

Partial Constraint Ordering in Child French Syntax

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ABSTRACT

Reanalyzing production data from three French children, we make three basic points. First, we show that tense and agreement inflection follow independent courses of acquisition (in child French). Tense production starts and ends at near-adult levels, but suffers a “dip” in production at the second stage. Agreement develops linearly, going roughly from none to 100% over the same time. This profile suggests an analysis in which, at the second stage, tense and agreement *compete*. Second, using a mechanism of grammatical development based on partial rankings of constraints (in terms of Optimality Theory (Prince & Smolensky 1993)), our analysis successfully predicts, over three stages, the frequency with which children use tensed, agreeing, and nonfinite verbs. Third, looking at several other constructions (including null and postverbal subjects), we find support for our agreement data and our analysis from the frequencies with which agreement and/or subject clitics appear.

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1. Introduction

Within Principles & Parameters approaches to acquisition, there are two prevalent but incompatible views on the development of phrase structure. Briefly, one posits fully articulated structures in child grammars (Strong Continuity or the Full Competence Hypothesis), and the other claims that child grammars represent less than adult grammars do (Weak Continuity or Minimal Trees). In this paper, we argue for a novel way of resolving these apparently conflicting views of syntactic development combining the fundamental insight of Optimality Theory (“OT”, Prince & Smolensky (1993))—i.e. violable, ranked constraints—with the concept of a “partial constraint ordering” borrowed from synchronic and diachronic studies in the phonological literature (Kiparsky (1993), Reynolds (1994), Anttila (1997)). We also present novel results showing the course of acquisition for tense, agreement, and subject position in child French.

According to the Strong Continuity (or Full Competence) approach to phrase structure development, adult-like phrase structure is available to the child from the beginning of syntactic acquisition (see Boser, Lust, Santelmann & Whitman (1992), Hyams (1992), Poeppel & Wexler (1993), and Wexler (1998), among others). The main advantage of such an approach is its simplicity in terms of learnability: since the child at all relevant points of development has the adult grammar, nothing special needs to be said about how the adult grammar is acquired. Apparent non-adult properties of child language are then attributed to interfering factors, e.g. memory limitations, or specific non-adult restrictions on the syntactic structures. The partial ordering proposal put forth here shares several properties with Strong Continuity:

(1) *Strong Continuity properties shared by the partial ordering analysis:*

- a. The input to the syntactic component is adult-like (all of the features corresponding to functional categories are present in the grammar from the beginning of syntactic acquisition).
- b. The syntactic constraints are adult-like (there are no special constraints specific to child language nor does the child learn any new constraints over the course of development).
- c. Variation between stages of a child’s grammar is adult-like (the mechanism of constraint reranking that is needed to account for different child grammars is the same as the mechanism needed to account for historical or sociolinguistic variation in adult grammars).

There are also several differences, many of which are common to both our partial ordering proposal and the “Weak Continuity” approach (also referred to as the Minimal Trees approach; see, e.g., Guilfoyle & Noonan (1992), Vainikka (1993/4), Wijnen (1995), Vainikka & Young-Scholten (1994), Radford (1996). According to Weak

Continuity, phrase structure develops gradually, “from the bottom up,” resulting in representations during intermediate stages of development that often differ from those available to the adult grammar. The following characteristics are shared by the Weak Continuity approach and the partial ordering analysis:

(2) *Weak Continuity properties shared by the partial ordering analysis:*

- a. Each stage of development corresponds to a different grammar (the differing grammars arise from constraint reranking during development).
- b. Minimal amount of phrase structure is posited (this Economy of Structure arises from constraint interaction between markedness constraints and faithfulness constraints).
- c. There exist non-adult-like grammars at early stages of development (such non-adult grammars arise from a general tendency of input-output faithfulness constraints to have an initial low ranking, as has been observed in the acquisition of phonology; see, e.g., Levelt (1994), Demuth (1995), Gnanadesikan (1995), Pater and Paradis (1996)).

The partial ordering analysis presented here shares important characteristics of both the Strong and Weak Continuity approaches, while capturing the most important advantages of each. As with Strong Continuity, the acquisition problem is considerably reduced; under the partial ordering approach, it consists of explaining why faithfulness constraints have an initially low ranking and how their status changes during development (cf. (2c)). As with Weak Continuity, early syntactic structures receive a simplified syntactic analysis. Unlike Weak Continuity, however, the partial ordering analysis is grounded in a learning theory of transitions from the initial state to the adult state.

Child and adult grammars consist of the same (minimally violable) structural markedness constraints (the core of UG). Smolensky (1996) argues that children’s underlying representations (or “inputs”) are essentially the same as adult ones and shows that for unmarked structures to be learnable, the “Faithfulness” constraints (demanding faithful production of the input form) must be ranked below (be less important than) the structural markedness constraints (demanding that productions conform to certain requirements) in the initial state of the grammar. This initial ranking (with Faithfulness ranked low) results in surface forms which are “simplified” (less marked) than those which the children hear. Over time, the child’s constraint ranking changes to match the adult’s: children demote some structural markedness constraints below some Faithfulness constraints, permitting marked structures to appear in their language production (see Tesar & Smolensky (1998) for discussion of learning procedures in strict domination hierarchies, and Boersma (1997), Boersma & Levelt (1999) for discussions of learning partial rankings). While inventories of entirely unmarked structures are most easily processed in production and comprehension, they do not allow for the range of distinctions that adult language expresses. Learning a target grammar rich enough to express such distinctions involves interleaving Faithfulness constraints among structural

markedness constraints (see Legendre et al. 1998 on the claim that Faithfulness constraints are not all at the top of the hierarchy in adult grammars). On this view, reranking is driven by the cognitive and functional role of grammars, i.e., the need to express distinctions.

Note that the partial ordering analysis synthesizes the Strong and Weak Continuity approaches as a *natural* consequence of the mechanisms of OT, arising from the separation of syntactic constraints from their ranking. Under Principles & Parameters approaches, by contrast, the two approaches are explicitly incompatible.

As we will show, partial constraint orderings allow us to predict and explain the actual proportions of “root infinitives” and other structures through the course of development. Under this view, certain constraints “float” or extend over a fixed *range* of other constraints. A floating constraint gives rise to *sets* of rankings, one ranking for each position the floating constraint could take in the hierarchy, which in turn gives rise to a set of possible outputs (winning candidates for each of the rankings). Crucially, each output will be the winning candidate for a certain subset of the rankings. From the number of rankings which produce a given output, we can predict its probability of occurring. Concretely, our model allows us to predict how often, for example, the verb is realized without tense in child speech at a given stage of development. A ranking with a “floating constraint” results in a *partial ordering* of the constraints.

Perhaps the most significant advantage of this view is the ability to predict and explain not only *which* grammatical constructions occur in child language, but also the *frequency* with which they appear. The example we will discuss here is the proportion of “root infinitives” in child language, which varies over the course of development (Phillips (1995)). Traditional syntactic analyses do not lend themselves to even a description of the actual proportions attested (let alone to an explanation), whereas the partial ordering analysis presented here provides an account of (what gives rise to) them.

(3) *Properties unique to the partial ordering analysis:*

- a. A natural synthesis of (otherwise explicitly incompatible) Strong and Weak Continuity.
- b. A description and explanation of proportions of “optional” syntactic phenomena is possible.

