analyses, i.e. those developed in Hyams (1994) and Rizzi (1994a).

According to Hyams (1994)[9], the null argument parameter determines language-specifically whether null arguments are licensed in A- or A'-positions, A-positions being theta-positions and specifiers construed with agreement. In languages like English or Dutch/German without rich agreement, null arguments must be identified via topic-identification which is possible only in CPSpec (hence the V1 effect in Diary/Topic Drop). In English, the null argument parameter is set to "A-positions". CPSpec is a non-thematic position and must therefore be construed with agreement in order to count as an A-position where null arguments are licensed. This is the case if the subject (bearing an agreement index) but not if the object (bearing no agreement index) has moved to CPSpec.[10] The subject-object asymmetry in (7) and (8c) follows. In Dutch/German, the null argument parameter is set to "A'-positions". Null arguments are hence licensed (and identified) in CPSpec regardless of whether they are subjects or objects, and both can be dropped (cf. (4a) and (4b)). Hyams assumes that the null argument parameter governing the licensing of null arguments is already correctly set during the early stages of the linguistic development and that it is merely the condition on the identification of null arguments which becomes more restrictive at a later point. She writes on p.37 that "we do not expect to find a discrete shift in the development from null subject to non-null subject use since this is not the result of a parameter resetting. Rather, the change

[9] Hyams' position has since evolved in a direction that has brought her views closer to ours. See Sano & Hyams (1994) and our discussion of this work at the end of section 6.

[10] Hyams' analysis contains at least two problematic assumptions. First, if Chomsky (1989) is correct that both subjects and objects have agreement projections (AgrSP and AgrOP), then it is unclear why subjects but not objects can pass on their agreement index to CPSpec, thus turning the latter into an A-position by virtue of being construed with agreement. Second, there is no evidence that the subject in the second sentence in (7) has indeed been moved into CPSpec.

will be more gradual as the child determines the proper discourse conditions for topic identification in English." Below we will see that there are such discrete shifts in the development of Adam which suggests that the licensing of empty subjects is affected, although not via the resetting of a parameter.

Rizzi (1994a) proposes that the empty argument of Diary/Topic Drop is a null constant of category <-a,-p,-v> which must be a) located in an A-position and b) identified by a c-commanding discourse-linked null operator *if it can be* i.e. if the null constant is c-commanded by a specifier which could host such an operator. English does not have a discourse-linked null operator. Moreover, adult clauses are in general CPs in which all A-positions are c-commanded by CPSpec, a specifier that could host a discourse-linked operator if one existed. Null constants of this type are therefore generally unavailable in adult English. Child clauses on the other hand may freely lack the CP-level. As a result, AgrSPSpec, the S-structure (A-)position of the subject, is not c-commanded by a specifier and the subject can be a null constant in child English if and only if the CP is absent. All other A-positions are c-commanded by AgrSPSpec, a potential host for an operator, and objects etc. cannot be null constants in child English irrespective of the presence or absence of CP. Rizzi (1994a: 164) suggests that the requirement that adult clauses be CPs "may remain a weak principle, though, susceptible of being 'turned off' on abbreviated registers", thus accounting for adult English Diary Drop of the type illustrated in (7). As for Dutch/German, he assumes that these languages have a discourse-linked null operator which, if located in CPSpec, can identify null constants in all argument positions.

Although strikingly different in their technical details, Hyam's and Rizzi's analyses both predict that early null subjects do not occur in Wh-questions because CPSpec, the landing site for Wh-movement, is either occupied by an empty topic (Hyams) or altogether missing (Rizzi) in early null subject sentences. In fact, Valian's (1991) study of American children (see above for details) found only 9 null subjects in 552 wh-questions (excluding subject questions), and Crisma's (1992) analysis of the French child Philippe (age 2;1-2;3) found only one null subject out of a total of 114 Wh-questions (<1%, compare with 407 or 41% null subjects out of a total of 1002 declaratives). Radford (1994: 4) on the other hand states that "null subject Wh-questions are widely reported in the acquisition literature". In the next section, we will show that null subjects are indeed very frequent in Adam's Wh-question. In addition, we will show that null subjects are much more frequent in non-finite than in finite clauses, a conclusion that has been reached by many researchers independently of each other. Like the performance limitation theory, the Diary/Topic Drop theory cannot capture this non-finiteness effect which is not attested in adult Diary/Topic Drop.

3 Null Subjects and Finiteness in Adam's Wh-Questions

Between file 01 recorded at age two years and three months and file 18 recorded at age two years and eleven months, Adam (CHILDES, Brown 1973 and MacWhinney in press) produced a total of 104 Wh-questions without an overt subject. Some examples are given in (10) below.

(10) a. where go? ADAM01
b. dining # where eat. ADAM02
c. where find plier(s)? ADAM05
d. what looking for? ADAM06
e. what doing? ADAM07
f. where zip it # uh? ADAM09
g. why working? ADAM12
h. what getting? ADAM12
i. where going? ADAM13
j. what call it? ADAM15
k. why laughing at me? ADAM17
l. where gone? ADAM18
m. what think? ADAM18

Taking into consideration the fact that our corpus represents only a small fraction of Adam's utterances during this period (maybe 1%), we can project that Adam actually produced a large number of subjectless Wh-Question (maybe 10 000). This immediately creates a serious problem for the Diary/Topic Drop analysis, according to which such examples should be unattested.[11] The suggestion by Hyams (1994 fn.13) that these cases are "derived via adjunction of the Wh-phrase to CP" only evades the problem, especially since under this analysis the child seems to violate the Wh-Criterion of Rizzi (1990: 378) which goes back to May (1985: 17) and states that "each wh-phrase must be in a Spec-Head relation with a +wh X°". A further problem arises once we look in more detail at the distribution of null subjects in Adam's Wh-questions, which we will do next.

For each of Adam's files, table 2 lists the absolute number of overt personal subjects pronouns and missing subjects in Wh-questions as well as their proportion of all Wh-questions containing either an overt personal subject pronoun or no overt subject.[12]

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[11] As mentioned by Hyams & Wexler (1993 fn 25), these null subjects in Wh-questions (as well as their counterparts in negative declaratives, see the discussion below) also create a problem for the theory developed in Gerken (1991) according to which subject drop is due to the omission of a weak syllable in iambic (weak-strong) but not trochaic (strong-weak) feet. The problem arises since fronted Wh-elements and utterance-initial negation markers are often stressed, forming a trochaic foot with a following optional subject pronoun as in "whát (you) dóing?" (ADAM07).

[12] Only those Wh-questions where the Wh-word corresponds to an element other than the subject were considered. We disregarded Wh-questions with full NP-subjects since here pro-drop is obviously not an option. Proportions were calculated only for files with more than one relevant example.

	Finite			Non-Finite			ALL		
	overt	missing		overt	missing		overt	missing	
FILE	n	n	%	n	n	%	n	n	%
01	1	0	-	0	3	100	1	3	75
02	0	0	-	0	5	100	0	5	100
03	0	0	-	0	1	-	0	1	-
04	0	0	-	1	0	-	1	0	-
05	0	0	-	4	4	50	4	4	50
06	0	0	-	1	3	75	1	3	75
07	2	0	0	3	14	88	5	14	74
08	0	0	-	1	13	93	1	13	93
09	1	0	-	1	8	89	2	8	80
10	0	0	-	1	3	75	1	3	75
11	0	1	-	1	11	92	1	12	92
12	2	1	33	3	2	40	5	3	38
13	2	0	0	5	6	55	7	6	46
14	14	0	0	2	3	60	16	3	16
15	28	2	7	7	7	50	35	9	20
16	31	2	6	8	0	0	39	2	5
17	11	0	0	38	9	19	49	9	16
18	15	0	0	30	6	17	45	6	12
ALL	**107**	**6**	**5**	**106**	**98**	**48**	**213**	**104**	**33**

Table 2: Overt Personal Pronouns and Missing Subjects in Adam's Wh-Questions

Overall, 104 Wh-questions or 33% out of a total of 327 relevant examples lack an overt subject. A closer look reveals a clear non-finiteness effect: Whereas the subject is missing in 98 (or 48%) of all 204 non-finite wh-questions, it is missing in only 6 (or 5%) of all 113 finite Wh-questions.[13] Subject drop is thus generally available only in non-finite sentences, but not in finite sentences. This becomes especially clear when we consider cases like (11) or (12) where the finite and non-finite versions of the same question

[13] Wh-questions were counted as finite if they contained a (finite) auxiliary (*have* or *be*), modal (*can*, *must*, etc.) or expletive (*do*) and as non-finite if they did not contain such an element. There were only two exceptions to this rule: In two utterances, no auxiliary etc. was present but the main verb carried regular 3ps present tense agreement (cf. (11b)). Both utterances were counted as finite. The fact that examples of this type are very rare suggests that we were justified in counting Wh-questions without an auxiliary, modal or expletive as non-finite. Moreover, the highly significant correlation between finiteness (as defined above) and subjecthood also indicates that this assumption was correct.

appear side by side in adjoining or near-adjoining lines.[14] While the subject may be missing in the non-finite version, it is invariably overt in the finite version.

(11) a. where go? ADAM11 line 913
b. where dis goes. ADAM11 line 914

(12) a. what d(o) you doing? ADAM15 line 855
b. what do [?] you doing? ADAM15 line 857
c. what doing [?]? ADAM15 line 876
d. what d(o) you doing? ADAM15 line 896

Before we proceed, let us take a look at the six counterexamples against the generalization that subject drop is restricted to non-finite clauses, i.e. clauses without subject-verb agreement. All of these counterexamples are listed below in (13).

(13) a. where can go? ADAM11
b. what said # Mommy? ADAM12
c. I simply where is? ADAM15
d. simply where is? ADAM15
e. where is. ADAM16
f. where is? ADAM16

Note that none of these examples shows regular subject-verb agreement: Agreement is either altogether absent as with the modal in (13a) and the past tensed main verb in (13b) or realized in a suppletive verb stem as with the copula in (13c-f). Crucially missing are counterexamples of the form in (14), where a main verb bears regular subject-verb agreement and the subject is null. We will return to this point in section 6. The unattested example in (14) should be compared with the attested examples in (11b), where regular agreement co-occurs with an overt subject.

