The Development of Root Infinitives and Null Subjects in Child Language: A Minimalist Approach

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The goal of this paper is two-fold: one, to explain the observed patterns of childhood development in what I consider to be the interconnected phenomena of null subject usage and Root Infinitives (RIs) and two, to do so in a model that conforms to the precepts of the Minimalist Program (MP). To explain the development of RIs and null subjects one not only has to explain the differences in their usage between a child learning a null subject versus non-null subject language but also to explain the patterns of their usage. The latter point involves, primarily, explaining why the child learning a non-null subject language initially adopts a behaviour inconsistent with the adult use of the language (or only marginally consistent, in the case of RIs) and the gradual transition away from this inappropriate usage to the adult grammar. One must also explain the differences in null subject usage in the child's finite constructions (which decreases gradually over time) and null subject usage in the child's RI constructions (which remains roughly consistent). To posit an explanation fully consistent with the precepts of the MP, in which all syntactic variation is posited as being in the lexicon, I will adopt a Strong Continuity Hypothesis model in which the child's syntactic component equals that of the adult. To do so, I must abandon traditional notions of syntactic development, i.e. the (perhaps gradual) inclusion of some syntactic rules or principles over others, for a model in which linguistic development is seen to be the result of knowledge identification and storage within the lexicon. The acquisition model presented here is an attempt to meet the demands of this new paradigm while attempting to explain the diverse acquisition patterns observed in the cross-linguistic study of the acquisition of RIs and null subjects. All variation between the adult and child use of these phenomena is postulated to be the result of the configuration of, and knowledge stored within, the lexicon, while the syntactic component of the grammar is held constant.

1. The Starting Point

1.1 Economy of Projection

As the starting point of this proposal, I will be adopting the idea of two possible configurations of the lexicon as originally postulated by Rohrbacher (1993), for verb movement, and adapted to an analysis of null subjects by Speas (1994, 1995). The proposal is that verbal affixes, which encode the agreement of a language, are stored in the lexicon as either

a lexical representation (i.e. each affix having a lexical entry) or encoded in a rule-base (which generates the affixes)[1] - cf. the previous references for discussion.
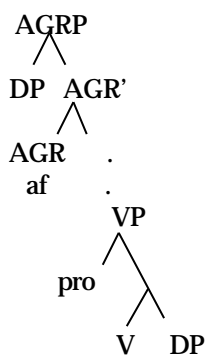
Speas (1994) takes up this distinction as a possible explanation for the difference between languages which allow null subjects and those that do not. Under her proposal, languages which store affixation in the lexical representation will allow null subjects while those in which affixation is generated by the rule base will not. The reasoning for this is as follows. If the affix is stored as a part of the lexical representation then that affix is available to the computational component and thus may be separated from the verbal stem when the verb and affix are selected for insertion into the syntactic derivation. On the other hand, affixes generated by the rule-base are not available to the computational component (as affixes generated by the rule-base have no lexical properties until they are generated) and therefore must be inserted into the syntactic derivation attached to the verb stem for which they were generated. Thus we have a proposal in which null subject languages (those with a lexical representation of affixation) may separate the affix from the verbal stem and non-null subject languages (those with a rule-based paradigm which generates the affix) may not.

To explain how this difference in affixal representation can explain the differences in null subject behaviour Speas introduces a new principle of economy: Economy of Projection. This principle states that an XP may only project if either the head or Spec of that XP has independent phonological or semantic content. In other words, an XP must have one or the other of its head/Spec (or both) filled in order to project. The important entailment of this principle is that an XP need have only one of its head or Spec filled. Therefore, if one can show that, say, the head of AGRP is filled in one language but not another then the Spec of AGRP (i.e. the subject) could be filled by an element with no independent phonological or semantic content (i.e. a null subject).
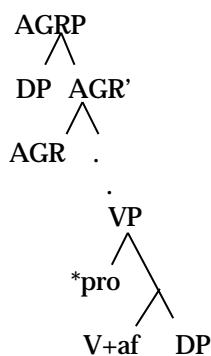
Given these two presuppositions, Speas makes the following proposal. A language which stores its (verbal) affixation in the lexical representation can separate an affix from its verbal stem. Under the Principle of Procrastination, the separate affix will not be inserted into the syntactic derivation until it is required, i.e. in the head of AGRP where it is required for feature checking. If the affix is inserted directly into head,AGRP then AGRP now has an element with independent phonological or semantic content in one of its head/Spec nodes and therefore the other node (the Spec) need not contain an element with independent content, thus it may contain a null element (subject). This gives us the distinctions below:

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[1] I will be avoiding the terms "weak agreement" and "strong agreement" (used by Rohrbacher and Speas) as these terms are easily confused with the Weak/Strong distinction of abstract features within the MP.

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        AGRP                        AGRP
        /\                          /\
      DP  AGR'                    DP  AGR'
           /\                          /\
        AGR   .                     AGR   .
         af    .                           .
               VP                          VP
              /\                          /\
          pro   \                     *pro   \
               /\                           /\
              V   DP                    V+af   DP

      Null Subject                Non-Null Subject²
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In Italian (null subject), the affix is stored in the lexical representation and therefore may be separated from the verb for insertion into the syntactic derivation.. Under the process described above, procrastination determines that this separate affix is inserted directly into the head,AGRP. Given that AGRP now has an element with independent phonological or semantic content in one of its head/Spec nodes, the other node (Spec,AGRP) may be filled (at some level of derivation) by an element without independent content. Therefore, a null subject may be generated in Spec,VP which will later move to Spec,AGRP (in Speas' account, post-Spell-Out). The verb will then move to join with the affix in head,AGRP for independent reasons.

In English (non-null subject), the affix is stored in a rule-based paradigm and therefore cannot be separated from the verbal stem; it must 'follow' the stem element which generated it into the syntactic derivation (i.e. into VP). Under this model of insertion, the head of AGRP no longer has independent phonological or semantic content, therefore the Spec of AGRP must be non-null or the Economy of Projection principle would prohibit the projection of AGRP. Because of this, the subject must be overt in such languages.

So, under Speas' proposal the difference between null subject and non-null subject languages 'falls out' from the difference in how affixes are stored in the lexicon (and one new principle of economy); in my opinion, a highly desirable result. However, I have thus far avoided discussion as to what causes this differentiation in representation in the lexicon. I have done so for a reason; the question of what overt phenomena differentiates a null subject from a non-null subject language appears to be a highly complex and troublesome issue, a discussion of which is well beyond the scope of this paper. Speas (1995) adopts a distinction made in Rohrbacher (1993):

> INFL is a referential category with lexically listed affixes in exactly those languages where regular subject-verb agreement minimally distinctively marks all referential INFL-features such that a. and b.:
> a. In at least one number and one tense, the person features [1st] and [2nd] are distinctively marked.
> b. In at least one person of one tense, the number feature [singular] is distinctively marked.
>
> (Rohrbacher 1993, p.118)

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² I will not be discussing Speas' proposals for Chinese-type and Yiddish-type languages.