In the next section we provide some general background to the crosslinguistic acquisition of grammatical phenomena under study: finite and non-finite verb forms in child language and the distribution of subject NPs. We then turn to a description of our data from child French on finite and non-finite verbs (Section 3), followed by our OT-analysis of these data (Section 4). The distribution of subject NPs in the French data is provided in Section 5, and section 6 concludes the paper.

2. The crosslinguistic development of finiteness and subjects

2.1. Tense and agreement

Inflection on the finite verb is in many languages already acquired by around age 2, as production data from various languages have shown (see e.g. Aksu-Koc & Slobin (1985)

on Turkish, Berman (1985) on Hebrew and Imedadze & Tuite (1992) on Georgian). Verbal inflection can generally be decomposed into tense marking and agreement marking, but most previous studies have not addressed these inflections separately, making it difficult to discern whether they are acquired at different times. We present data from child French which indicate that tense marking appears before agreement marking. The literature contains a modest amount of evidence that this is also true of English and possibly German, which we review briefly below.¹

According to Brown (1973) and de Villiers & de Villiers (1973), past irregular forms reached a 90% level (in obligatory contexts) much earlier than the third person irregular forms (e.g. *has*). For regular inflection, Brown showed the regular past (*-ed*) reaching 90% (of obligatory contexts) slightly before the third person regular suffix (*-s*) was, although de Villiers & de Villiers found them to be acquired at the same time. Ingham (1998) strengthens the case further, based on data from the English-speaking Sophie (age 2;5–3;0), arguing that Tense Phrase (TP) is acquired before Agreement Phrase (AgrP) based on syntactic evidence. Taking the fact that subjects appear before adverbs as evidence for a functional projection into which the subject moves, Ingham identifies that functional projection as TP and not AgrP based on the presence of modals and tense inflection, and on the lack of Nominative case marking and agreement inflection. A similar proposal was made for German by Clahsen (1990) and Clahsen & Penke (1996).²

Determining the status of a French verb with respect to tense and agreement is complicated by the fact that many agreeing forms of the regular verbal paradigm are homophonous (see section 3.3). Pierce (1992), assuming (as we do here) that a clitic subject in French also indicates subject-verb agreement, found that agreement in French is acquired very early, possibly before age 2.³ However, Pierce’s analysis often collapses data spanning several months, making it impossible to discern the mutual order of acquisition of tense and agreement. Ferdinand (1996), using the same data set,⁴ provides a better description of the acquisition of tense and agreement in early French, although she too considers tense and agreement together. Our analysis of the French data

¹ Without further development, our partial ordering analysis has no commitments that make predictions about the relative order of acquisition of the functional projections. If in the functional hierarchy, agreement (AgrP) is always superior to tense (TP), the Weak Continuity approach predicts that tense is universally acquired before agreement. Under our analysis, however, there is a stage of acquisition in which representations with only AgrP and representations with only TP co-exist in the grammatical output. See Section 4.

² There is some dispute about the relative order of acquisition between tense and agreement in German (see, e.g., Meisel (1994)). Some have proposed that apparent early instances of tense marking (at least in Italian and English) actually represent aspect (see Antinucci & Miller 1976, Allen 1995), although Weist et al. (1984) argue that this is not true of early tense morphology in Polish and Finnish. See also Fantuzzi (1996) and Bloom & Harner (1989) for a reply to Weist et al. Further systematic data from a wider variety of languages will be crucial in determining whether tense is universally acquired before agreement. Though not reported here, we are developing an extension of the present approach to several languages to help provide a systematic description of the order of acquisition of functional projections (see Vainikka, Legendre & Todorova (1999)).

³ Pierce’s data come from the following four children: Nathalie 1;9-2;3 and Daniel 1;8-1;11 from the Lightbown corpus (Lightbown 1977); Grégoire (1;9-2;3) and Philippe (2;1-2;3) from the CHILDES database. The data from the latter two children will be discussed at length in this paper.

⁴ Ferdinand’s analysis covers Philippe’s data over a longer period of time (from 2;1 to 2;6).

(discussed in section 3), however, based on a new system of syntactic stages, reveals clearly that tense is acquired before agreement.

2.2. Root infinitives and other NRFs

In addition to producing adult-like finite verbs with tense and agreement marking, young children often produce sentences with a non-finite verb form in a main clause, sentences which are ungrammatical in the adult language. These “Root Infinitives” have posed a challenging problem for current research on the early acquisition of syntax. A primary goal of this paper is to describe and explain this phenomenon in French. We will use the term Non-Finite Root Forms (NRFs) to refer to these non-finite verbs in root contexts because it explicitly encompasses both infinitives and other non-finite forms (such as participles) used as main verbs.⁵ Some examples of NRFs from child French are provided in (4), obtained from the CHILDES Database (MacWhinney & Snow 1985; cf. also Vainikka, Legendre & Todorova (1999)):

- (4) a. Cabinets ouvrir. (Grégoire 1;9.28)
 Restroom open-INF
 ‘(I will) open the restroom (door)’
- b. Ranger Christian (Grégoire 1;10.20)
 Clean.up-INF Christian
 ‘Christian cleans up’
- c. Assis Grégoire (Grégoire 1;10.20)
 Sit.down-PART Grégoire
 ‘Grégoire is sitting down’

Robust occurrences of NRFs (specifically infinitives) have been attested in many different languages, including German (Stern & Stern (1928/1975), Mills (1985), Clahsen (1990), Meisel (1990)), Dutch (de Haan (1987), Weverink (1989)), the Scandinavian languages (Wexler 1998 and references therein) and French (Pierce (1989, 1992), Ferdinand (1996)). On the other hand, in the Romance languages Italian, Spanish and Catalan, NRFs are rare (Guasti (1994), Grinstead (1994)). NRFs are also relatively rare in the Slavic languages of Russian and Polish (Bar-Shalom & Snyder (1997), Wexler (1998)). Modern Greek has no infinitive form in the adult language (Joseph (1983)), so children produce no infinitive NRFs; however, there is a possible NRF form that is overgeneralized in early acquisition (Varlokosta, Vainikka & Rohrbacher (1998)).

The status of NRFs in child English is difficult to determine, given the impoverished verb morphology of the language. Children frequently produce bare verb forms (e.g. *walk*), but these are ambiguous between a finite (non-third-singular) verb and a non-finite verb. Nevertheless, Harris & Wexler (1996) argue that clear cases of non-agreeing (third singular) verbs in English are instances of root infinitives, on the basis of their behavior in negated contexts. Harris & Wexler show that at an early stage forms

⁵ Although the term “Root Infinitive” is sometimes used to refer both to infinitives and other non-finite forms such as participles, the traditional literature on this topic concentrates on infinitives to the exclusion of other non-finite forms.

such as *she go* co-occur with *she not go*, while *she goes* co-occurs at a later stage with *she doesn’t go*. This pattern suggests absence of auxiliary raising at the earlier stage—which is consistent with the general “root infinitive” pattern according to which children’s non-finite verbs do not raise (cf., e.g., Poeppel & Wexler (1993) for German).

The status of NRFs in non-Indo-European languages is almost completely unknown. According to Rhee & Wexler (1995), NRFs (infinitives) occur in Hebrew, but only in the types of sentences which would not also allow null subjects.⁶ Sarma (1994) reports that Tamil does not show NRFs.⁷ In Finnish, an overgeneralization of the third person singular form appears to occur instead of overuse of the infinitive (Anne Vainikka (p.c.)).

