

**QP 1****Core area: Syntax****Null subjects in child English*****Abstract***

Null subjects in early English are well-attested. This paper reviews the syntactic variation that distinguishes null subject languages (both Romance and radical *pro*-drop) from partial and non-null subject languages. Theories of acquisition, most notably root subject drop (RSD), are also discussed. The basis for postulating a Romance *pro*-drop theory of early English null subjects is found to be weak. An analysis of six children's longitudinal spontaneous production data, focusing on the relationship of the null subject and root infinitive stages, shows variability in the relative endpoints of the stages. This puts theories that implicate a lack of agreement in licensing child English null subjects, including RSD, in doubt. Null subjects are also found to be present in significant rates in some children's *wh*-questions, further complicating an RSD account.

**1 Introduction**

The omission of subjects by children acquiring English at higher-than-adult rate is well-documented and pervasive (Hyams in press). This period in children's development will be referred to as the "null subject stage" in this paper for convenience, even though it may not form a discrete stage, with specific properties, in the acquisition process.

A full picture of children's null subjects requires investigating their possible links to adult grammars. Null subjects are a robust phenomenon in many languages. Although the various syntactic theories concerning them have seen much development over the years, one of the basic

factors long thought to license their presence in various languages is still implicated: the richness of agreement morphology.

Languages can be divided into five groupings with respect to null subjects. Two of these make extensive use of null subjects—the “consistent null-subject languages” (CNSLs), such as Italian and Spanish; and the “radical” *pro*-drop languages, such as Chinese and Japanese. The former have “rich” agreement morphology, i.e. distinctive inflectional marking for most persons in most tenses, while the latter have no agreement morphology at all, so phonological representation of the subject is “radically” absent. A third grouping, the non-null subject languages, such as English<sup>1</sup>, consists of languages that generally have some degree of impoverishment in their agreement morphology. The relationship between null subjects and agreement in these three groupings led to the idea of “all-or-nothing” agreement as an apparent prerequisite for the licensing of null subjects.

Complicating this picture are two additional groupings—the partial null-subject languages, such as Hebrew, Finnish and Icelandic, which allow null subjects only in certain person/tense combinations; and languages which only allow expletive null subjects, such as German.

Section 2 is a review of the syntax of null subjects that covers most of these groupings. Identifying the syntactic processes that determine the availability of null subjects in these languages is necessary to determine the nature of the parameter or parameters involved. Determining the evidence available to children relating to the settings of these parameters in particular languages can then help explain patterns of acquisition relating to licit or illicit uses of null subjects, especially if one proposes to analyze English-speaking children’s null subject stage as an instance of a non-target grammar or parameter settings.

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<sup>1</sup> English and other non-null subject languages allow omitted subjects in so-called “diary-drop” contexts.

Another approach involves analyzing the null subject stage as an instance of an incomplete grammar; or a complete, non-UG-compliant grammar. In this case, other special properties of the grammar that distinguish it from adult English can be investigated. Section 3 deals with some of these types of proposals, focusing on Rizzi's (2005a, b) root subject drop (RSD) and two that implicate a lack of agreement in children's null subjects in *wh*-questions. This section also discusses performance deficit accounts, which implicate processing and memory limitations in young children to account for their null subjects. Section 4 describes a corpus analysis that tests some of the predictions made by these proposals.

## **2 Syntax of null subjects**

### *2.1 Overview of pronominal elements*

The syntactic element corresponding to (most) null subjects is commonly taken to be *pro*, which is assumed to be some sort of pronoun. A good first step would be determining where *pro* fits in the typology of pronominal elements.

Cardinaletti & Starke (1999) classify pronouns as being either strong or deficient. Strong pronouns (such as *he* or *she*) can be coordinated, but are generally limited to human referents. Deficient pronouns (such as *it*) cannot be coordinated, but can have human or non-human referents; they also cannot appear in theta-positions, "peripheral positions" (cleft, left- or right-dislocated, in isolation), but can appear with an impersonal interpretation, unlike their strong counterparts. Semantically, strong pronouns must be referential, and need not be associated with a discourse-prominent antecedent, whereas weak pronouns can be non-referential, and must be associated with such an antecedent.

Deficient pronouns can be further subdivided into weak pronouns and clitics. Together with strong pronouns, they form a hierarchy in which each successive member is increasingly deficient (strong pronoun > weak pronoun > clitic) in terms of referential capability, syntactic distribution, and morphology. The fact that many deficient pronouns are, morphologically, a proper subset of strong ones leads to the proposal that weak pronouns are “peeled-off” strong pronouns, missing an outer functional projection (whose head is often a morphological marker sometimes found in strong pronouns, e.g. Italian *a* in *a loro*, “them”). This functional head is said to be the referential index of the pronoun, and explains, among other things, why weak pronouns and clitics need a referential antecedent (if they are referential) and strong pronouns do not. As for the structure of clitics, they are “peeled-off” weak pronouns, i.e. heads containing only the inflectional part of the pronoun.

The functional projection missing in weak pronouns can also be linked to case, and accounts for the fact that weak pronouns need to appear in case-assigning specifier positions (specTP, specvP), among other things. The fact that clitics are heads explains why they can’t appear in XP positions, such as first position in a V2 clause.

For any given position, the weakest possible pronoun must be chosen. For example, a strong pronoun will be impossible in a position where a weak pronoun is possible until, say, a coordinate structure is inserted to prohibit the latter from occurring.

Cardinaletti and Starke (1999) claim that *pro* is a weak pronoun. They point out that *pro* appears to have the semantics of a deficient pronoun, in that it can be expletive and have non-human referents:

- (1)      a. *pro* piove molto qui. (\*lui)  
              [it] rains a lot here  
              b. *pro* mi hanno venduto un libro danneggiato. (\*loro)

- [they] me have sold a book rotten
- c. *pro* è molto costoso. (\*lui)
- [it] is very expensive

Rizzi (1986) and Chomsky (1992) conclude that *pro* can only occur in a case-marked specAgrP, just where weak pronouns are required to be. Additionally, the “Avoid Pronoun Principle” (Chomsky 1981)—where a null subject is preferred over an overt strong pronoun if both are possible—can be thought of as a special case of the general requirement to pick the weakest possible pronoun.

## 2.2 *Consistent and partial null subject languages*

The “traditional” analysis of the omitted subject in CNSLs is a phonologically null pronoun, *pro*, occupying specTP, which is licensed by rich agreement with T. An alternative is the I-subject analysis, according to which the agreement morphology in T serves as the subject of the sentence, possibly with an incorporated pronominal, and without the projection of specTP, the EPP presumably being satisfied by other means. Two modern exemplars of these analyses are Roberts (2010) and Holmberg (2010), respectively. Although they differ in crucial respects, both accounts implicate a syntactic feature that is most plausibly related to agreement morphology to account for the differences in null subject licensing between English and CNSLs—a D-feature in T.

### 2.2.1 *Roberts (2010)*

Roberts (2010) follows Cardinaletti & Starke (1999) in identifying *pro* as a weak pronoun. He takes weak pronouns to be  $D^{\min/\max}$ , preventing them from incorporating in the

manner of clitics (which are just  $\phi^{\text{min/max}}$ ), but without the internal structure of strong pronouns, which are DPs.

The remaining question is how it comes to be unpronounced. The difference between English and CNSLs will, at least in part, lie here. It is not a matter of the presence or lack of an EPP feature, as there is evidence that the *pro* moves to specTP to satisfy the EPP in a number of Romance languages.

Instead, Roberts argues that the core property of null subjects in CNSLs is a “pronominal” T, which is instantiated by a D-feature in T in those languages. This D-feature is associated with rich agreement (see below). The notion of a “defective” goal, spelled out in an analysis of cliticization, is important in accounting for the deletion of *pro*.