However, this distinction was originally made by Rohrbacher to distinguish languages which undergo V-I movement from those that do not rather than a distinction between null and non-null subject languages. Speas recognises that this is an overly general distinction, predicting that all languages with V-I movement will encode affixes lexically and thus license a null subject. This is not the case for (e.g.) the V-I languages French and German. In the end she recognises that this morphological condition is at best incomplete (as are all currently proposed distinctions) and may require additional mechanisms to accurately capture the distinction. This is the position I will be taking in this paper, that something determines how a language is identified as null subject or non-null subject, but what this distinction is is at present unclear.[3]

1.2 Problems with the Economy of Projection Proposal

I see two main problems with Speas' syntactic proposal: one, it is not clear why verb movement of the verb+affix to head,AGRP in, say, German does not license a null subject and two, why it is that an overt subject in a null subject language does not license a null affix. The first of these problems is the most troubling and Speas herself recognises this inconsistency. She states:

> Interestingly, verb movement by itself does not license the projection of AGRP. Such languages must have a filled specifier of AGRP. This may be because the AGR projection cannot be licensed by a head of a category other than AGR. The projection of AGRP would hence have to be licensed independently as an AGRP, before it could become the landing site of verb movement. (Speas 1994, p.190)

However, given the derivational nature of her proposal (and developments in the field in general) it is unclear why this should be so. Given that AGRP does not project until something motivates it (by insertion into, or movement to, head,AGRP) there should be no difference between insertion and movement. Also, it is not clear how this would apply to other projections (e.g. CP).

The problem of why an overt subject does not license a non-overt (separate) affix could be solved by simply stating that null affixes are not a permissible option. Such a stipulation is perfectly acceptable and is consistent with current linguistic theory, in which null affixes are rarely proposed (although see Phillips 1995). Therefore this 'problem' is less compelling than the first.

2. The Minimalist Program

The Minimalist Program (MP) (Chomsky 1996) is a conception of grammar in which all principles of syntactic derivation (i.e. tree construction) are posited as being (innately) similar for all languages. All cross-linguistic variation is seen as being the result of differences encoded within the lexicon. On its face it is a proposal which adheres to the Strong Continuity

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[3] See LeBlanc (forthcoming) for an in-depth discussion of this issue. Barring unforeseen complications, I will be arguing that the distinction is based upon unambiguous marking of Person and Number features (if they are expressed in the language), those languages with ambiguous marking lacking null subjects. However, there is insufficient space to defend this position in this paper, so I fall back upon Speas' argumentation that something differentiates null subject from non-null subject languages and leave it to future work to investigate the properties of this distinction.

Hypothesis of language acquisition, i.e. that the syntactic component of grammar is the same for the child and the adult. Of course, as is the case with Government and Binding Theory models, one can postulate that some of these principles are initially absent from the child's grammar and only appear later as the result of a maturation process (cf. Borer & Wexler 1986) or that some principles are initially optional (Rizzi 1994, Phillips 1995, Roeper & Rohrbacher 1996), but in my opinion this weakens the appeal of the model and should only be adopted as a last resort.

Within the MP, inter-language variation is traditionally discussed in terms of verb movement within a universal process of feature checking.[4] Under this view, the inflectional morphemes which attach to lexical stem elements (e.g. verbs, nouns, complementizers, etc.) contain features which must be 'checked' with matching features in the Functional Projections (FPs). This requirement to check features draws elements from their point of insertion[5] into the derivation up into the FPs. Just what these features are is not entirely clear (although Tense, Case and some conception of agreement are traditionally referred to), but the features that actually check are viewed as being identified with the agreement morphology of the related inflectional morpheme rather than with the (overt) morphology itself (i.e. an abstract but related feature actually checks). Language variation (at least for verb movement) is the result of when these features must check: pre- or post-Spell-Out - the point at which a copy of the derivational structure built to date is passed to the phonological process for articulation. Features which must (move to) check before Spell-Out are termed Strong, those which check post-Spell-Out (at a derivational level termed Logical Form or LF) are termed Weak.[6] Note that all features must eventually check in the same FPs (cross-linguistically), maintaining the concept of a universal derivational procedure. However, if a feature need not check before Spell-Out, it will not – all movement occurs only when it must, a principle called Procrastination.

Italian   English   German
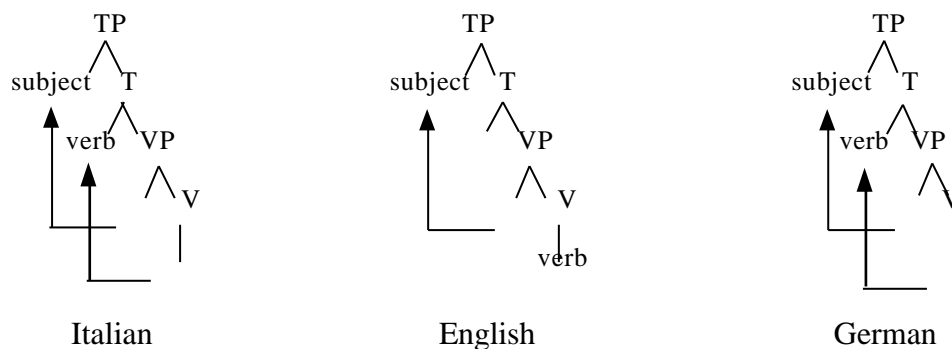
[4] I will not be discussing the proposal of Chamsky (1998) in this paper.
[5] It should be noted that in the MP, lexical items are not inserted directly from the lexicon into the derivation, but rather are first placed in a 'buffer' called the Numeration. This is not an incremental procedure: by the theory of Chomsky (1996) all lexical items to be used in the derivation are placed into the Numeration, then the derivation is constructed. This makes Speas' proposal incompatible with the MP, as her proposal depends upon the rule-base generated affix being unavailable to the computational component because it is inserted directly into the tree from the lexicon (the same can be said of Rohrbacher's proposal for verb movement). If all lexical elements are first inserted into the Numeration, there is no reason to believe that a rule-base generated affix would not be equally available to the computational component at this stage.
[6] The Weak/Strong distinction is based upon whether a feature may or may not be visible as an illegitimate object at Phonological Form (PF). Checked features are eliminated and therefore not visible in the copy of the derivation handed to PF.