Based on the well-studied infinitive NRFs in German, Dutch, French and the Scandinavian languages, we can synthesize a list of common properties, and we make the plausible assumption that these properties carry over to non-infinitive NRFs. A very thorough overview of (infinitive) NRFs provided by Phillips (1995), concludes with the findings summarized in (5):

(5) *Summary of recent findings on properties of (infinitive) NRFs:*

- a. The word order of (infinitive) NRFs shows that they are unmoved verbs (cf., e.g., Poeppel & Wexler (1993) and Rohrbacher & Vainikka (1994)).
- b. Auxiliary verbs do not occur as (infinitive) NRFs (de Haan & Tuijnman (1988), Wexler (1994)).
- c. (Infinitive) NRFs are very likely to co-occur with a null subject (Krämer (1993)).
- d. (Infinitive) NRFs decline gradually with age (Miller (1976)).
- e. The richer the inflectional paradigm of the adult language, the less common (infinitive) NRFs are (Phillips (1995)).

The analyses proposed to account for the NRF phenomenon can be divided into two categories: (i) those assuming a null modal or auxiliary, and (ii) those involving missing or underspecified functional projections. Approaches of either type can account for the properties (5a–c) listed above, while neither approach accounts for properties (5d–e). The classic null modal/auxiliary analysis was proposed in Boser, Lust, Santelmann & Whitman (1992), based on German data; however, later analyses of Germanic data have failed to find semantic support for such a null element in these NRFs (cf. e.g. Wijnen 1995). For early French, Ferdinand (1996) pursues this type of approach as well. The second type of analysis is exemplified by Radford (1990) and Rizzi

⁶ This is taken by Rhee & Wexler as support for the hypothesis that NRFs in child language appear exclusively in languages (or, in the case of Hebrew, contexts within a language) which do not allow null subjects. However, we argue that French is a null subject language with abundant NRFs, which counterexamples the generalization. See also section 5.4.3.

⁷ However, Usha Lakshmanan (p.c.) has reported otherwise.

(1993/4), who propose that NRFs have a reduced syntactic representation (e.g. a bare VP projection) lacking some or all of its functional projections. Pierce's (1992), Wexler's (1994, 1998), Hyams' (1996) proposals also fall into this category, as they involve underspecified, empty, or missing functional projections.

The analysis of child French developed in this paper follows this second general approach; our proposal entails that NRFs lack functional projections. Unlike previous analyses, however, our analysis allows us to capture and explain property (5d), the gradual reduction in NRFs over time. Property (5e), on the other hand, does not follow directly from our approach. It stands to reason that in the languages with richer inflection provides the child with more abundant evidence for the rankings of the constraints concerned with tense and agreement, which could accelerate the acquisition process in this domain. If this is true, we might expect to find NRFs in the child data for languages with rich inflectional paradigms, but only at an earlier point (making them much more difficult to detect). Lacking further evidence, we leave these as speculative remarks.

2.3. Null and overt subjects in acquisition

Ever since the seminal work of Hyams (1986) on the acquisition of Italian and English, it has been well known that children tend to omit subject NPs at early stages of acquisition, regardless of whether the adult language allows subject omission. Various performance-based, pragmatic, or prosodic approaches to this phenomenon have failed to account for its cross-linguistic nature (see e.g. Gerken 1991 who admits that her own prosodic analysis only works for English) or for the finding that subject NPs are omitted more often than other NPs, at least in English-type languages (see Hyams & Wexler (1993) on arguments against the pragmatic approach of Bates (1976) and others).

Within the Principles & Parameters approach, various instantiations of the Null Subject Parameter approach in acquisition have been developed based on the early work of Hyams (1986) and Rizzi (1986). On this view, the Null Subject Parameter has two settings; either subjects are required, as in English, or subjects are optional, as in Italian.⁸ Recent proposals (e.g., Radford (1990), Rizzi (1994)) have typically taken this to be a parameter of a specific functional projection, either requiring an overt subject or allowing non-overt subjects.⁹ During acquisition, this functional projection can be missing, empty, or underspecified, which—even in a non-null subject language—makes it unable to require a subject. This means that the Null Subject Parameter can be set correctly in a child's grammar, but sometimes (i.e. when the relevant functional projection is missing) its setting can be ignored.

Early child French appears to exemplify this behavior, showing non-adult-like utterances which lack any overt subject, often with NRFs. Child French also exhibits another subject-related phenomenon, postverbal subjects (ungrammatical in the adult language) as in (6a).

⁸ More recent work suggests that a binary valued parameter is not descriptively sufficient; for example, Hebrew and Finnish exhibit a third option, allowing subjects to be omitted, but only in the first and second person (Rhee & Wexler (1995), Vainikka & Levy (1999)).

⁹ There are several proposals as to which functional projection is responsible. O'Grady, Peters & Masterson (1989) propose that it is Tense, Roeper & Rohrbacher (1994) propose that it is Agreement, Hoekstra & Hyams (1995) propose that it is Number.

- (6) a. Manger salade Adrien (Grégoire 1;9.10)
eat-INF salad Adrien
'Adrien is eating salad.'

These postverbal subjects have been analyzed by Déprez & Pierce (1993) as being a VP-internal subject with the verb moved leftward over the subject. However, while (6a) is ungrammatical in the adult language, a very similar construction is grammatical, the Right Dislocation (RD) construction illustrated in (6b).

- (6) b. Il est monté Grégoire (Grégoire 1;9.28)
he has gone.up Grégoire
'Grégoire has gone on top.'

An alternative interpretation of utterances like (6a) in child production is that it is actually an attempt to use a RD construction like (6b). This is the view taken by Ferdinand (1996) and Labelle & Valois (1996), who argue on the basis of word order, prosody, and distributional restrictions that postverbal subjects in child French have the same properties as RD constructions in adult French. The data we present below in section 5 provides further support for this interpretation.

3. The acquisition of tense and agreement in French

3.1. PLU stages in early syntax

To begin to analyze syntactic development, it is important to be able to measure a child's stage of development using a metric which is comparable across children and independent of particular syntactic constructions. Age and MLU (Mean Length of Utterance) are well known to be unreliable, but the PLU (Predominant Length of Utterance) measure developed elsewhere (Vainikka, Legendre & Todorova (1999)) has been very effective in isolating qualitative shifts in development. The stages represented in our data are defined below (for further details on the PLU measure and on earlier stages, see the Appendix.). PLU stages are defined over two dimensions, the primary stage reflecting the number of words in the majority of a child's utterance, and the secondary stage reflecting the proportion of utterances containing a verb.

(7) PLU stages in our data:

Stage 3: "Two-word" stage

- The one-word sentence type no longer clearly predominates (i.e. fewer than 60% of all utterances are one-word utterances)
- Of the three sentence types, the multi-word sentence type is not the most common one

Stage 4: Predominantly multi-word stage

- Of the three sentence types, the multi-word sentence type is the most common one

- (8) *Secondary PLU stages in our data*
 Secondary stage b: 11%–60% of all utterances contain a verb
 Secondary stage c: more than 60% of all utterances contain a verb

3.2. Subject profiles

We have examined the speech production data from three French children, Grégoire, Philippe, and Stéphane, whose early files are available on the CHILDES Database (MacWhinney & Snow 1985). All files were analyzed by hand and classified into PLU stages. The data obtained from Grégoire's and Stéphane's files had the greatest developmental spread, spanning PLU stages 3b, 4b, and 4c. Philippe's data were found to instantiate stages 4b and 4c.¹⁰ The profile for each child is given below.