(14) *where goes? unattested

Not only do null subjects practically never occur in finite clauses, but the proportion of null subjects in non-finite clauses also dramatically decreases with acquisition of finiteness and agreement. Judging from table 2,

[14] The examples in (11) and (12) already indicate that the phenomenon under observation is not lexically governed. In fact, pro occurs with all wh-words used in this stage except *how* (which shows up only in the probably formulaic *how are you?* and *how do you know?*) and with 18 different verbs, 10 of which are also among the 37 verbs that occur in wh-questions with overt pronominal subjects.

finiteness is not yet productively used in Wh-questions in files 01-11:[15] During this period, no two consecutive files contain finite clauses and the latter are overall rare (5 examples in 11 files). During the same period, null subjects are very frequent in non-finite Wh-clauses, averaging 83%. Makowski (1993) reports that Adam's first agreeing and contrasting uses of *be*- and *do*-forms (which do not yet meet her criteria for 'productivity') occur in files 10 and 11, respectively. Beginning with file 12, all files contain finite clauses and the latter became more numerous overall (108 examples in 7 files). At the same time, the proportion of null subjects in non-finite Wh-questions drops dramatically from 92% in file 11 to 40% in file 12 (or from 83% in files 01-11 to 51% in files 12-15). Makowski argues that agreement reaches the productive stage in file 15. The first productive use of agreement immediately precedes the second dramatic drop in the rate of null subjects in non-finite Wh-questions from 50% in file 15 to 0% in file 16 (or from 51% 12-15 to 16% in files 16-18). We will argue below in section 6 that there is a causal relation between the acquisition of finiteness or, to be more precise, agreement and the loss of null subjects. Concretely we will propose that as long as agreement is not acquired, clauses lack the AgrSP-level and pro is licensed in VPSpec in accordance with the theory of Economy of Projection. Once agreement is acquired, AgrSP must be projected and the theory of Economy of Projection requires AgrSPSpec to be filled by an overt subject, a situation that excludes pro.

The fact that empty subjects are much more frequent in non-finite Wh-questions (which only contain main verbs) than in finite Wh-questions (which contain an auxiliary and hence potentially an extra VP-element[16]) and especially the existence of n-tuples like the one in (12) intuitively suggest that there is no obvious link between missing subjects and long VPs in the sense of Bloom (1990,1993). This intuition is confirmed by a formal comparison of the average VP-length in Wh-questions without overt subject with the average VP-length in Wh-questions with an overt personal pronoun as the subject:

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[15] The development of finiteness in Wh-questions thus appears to lag behind that in other sentence types, possibly because it is linked to the acquisition of a discrete set of lexical items with special properties (cf. fn 13). Based on the distribution of personal pronouns, Vainikka (1994) determines file 03 as the onset of Adam's IP stage, although it may in fact be the case that only the lower but not the higher inflectional projections (e.g. TP but not AgrSP) are available at this stage, a situation that would be compatible with the theory we develop below (but see the discussion around footnote 34).

[16] Strictly speaking, (finite) auxiliaries are probably not VP-elements (see Rohrbacher 1993). But since Bloom (1990,1993) uses VP-length as an indicator of processing load and since there is no reason not to believe that auxiliaries increase processing load, this detail is irrelevant. By the same token, it is reasonable to count all non-subject elements in this measure as was done in table 3 below.

FILE	VP-Length (Words)	
	Empty Subject	Pronoun Subject
1-11	2.194	2.294
12-15	2.286	2.381
16-18	3.353	2.614
All	**2.400**	**2.519**

Table 3: VP-Length and Subject Type
in Adam's Wh-Questions

Overall, the difference in average VP-length is very small and, most importantly, in the wrong direction (Wh-questions without overt subject tend to have slightly shorter VPs than Wh-questions with an overt personal pronoun as the subject). Similar non-significant differences in the wrong direction appear if we limit the comparison to the files with the highest or second-highest rate of subject-drop (files 01-11 and 12-15, respectively). It is only in the files with the lowest rate of subject-drop (files 16-18) that VPs in Wh-questions without overt subject are longer than VPs in Wh-questions with an overt personal pronoun as the subject, and this difference is almost significant according to a t-test ($t = 2.046$, $p = 0.056$).[17] What this means is that the performance limitations theory cannot explain those null subjects which occur in files 01-15 where subject drop is a common phenomenon. Such a theory may be able to explain those null subjects which occur in files 16-18 where subject drop has become rare. It is of course entirely conceivable that children employ more than one process to omit subjects, and this would account for the apparent gradualness in the loss of early null subjects that has been reported by Valian (1991), Bloom (1993) and others and that can -- to a limited degree -- also be observed in table 2 above (But note the dramatic, non-gradual decline of the null subject rate after file 11 and after file 15 to be discussed in section 6). The most important conclusion is that the bulk of null subjects in Adam's Wh-questions is not amenable to a performance limitations analysis à la Bloom or Valian. Since these examples cannot be due to Diary/Topic Drop à la Hyams or Rizzi either, a different account is called for. In section 6 we develop such an account based on the assumption that the missing subjects in question are in fact pros which are licensed as long as AgrSP is not projected.

Other children produced fewer Wh-questions than Adam and the evidence from these children is therefore often less compelling, but in all cases a sizable portion of the Wh-questions lacked an overt subject and these examples were in general non-finite. Claire (Hill 1982), a child acquiring English recorded nine times between ages 2;0 and 2;2, may be typical in this

17 We would like to thank Ken Matsuda and Sergey Avrutin for helping with the statistics.

respect. Radford (1994: 4) calculated that "39% (11/18) of [Claire]'s questions containing overt wh-words have null subjects". Again, we find a clear non-finiteness effect. An exhaustive list of Claire's types of Wh-questions containing either an overt personal pronoun as the subject or no overt subject at all is given in (15) - (17). While non-finite Wh-questions often lack an overt subject pronoun (compare (15) with (16)), the subject pronoun is never missing in non-finite Wh-questions (cf. (17)).

(15) a. where go? CLAIRE01
b. what doing? CLAIRE01
c. where tickle? CLAIRE03
d. what do? CLAIRE06

(16) where it? CLAIRE02

(17) a. Jane what is it? CLAIRE06
b. where is it? CLAIRE08

It is instructive to compare the distribution of (the tokens of) overt and null subjects file by file throughout the corpus. To this end, consider table 4 (Note that files 4 and 5 were lost due to a malfunctioning tape recorder).

	Finite		Non-Finite	
	overt	missing	overt	missing
FILE	n	n	n	n
01	0	0	0	4
02	0	0	1	3
03	0	0	0	1
06	1	0	0	3
07	0	0	0	0
08	1	0	0	0
09	0	0	0	0
ALL	**2**	**0**	**1**	**11**

Table 4: Overt Personal Pronouns and Missing Subjects in Claire's Wh-Questions

Null subjects occur only in files 01 to 06, but not in files 07 to 09, i.e. after the first finite Wh-clauses have appeared in files 06 and 08. Hill (1982: 64ff) reports for file 01 that "when asked 'what's Kitty doing' Claire responded 'what doing'. When asked 'where's the doggie?' she responded 'where doggie?'". This behavior persisted until file 06 where "what room is this" was echoed as "what room this". "In session 7 Claire used the question form

'who's this?' for the first time... Also in session 7 she used the form 'where did the chair go?'" (loc. cit.). From what little we know about Claire, it thus appears that a major change concerning the finiteness of her Wh-questions occurred around file 07, and it is at this very same point in her development that null subjects seem to disappear from her Wh-questions. Although Claire's data perhaps do not constitute convincing evidence in their own right, these data are clearly compatible with the generalizations reached earlier in connection with Adam's data: Null subjects are restricted to non-finite (non-agreeing) clauses and vanish from the latter once finite (agreeing) clauses begin to take over.

Similar statements can be made with respect to the other children on the CHILDES data base, although their material is again sparser and less easily quantifiable. A few of their subject-drop examples are given in (18) below. Radford (1994: 4) supplies additional examples: "Klima and Bellugi (1966, p. 200) report 'What doing?' as a typical stage I question; Plunkett (1992, p. 58) reports that one of the earliest wh-questions produced by her son was 'Where go?'".

(18) a. what doing? EVE14
b. where gone? SAR15
c. what got? NAO31
d. when eat eggs. NIN01

It is interesting to note that children with language impairments appear to display the same pattern. For Penny, a child suffering from Downs Syndrome (CHILDES, Tager-Flusberg et al. 1990 and MacWhinney in press), overt subject pronouns are optional in non-finite Wh-questions (cf. (19)) but obligatory in finite Wh-questions (cf. (20)). 'B', a child diagnosed with Special Language Impairment from the Leonard-corpus on CHILDES (MacWhinney in press), produced numerous Wh-questions without an overt subject. Like those shown in (21), none of them was finite.

(19) a. how you do this? PENNY02 line 349
b. how do this? PENNY02 line 353

(20) a. where is it? PENNY02
b. *where is? unattested

(21) a. what way go SLIB
b. how get it on? SLIB
c. how play that game? SLIB
d. where put it at? SLIB
e. where go to? SLIB

There is another environment in English where finiteness is always visible even in the present tense. Like (non-subject) Wh-questions, finite negative declaratives require an auxiliary, modal or expletive. In the first ten files, Adam produced twenty non-finite and only one finite negative declaratives without overt subject (Note that the overall number of negative declaratives is much lower than the overall number of Wh-questions). After file 10, subjectless negative declaratives become very rare. It is not always easy to distinguish non-finite negative declaratives from negative imperatives (which regularly omit the subject in adult English), but examples like those in (22) do not easily lend themselves to an imperative interpretation. As was the case with Wh-questions there are cases where the finite and non-finite versions of the same negative declarative appear side by side in adjoining lines and the subject is absent in the non-finite version but present in the finite version (Compare (23) with (11) and (12)). In sum, the evidence from Adam's Wh-questions and negative declaratives suggests that in both sentence types, null subjects are restricted to the same environment (non-finite clauses) and start disappearing at roughly the same point in the development (files 12 and 11, respectively). In the remainder of this paper, we will say little on the issue of null subjects in Adam's negative declaratives, a topic to which we plan to return in future work. Suffice it to say that the analysis we propose in section 6 covers null subjects in all non-finite clauses, including non-finite negative declaratives.

(22) a. no heavy. ADAM03
b no rocking. ADAM05
c. no singing song. ADAM06
d. no want dat op(en). ADAM07
e. no want stand head. ADAM08

(23) a. no wan(t) (t)a sit dere. ADAM07
b. no I don't want to sit seat. ADAM07

Sano & Hyams (1994) also observe a non-finiteness effect in early Child English null subject sentences, although their corpus is more inclusive than ours and does not focus on Wh-questions and negative declaratives.[18] Sano

[18] In addition, Valian (1991: 65) found that her 21 American children never left out the subject in the 132 tensed subordinate clauses they produced. Rizzi (1994a: 154) claims that this finding supports the Diary/Topic Drop analysis of early null subjects, since adult Diary/Topic Drop is ruled out in embedded clauses (cf. (6), (8b)). Valian's finding might however just as well be taken to support our pro-drop analysis, according to which early null subjects are excluded from finite clauses. The two theories would make different predictions for embedded non-finite clauses that are not control-infinitives, but apparently (and not surprisingly) children do not

& Hyams report that the proportion of null subjects in sentences containing a copula (table 5) or modal (table 6), i.e. in necessarily finite utterances, is much lower than the overall proportion of null subjects in finite and non-finite utterances together (table 7) and conclude that "it is the availability of root infinitives that makes null subjects possible in child English" (p. 545). We agree with this conclusion, but the perspective of the analysis we will propose in section 6 is quite different from that of Sano & Hyams.