In the syntactic derivations depicted above, we see the difference in structures at the time of Spell-Out between three simple sentences, one each in Italian, English and German. In English, the feature which causes the verb to move to TP (a.k.a. AGRP and IP in other versions of the theory) is thought to be Weak and therefore the verb stays in its initial position. In Italian[7] and German, the same feature on the verb is thought to be Strong and therefore the verb moves to the TP. Copies of these structures are then passed to the phonological component of the language faculty which articulates the elements in their given order, producing the differing overt forms. Meanwhile, the syntax continues to process the sentences post-Spell-Out, moving the verb in English to the FP so that the feature may check. If at any point in the syntactic procedure (pre- or post-Spell-Out) the features on the two elements in an FP are found to conflict, the derivation 'crashes' and the entire procedure (syntactic and phonological) ceases.[8]

The Weak versus Strong quality of a feature is a lexical property – features are stored in the lexicon as Weak or Strong.[9] Thus we can account for syntactic variation while maintaining a universal syntax. The syntax itself consists of rules/procedures which depend upon the properties of lexical elements. These lexical properties can differ from language to language, but the rules (i.e. the syntax) are always the same.

For reasons which will only become clear in Section 4.2, I make two further assumptions with respect to the syntactic process. I am assuming an extended projection model of derivation, in which functional projections are only projected if they need be (i.e. if the feature they correspond to is encoded in the sentence), cf. Travis (1984) and Zwart (1996). I am also assuming that the feature which drives verb movement to CP is encoded within the affix of the verb.

3. The Adult Proposal for Null Subjects

As stated previously, I will be adopting the idea of Rohrbacher (1993), also adopted by Speas (1994), of two possible configurations of affixes in the lexicon: a lexical representation and a rule-based paradigm. However, I will make major modifications to their proposals. Firstly, contra Speas, I propose that in null subject languages the affixes are generated by the rule-based paradigm while in non-null subject languages the affixes are stored directly attached to each verb. This seems more intuitive to me, as it groups the affixal systems with the least inter-paradigm ambiguity with the rule-base, and rule bases are most easily adapted to regular, unambiguous systems.[10]
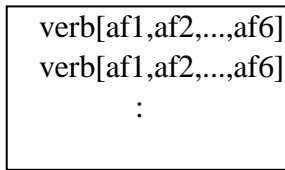
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[7] Here I assume the standard interpretation of verb movement in Italian. Later in the paper I will point out an alternative possibility.

[8] Chomskian linguistics is a representational rather than a derivational theory – i.e. it is a theory of what conditions a syntactic representation must meet to be acceptable rather than of how the representation was derived. Therefore one does not really think of various incorrect derivations crashing until the correct one is found but rather that the system simply generates the correct representation every time. How this is actually done awaits the proposal of a derivational theory.

[9] To be more exact, the features of the FP, which draw up the features embodied within the overt elements (verb, subject) are stored within the lexicon as Weak or Strong.

[10] One could adhere to Speas' original distinction of null subject languages being the lexical representation and non-null subject languages being the rule-base by arguing that in the lexical representation the affixes are stored separately from the verb (and thus inserted into the Numeration separately) and that the rule-based paradigm requires a merger procedure between the verb and the generated affix (creating a local tree). However, I find the idea of equating the usually distinctive (non-ambiguous) agreement systems of null subject languages to a rule-base to be more intuitive.

non-null subject: null subject:

verb[af1,af2,...,af6] verb[af1,af2,...,af6] :

| verb
verb
: |
|---|

rule-base: rule1 rule2 : rule6[11]
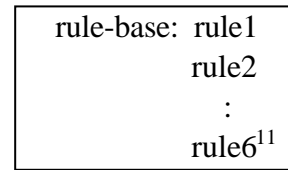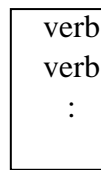
Secondly, I propose that the syntactic differences that the two representations engender is in their representation within the Numeration rather than their availability to the computational component. I propose, following an option presented in Chomsky (1996), that the verb+affix in the lexical representation is stored as a local tree in which the attributes of the verb dominate[12] and are inserted into the Numeration as such.

verb
∧
verb   affix
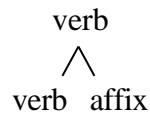
On the other hand, affixes generated by the rule-base are inserted into the Numeration as separate lexical items.

After the Numeration is filled with all relevant lexical items, the syntactic derivation process commences. Under the Principle of Procrastination, elements are inserted into the derivation only when required. In both null subject and non-null subject languages, the verb is required to be inserted into the VP. In the case of a non-null subject language, this means that the affix will also be inserted at this point, as the verb and affix are already in a local tree relationship. However, in a null subject language the verb and affix are stored separately and may therefore be inserted separately. As the features of the affix are not required until the checking operation within TP, the affix is not inserted until this point. Upon the affix's insertion into TP to fulfil the checking operation the verb will move up to adjoin to the affix in order to meet the phonological constraint that a verb must be attached to its overt affix (if it has one) before articulation. Therefore the verb always appears in (at least) head,TP position (although it may move on to CP if required).[13]

TP
∧ T'
   ∧ VP
subj ∧ V
   verb+af

non-null subject

TP
∧ T'
af ∧ VP
subj ∧ V
   verb

null subject

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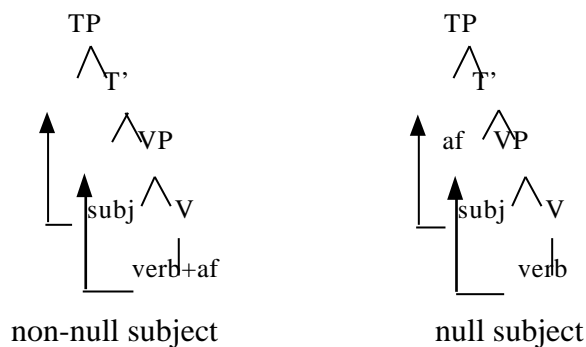
[11] The number of rules within the rule base will depend upon the number of agreement affixes encoded within the paradigm. This example assumes six affixes.
[12] Chomsky takes no position as to which attributes dominate.
[13] I am ignoring the null subject languages with no agreement affixation at all, e.g. Chinese, Japanese. I argue in LeBlanc (forthcoming) that this is a separate phenomena from that of null subjects in the Romance and Semitic languages.