Table 1. Children, files, and ages included in this study

a. Grégoire (Champaud corpus)				
Files	Age	PLU stage	Total # of Utterances	
1–4	1;9–1;10	3b	874	
5–7	2;0–2;3	4b	732	
8–10	2;5	4c	1038	
b. Stéphane (Rondal 1985)				
Files	Age	PLU stage	Total # of Utterances	
1–3	2;2–2;3	3b	644	
6a/6f/8a	2;6–2;8	4b	688	
25b	3;3	4c	257	
c. Philippe (Suppes, Smith & Leveillé 1973)				
Files	Age	PLU stage	Total # of Utterances	
1–3	2;1–2;2	4b	898	
11	2;6	4c	387	

The files were further analyzed with respect to the development of finite inflection in the verbal system, the occurrences of NRFs, and the type and positioning of subjects. Before presenting our findings, we turn to a brief overview of the verbal inflectional paradigm of French to illustrate the specific challenges it presents to the researcher interested in the development of finiteness and to point out the methodological decisions we have made in the analysis of the data.

3.3. The tense and agreement paradigms in adult French

The overwhelming majority of French verbs (90%; Dietiker (1978)) belong to the regular conjugation whose infinitive ends in '-er'. The present tense agreement paradigm for this conjugation is illustrated below for the verb *danser* 'to dance':

(9) *The -er conjugation (French)*

		singular	phonetic		plural	phonetic
1.	(je)	danse	[dās]	(nous)	danseons	[dāsō]
2.	(tu)	danse s	[dās]	(vous)	dansez	[dāse]
3.	(il, elle, on)	danse	[dās]	(ils, elles)	danse nt	[dās]

As can be seen from the phonetic transcriptions given above, all present tense forms of the verb except the first and second person plural are homophonous. This means that except for the first and second person plural, and in the absence of an overt subject, it cannot be determined whether a verb form produced by the child indeed carries correct agreement. Worse, the two identifiable forms in the plural are usually the last to appear in the course of acquisition, which renders them relatively uninformative for the purpose of studying the earliest stages of the development.¹¹ Fortunately, agreement in French is not only realized in the verbal endings; subject clitics also appear to be overt instantiations of agreement. While this view of subject clitics is not universally accepted, it has been proposed and argued for by, e.g., Lambrecht (1981), Suñer (1988), Roberge (1990), Auger (1994), Legendre (1999). In the acquisition literature, Pierce (1992) reports that over 95% of the subject clitics produced by the four children she studied occurred with finite verbs, while this correlation does not hold for strong (non-clitic) subject pronouns or lexical NP subjects.¹² The data we present here supports this interpretation as well (see Section 5). Accordingly, we take subject clitics to be an overt realization of agreement, a reliable diagnostic for finiteness.¹³ Of course, we also count verbs with a finite morphological shape which occur with an appropriate overt subject as agreeing.

Irregular verbs display greater diversity in inflectional endings, including the auxiliaries *être* 'to be', *aller* 'to go', and *avoir* 'to have', used very frequently both as main verbs and in the periphrastic tenses. The agreement paradigms for these verbs contain five distinct forms (only the second and the third person singular are homophonous), which are easily identifiable.

Turning to tense inflection, French has two past and two future tenses. Of these, the *passé composé*, or perfect past, and the *future proche*, or near future, are formed with an auxiliary verb (*avoir* or *aller*, respectively) combined with a non-finite form of the verb (the past participle or the infinitive, respectively).¹⁴ Agreement in these tenses is carried on the auxiliary verb.¹⁵ The periphrastic past and future tense paradigms for the verb *dancer* 'to dance' are given below.

¹¹ In fact, one of the two identifiable forms, the 2nd person plural (*nous*) form, is becoming very rare in spoken adult French as well; it is often replaced by the third person impersonal *on*, which takes 3rd person singular agreement.

¹² Pierce also found that subject clitic pronouns were never dislocated, which she attributes to their fixed attachment to the left of an inflectional (INFL) head. This claim is further evidence for the contingency between subject clitics and finiteness.

¹³ This also implies that adult French sentences where the only indication of the subject is a subject clitic should be analyzed as in fact having a null subject (the clitic being subject agreement). We will have quite a bit more to say on this issue below (see, in particular, Section 5)

¹⁴ A small class of verbs, a subset of the unaccusatives, form the *passé composé* with inflected forms of the auxiliary *être* instead of with *avoir*.

¹⁵ The remaining finite tenses, the imperfective past and the distant future, are synthetic. The periphrastic tenses are more frequent in spoken French, and are the first to be used by the child acquiring the tense system of French. Accordingly, we focus on the periphrastic tenses here.

¹⁰ We have only analyzed one file from Philippe's stage 4c, Philippe 11, but there are several files after this which have yet to be analyzed.

- (10) *Passé composé* ‘danced’
- | | <u>singular</u> | <u>phonetic</u> | <u>plural</u> | <u>phonetic</u> |
|----|--------------------|-----------------|-------------------------|-----------------|
| 1. | j’ ai dansé | [e dāse] | nous avons dansé | [avō dāse] |
| 2. | tu as dansé | [a dāse] | vous avez dansé | [ave dāse] |
| 3. | il a dansé | [a dāse] | ils ont dansé | [ōn dāse] |
- (11) *Future Proche* ‘going to dance’
- | | <u>singular</u> | <u>phonetic</u> | <u>plural</u> | <u>phonetic</u> |
|----|-----------------------|-----------------|---------------------------|-----------------|
| 1. | je vais danser | [ve dāse] | nous allons danser | [alōn dāse] |
| 2. | tu vas danser | [va dāse] | vous allez danser | [ale dāse] |
| 3. | elle va danser | [va dāse] | elles vont danser | [vōn dāse] |

It is worth pointing out that a difficulty in coding tense can arise from the widespread tendency of young children to omit auxiliaries in their production. A past participle without an auxiliary can have an adjectival use in adult French, and in the absence of an auxiliary in a child utterance it is nearly impossible to determine which use was intended by the child (adjective, main verb, or past tense). Similarly, some bare infinitives might be instances of the future tense lacking an auxiliary, or they might be true NRFs. We have decided to code only forms of the verb consisting of both the auxiliary and the participle/infinitive as instantiations of the respective tense. Participles and infinitives used without the auxiliary were coded as non-finite forms.

3.4. Development of tense and agreement

We calculated the proportions of forms morphologically inflected for tense and/or agreement out of the total number of verbs produced by each child at each attested PLU stage. It is well-known that the third person singular and present tense forms are the first to appear in child productions, and for a time may be the only finite forms produced by the child. Furthermore, young children tend to overuse third person singular and present tense forms. This suggests that these serve as “default” forms, which makes it unclear whether a third person singular verb is truly agreeing with a third person singular (3sg) subject or whether it instead simply lacks agreement and is taking on a “anywhere” form (see also Ferdinand (1996)). Accordingly, to determine the proportion of children’s verbs which actually show agreement (and not a default form), we have counted only non-3sg and non-present forms as unambiguously showing agreement,¹⁶ and we present our results in these terms.