CHILD	FILE	AGR	am	are	is
Eve	01-20	1;6-2;3	0/4	0/36	0/109
Adam	01-20	2;3.4-3;0.11	0/1	0/71	13/114 (=11.4%)
Nina	01-07,09-21	1;11.16-2;4.12	0/0	0/19	2/50 (=4%)

Table 5 (from Sano & Hyams 1994: 548): "The Proportion of Sentences with Null Subjects out of Sentences Containing an Uncontracted Copula"

	GROUP I	GROUP II	GROUP III	GROUP IV
Ave. Age	2;0	2;5	2;5	2;7
Ave. MLU	1.77	2.49	3.39	4.22
% Overt Subj.	94	95	98	99

Table 6 (from Sano & Hyams 1994: 549): "The Proportion of Lexical Subjects in Sentences Containing the Modals (from Valian 1991)"

CHILD	AGE		% Ø-Subject
Eve	1;6-2;1		26%
Adam	2;5-3;0		41%
Nina	1;11.16	File Nina01	44%
	2;2.6	File Nina13	11%
(EVE & ADAM: out of sentences with lexical verbs, from Hyams & Wexler 1993; NINA: out of all utterances, from Pierce 1992)			

Table 7 (from Sano & Hyams 1994: 549): "The Overall Proportion of Sentences with Null Subjects"

The non-finiteness effect discussed above also surfaces in the speech of children acquiring languages other than English. In their analysis of two German children, Katrin (age 1;5) and Nicole (age 1;8), Rohrbacher & Vainikka (1994) report that the subject was missing in 82% and 60% of all non-finite clauses and 35% and 20% of all finite clauses, respectively. Poeppel

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produce such examples any more than adults do, presumably because finiteness is acquired before subordination.

& Wexler (1993: 15) found that Andreas, another child acquiring German recorded at age 2;1, left out the subject in 13 (or 35%) of his 37 non-finite utterances with the highest verb in V-final position as opposed to 17 (or 9%) of his 197 finite utterances with the highest verb in V2 position. Krämer (1993: 199) gives even more divergent numbers for the same child: "Andreas uses overt subjects with infinitives 31.7% of the time [=32/101], and with finite verbs 87.[1]% of the time [=229/263]". Krämer also investigated Maarten, a Flemish child recorded at age 1;11 with overt subjects in 11 of his 100 infinitives and 69 (or 75%) of his 92 finite clauses, and Thomas, a Dutch child recorded between ages 2;3 and 2;8 with overt subjects in between 5.5% and 12.5% of his infinitives and between 66.1% and 78.1% of his finite clauses. The weighted average of overt subjects in root infinitives versus that in finite clauses in the speech of the Dutch children Peter (1;9-2;4) and Niek (2;7-3;6) is 66.4% versus 88.2% and 39.6% versus 82.9%, respectively (cf. Wijnen 1994). Finally, Haegeman (1994) found that Hein (Dutch, 2;4-3;1) omitted subjects in 86% of his root infinitives but only 32% of his finite clauses. These results point in the same direction as our own results: Subjects are much more often missing from non-finite clauses than from finite clauses. The fact that the studies summarized in this paragraph consistently reported higher percentages of missing subjects in finite clauses than we did is probably due to their failure to exclude possible cases of Diary/Topic Drop (i.e. declaratives). This again suggests that more than one process is responsible for subject drop in early child language; we will argue below that pro-drop is one of these processes.

Let us sum up this section by saying that we found null subjects to be frequent in Adam's Wh-question. This finding is problematic for the Diary/Topic Drop theory which wrongly predicts that Wh-Questions without overt subjects are rare or non-existent. Equally problematic for the processing limitations theory is the fact that the VPs of Wh-questions without overt subject are not longer than the VPs of Wh-questions with overt pronominal subjects. Both theories cannot explain why Adam freely omits subjects in non-finite (non-agreeing) Wh-questions and negative declaratives but almost never does so in the finite (agreeing) counterparts of these constructions. Before we can develop an analysis that successfully addresses these questions, we have to briefly discuss the phenomenon of non-finite root clauses in early child language more generally.

4 Root Infinitives

The proper analysis of root infinitives[19] in child language is currently the subject of a vigorous debate, much of which does not concern itself directly with the issue of early null subjects. But since we have just seen in the previous section that early null subjects are largely restricted to non-finite contexts, we might expect a convincing account for root infinitives to significantly contribute to the explanation for early null subjects. We therefore now briefly turn our attention to the debate around root infinitives. Given the large and steadily growing volume of the literature on root infinitives on the one hand and the limitations of this paper on the other hand, the following comments must remain sketchy.

Non-finite root declaratives are often claimed to be universally ungrammatical in adult language, and the challenge is to explain why they are present in such large numbers in child language. According to one school of thought, the problem is only an apparent one and young children's 'root infinitives' are really finite utterances containing an empty finite auxiliary (Boser *et al* 1992).[20] Poeppel & Wexler (1993: 16) point out that such an empty finite auxiliary should be able to license object- or adverb-topicalization in child German root infinitives and that Andreas, the German child they are analyzing, does in fact not produce any nonfinite object- or adverb-first sentences, contrary to the prediction of the empty auxiliary theory. Likewise, in their study of natural speech from 30 German children from 21 to 34 months and elicited imitations from 40 German two- to four-year-olds, Boser *et al* (1992: 62) found that "there is no instance in the data of a non-subject initial sentence with a null auxiliary". In other words, examples of the type "*Kuchen Mama backen" (cake mommy bake) are unattested. Boser *et al* explain the absence of topicalization in root infinitives by assuming that empty finite auxiliaries, like empty pronouns, must be licensed (i.e. receive their φ-features) under S-structural Spec-head agreement. The S-structure position of finite verbs in German is Comp, where they Spec-head agree with a subject in CPSpec, but not with a non-subject in CPSpec. Hence an empty finite auxiliary will be possible only in utterances with the order subject-first. Boser *et al* (1992: 61) note that the empty auxiliary theory thus predicts "that a null pronominal specifier can be licensed by an overt X° head sharing the relevant set of feature specifications, and symmetrically, a null pronominal

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19 This term is widely used in the literature and we will continue to use it although it should be clear in the light of examples like (10d,e,g-i,k,l), (15b), (18a-c) and (22b,c) that the term 'non-finite matrix clause' would be more appropriate.

20 Similarly, Krämer (1993) argues that root infinitives with overt subjects contain an empty modal. However, she assumes that subjectless root infinitives (i.e. the kind we are interested in) do not as a rule contain an empty modal and that most of them are instead true root infinitives.

X° category can be licensed by an overt specifier sharing its relevant feature specifications... But instances where both head and specifier are null are not licensed..."[21] More concretely, an empty auxiliary can receive its φ-features from and thus be licensed by an overt subject and an empty subject can receive its φ-features from and thus be licensed by an overt verb, but an empty auxiliary and an empty subject cannot receive any φ-features from each other and both remain therefore unlicensed. This means that the empty auxiliary theory wrongly predicts subjectless root infinitives to be unattested. (2a) for example could only have the ungrammatical S-structure in (24), where both [$_{Subj}$ *e*] and [$_{Aux}$ *e*] remain unlicensed.

(24) [$_{AgrSP}$ [$_{Subj}$ *e*] [$_{AgrS'}$ [$_{Aux}$ *e*] [$_{VP}$ eating popcorn]]]

In section 3, we have shown that subjectless root infinitives are in fact very common in child language. Since the empty auxiliary theory incorrectly rules them out, we must reject this theory.

Like Boser *et al*, Wexler (1994) assumes that root infinitives are in fact finite clauses with the full array of functional projections, but unlike the former, he suggests that it is the seemingly non-finite overt verb itself which is the finite element of these clauses. Wexler proposes that at the stage where children produce root infinitives, they cannot distinguish different tense values and therefore take both agreeing finite verbs and non-agreeing infinitivals to be finite forms with strong (abstract) AgrS in the first case and weak (abstract) AgrS in the second case. In accordance with the theory developed in Chomsky (1992), the child overtly raises the agreeing 'finite' verbs to AgrS at S-structure but does so only covertly at LF with the non-agreeing 'infinitivals'.[22] This account is very successful in dealing with languages like French, German or Dutch where finite but not non-finite verbs overtly raise to AgrS in the adult language and where this distinction between finite verb raising and non-finite verb in situ is already in place in child language at the optional root infinitive stage (cf. Pierce & Déprez 1993, Poeppel & Wexler 1993, Rohrbacher & Vainikka 1994 and many others). The overt/covert verb raising account is less successful in dealing with languages like English where neither agreeing finite nor non-agreeing non-finite main

[21] The theory of Boser *et al* is hence quite similar to the theory of Speas (1994) to be outlined in the next section, with the crucial difference that Boser *et al* assume that all functional projections are always present.

[22] As an alternative, Wexler considers a verb raising/Infl lowering analysis along the lines of Pollock (1989) and Chomsky (1989). This proposal runs into the same problems (outlined below) as the overt/covert verb raising analysis. In addition, Wexler mentions that it might be the case that root infinitives simply lack Tns (and presumably its projection, TP) as independently proposed by Rizzi (1994b), Haegemann (1994) and others, but he does not discuss this possibility in great detail.

verbs overtly raise to AgrS in the adult language and where there is no reason to believe that either of them do so in child language at the optional infinitives stage. Following Pollock (1989), it is generally agreed that the obligatory position of the main verb after the sentential negation marker (cf. (25)) or an adverb (cf. (26)) indicates that adult English main verbs do not leave the VP in overt syntax. The overt/covert verb raising theory states that at the optional infinitive stage, English children raise agreeing finite forms to AgrS. This theory therefore predicts that children at the optional infinitive stage consistently produce sentences of the type illustrated in (25b) and (26b) instead of sentences of the type illustrated in (25a) and (26a), which does not seem to be the case. Thus Roeper (1993) notes that "Adam, like all others, shows *do*-insertion in the adult manner" (p 82) and that "there are no instances of an adverb between the [main] verb and direct object" (p 80). The examples in (25a) and (26a) were produced by Adam and are taken from Roeper (1993).[23]

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[23] Wexler acknowledges that the non-occurrence of (25b) in child English is a problem for his theory. In connection with the verb raising/Infl lowering analysis mentioned in the previous footnote, he writes on p.337 that "English *not* has a property which prevents I from moving around it [hence *do*-support, R. & R.]. We can assume that the same property will prevent V from raising around *not* for the child." In fact, no such assumption can be easily integrated into the verb raising/Infl lowering analysis. Chomsky (1989) suggests that the trace of Infl lowering must be undone at LF via verb raising in order to avoid an ECP-violation. LF raising is substitution (since the landing sites are empty after Infl lowering), resulting in an intermediate verb trace in Tns. This trace, having semantic content, cannot be deleted at LF and the ECP demands that it be governed by its antecedent in AgrS which is impossible if a minimal governor such as *not* intervenes between AgrS and Tns (cf. (i)). Verb raising at S-structure as exhibited by English aspectual auxiliaries or French main verbs does not face this problem. Overt verb raising is adjunction (since the landing sites contain abstract or concrete affixes), resulting in an intermediate Tns trace. This trace, not having semantic content, can be deleted at LF and the ECP is trivially satisfied (cf. (ii)).