Roberts’ account of cliticization exploits the fact that in bare phrase structure, minimal and maximal categories are not distinct, so the former can also be phasal, and attract material to their left edge. Heads can incorporate clitics, forming a structure as below—where  $Y_2$  is a minimal head and X is a clitic—because clitics are also minimal categories without a label that is distinct from their incorporating host, as their features are a subset of those of the host’s.

(2)  $[_{Y_2} X Y_1]$

Because of this, clitics can be thought of as “defective” in relation to their probes.

The trigger for incorporation is Agree, and the copying of features from the goal (the clitic) to the incorporation host (say, *v* in the case of an object clitic) exhausts the content of the goal. In this case, Move and Agree are indistinguishable, and deletion of the exhausted goal can be thought of as chain reduction, with the highest copy (the incorporated clitic) remaining pronounced.

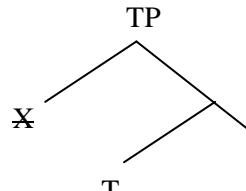
Since CNSLs have a D-feature in T, the features of a weak pronoun (D,  $\phi$ ) are a proper subset of those of T, so the pronoun counts as a defective goal in relation to T. Roberts posits that a general property of defective goals is that they can be deleted/not be given a PF realization, as the goal's features delete under identity with those of its probe. This has already been shown to be the case for clitics, and Roberts claims that a "suitable generalization" of chain reduction can extend it to *pro*: if a defective goal undergoes deletion because it is, essentially, a copy, and the first- and second-merged instances of a weak pronoun can be thought of as copies of the features of a D-bearing T, then they should undergo deletion as well.

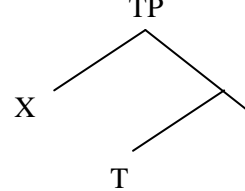
There are apparent parallels to this process in unrelated domains. For example, null *wh*-operators can be thought of as *wh*-phrases that are defective goals in relation to a C head with a *wh*-feature, and are thus deleted, sometimes obligatorily (Roberts, 2010):

- (3)
- a. [The man [(who) I saw-]] is John.
  - b. John found [a book [(*\*which*) [to read-]]].
  - c. John is easy [(*\*wh*) [to please-]].

Roberts argues that these *wh*-elements are arguably not quantificational, so that their features are a subset of the probes. This is not the case in *wh*-questions, in *wh*-elements have both a quantifier and a restriction, which imply that their feature set is not a proper subset of the probing head. This provides further evidence that defective goals delete.

In the schematic below highlighting the difference between CNSLs and English with regard to null subjects, X is a weak pronoun, and a strikethrough indicates no phonetic representation:

- (4)
- a. CNSLs
  - b. English
- 



[D,  $\phi$ ][D,  $\phi$ ][D,  $\phi$ , EPP][ $\phi$ , EPP]

English has no D-feature in T, so a weak pronoun will not count as a defective goal, and cannot be deleted. It is simply this D-feature, which will be linked with rich agreement (see below), that distinguishes English from CNSLs.

### 2.2.2 Holmberg (2010)

An I-subject approach to CNSLs also involves an unvalued D-feature in T, which is, again, what distinguishes these languages from English. However, ‘*pro*’ in Holmberg’s (2010) account is a  $\phi$ -P, a deficient pronoun which can Agree with the T head, but cannot value T’s D-feature. Instead, this feature is valued by a null aboutness-shift topic in the C-domain.

This account captures the definite reference of null subjects in CNSLs, and, additionally, their general dependence on discourse conditions—namely, the fact that null subjects need a topic antecedent:

- (5) a. Questa mattina, la mostra è stat visitata di Gianni. Più tardi \*(egli, lui) ha visitato l’università.  
 ‘This morning the exhibition was visited by Gianni. Later he visited the university.’  
 b. Questa mattina, Gianni ha visitato la mostra. Più tardi ha visitato l’università.  
 ‘This morning Gianni visited the exhibition. Later he visited the university.’  
 (Samek-Lodivici, 1996)



A null subject is impossible in the second clause in (a) because its antecedent, *Gianni*, is not a topic (the topic in the preceding clause being *the exhibition*, in contrast to (b) where *Gianni* is the antecedent and a null subject is allowed.

The derivation of a null subject works as follows, assuming the subject is a deficient pronoun (a  $\phi$ P):

- (6)
  - a. T has unvalued  $\phi$ -features, and probes for a category with matching features
  - b. T copies  $\phi$ P's features, and values the  $\phi$ P's unvalued case feature,
  - c. T still has an unvalued D-feature, which is valued by an A-topic in the C-domain, assigning it a referential index
  - d. T and  $\phi$ P form a chain, which is subject to chain reduction; only the highest copy, T, is pronounced, as inflection on the verb
  - e. For 1<sup>st</sup> and 2<sup>nd</sup> person, replace the null A-topic in all of this with SPEAKER or ADDRESSEE located in the C-domain, from Sigurðsson's (2004) hypothesis that every clause has features representing them.

The result here is identical to a head movement account of incorporation into T, but without running into the problem of a lack of a c-command relation between the head and the foot. The intuition here is the same as that of Roberts (2010), the superset-subset relation between the probe and the goal makes the Agree/Move operation an instance of chain formation, leading to the deletion of the lower copy.

As for the EPP, a number of sources for checking it are offered, including V-to-T movement and the incorporation of the subject itself. Holmberg proposes that EPP is checked by the null A-topic that values T's D-feature, without the projection of SpecTP.

Partial-NSLs don't have D in T, so a  $\phi$ P can Agree with T, but, it will be a null generic pronoun, such as the *one* in "One can have a good time in this city." Another possibility is a

pronoun with an unvalued D-feature, which can't incorporate, but can move to SpecTP and be interpreted if it is controlled by a c-commanding argument in a higher clause.

Non-NSLs, like English, have no D-feature in T, and cannot have a definite null subject for the same reasons that partial NSLs cannot. However, they also cannot make use of the incorporation option (with a  $\phi$ P) to obtain a generic null subject, as partial NSLs can. Holmberg argues that the reason for this difference lies in non-NSLs having a  $\phi$ -dependent EPP—the only category that can satisfy T's EPP feature in these languages is the goal that T probes. If a  $\phi$ P were to incorporate into T in a non-NSL, it would not be able to move to SpecTP and satisfy T's EPP feature, and since it is the only element that can satisfy it, the derivation would crash. The effects of a  $\phi$ -independent EPP can be seen in the following, where the (inherent) dative-marked indirect object pronoun is in SpecTP, having been closer to T than the direct object, which nonetheless value's T's  $\phi$ -features ((30) in Holmberg, 2010):

- (7) MÉR voru gefnar peninga.  
me were given money(PL)

To account for the impossibility of null subjects in non-NSLs even when there is a c-commanding antecedent in a higher clause, Holmberg also proposes that non-NSLs have a P-feature in finite T, essentially an EPP feature in the PF representation that forces the pronunciation of the category in finite SpecTP. This, along with the lack of a D-feature in T and a  $\phi$ -dependent EPP, is what conspires to assure that subjects are always pronounced in SpecTP in a non-NSL such as English.

We've seen that two of the more developed theories of null subjects both locate the variation between English and the Romance null subject languages in the presence or absence of a D-feature in T. To inform a study of language acquisition, this abstract feature specification

needs to be linked to something that can be found in linguistic data. In this case, both Roberts (2010) and Holmberg (2010) implicate agreement morphology (see 3.4).

### 2.2.3 *Evaluating Roberts and Holmberg*

One apparent advantage of Holmberg's approach over Roberts is the linking of null subjects (via T) to A-topics in the C-domain, which can account for the discourse properties of null subjects in CNSLs.