Tables 2 and 3 below summarize our findings relating to the use of tense and agreement, respectively, by each child.¹⁷ The numbers in Table 2 show how many verbs unambiguously marked for tense were non-present forms. Note that verbs which are “unambiguously marked for tense” include verbs marked with present tense inflection, some proportion of which (following the discussion above) may be “default” forms and not truly realizing present tense. By looking at the proportion of tensed verbs that appear

¹⁶ This is essentially in accord with Meisel’s (1990) definition of ‘acquisition of an inflectional paradigm,’ according to which a paradigm is not considered to have been acquired unless at least two distinct affixes from that paradigm are productively used by the child.

¹⁷ All of the data we report in this paper excludes imperative verbs from consideration.

in non-present tense, we can estimate how many of the present tense forms represented a “default” tense marking by comparing it with an “expected” rate of non-present tense forms (see the discussion below). The numbers in Table 3 are exactly analogous to those in Table 2 except they describe use of non-3sg agreement instead of non-present tense. The combined results are graphed to illustrate the development of tense and agreement across the attested PLU stages:

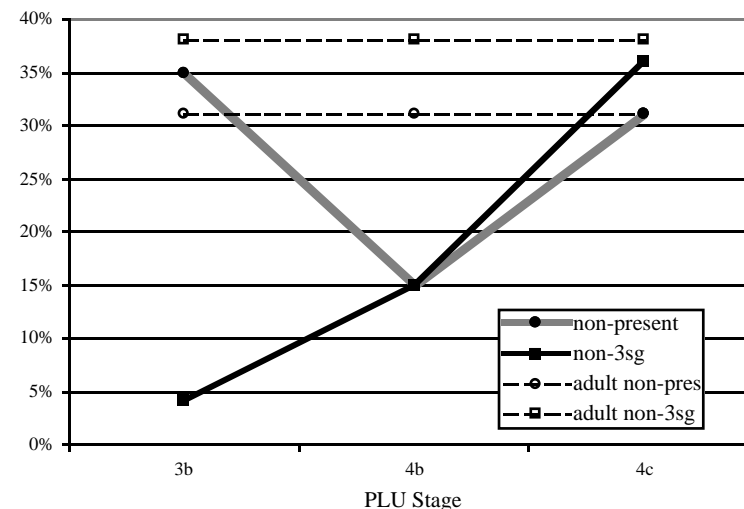
Table 2: Verbs with non-present tense inflection (out of unambiguously tensed verbs)

Child	Stage 3b	Stage 4b	Stage 4c
Grégoire	34% (66/194)	21% (44/212)	32% (205/646)
Stéphane	37% (19/52)	10% (17/179)	25% (34/135)
Philippe		13% (44/334)	30% (74/246)
Weighted average	35% (85/246)	15% (105/725)	31% (313/1027)

Table 3: Verbs with non-3sg agreement inflection (out of unambiguously agreeing verbs)

Child	Stage 3b	Stage 4b	Stage 4c
Grégoire	3% (5/156)	19% (33/172)	34% (221/650)
Stéphane	5% (2/43)	12% (13/109)	38% (51/133)
Philippe		15% (44/303)	40% (98/246)
Weighted average	4% (7/199)	15% (90/584)	36% (370/1029)

Figure 1. Tense and Agreement



Because we are looking at percentages of overall utterances that contain non-present tense forms in Table 2, we do not ever expect these figures to reach 100%. To understand what level of production these percentages indicate, we need to know what *adult-like* production of non-present tense forms is. To ascertain this, we ran a similar count on the adult utterances in two of the CHILDES files (Philippe 11 and Grégoire 9) in order to get at least a reasonable estimate of what adult use of non-3sg and non-present forms is. The results are given below in Table 4.

Table 4: Adult usage of non-3sg and non-present tense

Adults from file	non-present	non-3sg
Grégoire 9	28% (184/661)	35% (231/659)
Philippe 11	34% (173/507)	41% (206/506)
Average	31% (357/1168)	38% (437/1165)

Assuming that adults always produce finite verbs and produce non-present tense verbs roughly 31% of the time, we can reasonably take the 35% production of non-present tense (of tensed verbs) at stage 3b to be an adult-like level of production. On the other hand, we can also reasonably assume that the 4% production of non-3sg (of agreeing verbs) at stage 3b indicates that the children are not realizing agreement and are using a default (3sg) form.

As can be seen from Tables 2 and 3 and Figure 1 above, tense and agreement appear to undergo distinct patterns of development. At stage 3b, the proportion of agreeing forms in the children's speech is negligible—it is clear that they are not yet using agreement. At the same time, the proportion of tensed forms is sufficiently high to allow us to conclude that tense is already in regular use. At the subsequent stage, 4b, agreement emerges at a significant, though not yet adult-like, level. Notice that at stage 4b, tense suffers a dip in production compared to stage 3b. This interesting correlation between increased use of agreeing forms and decreased use of tense forms suggests a temporary competition between the two before they both stabilize at the subsequent stage, 4c. We expand on this idea further in our analysis of the tense and agreement data in section 4.

The dissociation between tense and agreement is especially striking in the child production of periphrastic tenses; throughout stage 3b, Grégoire and Stéphane produce numerous instances of the past and future tenses; however, the auxiliary that appears in these utterances is always 3rd person singular:

- (12) a. Est tombé puzzle. (Grégoire 1;9.18)
 is fallen puzzle
 'The puzzle has fallen down.'
- b. Papa et Maman est parti. (Grégoire 2;0.5)
 Father and Mother is gone
 'Mother and Father have gone.'

Broadly speaking, our results support and expand previously reported data from child French. However, our findings cannot be directly compared with findings from the existing literature for two reasons. First, our division into PLU stages provides a fine-grained observation of the trends in the development of tense and agreement, whereas previous researchers (e.g., Pierce (1992), Ferdinand (1996)) report their results using such arbitrary markers as CHILDES file number or age, and tend to carry out their analyses over a collapsed data set from the entire corpus of the child studied, which frequently spans several months. Thus, when Pierce (1992) claims that her subjects have a knowledge of finiteness at a very young age, it is conceivable that the data from the later files in her study are concealing an earlier stage where such knowledge is still absent.

In addition, all previous work on the acquisition of French has used 'finiteness' as a cover term encompassing both tense and agreement inflection, precluding any systematic study of the course of these developments individually.¹⁸ However, we have seen above that tense and agreement do follow different courses of development: agreement develops in an incremental linear fashion, not acquired at stage 3b but controlled by stage 4c, while tense develops in a U-shaped curve, controlled at stages 3b and 4c, but yet often omitted at stage 4b. Our findings thus strongly suggest that these two grammatical categories are independent.