So far we have a proposal that still closely resembles Speas' Economy of Projection model. Null subject languages insert their verbal affixes directly into TP (AGRP in Speas' model), non-null subject languages insert the affix attached to the verb in VP. If I were to maintain an Economy of Projection model at this point I would still have the problems described in Section 1.2, mainly the problem of why verb movement to TP wouldn't license a null subject even in non-null subject languages. There would also be the 'problem' of limiting myself to one particular version of the MP. Speas' proposal relies upon full XP insertion (i.e. Kayne 1994); the properties of the entire XP must be considered. This is incompatible with the local-tree Merger model of Chomsky (1996), as Speas points out (Speas 1994, p.17). This is not to imply that this is necessarily wrong, but I prefer a model which is compatible with both proposals.

To avoid the problems of the Economy of Projection model, I will abandon it. I propose instead that null subjects are licensed by a syntactic process within a Spec-head relation.[14] If the features (perhaps only Person and Number) of the affix are available to this syntactic process then the subject may be left null (as the affixal features identify it). However, the features of the affix are only available to the syntactic process in null subject languages (for adults, anyway). To see why this is we must examine the property of Lexical Integrity.[15]

Lexical Integrity
No syntactic process can affect a or b in [$_c$a...[b...]] if c is a word.

Lexical Integrity basically states that no syntactic process may violate word boundaries. In the case of a non-null subject language, where the verb+affix are inserted into the derivation as a local tree in which the attributes of the verb dominate, the features of the affix are 'stranded' within the local tree and unavailable to the syntactic process of licensing a null subject.[16] In a null subject language, the affix is inserted directly into head,TP and then the verb moves up to adjoin to it. In the process of adjunction the features of the element being adjoined to (i.e. the affix) always dominate, therefore the features of the affix are available to the licensing process.
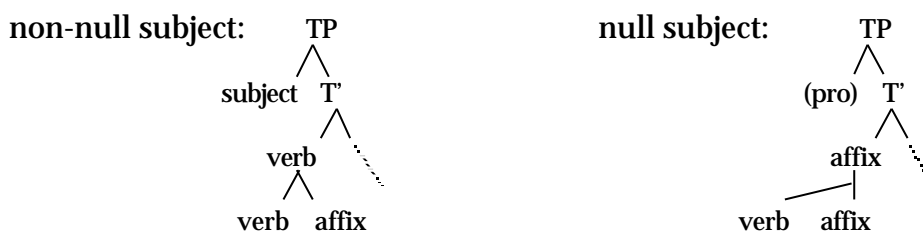
So, under this model null subjects are licensed by a syntactic process mediated by Lexical Integrity rather than a (new) principle of Economy. The distinction between null subject and non-null subject languages is still in their representation within the lexicon, however the motivation for the licensing of a null subject differs. Rather than introduce a new principle of

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[14] In keeping with the precepts of the MP, a null subject is created by an overt subject being deleted before PF. Thus to say a null subject is licensed is to say that the subject will remain identified (i.e. to another speaker of the language) even if the Delete operation is applied.

[15] I thank Hans Broekhuis (p.c.) for suggesting Lexical Integrity as a solution to this problem.

[16] It should be noted that feature checking is not a standard syntactic process and is exempt from the constraints of Lexical Integrity.

Economy which seems specific to one particular syntactic phenomenon,[17] I have adopted the traditional approach of a specific syntactic 'rule' which licenses a null subject (also specific to one phenomenon) mediated by the pre-existing constraint of Lexical Integrity. Specifying a specific 'rule' has the benefit of allowing an identification criteria within the process of null subject production, should this be necessary. Given the complexity of the null subject phenomenon, it may well be. As previously discussed, Speas (1995) acknowledges that the morphology-based distinction she has adopted (i.e. that of Rohrbacher 1993) does not correctly characterise the data and speculates that this distinction may be merely a prerequisite for a null subject language and that a further lexical distinction may be necessary. However, it is not clear what such an idiosyncratic distinction would be or how such a 'rule' could be integrated into a general lexical system.

4. The Acquisition Proposal

We now turn to the acquisition phenomena related to the child's use of null subjects. In recent years it has been realised that this phenomena is more complex than the traditional notion of children learning a non-null subject language initially using null subjects and then abandoning this option. In-depth analysis of the child data (cf. e.g. Haegeman 1996) have shown that there are sub-patterns of null subject use by children learning a non-null subject language, related to the child's use (or not) of finite constructions. Such studies have shown that the child's use of null subjects within finite and non-finite (RI) constructions differs in both frequency and development. Null subject use (by children learning a non-null subject language) is initially greater in RI constructions than in finite constructions. In addition, over time the percentage of null subject use in finite constructions gradually declines while it remains roughly constant in RI constructions. The use of RI constructions also varies cross-linguistically with respect to whether the child is acquiring a null-subject or non-null subject language. Children acquiring a null subject language initially use a small percentage of RIs and this use quickly disappears (Guasti 1994, Phillips 1995) while children acquiring a non-null subject language initially use a large percentage of RIs and this use declines gradually over an extended period of time.

In this part of the paper I will be proposing an integrated model of these phenomena. In keeping with the stated purpose of this work I will propose that all of these phenomena stem from developments within the lexicon. The acquisition model relies upon the model of adult null subject use presented in the previous section, in keeping with the Strong Continuity Hypothesis (and the precepts of the MP). However, whereas the distinction between adult null subject and non-null subject grammars is proposed to be a result of the configuration of the lexicon, the child phenomena is proposed to be a result (primarily) of what knowledge has been acquired by the child and stored in the lexicon at any point in their linguistic development.

For ease of discussion, I will be examining the child phenomena in three separate sections: use and development of null subjects in finite constructions, the use and development of RI constructions, and the use and (non) development of null subjects in RI constructions. I will be attempting to demonstrate that if one views the development of the lexicon as a lexically-based (i.e. individual words and affixes) process, then the child phenomena can be explained with a minimum of additional assumptions.

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[17] It is unclear how the Economy of Representation principle could account for (e.g.) null objects in CP in V/2 languages.

4.1 Null Subjects in Finite Constructions

4.1.1 The Data

This section will be concerned with the use of null subjects in finite constructions by a child acquiring a non-null subject language. The use of null subjects in finite constructions by a child acquiring a null subject language is considered to be adherence to the proper adult grammar and is therefore uninteresting with respect to this proposal.[18]

Children acquiring a non-null subject language show a number of consistent[19] developmental phenomena in their null subject use.

- The percentage of null subject use in finite constructions is lower than the use of null subjects in RI constructions (Haegeman 1996)
- The child's use of null subjects decreases gradually over time (Haegeman 1996).
- Children produce few null subjects with auxiliaries (Valian 1991).
- Children do not produce null subjects in embedded clauses (Valian 1991).