It seems that the facts in (6) cannot be accounted for straightforwardly under Roberts' analysis. If *pro* is just a weak pronoun, deleted under identity with a D-bearing probe (T), we should expect its overt counterpart to be inadmissible in (6a) as well, or expect *pro* to be licit in this context. Other Italian examples from Samek-Lodivici (1996) show a gradient of acceptability from *pro* to strong pronouns in other constructions with or without topic antecedents, with one or the other being the most acceptable in a given context, and a weak pronoun's acceptability lying somewhere in between. This is further evidence that *pro* may not simply be the covert counterpart of a weak pronoun.

However, the Chinese counterparts of the Italian examples demonstrate the same topic requirement on null subjects, or on weaker pronouns generally. Whatever analysis of radical *pro*-drop languages one adopts, it won't involve the relationship Holmberg postulates for CNSLs: a  $\phi$ P in an Agree relationship with a D-bearing T (forming a chain in which the foot is deleted), which is linked to a null A-topic. There are no  $\phi$ -features on probes in Chinese, so such chain formation cannot take place. There is also no D-feature in T to be valued by a null topic.

This suggests that the topic requirement on null subjects (or, more generally, on weaker pronouns) might be a more general condition, and that Holmberg's analysis cannot be automatically favored over Roberts' because of how it accounts for it.

#### 2.2.4 *Linking a D-feature to agreement*

The relationship of a D-feature in T to rich agreement deserves further consideration. An important question is what, exactly, constitutes “rich” agreement. In Distributed Morphology, traditional inflectional paradigms are viewed as epiphenomena (Müller, 2005). Müller argues that counting distinctive forms among these paradigms does not give a meaningful indicator of the morphological richness of a language, and that “invoking an abstract property of morphological inventories,” that is, impoverishment, is necessary to derive the surface forms.

Standard morphological features can be decomposed into combinations of more abstract primitives ((8) in Müller, 2005):

- (8)
- a.  $1^{\text{st}} = [+1, -2]$
  - b.  $1^{\text{st}} \text{ inclusive} = [+1, +2]$
  - c.  $2^{\text{nd}} = [-1, +2]$
  - d.  $3^{\text{rd}} = [-1, -2]$

Impoverishment rules apply to these abstract feature specifications, leading to “system-wide” syncretism patterns. So, for example,  $1^{\text{st}}$  and  $3^{\text{rd}}$  persons form a natural class of  $[-2]$  elements that could be subject to syncretism, whereas we would not expect  $1^{\text{st}}$  and  $2^{\text{nd}}$  to be affected. For example, the following two rules can account for certain properties of German verbal inflection:

- (9)
- a.  $[\pm 1] \rightarrow \emptyset / [-2, -\text{PL}, +\text{past}] \text{ \_\_\_}$
  - b.  $[\pm 1] \rightarrow \emptyset / [-2, +\text{PL}] \text{ \_\_\_}$

These rules delete the  $[\pm 1]$  feature in both non- $[+2]$  singular past tense and non-second plural in all tenses.  $[\pm 1]$  is what distinguishes 1<sup>st</sup> from 3<sup>rd</sup> person (which are both  $[-2]$ ), so the distinction between them in singular past contexts and plural contexts is eliminated by their application.

The presence or absence of paradigms derived from these sorts of impoverishment rules predicts the licensing (or lack thereof) of *pro* in Icelandic, Modern Irish, and Russian. Roberts (2010) uses this analysis to provide a concrete link between the richness of agreement and the presence or absence of a D-feature in T that determines the availability of *pro*.

Holmberg (2010) takes some issue with Müller's theory, arguing that it does not make a "useful distinction" between non-null subject languages and partial null subject languages. He points out that Finnish has no syncretism in its verbal inflection, and yet is only a *partial* null subject language, with "restricted" occurrences of 3<sup>rd</sup> person null subjects. However, this may not be relevant for the case of English. Roberts says that the presence of D in T is "plausibly...dependent on rich  $[\phi\text{-feature}]$  content," but that the case of Finnish shows that the converse doesn't hold. Since English has very poor  $\phi$ -feature content, Müller's theory should still be useful for making predictions about the English null subject stage.

It is clear from the above that children must have a command of their language's agreement morphology before the parameter(s) relevant to null subjects can set correctly. Knowing when children achieve competence in this area is vital to understanding the syntactic basis of any subjects they omit before and after this point.

Even though spontaneous production data can underestimate children's grammatical knowledge, it still provides evidence that children have a firm grip on person inflections from the earliest stages of acquisition. Italian children, who must master an agreement system far more

complicated than that of English, seem to make very few agreement errors even from as young as 1;8 (and root infinitives are rare in early Italian, so it cannot be said that there is a large number of uninflected verbs masking poor knowledge of agreement paradigms) (Guasti, 1993). So, one would assume that children acquiring English, having far fewer inflectional suffixes to learn, would have equal mastery of verbal agreement from early on as well.

Assuming the link between  $\phi$ -feature impoverishment and the licensing of a D-feature in T discussed above, we can tentatively assume that children learning English are equipped to make the correct parametric choice with regard to the presence of a D-feature in T at an early age. This means that a theory of early English null subjects that appeals to the use of a different (but still UG-compliant) grammar will have problems if the grammar children are said to be adopting is a Romance *pro*-drop grammar, because, as we have seen above, there does not appear to be a *pro*-drop parameter that is not simply a reflex of morphological richness. Assuming that the presence of a D-feature in T being contingent upon the richness of agreement is a cross-linguistic principle not subject to parameterization, children learning English cannot have a D-feature in T (assuming their verbal inflections are, at most, as rich as those in adult English), and so cannot seem to have a CNSL '*pro*-drop' grammar at any point in the acquisition process.

### 2.3 *Radical pro-drop*

Of course, there is an implicit assumption in the above analysis that can be argued against—that children, at given point in the acquisition process, are employing only one grammar, i.e. only one setting of parameters. If one views the acquisition process as a competition among grammars in which various parameter settings are rewarded or punished as

evidence for or against them accumulates, with grammars being whittled away until one is left (Valian, 1990; Yang, 1999), the situation becomes a bit more complicated.

Even under this view, however, it seems unlikely that children learning English would be under the assumption that their language has a D-feature in T for long; there is so little agreement in English that one could assume that children converge on the correct feature specification for T rather quickly. However, the possibility remains that they are making a mistake in the *other* direction—that the paucity of agreement in English leads them to believe that their language has no agreement.

If this were the case, a radical *pro*-drop language such as Japanese would be a more likely candidate for accounting for subject drop in early English, if one maintains that English learners are, in fact, adopting the parameter settings of another grammar during the NS stage.

Japanese, and other East Asian languages, have a well-known property of argument ellipsis, as below ((1) in Saito, 2007). The object DP in the second clause can be omitted, and both strict and sloppy identity readings are allowed:

(10)

- a.        Hanako-wa [zibun-no teian -ga        saiyoosareru to]        omotte iru  
              -TOP        self -GEN    proposal-NOM    accepted-be    that        think  
              ‘Hanako        thinks        that        her        proposal    will        be        accepted’
- b.        Taroo-mo [ \_\_\_\_        saiyoosareru to]        omotte iru  
              -also        accepted-be    that        think  
              ‘Taroo        also        thinks        that        her/his    proposal    will        be        accepted’

There are restrictions on CP ellipsis of this sort when phrases are scrambled out of the CP, which would be unexpected under a PF analysis of argument ellipsis, since constituents with

traces can generally be elided. This leads to an LF-copying analysis of argument ellipsis, in which a set of discourse entities, among them *pro*, are available to be copied into argument positions at LF (Saito, 2007). In (2) above, the discourse entity *self's proposal* (brought into the discourse in (2a)) is available to be LF-copied into the object position in (2b), accounting for availability of both strict and sloppy identity readings.

It can be shown that a lack of agreement (or at least the optionality of agreement) is a prerequisite for LF-copying of this sort: Assume a close relationship between agreement and Case, if agreement is obligatory, the DPs that are to be copied in LF will have already had their uninterpretable Case features deleted, and can therefore no longer serve as goals for  $\nu$  or T in the clause they are being copied to. With  $\nu$  or T retaining their unvalued features, the derivation will crash (Saito, 2007).