3.5. Non-finite root forms

Turning now to NRFs, we found that children produce steadily fewer of these as their age/PLU stage increases. Our findings are illustrated in Table 5 and the accompanying graph below.¹⁹

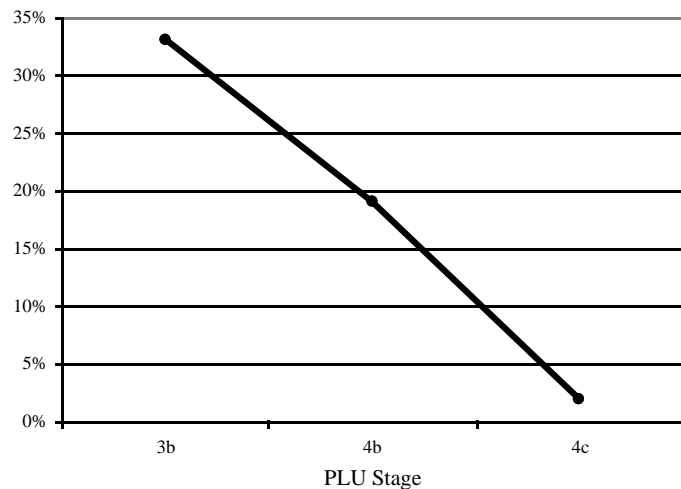
Table 5: Proportion of non-finite root forms (NRFs) of all verbs

Child	Stage 3b	Stage 4b	Stage 4c
Grégoire	28% (83/297)	18% (51/287)	1% (7/711)
Stéphane	48% (51/106)	13% (27/205)	2% (3/152)
Philippe		22% (105/476)	6% (14/250)
Weighted average	33% (134/403)	19% (183/968)	2% (24/1113)

¹⁸ Often, this is theoretically motivated. For example, Ferdinand (1996) assumes that an agreeing verb must also be representing tense, given a rigid hierarchy of functional projections under which TP is subordinate to AgrP and the assumption that functional projections can't be "skipped."

¹⁹ It is likely that an earlier stage (PLU Stage 2) can be observed, where the proportions of NRFs are much higher (and those of tensed and agreeing forms much lower) than the ones attested in our data. Although Stage 2 was not instantiated in our data, we have observed such a stage in the utterances of the Swedish children Harry and Markus, who produced 68% NRFs at that stage. Furthermore, the French child Nathalie, whose production was studied by Pierce (1989) and Ferdinand (1996), is reported to produce only 4% finite verbs and almost no overt subjects in her earliest file (age 1;9.3). It is possible that Nathalie's production reflects the syntax at Stage 2; however, we have been unable to study this child since her data is not publicly available.

Figure 2. Proportion of non-finite root forms of all verbs



Comparing the graph above to the previous graph of agreement, we can see that the reduction in the use of NRFs over time appears to be inversely correlated with the development of agreement: in a sense, the NRF pattern is the mirror image of the pattern we have found for agreement (recall Table 3). By contrast, the decrease in NRFs does not appear to correlate with the development of tense; compare the graph above to the previous graph of tense (Figure 1). This observation is important in light of existing claims that relate the occurrence of root infinitives to the development of Tense. For example, Wexler (1994) has proposed that the underspecification of Tense is responsible for the presence of root infinitives in young children’s speech. Our findings suggest at the very least that the development of agreement is also involved; the profile of NRFs is not directly linked to the profile of realization of tense.²⁰

Again, our data are not easy to compare with previous reports in the acquisition literature. While Pierce (1992) notes the presence of non-finite forms in her subjects’ speech and even proposes a syntactic representation for these utterances, she does not provide any numbers to illustrate the extent to which NRFs are used by children or any developmental trends there may be. Ferdinand (1996) reports the proportions of finite and non-finite forms out of the combined files for her three subjects. She found that roughly between one quarter to one third of each child’s utterances contained a non-finite main

²⁰ The finding that both tense and agreement contribute to a verb’s status as an NRF is similar, but not identical, to the assumption made in the “Agr/Tense Omission Model” (ATOM) (Schütze & Wexler (1996), Wexler (1998)). Under ATOM, an NRF is considered to be any verb which doesn’t simultaneously realize *both* tense and agreement, whereas under our approach here, an NRF only arises when a verb realizes *neither* tense *nor* agreement.

verb. Again, it is impossible to determine whether these were distributed evenly, or clustered in the very early files from among those that she analyzed.

4. An OT analysis of the development of finiteness

We argue that an optimality-theoretic analysis which exploits three formal properties of OT—(i) competition (for a single projection), (ii) constraint re-ranking, and (iii) partial ordering of constraints at any stage of the developing grammar—straightforwardly accounts for the developmental course outlined above as well as the observed percentages summarized in section 3.4. We briefly introduce the general principles of Optimality Theory (Prince and Smolensky, 1993), followed by an analysis of the development of finiteness. Our discussion of empty and postverbal subjects is delayed until Section 5.

4.1. Fundamentals of Optimality Theory

Optimality Theory is a formal theory of constraint interaction in UG (see Legendre, to appear for an introduction to its application in syntax). Its main hypotheses are:

- (13) (i) UG is an optimizing system of universal well-formedness constraints on linguistic forms.
- (ii) Well-formedness constraints are simple and general. They routinely come into conflict and are surface-violated.
- (iii) Conflicts are resolved through hierarchical rankings of constraints, which are language-particular. The effect of a given constraint is determined by its ranking relative to other constraints, fixed on a language-particular basis.
- (iv) Candidates are evaluated against a *strictly ranked* set of constraints; for every two constraints C_1 and C_2 , either C_1 outranks C_2 or C_2 outranks C_1 .
- (v) Alternative structural realizations of an input compete. The most harmonic structural realization—the one which best satisfies, or minimally violates, the full set of ranked constraints in a given language—is the optimal one. Only the optimal structure is grammatical.
- (vi) Every competition yields an optimal output.

OT is an architecture for mapping an input to an output. The *input* to an optimization in syntax may be assumed to consist of predicate-argument structure, functional features, and lexical items. For a given input, the grammar generates and evaluates a potentially infinite set of output candidates—the *candidate set*—which consists of alternative structural descriptions of that input. The component of the grammar responsible for generating the candidate set corresponding to a particular input is called *Gen* (for Generator). In syntax, we assume that *Gen* generates only candidate structures which respect basic X' theory principles. The constraint ranking constitutes the language-

particular component of the grammar, that is, it is the only component that admits variation, while the set of constraints itself is claimed to be universal.

A subset of the constraints in an OT grammar are the family of “Faithfulness” constraints, which limit differences between the input and the output. They require the output to express all and only the properties of the input, and often stand in conflict with “markedness” constraints that make demands on the structure of the output. Notice that the faithfulness constraints are crucial to the OT conception, since without them any input structure would be mapped to the same, least marked, output.

As stated in (13iv), candidate structures are evaluated against a strictly ranked set of constraints, meaning that between any two constraints, one has priority over the other. We interpret this as a requirement on each *evaluation* rather than on each *grammar*, however. By allowing a single grammar to encode several possible rankings (by allowing *partial rankings* in the grammar, which are fixed in some possibly different strict order before each evaluation), we gain a means to explain the phenomenon of variation, e.g., across sociolects, across the diachronic evolution of a language, or—as is particularly relevant here—over the course of language acquisition. This idea has also been pursued by others in studies of variation in phonology and morphology as well as of learnability (Kiparsky (1993), Reynolds (1994), Nagy & Reynolds (1997), Anttila (1997), Boersma (1997), Boersma & Levelt (1999)). Behind this approach is the recognition that (grammar-level) partial constraint rankings determine sets of strict rankings (consistent with (13iv)), each of which can yield a potentially different optimal output. This particular interpretation of constraint rankings is exploited in the proposed analysis below. We will show that the developing grammar at any stage is specified by a partial ordering of constraints.