The last of these points will not be discussed in this work. Embedded clauses begin to appear only in the dying stages of null subject usage (i.e. when null subject usage has almost stopped). For this reason Valian (1991) has speculated that null subjects may not be a permissible option by the time embedded clauses become generally available to the child. However, there are example utterances with both null subjects (in the root clause) and embedded clauses. This is further complicated by the fact that the data (with respect to this phenomenon) has not taken into account possible finite/RI differences and by the fact that other researchers have reported small numbers of null subjects in embedded clauses in other studies (cf. e.g. Hamann 1996). I will not be addressing this issue in this work, other than to say that if there is in fact an incompatibility between null subjects and embedded clauses, the following proposal cannot account for it. However, I will be seeking to explain the other child phenomena.

4.1.2 The Proposal

Let us begin by again considering the distinction in lexical configuration between null subject and non-null subject languages. Under the proposal in Section 3, null subject languages generate verbal affixation from a general rule-base while non-null subject languages store each affix for each verb individually. In a theory of language based upon general theories of economy (as the MP is), the rule-based configuration would be highly preferred. In other words, given the choice of the two possible configurations, the Language Acquisition Device (LAD) would prefer to adopt the rule-based configuration (if it can). By this reasoning I propose that the LAD will initially attempt to store the verbal affixation of a newly acquired language as a rule-base.[20] It is only after receiving overwhelming (because of the strong bias

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[18] Valian (1991) notes that children acquiring a null subject language (Italian) initially use more null subjects (~70%) than do adult speakers of that language (~50%). However this is likely due to the discourse/pragmatic factors which determine when a null subject should be used (when licensed) and/or the child's propensity to root their speech in the 'here and now'.

[19] As much as anything is consistent in child language.

[20] This is not to imply that the generally applicable (i.e. to an entire category) affix rules (which constitute the paradigm in the adult language) would be immediately acquired. In paradigm-based learning models there must be an initial period of individual verb+affix acquisition (i.e. all verbs are initially acquired as irregular verbs). The process of rule-based paradigm building is described in the following paragraphs.

towards a more economical system) evidence that the language cannot conform to the rule-based configuration (by violation of whatever criteria differentiates null subject from non-null subject languages) that the LAD abandons attempts to create a generally applicable rule-base and instead relies upon the lexical representation of affixation.

The above argumentation relies upon the idea that the lexicon is built up gradually, i.e. lexically (one verb at a time, each affix for each verb acquired separately). There is strong evidence to suggest that this is so. Studies into the No-Overlap Hypothesis, trying to relate finite/RI usage to particular semantic properties of a verb, have consistently shown that most verbs are used either finitely or non-finitely, with only a few verbs being used both ways (Poeppel & Wexler 1993, Kramer 1993, Ingram & Thompson 1996). Wijnen (1995, p.112) addresses this question directly and concludes that the distinction is lexical rather than syntactic (see also Section 4.2.2).

So, we have a model where the LAD is initially attempting to construct a rule-based configuration (i.e. a null subject language configuration) and starts to acquire verbs and their affixes individually. What behaviour is then predicted for finite (i.e. where the affix has been acquired) constructions in a null subject language? Initially, newly acquired verbs and their affixation will be stored in the rule-base, with each verb having separate rules for generating each affix. Although positing a separate rule for each affix of each verb may seem uneconomical (and it is), the LAD is 'hoping' that over time these rules will 'collapse' into a general rule base applicable to all regular verbs[21] (a very economical configuration). A rule base 'collapses' when enough rule information has been acquired for enough lexical entries for the LAD to determine the existence and identity of the generally applicable rules. At this point the redundant individual rules are replaced by a small rule-base applicable to all elements that previously had this rule. However, for a non-null subject language the rule-base is not the proper configuration. Assuming that the criteria for distinguishing a null subject from a non-null subject language is somehow related to the verbal affixation (i.e. some notion of 'rich' morphology), at some point in acquiring the affixation for a particular verb the LAD will realise that the verb does not meet the null subject criteria. At this point the verb and its acquired affixation will be copied to the lexical representation. I say copied rather than moved because even in a null subject language there are some (irregular) verbs that will not meet the (morphology-based) criteria. To move rather than copy such verbs would strand them in the lexical representation when the general rule-base is formed, meaning that these verbs would not allow null subjects in the adult language (which is not the case).

At this point in their development the child learning a non-null subject language now has two representations of the verbal affixation; the rule base, corresponding to a null subject language, and the lexical representation, corresponding to a non-null subject language. When the child seeks to produce an utterance containing a verb+affix stored in both configurations, their language faculty has a choice of what configuration to choose from. I posit that the choice of which representation is chosen is probabilistic, based on the relative strengths of the two configurations.[22] Here "strength" corresponds to the amount of information stored in the two representations. Initially, given its status as the preferred option and the fact that all verbs+affixes are initially stored in it, the rule-base is strong compared to the lexical representation. As individual verbs (and their affixation) are determined to be in violation of

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[21] The affixation for exceptional (irregular) verbs would also be stored in the rule-base. See e.g. Ling & Marinov (1993) for a proposal as to how this can be accomplished.
[22] This choice would be based on the probability of one or the other representation being chosen, rather than the stronger always being chosen.

the null subject criteria they are copied to the lexical representation thereby increasing its strength and decreasing the strength of the rule-base. However, the child is constantly acquiring new verbs which are initially stored in the rule-base (until their affixation is acquired and their violation of the null subject criteria recognised), increasing its strength. So, we have a process in which the lexical representation is constantly growing in strength (with corresponding reductions in the strength of the rule-base) but the rule-base is also receiving fresh strengthening by the acquisition of new verbs. This will lead to an overall pattern of the strength of the lexical representation growing over time in relation to the strength of the rule-base (as the strength of the lexical representation only increases, while that of the rule base variably increases and decreases). Given that the choice of which representation the language faculty chooses is based upon these strengths, this would predict that verbs+affixes would initially be selected overwhelmingly from the rule-base, but that over time the choice would be made more and more from the lexical representation. As selection from the rule base provides the possibility of a null subject in the child's utterance and selection from the lexical representation prohibits the use of a null subject, this model would predict that the use of null subjects (in finite constructions) would gradually decline over time (as the lexical representation is selected more often) which is the pattern we observe in the child data.