This leads to the conclusion that languages which allow argument ellipsis cannot have  $\phi$ -features on probes, or else these probes would fail to have those features valued by Agree in every case of argument ellipsis. Roberts (2010) suggests that  $\phi$ -features may be absent from probes in a language where there is no agreement (i.e. no PF realization of  $\phi$ -features), establishing the link between radical argument drop and the absence of verbal morphology.

Roberts proposes a reorganization of the existing typology of NS (or null argument) languages, suggesting that the “fundamental dimension of parametric variation is ‘radical’ vs. ‘consistent’ null-subject (or null argument languages), with partial and non-null subject languages being special cases of the ‘consistent’ type featuring varying degrees of impoverishment of the goal..”. He sketches out a parameter hierarchy as follows:

- (11)
  - a. Are  $\phi$ -features optional or obligatory on probes?
  - b. If obligatory, are  $\phi$ -features impoverished on all probes?
  - c. If  $\phi$ -features can be impoverished, are those of  $\{T, \nu\}$  impoverished?



An “optional” answer to (a) yields a radical *pro*-drop language like Japanese, an “obligatory” answer to (a) and a positive answer to (b) yields a non-null subject language like English, whereas an “obligatory” answer to (a) and a negative answer to (b) yields a CNSL like Italian or Spanish. (c) represents special cases where there is impoverishment on certain probes, leading to partial null-subject languages.

With respect to acquisition, it seems possible that English learners might give the incorrect (“optional”) answer to (a), perhaps mistaking poor English agreement morphology for a complete lack of it, and therefore use a radical *pro*-drop grammar at some point in the acquisition process.

Legate & Yang (2007) give an account of the root infinitive stage—in which children sometimes illicitly produce infinitival or non-agreeing forms in root contexts—as being the result of a [-Tense] grammar in competition with a [+Tense] one. The gradual exit from the stage reinforces the idea that grammars may be in competition. Ranking several languages in terms of the amount of evidence for tense morphology compared with the amount against, it appears that children acquiring languages with a greater balance of evidence for [+Tense] tend have a shorter and less robust root infinitive stage than children acquiring languages with a smaller balance of evidence for [+Tense]. English, with its poor inflectional morphology, has a very small balance of evidence in favor of [+Tense], and consequently a long root infinitive stage.

With respect to null subjects, the balance in favor of [+Agr] is also quite small. If this sort of analysis is on the right track, then it indicates that if one is to investigate English-speaking children’s early utterance for evidence of a non-target grammar during the null subject stage, we are much more likely to find evidence of a radical *pro*-drop grammar than a CNSL *pro*-drop one.

### 3 Acquisition theories

#### 3.1 *pro-drop, topic-drop, performance-deficit*

As we have seen, the syntax of null subjects does not make a compelling case for a Romance *pro-drop* theory of the null subject stage in child English. The acquisition data seem to bear this out.

There are a number of differences in the distribution of null subjects in early English and Italian, a *pro-drop* language (Valian, 1991). These include the presence of expletives in the former, but not the latter; the production of far more overt pronouns by English-speaking children than Italian ones (where the relationship of null subjects to full NPs is parallel to that of pronouns to full NPs, as far as discourse conditions are concerned); and the fact that children don't appear to produce null subjects in subordinate clauses or in *wh*-questions, both environments where omitted subjects are perfectly acceptable in Italian (the status of subjectless *wh*-questions in English is unclear—see Sections 3.2.2 and 4).

A topic-drop grammar (as Chinese and Japanese are often analyzed), where subject or object NPs can be dropped if they are established discourse topics, is also sometimes implicated in the null subject stage.

In Valian (1996), elicited imitation studies were used to get a clearer picture of the grammar of English-speaking children with respect to null subjects. Two groups of children—one with a high mean length of utterance (MLU), producing overt subjects at adult levels, the other with a low MLU and still in the null subject stage—were studied with respect to factors that could indicate a topic-drop or *pro-drop* grammar. A competence-deficit account of null subjects claiming that the low MLU children spoke one of these two types of languages would

predict a difference in performance with respect to these factors between the younger and older children. However, their performance was very similar:

Both the high and low MLU groups showed a higher omission rate for expletive subjects over referential pronoun subjects— since *pro*-drop languages generally don't have overt expletives, if English children in the null subject stage were speaking a *pro*-drop grammar, we would expect a higher rate of expletive omission (compared to pronoun omission) in the first MLU group, which is in the null subject stage, but not the second.

Both groups also dropped pronominal subjects more after a topic-introducing sentence—a preference for dropping topics cannot be used as evidence of a topic-drop grammar in the null subject stage if the higher MLU group, which is not in the null subject stage, also drops topics preferentially.

So, these properties are taken to be representative of a broader phenomenon in language acquisition that can't be tied to early English having the properties of a *pro*-drop or topic-drop grammar.

The *pro*-drop and topic-drop hypotheses are competence deficit accounts—they propose that children acquiring English don't know that subjects are required. An alternative to these accounts are *performance* deficit accounts, according to which children know subjects are required, but fail to consistently produce them because of factors such as working memory limitations (Bloom, 1990; Valian, 1991).

Bloom (1990) and Valian (1991) found that VP length in children's spontaneous utterances varied with the “heaviness” of the subject: the shortest VPs tend to have lexical NPs, the longest tend to have null subjects, with pronouns occurring with VPs of an intermediate length. Valian (1996), among others, found a length-effect for the omission of subjects in an

imitation context. These results indicate that performance limitations are likely to play some role in children's null subject utterances. Other non-syntactic factors thought to influence subject production include prosody (Gerken, 1994) and information structure (Hughes & Allen, 2006).

### 3.2 *Agreement and null subjects, root subject drop*

Root infinitives, the use of an infinitive or uninflected form as a matrix verb, are a common feature in early English (Wexler, 1994), and their possible connection to null subjects has been proposed, notably by the root subject drop (RSD) proposal (Rizzi, 1993, 2005 a, b). However one analyzes root infinitives, the possible relationship between a lack of agreement and null subjects deserves investigation, as it bears on both RSD and proposals that implicate radical *pro*-drop in the null subject stage.

Although RSD is technically a competence theory, the syntactic structures it postulates arise from performance considerations. Children are said to “adopt parametric values that reduce the computational load on the production system and are not contradicted by positive evidence” (Rizzi, 2005a). In this case, they adopt the principle that the specifier of the root of a clause can left unpronounced. As the children mature, this strategy is abandoned until supported by positive evidence.

RSD depends on the possibility of clausal truncation in child grammar. That is, the principle that the root of a clause is CP is not operative. So, a null subject clause can have a TP root, which entails the presence of agreement inflection on the verb (with or without a subject); or a VP root, which results in a root infinitive (with or without a subject). This accounts for the presence of both finite and non-finite matrix verb forms in early English null subject utterances. It also entails that children's root infinitive stage should persist no later than their null subject

stage, because by the end of the latter stage, VP truncation, and therefore root infinitives, should be impossible.

RSD accounts for the asymmetry in subject/object dropping in early English, the (apparent) fact that null subjects in early English only occur in first position, and dissociates the null subject phenomena in early English from that of pro-drop languages, which, as described above, have very different properties.

Two questions arise at this point concerning RSD: (1) what is the evidence regarding the development of the root infinitive stage and the NS stage? (2) Are null subjects in early English, in fact, restricted to first position?

### 3.3 *Testing root subject drop*

#### 3.2.1 *Root infinitives and the null subject stage*

In Orfitelli & Hyams (2007) and Orfitelli (2008), children's level of development with regard to the null subject and root infinitive stages were tested using a truth value judgment task and a test of grammatical impairment. There was a near perfect correspondence in performance for all children except two. These two children both performed in a way that indicated that they had exited the root infinitive stage but were still in the null subject stage. This is consistent with RSD if it is assumed that children abandon VP truncation earlier than IP truncation (the former allowing for root infinitives and null subjects while the latter allows only for null subjects).