4.2. Development of finiteness: General analysis

Informally, the main idea is the following: At Stage 3b, constraints requiring realization of finiteness compete with constraints on economy of structure, sometimes resulting in finite verbs and sometimes resulting in NRFs. At Stage 4b, tense and agreement compete for a single structural position; a functional projection which can realize the features either of tense or of agreement (but not both).²¹ At Stage 4c, two positions are available, allowing both tense and agreement features to be realized without competition. Formally, the constraints which require parsing (realization) of the functional features (tense, agreement) rise in the ranking relative to a fixed hierarchy of constraints penalizing structure (*STRUCTURE, Prince and Smolensky (1993)). Variation in the optimal outcome arises from a constraint’s ranking being specified by a range (Reynolds (1994), Nagy & Reynolds (1997)).

Over the course of development of finiteness, the constraint re-ranking has the following profile.²²

²¹ We also assume that these features can only be realized on a functional head.

²² Recall that the stages are determined by the PLU measure of the child’s transcripts, introduced previously in section 3.1 and discussed in more detail in the Appendix.

(14) *Re-rankings*:

- Stage 3b: Ranking sometimes permits a single functional projection, which, when present, invariably realizes tense.
- Stage 4b: Ranking permits a single functional projection; variation in ranking permits either tense or agreement to be realized.
- Stage 4c: Ranking permits two functional projections, both tense and agreement are realized.

Constraints requiring parsing of functional features are Faithfulness constraints. They ensure that what is expressed (the output of the grammar) differs minimally from what is intended (the input to the grammar, which we assume does contain the functional features like tense and agreement). Constraints prohibiting structure, on the other hand, are economy constraints belonging to the superfamily of Markedness constraints. The present study supports the general picture emerging from studies of acquisition of phonology (e.g., Levelt (1994), Demuth (1995), Gnanadesikan (1995), Pater and Paradis (1996)) vs. adult phonology and adult syntax. In adult grammars, Faithfulness constraints often dominate Markedness constraints. In early child grammars, the reverse often holds, with Markedness constraints dominating Faithfulness constraints. From this perspective, the process of acquisition consists in gradual raising (re-ranking) of Faithfulness constraints up through the constraint hierarchy. The present study contributes evidence that this proceeds via constraints “floating” over a certain range (i.e., yielding a partial constraint ordering), rather than through abrupt and absolute constraint re-ranking.

Our analysis makes use of the following Economy of Structure constraints (*STRUCTURE family, Prince and Smolensky (1993)).

(15) *Economy of Structure constraints*

- *F: No functional heads
- *F²: No pairs of functional heads

The *F constraint is violated by any candidate structure which has a functional projection, be it Tense or Agreement. *F is only satisfied by non-finite verbs, which, by assumption, have no functional projections realizing tense or agreement features. The *F² constraint is violated by any structure which has two functional projections, i.e. by structures in which both tense and agreement features are parsed.

*F² is invariably ranked above *F, because they are part of a Power Hierarchy (Smolensky (1995), Legendre et al. (1998)); F² is a local conjunction of two instances of *F (*F² = *F&*F) and a local conjunction invariably outranks the individual conjoined constraints. This formalizes the intuition we wish to capture, that having two functional heads is more costly than having one, which gives us the fixed ranking: *F² >> *F.

The Faithfulness constraints we rely on are those given in (16).

(16) *Faithfulness constraints* (PARSE family (Prince & Smolensky (1993)))

PARSET: Parse Tense

PARSEA: Parse Agreement

PARSET and PARSEA require realization of tense and agreement, respectively. PARSET is violated by any untensed form while PARSEA is violated by any non-agreeing form.

There are four candidate structures relevant to this analysis (we assume that the input to every evaluation has tense and agreement features subject to Faithfulness constraints). They are given below in (17) along with examples and the constraints each satisfies and violates.

(17) *Candidates for input containing past tense and 1st singular agreement features:*

- a. VP
example: *danser* (NRF)
violates: PARSEA, PARSET
satisfies: *F, *F²
- b. TP
T[PAST] VP
example: *a dansé* (3sg, past)
violates: PARSEA, *F
satisfies: PARSET, *F²
- c. AgrP
Agr[1SG] VP
example: *je danse* (1sg, present)
violates: PARSET, *F
satisfies: PARSEA, *F²
- d. AgrP
Agr[1SG] TP
T[PAST] VP
example: *j'ai dansé* (1sg, past)
violates: *F (twice), *F²
satisfies: PARSEA, PARSET

The key to our proposal is the ability of the Faithfulness constraints to “float” over a certain range in the ranking (unlike the *STRUCTURE constraints discussed above, which remain fixed in their relative ranking) during the course of development. This is illustrated in (18), where PARSET ranges from below *F to above *F. A partial ordering like (18a) translates into the set of two rankings in (18b).

- (18) a. Partial ordering:
Fixed *F² >> *F
Floating: PARSET —————
=>
b. Set of rankings:
i. *F² >> *F >> PARSET winning candidate: untensed verb
ii. *F² >> PARSET >> *F winning candidate: tensed verb

We see that a different candidate structure wins under each of the rankings in (18b); under ranking (18bi), a candidate with a nonfinite verb wins, while under ranking (18bii) a candidate with a tensed verb (that is, with a functional projection to realize tense features). For any given evaluation, a grammar with the partial ordering in (18a) will use one of the rankings, either (18bi) or (18bii), to determine the optimal candidate. Thus, in any given evaluation, either a tensed verb or an untensed verb will win the competition. We make the further assumption that either of the two rankings has an equal chance of being called upon during an evaluation. This means that there is a 50% chance that ranking (18bi) will be used, yielding an untensed verb as the optimal candidate. To put it another way, we expect to see the untensed candidate 50% of the time (and to see the tensed candidate the other 50% of the time). Under this hypothesis, the model allows us to predict not only *that* we see variation between A and B in the developing grammar, but also *with what frequency* we will see each.²³

This example illustrates well the nature of the conflict underlying the development of finiteness. Functional features can only be parsed (satisfying the Faithfulness constraints PARSET and/or PARSEA) if the Economy of Structure constraints (*F and possibly *F²) are violated. The conflict is resolved by ranking. If Economy of Structure dominates Faithfulness, then functional features cannot be parsed and the optimal candidate will be a nonfinite form acting as a main verb (an NRF). If Faithfulness dominates Economy of Structure, then functional features will be parsed into a functional head, yielding a finite form as the optimal candidate (recall that *either* tensed *or* agreeing forms count as “finite” under our terminology). The actual course of development of finiteness we propose here is an expanded version of this basic re-ranking schema. We will see that the PARSE constraints advance separately, at one point (Stage 3) with PARSET invariably outranking PARSEA with the result that the observed finite forms will be tensed, but non-agreeing. In the following section, we will work through our analysis of the development of finiteness stage-by-stage.

4.3. Development of finiteness: A stage-by-stage analysis

We begin with stage 3b, where the rankings are as in (19), yielding the 3 rankings given in (20).