We are now left with the question of the low null subject use with auxiliaries by children acquiring a non-null subject language. I propose that this follows from the above model if we accept that auxiliaries are not grouped together with verbs in the lexicon but are rather stored as a separate (closed) class. As discussed above, the strengthening of the lexical representation (and subsequent weakening of the rule-base) by the copying of individual verbs+affixes to the lexical representation is somewhat off-set by the constant strengthening of the rule-base by the addition of new verbs (for which affixation has not yet been acquired). Thus the delay in final selection of the lexical representation, and gradual drop in null subject use, is largely a result of the number of verbs to be acquired, i.e. the status of verbs as an open-class category. Auxiliaries, on the other hand, are a closed-class category, i.e. there are a small number of them (among other properties). If auxiliaries are treated as a separate class of elements by the LAD, then there will not be the constant addition of new elements to this class (as there is with verbs) and therefore nothing to mediate against the quick dominance in strength of the lexical representation. Because of this we would not expect to see the numbers or patterns of null subject usage associated with verbs, but rather a quick adoption of the lexical representation and, correspondingly, a lack of null subjects with auxiliaries.

4.2 Root Infinitives versus Finite Constructions in Child Language

We next turn to the phenomenon of RI use by children acquiring languages in which RIs are not a generally applicable option.[23] It appears that all children initially go through a period of RI use, although the frequency and duration of use is dependent upon whether the language being acquired allows null subjects or not. For the child learning a null subject language, RI use is infrequent and disappears quickly (cf. Schaeffer 1990, Guasti 1994, Phillips 1995). On the other hand, if the child is acquiring a non-null subject language RI, use is initially high and decreases gradually over an extended period of time (cf. Wexler 1994, Haegeman 1996). I will be proposing that these facts fall out from the previously described model if one views RI constructions as finite constructions with a non-overt feature marker rather than as constructions lacking tense/finiteness (cf. Boser et al. 1992, Whitman 1994 and Phillips 1995

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[23] As Lasser (1997) demonstrates, RIs are a pragmatically restricted grammatical option in child language.

for proposals taking a similar position). This explanation will again be related to the two possible configurations of the lexicon, the initial competition for ascendancy between them and the individual nature of affix acquisition. In keeping with the stated goal of this paper, this RI proposal avoids variation in the child's syntactic component (with respect to the adult), including the need to introduce maturation or optionality into the development of the grammar.

4.2.1 The Data

The RI data on non-null subject languages is quite straight-forward and uncontroversial.

- Children initially use far more RIs than finite constructions (Pierce 1989, Phillips 1995)
- Over time, the use of RIs gradually decreases (Haegeman 1996).
- There is never topicalization in RIs in V/2 languages (Poeppel & Wexler 1993).

The data concerning RI use in null subject languages is, however, more open to question. Because of the somewhat rare (i.e. ~5%) occurrence of RI use by such children and the short duration of such use, the significance of such use is disputed (cf. e.g. Wexler 1994). I will be taking the position put forward in Guasti (1994) and Phillips (1995) that:

- Children acquiring a null subject language initially use a small number of RIs and RI use disappears quickly.

4.2.2 The Proposal

Before we can turn to the explanation of these data patterns we must again briefly examine the process of affix acquisition by the child. It is important for this proposal that the reader be convinced of the individual nature of this acquisition procedure (i.e. each affix for each verb is (initially) acquired separately). Although such a procedure may initially seem redundant and therefore counter-intuitive, it is not. Irregular verbs make up a large percentage of the first verbs used by the child (at least in English) which would mediate against a generally applicable affixation procedure. The notion of individual affixation agreement has also been implicit in the literature for years, with discussion of a point in the child's development at which agreement becomes 'productive' (Clahsen & Smolka 1986, Rummelhart & McClelland 1986). Although there has been much debate over the relationship between productive agreement and null subject use (in this model the relationship is indirect at best), the idea that affixation, at least initially, is acquired individually has not been hotly disputed. To further this position I ask the reader to consider the facts presented below, taken from the recent literature.

- Children do not use affixation inappropriately (Marcus et al. 1990, Valian 1991, Poeppel & Wexler 1993, Ingram & Thompson 1996).
- Children use different affixes to different degrees (Ingram & Thompson 1996).
- The same verb can be used in both finite and non-finite constructions (Ingram & Thompson 1996) but most verbs are used only one way or another (Wijnen 1995).

The fact that children do not use affixation inappropriately indicates that affixation, when used, is correctly understood and used by the child. This is counter-evidence to the claim of

(e.g.) Clahsen & Smolka (1986) that one cannot consider the child to be using affixation correctly until they use it in 90% of appropriate contexts (as pointed out by Poeppel & Wexler 1993). The fact that children use different affixes to different degrees indicates that the separate affixes are being learned, at the least, independently of one another.[24] The fact that the same verb can be used in both finite and RI constructions could be interpreted in one of two ways. It could be that the child is using the same verb in one agreement (affixal) context finitely and in another non-finitely, or that the child is using the same verb both finitely and non-finitely in the same context. Unfortunately, to my knowledge the data has not yet been analysed at this level of detail, so this must remain an open question at this point. If the child is using the verb finitely in one context and non-finitely in another, this would be compelling evidence for a model of individual affix acquisition. Even if the second interpretation turns out to be correct, this would not be compelling counter-evidence to such a model. As the second part of this data fact points out, most verbs are used only one way or another. This indicates that any ambiguity in verb usage is quickly eliminated. If the child is in fact using the same verb in the same context both finitely and non-finitely, then this behaviour disappears quickly. Therefore it may be that the child is having slight performance difficulties in using a newly acquired affix (and such difficulties disappear quickly). Of course, if the child is using the verb+affix correctly in all appropriate contexts (and RIs only in contexts not corresponding to that affix) it follows that once all affixation is learned for that verb then it will no longer be used in RIs. Taken together, these facts cause me to conclude that affixation is acquired lexically.

In the above I have been implicitly assuming that when the child 'knows' the appropriate affix for a verb they use it and produce a finite construction, and when they do not know the appropriate affix for a verb they produce an RI. However, this does not explain how an RI is produced or represented by the grammar. To explain this, I propose the following:

> **The Null-Affix Hypothesis**
> If the child has not yet acquired the appropriate (to the context) affix for a particular verb then they use a null (non-overt) affix to express the feature information.

In other words, if the child hasn't acquired the appropriate affix, they simply express the feature information through the use of a null affix.