The results of Valian's (1991) corpus study conflict with this. The children under investigation had a large increase in the use of *to* and over-regularization errors between the 2<sup>nd</sup> and 3<sup>rd</sup> MLU (mean length of utterance) groups. The use of infinitival *to*, which is assumed to be base-generated in TP, indicates the presence of at least that projection. The mere presence of TP

in some clauses does not mean that children can't truncate at VP in other clauses. However, the errors of overregularization indicate that children are aware that agreement is required in their grammar, so it can be inferred that they obligatorily project nodes above, at least, VP, and are therefore not in the root infinitive stage.

The problem arises when one considers that the major increase in subject use occurs between the 1<sup>st</sup> and 2<sup>nd</sup> MLU groups. By group II, the children are producing subjects in 89% of contexts where they are normally required, and so can be said to have exited the null subject stage. However, it is not until the 3<sup>rd</sup> MLU that the children seem to exit the root infinitive stage. This is problematic for RSD, which attempts a unified explanation of these phenomena as a result of truncation. The presence of root infinitives after the null subject stage would indicate that VP truncation persists, leaving the (relative) lack of null subjects in this period unexplained. Section 4 presents an analysis of more data that bears on this question.

### 3.2.2 *Null subjects in wh-questions*

Valian (1991) found only 9 subjectless *wh*-questions out of 552 (excluding questions where the subject was the *wh*-element) in the speech of 21 children. Some longitudinal studies yield greater numbers. Roeper & Rohrbacher (1994) examined Adam's data from the Brown corpus in CHILDES, and found that Adam produces numerous null subjects in *wh*-questions (104 between 2;0 and 2;11). Additionally, there is a strong effect of finiteness on the appearance of null subjects in *wh*-questions. Only 6 of 113 finite *wh*-questions had null subjects, and none of these counterexamples showed regular subject-verb agreement. The same effect is not found in Adam's non-*wh* null subject sentences taken as a whole, but does show up in Adam's negative

declaratives. Several other children showed the same pattern, but they had far fewer *wh*-questions overall.

These data are not directly compatible with a clausal truncation theory like RSD. Instead, RSD is modified so that children omit TP (allowing for root infinitives), while keeping projections above them, such as NegP and CP. The motivating factor here is the principle of economy, according to which projections appear if and only if features of their heads are overtly realized (c.f. Speas 1994).

According to Speas, if children neglect to use agreement morphology on verbs but ask a question, they project CP (for interrogative force), but not AgrSP. Without AgrSP projected, subjects can remain in SpecTP. According to the principle of economy of projection, the specifier of a head can remain empty if the head has independent semantic or phonetic content. The head of T has independent semantic content, so a subject that remains in SpecTP need not be pronounced. This is what is claimed to be the operative mechanism behind null subjects in Japanese, which lacks AgrS. Thus, when the children produce null subjects in *wh*-questions, they are using a Japanese-like clausal structure. When agreement morphology *is* produced, however, AgrSP must be projected. Because main verbs in English don't raise overtly, SpecAgrSP would have to be filled by a subject at S-structure, since AgrS has no independent semantic or phonetic content.

Reformulated in terms of the more contemporary syntax discussed in Section 2, this approach essentially involves English-speaking children having the option of making the non-target parametric choice for (12a), making  $\phi$ -features not obligatory on probes, and therefore licensing null subjects in non-agreeing contexts.

The main advantage of Roeper & Rohrbacher's approach is that it accounts for the presence of null subjects in *wh*-questions and other non-clause-initial contexts (and also for the strong effect of finiteness in these contexts), which is seemingly incompatible with an RSD/clausal truncation approach. Given that the finiteness effect is not present (or at least not nearly as strong) in simple declaratives with null subjects, a separate explanation for finite null subjects in these contexts is needed (see below).

There are issues with the developmental predictions of Roeper & Rohrbacher's theory. They link Adam's transition out of the null subject stage to developmental "milestones" in the acquisition of subject-verb agreement. After the first contrasting *be*- and *do*- forms occur in file 11, the rate of non-finite *wh*-questions drops from 95% in files 1-11 to 42% in files 12-15, and the rate of null subjects in those questions drops from 83% to 51%. At this point, Adam is said to have started projecting AgrSP (or putting  $\phi$ -features on probes—the choice of syntactic theory is not relevant for what follows), albeit optionally. After the emergence of productive subject-verb agreement in files 16-18, the rate of null subjects in non-finite *wh*-questions drops dramatically yet again, from 50% in file 15 to 0% in file 18. The use of regular subject-verb agreement is said to trigger the obligatory projection of AgrSP, and therefore require overt subjects even in non-finite contexts.

The major question is why there are still non-finite *wh*-questions by file 18 in the first place. If the presence of regular subject-verb agreement triggers the obligatory projection of AgrSP, even in non-finite contexts, why doesn't it trigger obligatory agreement on the verb as well? The authors say TP is projected, but according to the principle of economy, it shouldn't be (since its head is not overtly realized as an affix on the verb). Even if the principle is no longer operative, the question of why productive subject-verb agreement should force the appearance of



a subject (even in non-agreeing contexts) but not agreement itself is problematic. As with Valian's (1991) data, this forces a reconsideration of the hypothesis that root infinitives license null subjects in child English.

Bromberg & Wexler (1995) essentially agree with Roeper & Rohrbacher on the reasons for the null subject stage. They say there are two types of null subjects, those licensed by a non-finite verb (a claim which, we have already seen, has some problems), and those that are a result of topic drop. The former can occur in both *wh*-questions and simple declarative contexts, whereas the latter can only occur in declaratives.

They analyze the utterances of Adam, Eve, Peter and Sarah from CHILDES, and predict that that there will be proportionately fewer null subjects in *wh*-questions than declaratives, because the former have one less way of licensing null subjects. This prediction is confirmed for Adam and Sarah, and while the other children's data are too sparse to make a definitive conclusion, what is most relevant here is that there are a considerable number of null subjects in *wh*-questions for each child during their null subject period (14 out of 17 for Eve, 12 out of 29 for Sarah, and 7 out of 22 for Peter).

This sparseness suggests that the reason *wh*-questions are often thought not to host null subjects (something that a theory like RSD purports to explain) might be that they don't emerge productively until the null subject stage is tapering off. If this is the case, we would expect most children's data to look like Eves, Sarah and Peter's, and not Adam's. In the next section, an analysis of children's *wh*-questions during the null subject stage will be undertaken to determine how many of them are present, and to compare the rate of null subjects in *wh*-questions to that in declaratives.

## 4 Analysis of CHILDES corpora

### 4.1 Procedure

The main aims of the study are: (1) to determine the relative timing of the null subject and the root infinitive stages; (2) to determine the extent to which *wh*-questions occur during the root infinitive stage, and what proportion of them have subjects.

A number of the longitudinal corpora from the American English CHILDES database were selected for investigation. The MOR tag tiers in the corpora were used to determine the part of speech of the words in the utterances. For the sake of simplicity, only single-clause utterances were considered in the analysis. So, a sentence with one or more auxiliaries and a verb would be included (“I’m going home”), but a semi-auxiliary (“I wanna go home”) would not. Utterances with finite subordinate clauses were also excluded, but are relatively rare in the age range under investigation.

Three separate procedures were employed in gathering the data: (A) searching for null subjects in declaratives; (B) searching for null subjects in *wh*-questions; (C) searching for root infinitives in declaratives.