(i) * $[_{AgrSP}$ Baby $[_{AgrS'}$ $[_{V}$ like-Tns-AgrS $]_i$ $[_{Neg'}$ not $[_{TP}$ t_i' $[_{VP}$ t_i spinach]]]]]

(ii) $[_{AgrSP}$ Baby $[_{AgrS'}$ $[_{AgrS}$ $[_{Tns}$ $have_i$-Tns $]_j$ -AgrS] $[_{Neg'}$ not $[_{TP}$ t_j $[_{VP}$ t_i $[_{VP}$ eaten spinach]]]]]]

Notice that overt main verb raising in negative declaratives would result in a structure with all the relevant properties of (ii). Most importantly, this structure would satisfy the ECP. The ungrammaticality of overt main verb raising in negative declaratives can therefore not be linked to the presence of *not* and must instead be due to a general absence of overt main verb raising in adult English. Wexler's claim that agreeing finite main verbs overtly raise in child English assertive declaratives then wrongly predicts that they should do so in negative declaratives, too.

In connection with the overt/covert verb raising analysis discussed in the text, Wexler does not make a concrete proposal for the absence of (25b) from child English (see his footnote 51 on page 350). Whatever feasible explanation there might be in either theory, it is unlikely that this explanation will also cover the absence of pre-verbal, clause-medial adverbs in child English (cf. (26b)), a problem which Wexler does not bring up.

(25) a. [$_{AgrSP}$ I [$_{AgrS'}$ didn't [$_{NegP}$ *e* [$_{VP}$ see no tigers]]]]
b. * [$_{AgrSP}$ I[$_{AgrS'}$ saw$_i$ [$_{NegP}$ not [$_{VP}$ t$_i$ no tigers]]]]
(26) a. [$_{AgrSP}$ He [$_{AgrS'}$ *e* [$_{VP}$ always [$_{VP}$ closes doors]]]]
b. * [$_{AgrSP}$ He [$_{AgrS'}$ closes$_i$ [$_{VP}$ always [$_{VP}$ t$_i$ doors]]]]

Another problem for the overt/covert verb raising analysis stems from the by now standard assumption that the (abstract) strength of AgrS depends on the (concrete) morphological richness of agreement (cf. Rohrbacher 1993 and references cited there). Since agreeing finite main verbs in child English (with strong AgrS according to Wexler) show no more concrete morphological agreement than their counterparts in adult English (with weak AgrS), the overt/covert verb raising analysis has to conclude that the child determines the richness of agreement/strength of AgrS in ways that are fundamentally different from those in the adult grammar. If Rohrbacher (1993, 1994) is correct in arguing that UG principles determine whether AgrS is strong or weak, this conclusion entails that children may violate core properties of UG, an undesirable consequence. Finally, note that it is unclear what moves English children to reset the AgrS value from strong to weak.

This is not to say that the main insights of Wexler's analysis could not be retained under a slightly different guise. Thus one might assume with Wexler that root infinitives are in fact finite and contain all functional projections, that children at this stage are unaware of the different values for Tns and that they hence freely produce agreeing 'finite' verbs and non-agreeing 'infinitivals', taking in fact both to be finite. Let us further assume that AgrS already has the adult value at this stage and that non-agreeing infinitivals (even if they are perceived as finite by the children) have weak AgrS and therefore stay in situ in all languages under consideration. In adult and child English, the agreeing finite forms of main verbs also have weak AgrS. As a result, they may not overtly raise to AgrS either. In adult and child French, German and Dutch, the agreeing finite forms have strong features in AgrS (French) and/or Comp (German and Dutch) to which they raise. It is not straightforward how this approach could account for the non-finiteness (or non-agreement) effect evident in early child English null subject sentences, since agreeing and non-agreeing child English utterances now share the same abstract features (finite Tns and weak AgrS). But this problem might not be insurmountable. What is more important in the context of this section is that there is evidence that at least some functional projections are missing in root infinitives and it is to this evidence that we now turn.

Note first that child English root infinitivals virtually never display the infinitival marker *to*. Under the reasonable assumption that *to* is base-generated in Tns, its absence from root infinitives suggests that this head and its projection, TP, are missing in this construction (cf. Radford 1994). Next, it

has been observed that root infinitivals typically do not contain auxiliaries. In adult English, modal auxiliaries are arguably base-generated in Tns and Guasti (to appear) proposes that aspectual auxiliaries, too, are licensed by this head. If so, the absence of auxiliaries from root infinitives serves as a further indicator that TP is not projected here (cf. Haegeman 1994, Radford 1994 and Rizzi 1994b). As for AgrS(P), Pierce (1992: 87) reports that "from 88 to 99% of all subject clitics" produced by the four French children in her study "occur in overtly tensed clauses". Similarly, Haegeman (1994) found that Hein (Dutch, 2;4-3;1) produced 472 (or 13%) subject clitics in 3768 finite clauses but none in 78 root infinitives. Assuming that subject clitics are either base-generated in or adjoined to AgrS, their absence from root infinitives can be interpreted as a sign that the latter lack AgrS and its projection, AgrSP (cf. Haegeman 1994).[24] With arguments like this in mind, Rizzi (1994b) proposes the following account for root infinitives. Suppose Tns is a variable that needs to be bound. This can be done either selectively by finite features on the clause itself (in finite clauses) or a higher clause (in embedded infinitives) or unselectively by an operator (in non-finite, non-declarative matrix clauses, cf. Rizzi's Italian example "Che cosa dire in questi casi?" 'What to say in these cases?'). For matrix declaratives only the first option is available which explains why these clauses must be finite in adult language. Young children on the other hand may simply omit TP in which case there is no Tns variable to bind. In fact, Rizzi assumes that when this happens, none of the projections above TP can be present either. Given the order of projections in (27), this means that root infinitives lack not only TP and AgrSP, but also NegP and CP.

(27) $[_{CP}$ Comp $[_{AgrSP}$ AgrS $[_{NegP}$ Neg $[_{TP}$ Tns $[_{AgrOP}$ AgrO VP]]]]]

If NegP and CP must be absent in root infinitives, the latter cannot be negated or questioned. This conclusion seems to be supported by the following findings. Friedemann (1992) reports that only 6 out of 137 negative sentences in the data from Philippe and Grégoire (French) were root infinitives. Hamann (1994) found 167 positive and no negative root infinitives in Katrin's file and 204 positive and only 14 negative root infinitives in Andreas's file (both children are acquiring German). According to Crisma (1992), none of the 35 Wh-questions (but 117 of the 491 declaratives) in the first recordings from the French child Philippe (2;1 to 2;2) were root

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[24] Since subject clitics are also banned from adult French and adult Dutch infinitives, their absence from child French and child Dutch root infinitives might appear to be less than surprising. But recall that both Boser *et al* (1992) and Wexler (1994) argue that child language root infinitives are in fact finite constructions and we therefore expect subject cliticization to be possible in the presence of AgrS(P). Haegeman (1994) shows that Dutch clitics can adjoin to empty heads, and Boser *et al*'s assumption that the finite element in root infinitives is phonetically empty cannot play a role either.

infinitives. For child Dutch, Haegeman (1994: 17) reports that "in the entire Hein corpus there were 90 WH-questions, 88 of which were finite and only 2 were non-finite". Finally, Weissenborn (1992) claims that there are no Wh-root infinitives in child German. But the data presented in section 3 of this article and in particular the examples in (10) through (23) clearly show that child English root infinitives can be negative declaratives or Wh-questions. Moreover, Haegeman (1994) found that while Hein negated root infinitives less often than finite clauses (5.2% vs. 15.7%), negative root infinitives were a relatively robust phenomenon and the presence of adverbs that adjoin to NegP (or ∑P in non-negative sentences) in root infinitives further suggests that NegP can be present in child Dutch root infinitives. In keeping with Rizzi's theory, Haegeman proposes that NegP is projected above TP in the Romance languages and below TP in the Germanic languages. However, we see no theoretical reason for Rizzi's assumption that the omission of TP and AgrSP implies the omission of all functional projections above them and the empirical evidence for this assumption is equivocal at this point. We will therefore adopt a modified version of Rizzi's proposal according to which root infinitives are possible in early child language because unlike adults, young children can omit TP and other functional projections, the most notable among which is AgrSP. We will assume contra Rizzi that when they omit TP and AgrSP, young children can keep other, higher functional projections such as CP and NegP.[25] Here the underlying idea is that driven by considerations of Economy of Projection (cf. the next section), young children initially instantiate syntactic projections if and only if features of the head of that projection are overtly realized. In root infinitives, there is no overt material reflecting the presence of TP or AgrSP (i.e. no overt tense or agreement) and these levels are therefore initially not instantiated. Whenever an utterance contains negation or a fronted Wh-element, there is overt material reflecting the presence of NegP or CP and these levels are therefore instantiated. For any given utterance, the instantiation of each functional projection is independent from that of all others and NegP and CP can therefore be projected in the absence of TP and AgrSP and vice versa.[26] In effect, young children are using two grammars, one with inflectional projections (in finite clauses) and one without inflectional projections (in

[25] Not much hinges on this assumption. If it turns out that Rizzi is right and root infinitives necessarily lack CP and NegP, we might adopt an analysis according to which Adam's non-finite Wh-questions and negative declaratives involve adjunction of the Wh-element or negation marker to VP (see Radford 1994 for a similar proposal). In either case, the account in section 6 will go through: Since root infinitives do not show agreement, they lack the semantically empty projection AgrSP (whose specifier would have to be filled by an overt subject) and VPSpec is available as a position for pro.

[26] See section 6 for evidence suggesting that in child English (but not in child French, cf. footnote 34), the presence of TP implies the presence of AgrSP, a state of affairs which neither Rizzi's nor our own theory predicts.

non-finite clauses). The simultaneous use of multiple grammars by a single person is well documented in historical linguistics (cf. Kroch 1990, Pintzuck 1991 and Santorini 1989) and bi-dialectalism and can therefore not be a priori excluded in language acquisition. Moreover, we will argue in the next section that central features of each grammar in question and in particular the absence or presence of AgrSP are also attested in adult languages such as English (with AgrSP) or Japanese (without AgrSP). Thus the children presumably only make use of UG-options when they project or fail to project AgrSP (and TP). However, multiple grammars are in general unstable (see the sources cited above) and only the grammar with inflectional projections is compatible with all the input data and tensed/agreeing clauses in particular. When the child's productive use of contrasting agreement across different types of verbs signals that agreement has been recognized as a rule-based grammatical process, the grammar without inflectional projections is abandoned and TP and AgrSP become obligatory in all utterances, even non-finite ones. At this point, the option of root infinitives vanishes for the reason outlined in Rizzi (1994b): The tense variable introduced by TP must be bound and in matrix declaratives, this can be done only by finite features on these clauses themselves. In conclusion, when very young children are using inflectional projections (and they seem to do so at a very early stage if not the earliest observed stage, see e.g. Déprez & Pierce 1993, Poeppel & Wexler 1993, Rohrbacher & Vainikka 1994), then they do it because they are also using the inflectional morphology which motivates these projections. When they do not use this inflectional morphology (as in root infinitives), then they chose a more economic structure without the corresponding inflectional projections.