The above hypothesis states that a default null affix is used when the appropriate affix is not known, i.e. in RIs. What is the effect of this on the syntactic derivation? Note that this default element is not necessarily encoded in either of the affixal configurations, as they encode overt affixation. I propose that the null affix is in fact a separate lexical item and is stored as such in the general lexicon. As a separate lexical item it will be inserted into the Numeration as such, i.e. independently from the verb. And as proposed in Section 3, feature-bearing elements inserted into the numeration separately from the verb are not inserted into the derivation until head,TP (by the Principle of Procrastination) where they then license a null subject (as is the

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case for overt affixes inserted so, i.e. in null subject languages).[25] Therefore the null affix always licenses a null subject.[26]

In Italian (and null subject languages in general), child RI constructions differ little from finite constructions. In both cases the feature-bearing element is a separate item in the Numeration, is inserted into head,TP and licenses a null subject. Where they would differ (other than the overtness of the affix) is in overt verb movement to TP. In an RI there is no obvious reason for the verb to move to head,TP,[27] as the null affix has no phonological properties (assuming that this movement is based upon a phonological constraint and that the feature that drives verb movement to TP is encoded on the affix rather than the verb). Unfortunately, I know of no study which has examined this question for Italian RIs. However, this question has been addressed in Weissenborn et al. (1989) and Pierce (1989, 1992) for RIs in another V-TP language: French. These studies show that in French child speech finite verbs precede negation while non-finite verbs follow negation (indicating a lack of verb movement to TP). Of course it could be that these two languages behave separately (as one is a null subject language and one not), but I can make no firm comment at this time. I will be proceeding under the assumption that both lack verb movement to TP in child RIs. If the facts turn out to be different than this assumption, it will not be devastating to the general proposals being made but would require a further examination of only verb-TP movement.

In the case of English, which has no overt verb movement to TP, the only relevant point is the ability of the null affix to license a null subject, given its insertion into head,TP.
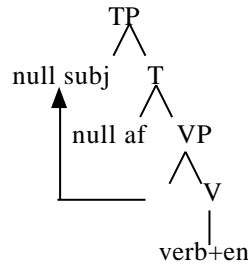
On the other hand, the facts available for German present a very interesting case. German is a V/2 language, meaning it has overt verb movement to TP and CP (when CP projects - under a Travis 1984/ Zwart 1996 analysis, when there is topicalization and wh-element fronting). Yet in RIs the verb is always in final position, indicating a lack of both movements. In addition, the verb actually bears an overt affix ('en'). I propose the following analysis of child German RI constructions. When the child wishes to express a verb in a context where they have not yet acquired the appropriate affix, they instead express the features (appropriate to the context) by the use of a null affix. Just as expressing these features on an auxiliary rather than a verb (in finite constructions) leaves the verb with a default "en" affix, expressing the features as a null affix also leaves this default affix on the verb. The null affix is inserted into the Numeration as a separate (from the verb) element and is therefore inserted into head,TP, where it licenses a null subject. The verb is inserted into its 'base' position in VP. At this point there is no reason for the verb to move to head,TP as the null affix has no phonological properties. Therefore it escapes the phonological constraint which dictates that verbs and affixes must be joined at PF.

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[25] If the null subject phenomenon requires an identification procedure as well as this licensing procedure, then this would indicate a difference in adult null subjects in finite constructions and child null subjects in RIs.

[26] Note that this implies that the null subject in RI constructions is pro, just as in finite constructions. This is not surprising, as under this proposal RIs *are* finite constructions.

[27] Whereas with an overt affix, the verb must move to head,TP to adjoin to the affix. This provides an alternative motivation for V-I movement in Italian.

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                    TP
                   /\
         null subj    T
            ▲        /\
            |   null af   VP
            |_____      /\
                    |_____  V
                            |
                         verb+en
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As stipulated previously, I am assuming that the feature driving movement to CP is encoded within the verbal affix; in the case of RIs, the null affix. On the assumption that this null affix cannot move (due to its lack of association with a categorical element, either overt or non-overt), movement to CP is therefore blocked. As this movement cannot take place in RIs, no feature which drives movement to CP can be inserted into the Numeration (otherwise a crash would occur). Under the assumptions given in Section 2, this means that no CP will project,[28] thus saving the derivation.

Having discussed the proposal for RI use by children, we now return to the child data facts presented at the beginning of this section. The fact that children never topicalize in RIs, even in topic-oriented languages (e.g. German), has been explained immediately above. This leaves us with the distinctions in RI use in the development of null subject versus non-null subject languages. In non-null subject languages, the child initially uses a large number of RIs and this RI use decreases gradually over time. I propose that these facts are the result of the individual nature of the acquisition of verbal affixation. Under the proposed model, the verb and its affixes are acquired separately. Also under the proposed model, an RI is produced by the child when they have not acquired the appropriate (to the context) affix for the verb, causing them to rely upon the (default) null affix (which results in the RI construction). So, under this model we would expect the production of RIs to continue until the child stops acquiring affixation individually, i.e. until affixation becomes 'productive'. And under this proposal, affixation becomes 'productive' when the LAD opts for one affixal configuration (in the lexicon) over another.[29] Therefore we would expect RI usage to continue until this choice is made.

Specifically, the model predicts the following pattern of behaviour for a child acquiring a non-null subject language. When the child acquires a new (to them) verb, it is initially acquired with little or none of its affixation. Therefore when the child uses this verb, they will have to resort to the default null affix (as the appropriate affix is unknown), producing an RI construction. As the child acquires the affixation for this verb (presumably a rather quick operation, given the child now has the stem form of the verb to compare to the verb+affix input) this will reduce the use of RIs with this verb, as they now know at least some of the appropriate affixation. Therefore individual verbs will initially be used in RI constructions, go through a brief period of use in both RI and finite constructions (as only some of the affixation is acquired), and then be used only in finite constructions once all of the affixation is acquired.

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[28] It should be noted that although this provides an analysis consistent with that proposed by the truncation analysis of Rizzi (1994) and Haegeman (1995), it has little to do with such proposals. The basis of the truncation analysis is that the lack of CP (by some optional procedure) is responsible for RI constructions. Under my analysis, the lack of CP is the result of the RI phenomenon, not the cause.

[29] In a non-null subject language, the LAD will opt for the lexical representation. Even under this configuration there must be general rules of affixation for novel verbs (i.e. after affixation becomes 'productive'). This may be the result of the rule-based paradigm becoming secondary to the lexical representation (rather than discarded) or simply an example of the 'gross' non-innate generalizations we can make about our language once we have innately acquired a grammatical option.

This is an on-going process, as many new verbs are acquired by the child, requiring them to learn the affixation for each. As we saw in Section 4.1.2, in a non-null subject language the individual verb and affix acquisition continues for an extended period of time as the two affix configurations compete for ascendancy. Therefore we would expect the use of RI constructions to similarly continue for an extended period of time. In the early stages of RI use, the number of verbs lacking an affix for a particular context will be large (as compared to the total number of verbs known), resulting in a large percentage of RI constructions. Over time, the LAD will acquire the affixation for these verbs (eliminating them from potential RI use) but new verbs (initially lacking affixation) are constantly being acquired, creating new possibilities for RI use. However, over time the number of verbs with acquired affixation will come to outnumber those without, leading to a gradual decline in RI use. Finally, at some point the LAD opts for the lexical configuration, affixation becomes 'productive' and general RI use disappears.