For (A), a computer script was used to bring up all “potential” null subject utterances—utterances with a verb occurring before the first occurrence of a noun or pronoun. The surrounding lines of dialogue were presented for context, to enable manual determination of whether or not the utterance in question was, in fact, a null subject utterance. The types of utterances that were excluded were: imperatives, imitations (utterances that were identical to an immediately prior adult utterance), answers to echo questions (e.g. “eating” in response to “you’re doing *what?*”), missing matrix verbs or modals (e.g. a child says “go there” and the context makes it clear that he is expressing his desire to go somewhere). All utterances with a

verb that were *not* brought up by the script as a “potential” null subject were assumed to have subjects, and they, in combination with the confirmed null subject utterances, formed the group of “scorable utterances”, the denominator from which the proportion of null subjects was calculated (again, this excludes imperatives).

For (B), all *wh*-questions during a child’s null subject stage were manually examined to determine whether or not they had subjects. Subject *wh*-questions were excluded from the denominator from which the proportion of null subjects was calculated, since they could not have a null subject.

For (C), all single-clause declarative utterances with a third person singular subject were considered, and those with an uninflected verb or missing auxiliary were counted as root infinitives.

To determine the relationship between the null subject and root infinitive stages, two different sets of criteria were applied. The first set defines the end of the null subject stage as the point at which the subject omission rate goes below 10% and never returns, and the end of the root infinitive stage as the point at which the rate of root infinitives goes below 5% and never returns. The 10% criterion for null subjects is used in Valian (1991), and the difference in criteria for null subjects and root infinitives comes from the fact that the former are, to some extent, present in the adult grammar, whereas the latter are not. A more stringent set of criteria was also applied, defining the end of both stages at the point at which the relevant rate goes below 5% and never returns.

Once each child’s data were collected, it was clustered by the child’s age in months, so that the data from all transcripts obtained from a given month in the child’s life would form one data point. For any month with data, if the number of scorable utterances (non-imperative single

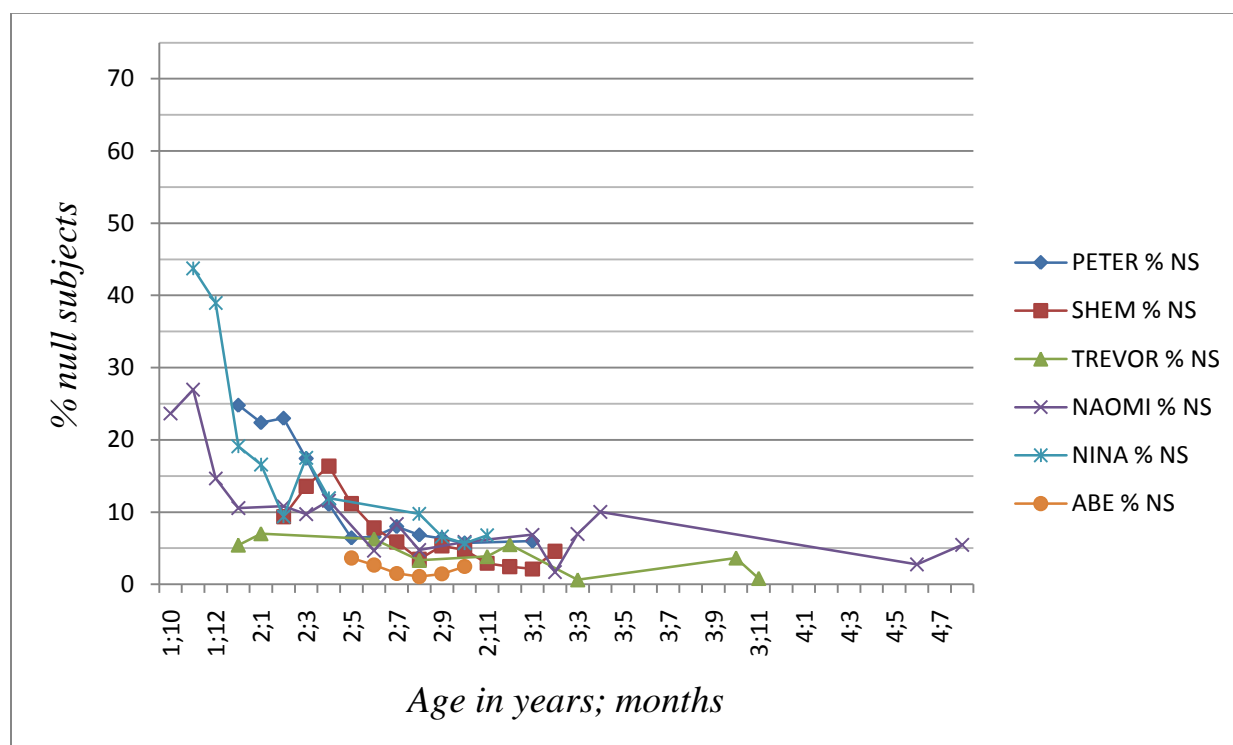
clause utterances with or without a subject) was lower than 100, the data for that month were excluded from the analysis. This procedure resulted in some children being excluded altogether. The remaining children are Abe (Kuczaj corpus), Naomi (Sachs corpus), Nina (Suppes corpus), Peter (Bloom70 corpus), Shem (Clark corpus), and Trevor (Demetras corpus).

A table summarizing the data can be found in Appendix 1.

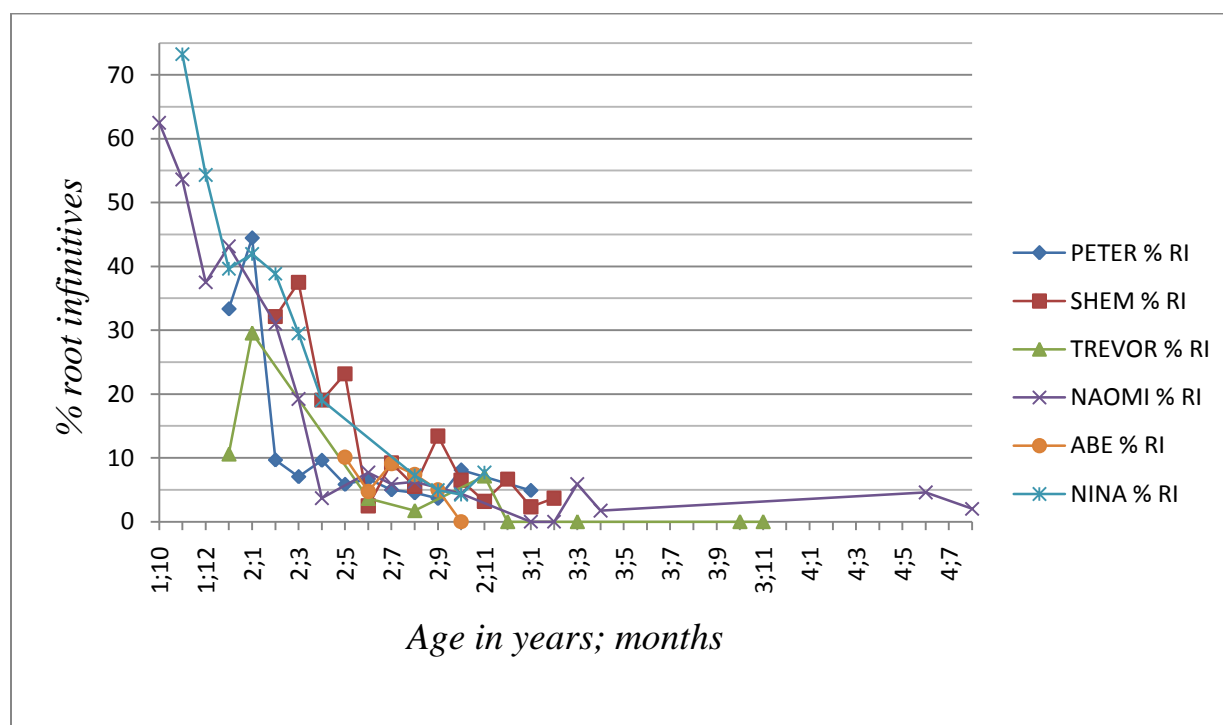
## 4.2 Results and Discussion

### 4.2.1 Null subjects and root infinitives—Results

#### (12) Percentage of null subjects in 6 corpora from the CHILDES database



## (13) Percentage of root infinitives in the same corpora



The combined null subject and root infinitive results for all the children are shown above. For null subjects, the data confirm what has been found in other studies—namely, that the rate of null subjects in early English is never very high, especially compared with that in children learning null subject languages (Valian, 1991). Only 1 child ever has a subject omission rate over 30 %, and even then only for 2 months. Three of the children omit 20% or more of their subjects for a period of at least 2 months. By 2;8 all children have a null subject rate under 10% (if Naomi’s brief excursion just above 10%—after 7 data points below that rate—is treated as an outlier).