5 Adult Pro-Drop and Economy of Projection

Our analysis of young children's null subjects will be modeled on a theory of adult pro-drop that was recently developed by Speas (1994) and that is in turn based on work by Rohrbacher (1993) on the morpho-syntax of verbal paradigms. They have addressed an old question in linguistic theory: What is the status of paradigms? Paradigms continue to play an important role in theoretical morphology but no longer have any formal status in theoretical syntax. The core concept in Rohrbacher (1993) is that verbal paradigms in 'strongly' inflecting languages such as Spanish have independent lexical entries (and the affixes expressing subject-verb agreement are generated in AgrS) whereas verbal paradigms in 'weakly' inflecting languages such as English do not have such independent lexical entries (and the affixes

expressing subject-verb agreement are generated in V). A more formal version of this generalization is given in (28). [27]

(28) AgrS is a referential category with lexically listed affixes in exactly those languages where regular subject-verb agreement minimally distinctively marks all referential AgrS-features such that in at least one number of one tense, the person features [1st] and [2nd] are distinctively marked.

Behind this generalization lies the following reasoning.[28] The person features of AgrS are referential in that they determine whether the subject refers to the speaker(s), the hearer(s) or somebody else. If and only if both of these features are distinctively marked in an agreement paradigm, the latter becomes itself referential. Under the reasonable assumption that the lexicon lists all and only the referential elements of a language, agreement paradigms which distinctively mark both of the person features will have separate lexical entries and agreement paradigms which fail to distinctively mark at least one of the person features will not. If these ideas are on the right track, the agreement affixes in 'strongly' inflecting languages are inserted into AgrS at D-Structure and the verb raises to this position at S-Structure because affixes cannot stand on their own.[29] The result is overt V-to-AgrS raising. The agreement affixes in 'weakly' inflecting languages on the other hand are generated directly on the verb, either already in the lexicon as proposed in Chomsky (1992) or post-syntactically in a spell-out component as proposed in Anderson (1992). In either case, AgrS is empty at D-structure in this second type of language. Since Lasnik's Filter is inoperative in the absence of affixes under AgrS, there is no motivation for overt V-to-AgrS raising and this process is delayed until LF where the abstract agreement features of the verb must be checked (cf. Chomsky 1992). The result is covert V-to-AgrS raising. We have arrived at the following two-way distinction:

(29) a. Languages with strong overt agreement morphology have an AgrS-node that is
filled at D- and S-structure.

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[27] (28) is taken from Rohrbacher (1994). The original formulation in Rohrbacher (1993) included the number feature [singular] in the list of referential AgrS-features. See Rohrbacher (1994) for the reason for this revision, which is immaterial in the context of this article. Speas (1994) advocates a different definition of agreement strength which is based on the notion of Morphological Uniformity. See Rohrbacher (1993,1994) for arguments for distinctive feature marking and against Morphological Uniformity as the decisive factor in the determination of agreement strength. Again, the theory we propose here is not directly affected by these details.

[28] See Rohrbacher (1993, 1994) for more details.

[29] This is formalized in Lasnik's Filter: "A morphologically realized affix must be realized as a syntactic dependent at Surface structure" (Lasnik 1981).

b. Languages with weak overt agreement morphology have an AgrS-node that is
empty at D- and S-structure.

To these two types of languages, Speas (1994) adds a third type to which languages like Japanese belong:

(29) c. Languages with no overt agreement morphology have no AgrS-node.

The idea behind (29c) is that languages without any overt agreement morphology also lack abstract agreement features and therefore AgrS(P) would have no role to play in these languages.

Based on the three-way distinction in (29), Speas develops a pro-drop theory that is arguably superior to its predecessors since it does not make use of a special licensing condition for pro. Instead, the 'licensing' of pro follows in Speas's theory from an independently motivated principle of UG, the Principle of Economy of Projection. It is well-known that referential pro subjects[30] are licensed in languages like Japanese (cf. (30a)) without any overt agreement at all and in languages like Spanish (cf. (30b)) with strong overt agreement, but not in languages like English (cf. (30c)) with weak overt agreement.

(30) a. *pro* sasimi -o taberu-Ø.
sashimi -ACC eat
'She eats sashimi.' (Japanese)

b. *pro* habl { -o / -as / -a } Espanol. (Spanish)

c. { I / you / she } speak { --Ø / -s } Spanish (Eng

Speas proposes that this state of affairs follows from the language typology in (29) in combination with a Principle of Economy of Projection of which we give a reformulated version in (31).

(31) Principle of Economy of Projection: Project XP only if its head X° or its specifier
XPSpec has independent semantic or phonetic content.

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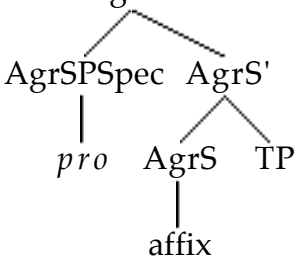
[30] Space limitations prevent us from addressing the distribution of expletive and object pro in this paper. See Speas (1994) for discussion.

The intuition behind the Principle of Economy of Projection is that a phrase can be projected only if it contributes something to the utterance (i.e. if it is needed). In other words, a maximal projection is never vacuous and always contains more than its (independently motivated) complement. Economy of Projection thus allows a specifier position of a projection to remain radically empty only if the head of that projection contains phonetic or semantic material. Conversely, the head of a projection may remain radically empty only if the specifier of that projection contains phonetic or semantic material. Economy of Projection rules out any structure in which both the specifier and the head of a projection are radically empty since in such a structure the projection would be indistinguishable from its complement and considerations of economy dictate that it not be projected. We believe that this proposal is very much in the spirit of the Bare Phrase Structure Theory developed in Chomsky (1994).

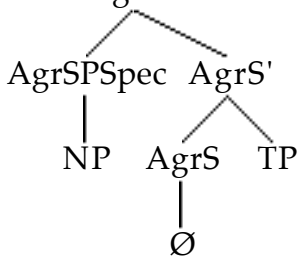
As briefly mentioned, Speas assumes that AgrSP is projected in exactly those languages that have some overt morphological reflex of verb-argument agreement, i.e. for example Spanish and English but not Japanese. Being a purely relational projection, neither AgrS nor AgrSPSpec ever has independent semantic content and one of them must be phonetically realized in order to satisfy Economy of Projection. AgrS can be phonetically realized only by an overt affix that has been base-generated there. Note in particular that "verb movement by itself is not sufficient to license null subjects... The projection of AGRP [has] to be licensed independently as an AGRP, before it [can] become the landing site of verb movement" (Speas 1994, her emphasis). With perhaps the exception of expletive subjects, nothing is ever base-generated in AgrSPSpec and this position can be phonetically realized only by an overt subject that has to move there for feature checking. Moreover, since phrases can be projected only during overt syntax, the phonetic realization of AgrS or AgrSPSpec must take place at D- or S-structure. Recall from (29a) that in languages like Spanish with strong overt agreement morphology, AgrS is phonetically filled at D- and S-structure by an agreement affix. Therefore, Economy of Projection allows AgrSPSpec to remain phonetically empty throughout syntax and subject pro is licensed in these languages (cf. (32a)). Recall further from (29b) that in languages like English with weak overt agreement morphology, AgrS is phonetically (and semantically) empty at D- and S-structure since the agreement affix is generated directly on the verb and the latter does not raise to AgrS in overt syntax. Therefore, Economy of Projection forces AgrSPSpec to be phonetically filled with an overt subject at

S-structure (cf. (32b)) and subject pro is not licensed in these languages (cf. (32c)).[31]

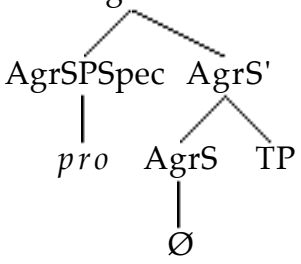
(32) a.



b.

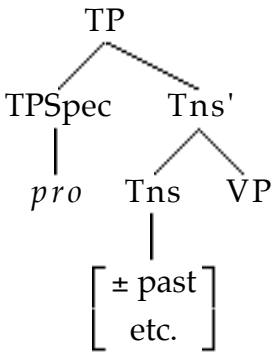


c.



Recall from (29c) that in languages like Japanese with no overt agreement morphology, there is no AgrS node and hence no AgrSP that must conform to the Principle of Economy of Projection in (31). Let us assume that in these languages, TP constitutes the highest inflectional projection and TPSpec constitutes the S-structural position of the subject.[32] Unlike AgrSP, TP is not a purely relational projection. Instead, its head always has independent semantic content in the form of a feature bundle which specifies the temporal reference of the clause. TPSpec can therefore remain phonetically empty and subject pro is licensed in these languages. This is illustrated in (33).

(33)



As for the identification of pro, we will assume that UG provides two different mechanisms. In languages with overt agreement morphology, pro will have to be identified via the agreement morphology.[33] In languages

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31 Note that empty arguments such as pro "lack independent content, and hence cannot suffice to license the projection of an AGR phrase" (Speas 1994).

32 Neither of these two assumptions is crucial in order for the account to go through. Thus if Sano (in preparation) is right and Japanese lacks not only AgrS(P) but also Tns(P), then Asp(ect)P will play exactly the same role that TP plays in (33).

33 We will adopt the idea by Jaeggli and Hyams (1988) that "AGR can identify an empty category as (thematic) pro iff the category containing AGR Case-governs the empty category."

without overt agreement , pro will have to be identified by the discourse. At present, the formal properties of discourse identification remain to be worked out. Space limitations prevent us from addressing this less-than-well-understood topic; see Kawasaki (1993) for one approach to this problem.

Table 8 below summarizes the relation between agreement morphology and pro-drop in the system of Rohrbacher (1993, 1994) and Speas (1994). This table already anticipates the analysis we will propose in the next section for child English finite clauses (which like adult English show weak agreement and hence do not allow pro-drop) and child English non-finite clauses (which like adult Japanese do not show any agreement at all and hence allow pro-drop).

This explains why referential pro subjects are ungrammatical in V2 languages with strong overt agreement morphology such as Icelandic or German: Although pro is licensed in these languages, it cannot be identified because in V2 languages nominative Case is assigned by Comp instead of AgrS. See Rohrbacher (1993, 1994) for details.