For the child acquiring a null subject language, the data facts are very different. Such children initially use a small percentage of RI constructions and this use quickly disappears. Under the proposal being made this would imply that children learning a null subject language acquire affixation more quickly than children learning a non-null subject language and that their affixation becomes 'productive' at an earlier stage. That children learning a null subject language are more attuned to affixation (and thus acquire it more quickly) is not surprising. After all, such a child must resolve the affixation paradigm in order to extract vital content from the adult input, namely the identity of null subjects. For a child learning a non-null subject language, lack of affixal knowledge does not have serious results. They would be left lacking some feature information, but all major constituents and grammatical relations could be resolved. On the other hand, for the child acquiring a null subject language, the identification of affixation is crucial in determining a major constituent (the subject). Therefore it is logical that the LAD would expend more of its resources in the early determination of affixation. That having been said, I readily acknowledge that this is an intuitive argument and in no way follows from the model being proposed.

On the other hand, the quick disappearance of RI constructions in null subject languages does follow from the proposed model. As discussed above, RI use persists until the LAD opts for one affixal configuration over another. In the case of a non-null subject language, there is a lengthy period of competition for ascendancy between the rule base and lexical representation, resulting in an extended period of RI use. In the case of a null subject language, this competition is nearly absent. Almost all verbal affixation (with the exception of some irregular verbs) meets the criteria for a null subject language, therefore very few verbs and their affixation are copied from the rule-base to the lexical representation. This in turn means that the strength of the rule-base will remain consistently high and the strength of the lexical representation consistently low. Therefore the LAD will have evidence from early on that the rule-base is the proper configuration for the language being acquired and will quickly adopt this as the proper configuration. Once the rule-base is chosen by the LAD, individual rules 'collapse' into generally applicable (to all verbs, cf. fn. 21) rules, thus eliminating the need for the null affix (and the RIs it generates).

4.3 Null Subjects in Child Root Infinitives

We now turn to the question of null subject use in child RI constructions. This use differs in both frequency and development from null subject use in finite constructions. We will be

discussing such use in non-null subject languages only, given the lack of data concerning RI null subject use in null subject languages.[30] As we have already discussed the model in detail (and some of its implications within this area), this will be a short discussion.

4.3.1 The Data

- Children use many more null subjects in RIs than in finite constructions (Haegeman 1996, Phillips 1995).
- The percentage of null subjects in RIs remains roughly constant over time whereas null subject use in finite constructions gradually decreases over time (Haegeman 1996, Phillips 1995).

4.3.2 The Proposal

The null subject facts relating to RI constructions derive from the status within the lexicon of the null affix. As previously discussed, the null affix is the default option for affixation when an overt affix for the required verb is not known by the child. Because of its special status, the null affix sits outside of both affixal configurations; i.e. it is an independent element in the lexicon. Because it is an independent element, it is inserted into the Numeration separately from the verb. Verbal affixes which are independent elements in the Numeration are inserted directly into head,TP and therefore license a null subject. As the process of RI construction creation and null subject licensing remains consistent over time, a null affix will always license a null subject. Therefore the percentage of null subjects in RI constructions should remain roughly consistent over time.

On the other hand, the rate of null subjects in finite constructions (in non-null subject languages) does not remain constant over time, but rather gradually decreases. As discussed in Section 4.1.2, this is the result of the child having two possible representations of the verb+affix. If the verb+affix is selected from the rule-base, a null subject is licensed; if selected from the lexical representation, no null subject is possible. Given that a particular verb+affix may co-exist in both configurations even in the early stages of the child's development, it is not surprising that even early on the child is using more null subjects in RI constructions (where a null subject is always licensed) than in finite constructions (where a null subject may or may not be licensed). Over time the language faculty will choose more and more verb+affixes from the lexical representation resulting in less and less opportunities for null subject use (and a gradual decrease in observed null subject use). As an RI construction always licenses a null subject, this developmental trend will not be mirrored in RIs.

5. Conclusion

The purpose of this paper has been to explain the observed development of null subject and RI use in first language acquisition and to do so in a way consistent with the precepts of the MP. The acquisition model presented in this paper accomplishes both. From a simple lexical variation in the configuration of affixal storage we get (by the independently motivated Principle of Procrastination) the difference between adult null subject and non-null subject languages. From the commonly held assumption that verbal affixation is (initially) acquired individually (i.e. for each verb separately) and a new assumption that an affix not yet acquired by the child is represented as a null affix, we get all of the important patterns of child null

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[30] Given the infrequent use of RIs in null subject languages, and the overwhelming use of null subjects in finite constructions, I doubt that such data would lead to any significant issues.

subject and RI development. Thus all variation (both cross linguistic and between adult and child) is concentrated within the lexicon, in keeping with the precepts of the MP. The model also avoids the use of maturation and/or optionality of principles[31] in explaining child linguistic development, making it a rare addition to the list of models which adhere to the Strong Continuity Hypothesis. Although adherence to the Strong Continuity Hypothesis is not strictly required under the MP, it is very much in the same spirit.

A secondary, and unstated, goal of this work has been to take issue with the oft-heard criticism that the MP has no 'breadth', i.e. it lacks cross-modular effects within a single grammar. Under the proposed model the very puzzling child phenomena of null subject and RI use fall out from a very few assumptions about the configuration of the lexicon and how lexical knowledge is acquired. This shows that subtle distinctions within the lexicon can have far-reaching effects within the grammar, which is exactly what the MP proposes. It is unfortunate that much of the attention given the MP has been upon the properties of the (admittedly, poorly understood) Weak/Strong distinction (i.e. verb movement). In my opinion, this ignores the much more interesting possibilities of other feature-based grammatical operations such as (e.g.) Binding and functional category projection. It is my hope that future work concentrating on the lexical properties of language (what features are encoded within a language and how) will help to evaluate the potential of the MP.

Acknowledgements

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[31] The introduction of (initially) optional principles was first proposed (to my knowledge) in Rizzi (1994) as an optional principle of CP projection (before the principle of CP = Root becomes effective). Since then it has become quite popular, cf. Phillips (1995), Roeper & Rohrbacher (1996). However, to my knowledge the notion of a principle being optional for a time has never been justified or defended. Why a principle, an unvarying innate mechanism of grammar, should be temporarily optional is unclear. Maturation at least has a biological counterpart and a discrete application (the principle is either present and in effect or not), optionality has neither.

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