Root infinitives are more prevalent. Four of the children have rates of over 30% for at least 2 months, with two of them over 50% for 2 months. The highest rate of root infinitives is 73%. It isn’t until 3;4 that all 6 children are under 5%.

Using the 10% criterion for the null subject stage, all of the children had exited the null subject stage for at least 4 months before exiting the root infinitive stage, with an average difference between the ends of the two stages of 5.6 months (1 child, Nina, hadn't exited the root infinitive stage by her last month).

Using the 5% criterion for the null subject stage, at least 2 of the children had exited the null subject stage before exiting the root infinitive stage—Abe for at least 5 months, Shem for 3. 3 exited the root infinitive stage before the null subject stage—Peter and Trevor for 1 month, Naomi for 3. The remaining child, Nina, hadn't exited either stage by her last month.

#### 4.2.2 *Null subjects and root infinitives—Discussion*

Using the 10% criterion for the null subject stage, the data show that the root infinitive stage persists for a considerable amount of time after the null subject stage. This argues against both analyses that involve VP truncation licensing early English null subjects—such as RSD—and those that implicate a lack of agreement more generally—such as Bromberg & Wexler (1995) and Roeper & Rohrbacher (1994). If a lack of agreement licenses null subjects in children, then—under the uncontroversial assumption that adult English null subjects aren't licensed by a lack of agreement—we should expect children's subject omission rate to be higher than adults' during any point at which point they are not regularly using agreement. This does not seem to be the case.

While the 10% criterion may seem high, the situations in which the children under investigation were studied probably predisposed some of them to omitting more subjects than they otherwise would, given that many of their null subjects utterances were in response to questions of the type “what is X doing?” by adults during book reading or television watching.

The criterion for the null subject stage seems more reasonable in light of this, but further work on child null subjects would need to control for such pragmatic effects to better delineate the difference between children and adults.

Using the stricter, 5% criterion for the null subject stage, there is no consistently observed relationship between the null subject and root infinitive stages.

In general, most of the children seem to reach a steady state with respect to their proportions of root infinitives and null subjects, and, for a number of them, their proportion of null subjects stabilizes before their proportion of root infinitives.

Taken together with other studies on root infinitives and null subjects, these results present a picture of considerable variability. The elicited production and truth value judgment data in Orfitelli & Hyams (2007), as discussed, suggests a roughly equal timing in children's movement out of both stages, except for two children, who persisted in interpreting imperative sentences as declaratives while seemingly not in the root infinitive stage. Spontaneous production data in Dutch from the Hein corpus (Haegeman, 1995) also indicate a high rate of null subjects persisting after a drop in the proportion of root infinitives to around 5%. The spontaneous production data in Valian (1991) show the opposite, and the data in this study compound this variability. This inconsistency presents complications for RSD, which could only to be taken to predict variability in one direction (i.e. the root infinitive stage ending before, or concurrently with, the null subject stage).

#### 4.2.3 *Null subjects and wh-questions—Results*

Only 4 of the 6 children were in the null subject stage at any point in their data. A one proportion Z-test was conducted to determine if the rate of null subjects in *wh*-questions was

significantly greater than 5%, this being the threshold above which they must occur to not be considered “noise” in the data (the same criterion used for root infinitives). Although the main aim is to simply to determine whether *wh*-questions are present in the data at a rate greater than the error rate, and not to determine whether or not they are present in the same proportion as null subjects in declaratives, if the one-proportion Z-test is significant for a given child, a two proportion Z-test comparing that child’s proportion of null subjects in *wh*-question to the proportion in declaratives during the same months (when the child is in the null subject stage) is also conducted.

- (14) Null subjects in *wh*-questions and declaratives (*NS*: null subject; *decs*: declaratives; *wh-q*: *wh*-questions)

NAOMI					NINA				
age	% NS in decs	wh-qs	Ns wh-qs	% NS in wh-qs	age	% NS in decs	wh-qs	NS wh-qs	% NS in wh-qs
1;10	23.65%	5	1	20.00%	1;11	43.75%	2	1	50.00%
1;11	26.96%	1	0	0.00%	2;0	38.97%	0	0	n/a
2;0	14.66%	35	22	62.86%	2;1	19.12%	2	0	0.00%
2;1	10.56%	3	0	0.00%	2;2	16.58%	9	0	0.00%
2;3	10.81%	17	4	23.53%	2;3	9.38%	14	1	7.14%
2;4	9.73%	9	0	0.00%	2;4	17.52%	7	0	0.00%
2;5	11.57%	2	0	0.00%	2;5	11.94%	9	1	11.11%
<b>totals:</b>	<b>18.52%</b>	<b>72</b>	<b>27</b>	<b>37.50%</b>	<b>totals:</b>	<b>17.70%</b>	<b>43</b>	<b>3</b>	<b>6.98%</b>

PETER					SHEM				
age	% NS in decs	wh-qs	Ns wh-qs	% NS in wh-qs	age	% NS in decs	wh-qs	NS wh-qs	% NS in wh-qs
2;0	24.81%	5	0	0.00%	2;2	9.36%	14	6	42.86%
2;1	22.41%	10	0	0.00%	2;3	13.57%	5	1	20.00%
2;2	23.01%	3	1	33.33%	2;4	16.37%	7	2	28.57%
2;3	17.44%	12	0	0.00%	2;5	11.17%	20	0	0.00%
2;4	11.07%	7	1	14.29%					
<b>totals:</b>	<b>17.95%</b>	<b>37</b>	<b>2</b>	<b>5.41%</b>	<b>totals:</b>	<b>12.48%</b>	<b>46</b>	<b>9</b>	<b>19.57%</b>



(15) Null subjects *wh*-questions

- How big is?
- What are doing?
- What are fixing?
- What doing?
- What doing up there?
- What shredding?
- What got?
- When eat eggs?
- Where go?

Of the 4 children, 2 had rates of null subjects in *wh*-questions that were significantly higher than the error rate of 5%: Naomi had 27 null subjects in 72 *wh*-questions, 37.5% ( $p < .01$ ), and Shem had 9 null subjects in 49 *wh*-questions, 19.6% ( $p < .01$ ). A two proportion Z-test comparing each child's null subject rates in *wh*-questions with their rate in declaratives was significant for Naomi, with 37.5% null subjects in *wh*-questions and 18.5% in declaratives ( $p < .01$ ), but not significant for Shem, with 19.6% null subjects in *wh*-questions and 12.5% in declaratives.

The remaining 2 children did not have rates of null subjects in *wh*-questions that were significantly greater than the error rate, so no tests were conducted comparing their null subject rates in *wh*-questions to those in declaratives: Nina had had 3 null subjects in 43 *wh*-questions, 7% (compared with 17.7% null subjects in declaratives) and Peter had 2 null subjects in 37 *wh*-questions, 5.4% (compared with 18% in declaratives).

As for finiteness, our results corroborate those of Roeper & Rohrbacher (1994). There were only 3 finite null subject *wh*-questions, out of 41. This means that a lack of finiteness might

be relevant to licensing null subjects in post-*wh* environments. An important question for further research is the discrepancy between post-*wh* environments and declarative ones in this regard.