Hamann (1992) offers an account along similar lines for late empty subjects in German child language. She found that in the speech of the two 3-year-olds Elena and Christian, "10-20% of empty subjects are used even after the full acquisition of inflection and V2-structure" (p. 1). More surprisingly, at this point "11-17% of all -subject declarative constructions involve post-verbal 0-subjects and though there are no 0-subject Wh-questions, there are 6-20% 0-subjects in Yes-No questions... Christian does not have one single embedded 0-subject, ... but for Elena embedded 0-subjects are not negligible" (p. 20). In other words, many of these late empty subjects occur in constructions that exclude a Topic Drop analysis. Hamann identifies them as pros in AgrSPSpec that are licensed via government from Comp. Initially, V2-style movement of the finite verb to Comp result in syntactically visible agreement features in this position which can govern and identify pro in AgrSPSpec. "Post-verbal thematic 0-subjects would disappear when the child realizes that in Standard German ... the AGR-features in C^0 in V2-structures do not count" (Hamann 1992: 26). Our own account for these data would differ from Hamann's only in the details, with pro in AgrSP licensed by strong agreement affixes in AgrS and identified by an agreeing Case-assigner in Comp. See Rohrbacher & Vainikka (1994) for a discussion of early null subjects in child German.

Agreement Morphology	AgrS	AgrSPSpec		pro-drop
		filled	empty	
strong e.g. Spanish	filled	√	√	**yes**
weak e.g. English, child English finite clauses	empty	√	*	**no**
none e.g. Japanese, child English root infinitives	-	-	-	**yes**

Table 8: The Relation between Agreement Morphology and Pro-Drop

6 An Economy-Driven Approach to Early Null Subjects

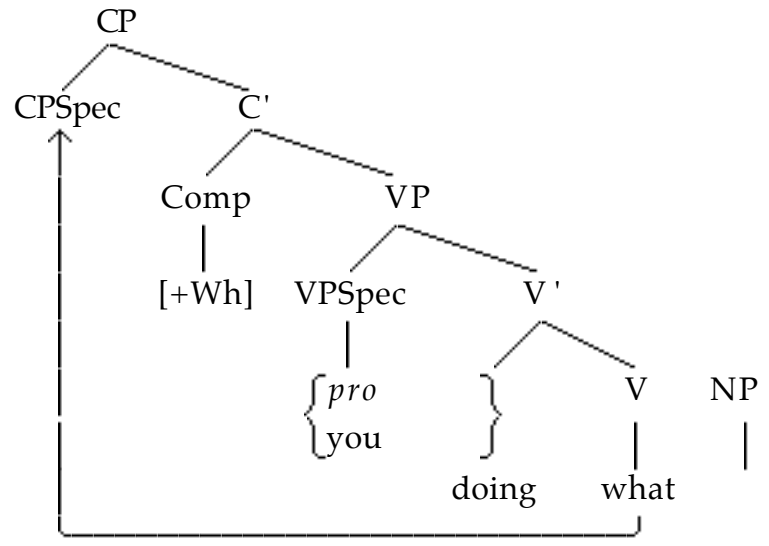
In section 3, we have shown that early null subject sentences display a non-finiteness or non-agreement effect. This effect is most pronounced in Wh-questions, where null subjects cannot be due to Diary/Topic Drop or to performance limitations induced deletion. We argue that these null subjects are instead instances of pro, and this conclusion naturally extends to all null subjects in root infinitives, at least during the early stage when the latter construction is common. In section 4, we adopted a modified version of the proposal in Rizzi (1994b) according to which root infinitives lack both AgrS(P) and T(P). In section 5, we outlined the pro-drop theory of Speas (1994): Economy of Projection allows pro if a) AgrS is underlyingly filled by a base-generated agreement affix or b) AgrS and its projection AgrSP are altogether absent from the derivation, but not if c) AgrS is underlyingly empty and the agreement affix is generated directly on the verb. Scenarios a) - c) obtain in languages with strong, no and weak overt agreement morphology, respectively. After these preliminaries, we can now directly turn to the analysis of null subjects in early child language.

If, as proposed by Rizzi, root infinitives instantiate the second of the three scenarios described above (i.e. AgrS(P) is missing), then the pro-drop theory developed by Speas predicts that referential pro subjects are possible in young children's root infinitives, in accordance with our earlier findings. We assign the examples in (34) and others like it the derivation in (35). Neither AgrSP nor TP are projected and the only projections that have to satisfy Economy of Projection are CP and VP. CP is licensed by independent semantic content in its head (i.e. the feature [+Wh] in Comp) and independent phonetic content in its specifier (i.e. the Wh-element *what* in CPSpec). More importantly, VP is licensed by independent phonetic and

semantic content in its head (i.e. the verb *doing* in V). As a consequence, VPSpec does not need to have independent semantic or phonetic content and can hence be occupied by a discourse-identified pro (cf. (34a)). Non-finite negative declaratives (cf. (22-23)) are analyzed in the same way, the only difference being that here CP is replaced by NegP, a projection that is licensed by independent phonetic and semantic content in its head (i.e. the negation marker *not* in Neg). The crucial part of the analysis goes through even if it turns out that non-finite Wh-questions and non-finite negative declaratives lack the CP- and NegP-levels and that the Wh-element and negative marker are directly adjoined to VP (cf. fn. 25). The child English structure in (35) should be compared with the adult Japanese structure in (33) with which it shares all relevant properties and in particular the ability to leave the subject phonetically empty because AgrSP is not projected. The analysis proposed here extends straightforwardly to subjectless root infinitives in the other child languages discussed in section 3. One important feature of this analysis is that it is not the initial missetting of a (pro-drop) parameter which is responsible for the production of pros by children acquiring a non-pro-drop language, but rather the general availability of root infinitives (i.e. matrix clauses lacking AgrSP and TP) in early child language on the one hand and the independently motivated UG-Principle of Economy of Projection on the other hand. Arguably, this is precisely the form that explanations in language acquisition research should take.

(34) a. what doing? ADAM07 line 15
b. what you doing? ADAM07 line 16

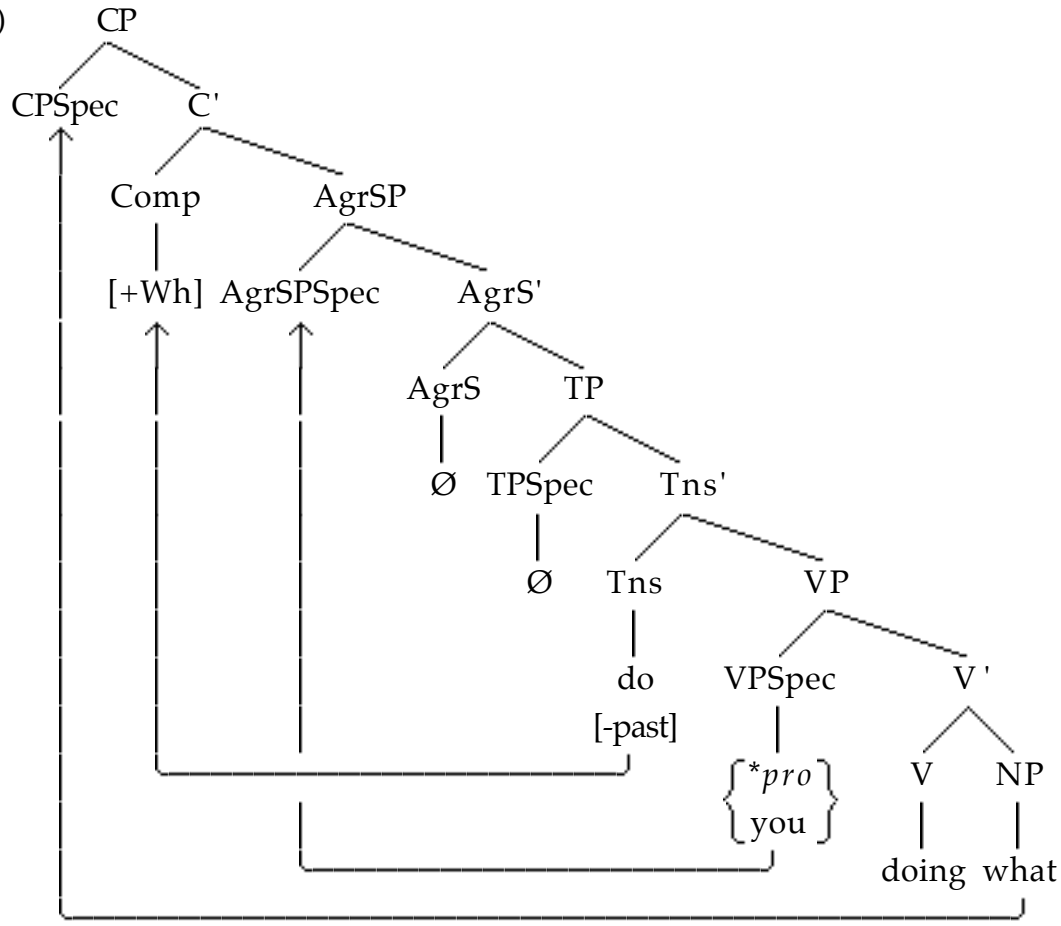
(35)



In child and adult English alike, finite clauses instantiate the third of the three scenarios described at the beginning of this section (i.e. AgrS is present but underlyingly empty). The pro-drop theory developed by Speas hence predicts that referential pro subjects in finite clauses are no more possible in child English than they are in adult English, and the absence of null subjects in Adam's finite Wh-questions (where alternative means to omit the subject such as Diary/Topic Drop are unavailable) bears out this prediction. Examples like those in (36) have the derivation in (37) where AgrSP and TP are present in addition to CP and VP and all of these phrases must satisfy Economy of Projection. CP and VP are licensed in the fashion discussed above in connection with (35). TP is licensed by independent phonetic and semantic content in its head (i.e. the pleonastic *do* and the tense feature [-past] in Tns) and the specifier of this projection can therefore remain empty. AgrS on the other hand lacks such independent phonetic or semantic content. Recall from the last section that verb movement does not license projections and movement of the pleonastic *do* through AgrS to Comp does therefore not license AgrSP. As a consequence, AgrSPSpec must have independent phonetic content and can hence not be occupied by pro (cf. (36a)). The child English structure in (37) should be compared with the adult English structures in (32b,c) with which it shares all relevant properties and in particular the inability to leave the subject phonetically empty because AgrSP is projected with an empty head. As for German and Dutch, the other Germanic languages discussed in section 3, we will simply assume for the moment that here, too, finite clauses have the same structure in early child and adult language and that referential pro in finite clauses is either not licensed (because the agreement paradigm is weak and AgrS is underlyingly empty) or not identifiable (because nominative is assigned from Comp, cf. fn. 33). See Rohrbacher & Vainikka (1994) for a more complicated view.

(36) a. *what do doing? unattested
b. what do you doing? ADAM15

(37)



As mentioned in section 3, none of the six (5%) counterexamples in Adam's speech against the generalization that finite Wh-questions do not allow subject drop exhibit regular subject-verb agreement. Instead, agreement is either altogether absent as with the modal in (38a) and the past tensed verb in (38b) or realized in a suppletive verb stem as with the copula in (38c). Crucially missing are counterexamples of the form in (39), where a main verb bears regular subject-verb agreement and the subject is null. We are tempted to propose the following explanation. Sentences like the one in (39) are impossible because the presence of regular subject-verb agreement requires the presence of AgrSP and (39) could only have the structure in (40a) where AgrSP remains radically empty, contrary to the demands of the Principle of Economy of Projection. Sentences like those in (38) are possible because the absence of regular subject-verb agreement allows the absence of AgrSP and these sentences could have the structure in (40b) where TP is licensed by the modal, copula (cf. section 4) or tense feature base-generated in its head (i.e. *can*, *is* and [+past] in Tns). As a consequence, TPSpec does not need to have independent semantic or phonetic content and can hence be occupied by a

discourse-identified pro. But this account does not explain why utterances of the type illustrated in (38) are so rare in Adam's speech, cf. for example the fact that in file 16, Adam said 31 times "Where is it?" but only twice "Where is?" (i.e. only 6% of all Wh-questions containing a form of the copula are missing the subject). The rarity of examples like (38a-c) might be taken to suggest that the presence of TP implies the presence of AgrSP, for reasons that are yet to be explored.[34] If this is correct, the explanation for Adam's few subjectless finite Wh-Question described in this paragraph does not go through. We will tentatively assume that the six examples listed exhaustively in (13) and partially again in (38) are real counterexamples to our theory. Since these counterexamples represent only 5% of all finite Wh-questions and are hence well within the range of adult production errors, they do not constitute a serious challenge to our theory.

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[34] This implication might hold only in English, but not in e.g. French. Pierce (1992) argues that adult French is a pro-drop language which base-generates subject-clitics in AgrS, leaving AgrSPSpec phonetically empty in sentences like the following.

(i) $[_{AgrSP}\ pro_i\ [_{AgrS'}\ [_{AgrS}$ elle-$[_{Tns}$ Tns -parle$_k$ $]_j$ $]$ $[_{TP}\ t_i'\ [_{Tns'}\ t_j\ [_{VP}\ t_i\ [_{V'}\ t_j\ ]]]]]]$

she speaks

In her study of the four French children Daniel (1;8-1;11), Grégoire (1;9-2;3), Nathalie (1;9-2;3) and Philippe (2;1-2;3) , Pierce (1992: 114) found that while "the rate of null subjects over the course of development ... remains constant, and at a fairly high rate, for all four children", the nature of the null subject sentences changes substantially over time. In the beginning, many of the null subject sentences lack the subject clitic, regardless of whether they are finite or non-finite. Later the subject clitic and the structure in (i) becomes near-obligatory. In the terms of the theory we are proposing, this means that initially AgrSP does not have to be projected, resulting in the pro-drop structures in (ii) and (iii).

(ii) $[_{TP}\ pro_i\ [_{Tns'}\ [_{Tns}$ Tns -parle$_j$ $]$ $[_{VP}\ t_i\ [_{V'}\ t_j\ ]]]]$

speaks

(iii) $[_{VP}\ pro\ [_{V'}$ parler $]]$

speak

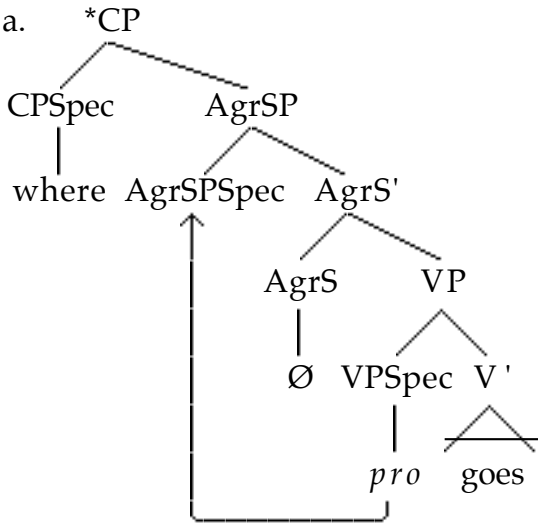
Note that the analog of (ii) was found to be very rare (if it exists at all) in Adam's speech, which lead us to conclude that AgrSP must be projected if TP is. In contrast, this structure is very common in the speech of Pierce's French children, accounting for 247 of Daniel's 782 utterances, 158 of Grégoire's 587 utterances, and so on. This suggests that the prohibition against bare TPs is language specific to (child) English.

Verrips & Weissenborn (1992) independently propose a structure resembling the one in (ii) for two of their French speaking children, Fabienne (1;5-2;0) and Benjamin (1;9-2;3). Verrips & Weissenborn report that "there is an initial period ... in which finite main verbs only occur in the erroneous sequence *pas* + finite verb... Another intriguing aspect of the errors is the absence of pre-verbal subjects in [this] sequence" (p. 308). During this period, "the child has not yet figured out that the verb has agreement features" (p. 311) and therefore "there is no AGR projection" (p. 312). Given the hierarchical order of functional projections in (27), the absence of pre-verbal subjects in the sequence *pas* + finite verb now follows: The verb moves to Tns and Neg and since NegPSpec is occupied by *pas* and AgrSP(Spec) is absent, no pre-verbal position is available for the subject.

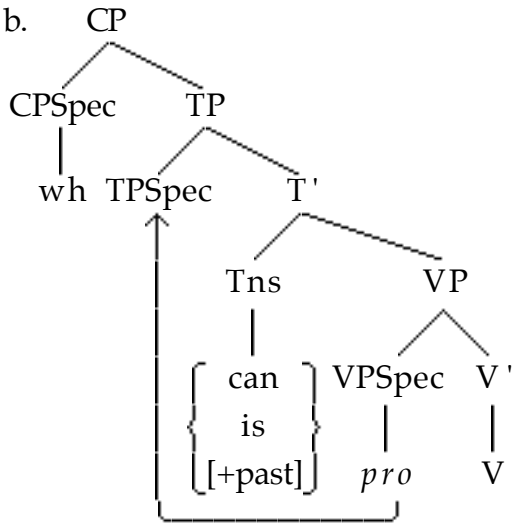
(38) a. where can go? ADAM11
b. what said # Mommy? ADAM12
c. where is? ADAM16

(39) *where goes? unattested

(40) a.



b.



Recall from section 2 that one of the arguments raised by Bloom (1990) and Valian (1991) against pro-drop approaches to null subjects in the early speech of children acquiring a non-pro-drop language was that the number of early null subjects declines gradually instead of suddenly, contrary to what might be expected if the (re)setting of a parameter such as the one traditionally assumed to govern the distribution of pro were involved.[35] Notice that this criticism does not directly carry over to the pro-theory defended here according to which there is in fact no pro-drop parameter and the licensing or non-licensing of empty referential subjects in any particular language instead falls out from the richness of the inflectional paradigm in that language on the one hand and independently motivated principles of Universal Grammar concerning the lexical representation of affixes (cf. (28)) and Economy of Projection (cf. (31)) on the other hand. If the child English option to omit the subject is lost as a function of the acquisition of the adult English agreement paradigm, then a gradual acquisition of the latter would go a long ways towards explaining an equally gradual loss of the former.

[35] Although it is commonly assumed that parameter (re)settings in the grammar are instantaneous and result in sudden changes in the linguistic output, we know of no a priori reasons to believe that this is in fact the case. We will ignore this matter.

Let us see what the facts are for Adam, the child that is at the center of this study (cf. table 2). In files 01-11, 95% of Adam's Wh-questions[36] are non-finite and 83% of these non-finite Wh-questions do not have an overt subject. Only one of the four finite Wh-questions produced in the first eleven files contains an empty subject. During this period, Adam's non-finite Wh-questions have the structure in (37) without AgrSP (and TP) and hence with the possibility to leave the subject phonetically empty. Adam's finite Wh-question can have only the structure in (39) with AgrSP (and TP) and hence without the possibility to leave the subject phonetically empty. As noted in section 3, Makowski (1993) reports that Adam's first agreeing and contrasting *be*- and *do*-forms occur in files 10 and 11, respectively, i.e. towards the very end of this AgrSP-less root infinitive period. In files 12-15, i.e. immediately after these first occurrences of contrasting agreement, the rate of non-finite Wh-questions drops to 42% and the rate of empty subjects in non-finite Wh-questions drops to 51%, with a sharp decrease in the null subject rate from 92% in file 11 to 40% in file 12. The rate of empty subjects in finite Wh-questions is 6%. During this period, Adam's non-finite Wh-questions may have either the AgrSP-less pro-drop structure in (37) or the AgrSP/obligatory subject structure in (39). Finite Wh-question again only have the latter structure. Our claim is that AgrSP begins to emerge in nonfinite clauses precisely because agreement has started to occur. Again as noted before, Makowski (1993: 28) argues that agreement reaches the productive stage in file 15, i.e. towards the very end of the period where AgrSP is optional in non-finite Wh-questions. In files 16-18, i.e. immediately after agreement has become productive, the rate of empty subjects in non-finite Wh-questions again drops dramatically, this time to 16%, with a sharp decrease from 50% in file 15 to 0% in file 16. The rate of empty subjects in finite Wh-questions is 3%. During this period, Adam's non-finite Wh-questions may no longer have the AgrSP-less pro-drop structure in (37) and, like their finite counterparts, instead require the structure in (39) with AgrSP (and TP) and hence without the possibility to leave the subject phonetically empty. Our claim is that AgrSP becomes obligatory (and as a consequence, pro becomes impossible) in all clauses precisely because weak agreement has reached the

[36] Here and in the following, remember that we included only Wh-questions with an empty or pronominal subject. In particular, we ignored all Wh-questions where the subject was a Wh-element.

productive stage.[37,38] It thus turns out that the loss of pro-drop is stretched out over a period of time only because the acquisition of agreement on which it depends is stretched out over that same period of time. Each milestone in the acquisition of agreement results in a dramatic drop in the rate of empty subjects, and there is nothing gradual about these drops in the empty subject rate.