It should be noted that our results for Peter conflict with those of Bromberg & Wexler (1995), who found a greater proportion of null subjects in his *wh*-questions. This may be due to the exclusion of his earliest transcripts from our analysis (because they did not meet the 100 scorable utterance per month criterion), to our automated procedure of extracting *wh*-questions, and to (possibly) differing definitions of null subjects.

#### 4.2.4 *Null subjects and wh-questions—Discussion*

Putting aside the discrepancy with Peter's data, the results show that, for at least half of the children with relevant data, null subjects are fairly common in *wh*-questions—to the degree that such questions are present in children's speech during the null subject stage. This is problematic for RSD. In fact, one of the children has a significantly *greater* proportion of null subjects in *wh*-questions than in declaratives, which counters the predictions of Bromberg and Wexler (1995). To be sure, there is considerable variability among the children, since two of them barely have any null subject *wh*-questions at all, like Valian's (1991) 21 children, but the variability in the presence of null subject *wh*-questions still makes an analysis that predicts their absence less compelling.

A separate way of licensing null subjects in *wh*-questions could make the data compatible with an RSD account, but the results in the previous section argue against a lack of agreement as the relevant factor.

## 5 Conclusion

The null subject stage in early English has yet to be fully understood. It has been shown that, on syntactic grounds, we should not expect English-speaking children to adopt a Romance *pro*-drop grammar at any point in the acquisition process, and acquisition research has confirmed that this is not likely to be the case. While the relative sparseness of agreement in English, especially in child speech, might lead one to implicate a lack of agreement (however this is instantiated syntactically) in children's null subject utterances, the lack of a consistent connection between the root infinitive and null subject stages in the data suggests otherwise.

Throughout this paper, the term “null subject stage” was used as shorthand, but the question of whether or not this period in development is a discrete one, with particular syntactic correlates, is important. The variability in the children presented here, as well as in the results of Valian (1991), Haegeman (1995), Orfitelli & Hyams (2007), and others, suggests that optionality in agreement (whether via clausal truncation, the omission of  $\phi$ -features on probes), may not be one of the syntactic correlates of the null subject stage, if in fact the stage exists. We have also seen variability with respect to null subjects in *wh*-questions, both within this study and among others.

If reliable syntactic correlates of null subjects in early English cannot be established, this would argue against an analysis of the null subject stage as an intermediate grammar (or range of grammars) in the acquisition process. To the degree that performance deficit or pragmatic accounts, or some combination of the two, are better able to handle variability, they would be preferable to a competence deficit account. The more output-limiting factors are included in a performance and/or pragmatic model (see Section 3.1), the more likely it will be able to account for the observed range of variation in children's abilities and output during the period in which they omit a high proportion of subjects.

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## Appendix 1—Summary of the data collected for each child

### *Abe*

<i>FILE</i>	<i>SCORABLE UTTERANCES</i>	<i>NULL SUBJECTS</i>	<i>3<sup>RD</sup> PERSON SINGULAR SUBJECT UTTERANCES</i>	<i>ROOT INFINITIVES</i>
abe002.cha- abe011.cha	301	11	99	10
abe012.cha- abe018.cha	225	6	21	1
abe019.cha- abe026.cha	466	7	33	3
abe027.cha- abe034.cha	466	5	27	2
abe035.cha- abe043.cha	413	6	40	2
abe044.cha- abe050.cha	445	11	42	0

### *Naomi*

<i>FILE</i>	<i>SCORABLE UTTERANCES</i>	<i>NULL SUBJECTS</i>	<i>3<sup>RD</sup> PERSON SINGULAR SUBJECT UTTERANCES</i>	<i>ROOT INFINITIVES</i>
n09.cha- n20.cha	702	166	72	45
n21.cha- n34.cha	905	244	69	37
n35.cha- n42.cha	566	83	48	18
n43.cha- n49.cha	521	55	51	22
n52na.cha- n56.cha	185	20	29	9
n57na.cha- n60.cha	185	18	26	5
n61na.cha- n64na.cha	268	31	27	1
n67.cha- n68.cha	278	13	39	3
n69.cha- n70.cha	276	23	34	2
n71.cha- n72.cha	126	6	16	1
n73.cha-	478	28	68	3

n80.cha				
n81.cha	102	7	10	0
n82.cha- n83.cha	176	3	28	0
n84.cha- n85.cha	172	12	17	1
n86.cha- n89na.cha	279	28	58	1
n91.cha- n92.cha	291	8	87	4
n93.cha	275	15	99	2

### *Nina*

<i>FILE</i>	<i>SCORABLE UTTERANCES</i>	<i>NULL SUBJECTS</i>	<i>3<sup>RD</sup> PERSON SINGULAR SUBJECT UTTERANCES</i>	<i>ROOT INFINITIVES</i>
nina01.cha- nina03.cha	304	133	71	52
nina04.cha- nina07.cha	349	136	81	44
nina09.cha- nina12.cha	659	126	111	44
nina13.cha- nina15.cha	742	123	155	65
nina16.cha- nina19.cha	991	93	175	68
nina20.cha- nina23.cha	525	92	78	23
nina27.cha- nina31.cha	1231	147	294	56
nina32.cha- nina34.cha	717	70	138	10
nina35.cha- nina38.cha	1044	69	242	12
nina39.cha- nina41.cha	616	35	118	5
nina42.cha- nina43.cha	456	31	78	6

**Peter**

<i>FILE</i>	<i>SCORABLE UTTERANCES</i>	<i>NULL SUBJECTS</i>	<i>3<sup>RD</sup> PERSON SINGULAR SUBJECT UTTERANCES</i>	<i>ROOT INFINITIVES</i>
peter06.cha	129	32	18	6
peter07.cha- peter08.cha	415	93	45	20
peter09.cha	239	55	31	3
peter10.cha- peter11.cha	430	75	85	6
peter12.cha	542	60	104	10
peter13.cha- peter14.cha	855	55	171	10
peter15.cha	562	37	149	10
peter16.cha	500	40	100	5
peter17.cha	716	49	155	7
peter18.cha	472	30	110	4
peter19.cha	542	31	111	9
peter20.cha	569	34	143	7

**Shem**

<i>FILE</i>	<i>SCORABLE UTTERANCES</i>	<i>NULL SUBJECTS</i>	<i>3<sup>RD</sup> PERSON SINGULAR SUBJECT UTTERANCES</i>	<i>ROOT INFINITIVES</i>
shem01.cha- shem02.cha	267	25	28	9
shem03.cha- shem06.cha	516	70	64	24
shem07.cha- shem09.cha	342	56	42	8
shem10.cha- shem14.cha	806	90	177	41
shem15.cha- shem16.cha	282	22	40	1
shem17.cha- shem19.cha	513	30	65	6
shem20.cha- shem23.cha	748	26	144	8
shem24.cha- shem27b.cha	562	30	67	9
shem28a.cha- shem30b.cha	419	20	77	5
shem31a.cha-	516	15	94	3



shem33.cha				
shem34.cha- shem36.cha	574	14	105	7
shem37.cha- shem39.cha	425	9	85	2
shem40.cha	131	6	27	1

***Trevor***

<i>FILE</i>	<i>SCORABLE UTTERANCES</i>	<i>NULL SUBJECTS</i>	<i>3<sup>RD</sup> PERSON SINGULAR SUBJECT UTTERANCES</i>	<i>ROOT INFINITIVES</i>
tre01.cha- tre03.cha	276	15	85	9
tre04.cha	100	7	44	13
tre05.cha- tre08.cha	398	25	55	2
tre09.cha- tre12.cha	392	13	116	2
tre14.cha- tre16.cha	156	6	28	2
tre17.cha- tre19.cha	200	11	35	0
tre21.cha- tre23.cha	156	1	19	0
tre24.cha- tre26.cha	219	8	38	0
tre27.cha- tre28.cha	121	1	21	0