We have just argued that whereas finite clauses are AgrSPs from the start[39], non-finite clauses initially lack this level (as well as the TP-level) and receive it only later as a function of the acquisition of the agreement morphology. Let us assume that the acquisition of agreement morphology triggers the acquisition of (abstract) agreement features which require the presence of AgrSP for checking purposes[40] and which, once hypothesized, must be represented in finite clauses (where they may be strong or weak) and non-finite clauses (where they are perhaps universally weak) alike. One might argue that this view is more complicated than one that takes all projections for granted from the beginning, but within a framework that incorporates a theory of Economy of Projection, this is actually not the case. Children start out with the most economical representation for infinitives which, in the absence of overt agreement morphology or abstract agreement features from the grammar as a whole and the absence of TP from root infinitives in particular (cf. footnotes 34 and 39), does not include AgrSP. The latter projection is automatically added by universal principles once overt agreement morphology and abstract agreement features are acquired. As far as we can see, none of the learnability problems ensue that are often adduced

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37 In Roeper & Weissenborn (1990) it is argued that non-clause-initial environments such as questions or subordinate clauses are the trigger domain for the loss of pro-drop, which would avoid the ambiguity between Diary/Topic Drop and pro-drop in clause-initial environments. Under the theory proposed here there is sufficient information in the agreement morphology of matrix clauses to determine the strong or weak nature of AgrS, and no recourse to embedded clauses is needed in order to establish the (non-)pro-drop nature of a language.

38 If this analysis is on the right track, some if not most of Adam's root infinitives in files 12-18 have both AgrSP and TP, in violation of the theory of root infinitives proposed in Rizzi (1994b) and discussed in section 4. Root infinitives do of course disappear shortly after the AgrSP-structure becomes obligatory, but the question of why an ungrammatical structure is allowed for some time is interesting.

39 I.e. even before the acquisition of agreement, again suggesting that the presence of TP implies the presence of AgrSP (cf. fn. 34).

40 Clahsen (1991) argues that in child German, the acquisition of the 2sg affix *-st* (the last singular agreement marker to be acquired) triggers the loss of pro-drop and the stabilization of verb movement. As far as pro-drop is concerned, Clahsen's position is very similar to our own, although we cannot delve into the details of child German null subjects (see footnote 33 and Rohrbacher & Vainikka 1994). As far as verb movement is concerned, Clahsen's findings support the theory of V-to-AgrS raising developed in Rohrbacher (1993,1994) and alluded to in the previous section.

against theories of incremental phrase structure acquisition (see also Radford 1994).

Our claim that in files 15-18, AgrSP becomes obligatory in all clauses has to be qualified in one important respect: instances of non-finite subject-less *Why*-questions persist well after overt subjects have become obligatory with all other Wh-words in file 19, as shown by the examples in (41).

(41) a. why fall and hurt myself? ADAM20
b. why finish waiting for my water? ADAM20
c. why got paint? ADAM22
d. why going to open it? ADAM22
e. why always push this [= record button] ADAM28
f. why take it apart? ADAM28
g. why haven't finished? ADAM28
h. why broken? ADAM28
i. why have the yellow black thing [?]? ADAM33
j. d(o) you know why put de Bandaid on my finger? ADAM33
k. why go slowly? ADAM34
l. why have a nose? ADAM46

Examples of this type are in fact grammatical in adult English,[41] where rhetorical *Why*-questions (and they alone) allow the simultaneous absence of subject and tense, as shown in (42a).

(42) a. Why not go to the movies tonight?
b. Why don't we go to the movies tonight?
c. * Why don't go to the movies tonight?
d. * Why not we go to the movies tonight?

Without going into the details of the semantics of (42a), we propose the following account for this phenomenon. As pointed out to us by Noam Chomsky (p.c.), the fact that rhetorical *why* cannot undergo long-distance movement (cf. Collins 1991) suggests that it is base-generated in Comp (instead of being moved to CPSpec). Under the assumption that as part of its lexical entry, rhetorical *why* selects a VP instead of an AgrSP as its complement, the facts described above follow. According to this approach, AgrSP-less non-finite clauses survive the otherwise general acquisition of AgrSP as lexically governed exceptions.

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[41] The examples in (43) have a number of non-adult properties. The use of gerunds (cf. (41d)) and participles (cf. (41c,h)) is widespread and may reflect the presence of an Aspect node. That Adam embeds subjunctive *Why*-questions (cf. (41j)) is not surprising if root clauses can be 'merged' before they are subcategorized, as follows from the work of Roeper & de Villiers (1994) and Chomsky (1994).

To conclude this section, let us now briefly mention the analysis of early null subject independently proposed in Sano & Hyams (1994) which in important aspects resembles our own analysis. Recall from tables 5-7 that Sano & Hyams also found null subjects to be much more common in non-finite than in finite early child English utterances. They argue that "it is the availability of root infinitives that makes null subjects possible in child English... On this view, then, children's null subjects are not the result of a missetting of a null subject parameter *per se*, but rather derives from an independent aspect of child grammars which is found in many languages other than English, the property which is responsible for root infinitives" (p. 545). In particular, "the structure of null subject sentences in child English parallels the null subject sentences in adult Japanese and Chinese" (p. 544). So far, their interpretation of the facts is very close to ours. But Sano & Hyams go on to say that "we are not proposing that it is the absence of functional projections which creates a licit context for [the empty subject], but rather it is the lack of [AgrS] features, and hence of verb raising" (p. 548). Here the idea is that empty subjects in child English are big PRO rather than small pro, that big PRO must not be lexically governed at LF, that V-to-AgrS raising is triggered at S-structure by strong AgrS features and at LF by weak AgrS-features, and, crucially, that infinitives do not have AgrS-features. It follows from these assumptions that root infinitives in child English leave the verb in situ even at LF and thus allow PRO in the ungoverned AgrSPSpec. Sano & Hyams suggest that L1 learners of English acquire AgrS features (and hence lose root infinitives and root null subjects) when they acquire the pleonastic *do* whose sole purpose it is to carry these AgrS features. "[This] hypothesis makes the prediction that we will not find pleonastic *do* during the null subject stage" (p. 554 fn. 14), a prediction that seems to be contradicted by the examples in (43).

(43) a. what did you did? ADAM07
b. no I don't want to sit seat. ADAM07
c. yes # but where do you spit? ADAM14
d. how do you know ADAM15

Behind the change from child English (with root and embedded infinitives) to adult English (with embedded infinitives only) lurks another, more serious problem for Sano & Hyams's theory: The child must learn that AgrS features are obligatory in root clauses, but not in embedded clauses, or "Max promised *PRO* to do the dishes" would be excluded alongside "*PRO* to do the dishes". The proposed trigger, pleonastic *do*, appears in both root and embedded clauses and can therefore not yield the needed distinction between

the two environments.[42] Rizzi's root infinitive analysis adopted in this article does not run into this problem. The generalization of TP to all clauses excludes non-finite declaratives from matrix contexts (where the Tns variable cannot be bound) while continuing to allow them in embedded contexts (where the Tns variable of the lower clause can be bound by the tense specification of the higher clause).

In section 4, we mentioned independent arguments for Rizzi's truncation analysis of root infinitives such as the absence of the infinitival marker *to* from this construction. Insofar as these arguments go through, the analysis of early null subjects proposed in this article will be automatically superior to that proposed by Sano & Hyams. Clearly the issue cannot be decided at this point, and we hope that it will be the subject of a lively debate.

[42] One could of course stipulate that the existence of embedded infinitives in the input data serves as an indication for the child that AgrS features are optional in embedded clauses, but we believe that such a solution would be incompatible with the program for language acquisition theory sketched in the next section according to which only overt morphological of the functional elements themselves are involved in language acquisition. Insofar as this program is attractive, a different solution should be sought.

7 Conclusion

In this paper, we have used the theory of Economy of Projection to provide a pro-drop account of early null subjects that does not refer to parameters and relies instead entirely on an interplay between the child's morphological knowledge on the one hand and universal principles on the other hand. A careful look at the data has revealed a series of sharp, non-gradual shifts in the change from pro-drop to non-pro-drop grammar which is closely linked to a series of similar shifts in the acquisition of contrastive agreement. This is expected if early null subjects are a grammatical phenomenon governed by universal principles but not if they reflect performance limitations which vanish as a pure function of time. Our account illustrates the acquisition consequences of the theories of paradigmatic knowledge developed by Rohrbacher (1993,1994) and Speas (1994). On a more general level, it is compatible with Chomsky's influential suggestion that "parameters of UG do not relate to the computational system, but only to the lexicon" and that actually "only functional elements will be parameterized" (Chomsky 1989:44).[43] According to this view, crosslinguistic variation and diachronic change are governed solely by properties of functional elements. Taken at face value, it also predicts that only functional elements will play a role in language acquisition. A radical interpretation of this view would maintain that only overt (i.e. morphological) properties of the functional elements themselves are involved in crosslinguistic variation, diachronic change and language acquisition (see Clahsen et al. 1994 for a similar view). We believe that this interpretation of Chomsky's proposal is in fact the only possible one if the following circular scenario is to be avoided. Assume that a certain property of a functional element (say a strong N-feature in AgrS) is responsible for a certain syntactic phenomenon (say obligatory movement of the subject to AgrSPSpec). If the property in question is purely abstract and not reflected in the morphology of the functional element, then it is more likely than not that the syntactic phenomenon that depends on it will be the only evidence for it. In other words, a child acquires obligatory movement of the subject to AgrSPSpec as a consequence of the acquisition of a strong N-feature in AgrS which in turn is motivated exclusively by obligatory subject-to-AgrSPSpec movement. Such an account would have very little explanative content beyond the statement that obligatory subject-to-AgrSPSpec movement in the output is triggered by obligatory subject-to AgrSPSpec movement in the input, contrary to the spirit of Chomsky's suggestion.[44] If on the other hand the strength of the N-feature were

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[43] This idea goes back to at least Borer (1984).

[44] The problem would become less compelling (although it would by no means vanish completely) if each abstract functional feature was paired with clusters of syntactic

determined by universal principles on the basis of overt morphological properties of the language-particular AgrS system, then the acquisition of the AgrS-morphology would automatically lead to obligatory subject-to-AgrSPSpec movement or the lack thereof. Note that the acquisition of functional morphology, like the acquisition of lexical items but unlike the acquisition of abstract features, is motivated by the direct observability of this morphology in the input, independently of the syntactic phenomena that might depend on it, thus avoiding the circularity mentioned above. Our analysis of early null subjects and their disappearance is compatible with this program. We have proposed that the distribution of pro throughout the linguistic development of the child is determined by the (un)productivity of contrastive agreement and the (lack of) distinctive marking of the referential AgrS-features [1st] and [2nd] on the one hand and universal principles governing when AgrSP is projected and how it is licensed on the other hand. The program for crosslinguistic variation, diachronic change and language acquisition advanced in this final section of our article might well turn out to be too radical.[45] But as far as the concerns that motivated this program are real, it is worth exploring whether syntactic phenomena with major importance for the organization of grammar can be successfully treated within this program. Null subjects are such a phenomenon, and if our account is on the right track, then a successful treatment along the lines of the radical program is indeed possible. Needless to say, the correctness of our account does not depend on whether this program ultimately turns out to be right or wrong.

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phenomena instead of a single phenomenon. Whether this is possible in all or even most cases is far from clear.

[45] Thus is hard to see how overt morphological properties of the English and German complementizer system (i.e. *that* vs. *daß*) could account for the fact that V2, a phenomenon standardly associated with the CP-level, is severely restricted in the former but general in the latter language.

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