- (19) *Stage 3*
Fixed *F² >> *F
Floating: PARSET —————
PARSEA —————

²³ An alternative way to interpret “floating” constraints of this sort would be to suppose that, while various rankings are possible given the range over which the constraints float, some are more likely than others. For example, it might be that a constraint is more likely to be evaluated in the ranking at the center of its range than near the edges of its range (a version of such an approach is explored by Boersma (1997)). We have not explored this alternative in any detail, but it is also not clear that either interpretation can lay claim to being the obvious “null hypothesis.” We therefore pursue the view that each possible ranking is equiprobable, but leave open the possibility that a view based on a normal distribution over a range might also be tenable. As we will see, our assumptions yield a tight match between predicted and observed percentages.

(20) Stage 3:

- a. PARSET >> *F² >> *F >> PARSEA yields: tensed
- b. *F² >> PARSET >> *F >> PARSEA yields: tensed
- c. *F² >> *F >> PARSET >> PARSEA yields: NRF

At stage 3b, PARSET spans a range allowing it to sometimes outrank *F², and sometimes be outranked by *F. PARSEA is always outranked by both PARSET and PARSEA.

Of the three rankings in (20), only (20c) results in an NRF; under this ranking, it is better not to have a functional projection (satisfying *F) than to parse tense (which would satisfy PARSET) or agreement (which would satisfy PARSEA). This means that we expect NRFs to comprise one-third of a child's utterances at Stage 3b.

The other two rankings yield a tensed form, but without agreement. Under these two rankings, PARSET outranks *F, making it more important to realize tense in a functional projection than to avoid functional projections. Neither ranking yields an agreeing form because this would require two functional projections, and PARSEA is under both rankings outranked by *F². Thus, we expect tensed forms (without agreement) to comprise the other two-thirds of a child's utterances at stage 3b.

What we actually observed (recall Table 5) was 33% NRFs and 67% finite forms, exactly our prediction. Of the finite forms, we counted only non-present forms, and found 35% such forms (Table 2). Recall that when this is compared to the adult production of 31% non-present forms (Table 4), it appears that all finite utterances the children produce at Stage 3 are tensed. Looking at agreement (Table 3), we found very few (4%) non-3sg forms, compared to an adult rate of 38%. So, idealizing a little, we find that all finite child utterances at Stage 3 are tensed but non-agreeing, as predicted.

In Stage 4b, illustrated in (21), PARSEA advances to a position equal to PARSET; both now sometimes outrank *F², and can sometimes be outranked by *F. Moreover, in some rankings PARSET outranks PARSEA, while in others PARSEA outranks PARSET. These ranges yield the 12 rankings in (22).²⁴

(21) Stage 4b:

Fixed		*F ² >> *F
Floating:	PARSET	
	PARSEA	

²⁴ To avoid confusion, a word about the "psychological validity" may be in order. Although a higher degree of constraint overlap results in a larger number of possible rankings for each evaluation, this does not in any way mean that the child must "exert more effort to choose" when there is a large number of possible rankings than when there is a small number of possible rankings. The number of possible rankings is an system-external fact. We could use the metaphor of choosing a random number for each constraint, to determine at which point in its range it will be for the purposes of the ranking. Under this metaphor, the child's task is to choose a random number for each constraint before each evaluation, a task which doesn't change no matter how much or how little constraints overlap with one another. Using the constraint ranges, we can look in from the outside and compute which rankings could result and what the individual likelihood is of each, but the number of possibilities we determine this way has no effect on the procedure required to fix a ranking; for 4 constraints, there are always 4 random numbers to choose, whether this could result in 2, 3, or 12 different possible rankings.

(22) Stage 4b:

- a. PARSET >> PARSEA >> *F² >> *F yields: tensed and agreeing
- b. PARSEA >> PARSET >> *F² >> *F yields: tensed and agreeing
- c. *F² >> *F >> PARSET >> PARSEA yields: NRF
- d. *F² >> *F >> PARSEA >> PARSET yields: NRF
- e. *F² >> PARSET >> PARSEA >> *F yields: tensed
- f. *F² >> PARSEA >> PARSET >> *F yields: agreeing
- g. PARSET >> *F² >> PARSEA >> *F yields: tensed
- h. PARSEA >> *F² >> PARSET >> *F yields: agreeing
- i. PARSET >> *F² >> *F >> PARSEA yields: tensed
- j. PARSEA >> *F² >> *F >> PARSET yields: agreeing
- k. *F² >> PARSET >> *F >> PARSEA yields: tensed
- l. *F² >> PARSEA >> *F >> PARSET yields: agreeing

First, notice that two of these rankings, (22a–b), yield verb forms which are both tensed and agreeing (that is, essentially adult forms), since under those rankings it is more important to realize both tense and agreement than it is to avoid having two functional projections. Another two rankings, (22c–d), yield NRFs, since under these rankings it is more important not to have any functional projections than it is to realize either tense or agreement. The rest of the rankings (22e–l) yield finite forms which are either tensed (when PARSET outranks PARSEA) or agreeing (when PARSEA outranks PARSET), but not both.

This predicts, then, that only 17% (2 out of 12) of the verb forms uttered at Stage 4b should be NRFs. We observed (Table 5) 19% NRFs, very close to the prediction. Of the remaining verbs, all finite, 17% are predicted to be adult-like (with both tense and agreement), the remaining forms having only one or the other (33% of them with only tense, 33% of them with only agreement). Again, this lines up well with the observations. and of the finite verbs we predict 19% non-present forms and observe 15% (Tables 2 and 4), and predict 23% non-3sg forms and observe 15% (Tables 3 and 4).²⁵

Compare stage 4b to stage 3b with respect to the realization of tense. Notice that, while at stage 3b, 100% of the finite utterances were tensed, at stage 4b only 60% (6 out of 10) of the finite forms are tensed. In other words, we predict (and in fact observe) a "dip" in the child's production of tensed forms. If children were simply "learning tense" (speaking vaguely), we would not have expected them to get worse at any point during the course of development. The proposed analysis provides an explanation for this otherwise puzzling fact. Back in stage 3b, PARSEA was ranked so low as to ensure that tense features were realized in the single functional projection allowed. What has happened at stage 4b is that the tense features and agreement features now compete for realization in the single functional projection available. Since tense sometimes (in fact, half the time) loses to agreement, we predict the observed dip in the proportion of tensed forms, which coincides with an increase in the proportion of agreeing forms.

²⁵ The predictions here are again scaled by the "expected" proportion of non-present forms and non-3sg forms based on what we found in the observed adult speech (Table 4). 60% of forms are predicted to be tensed by our analysis, and adults produce 31% non-present forms, so we expect to find 60%×31% = 19% of (finite) child utterances to be in a non-present form. Similarly, since adults produce 38% non-3sg forms, we expect to find 60%×38% = 23% non-3sg forms in the children's (finite) utterances.

that a clitic subject is evidence of agreement, and a verb with a clitic subject would therefore not qualify as an NRF.²⁸

It has been observed in the literature (see, e.g., Krämer (1993), Rizzi (1994), Sano & Hyams (1994)) that null subjects are particularly common with NRFs. We can see this effect in our data as well. Table 6 above gives the proportion of null subjects which appeared with NRFs. Whereas the finite verbs (Table 7) have null subjects around 57% of the time throughout the stages we examined, null subjects with NRFs increase over the course of development to almost 80%.²⁹

In support both of this interpretation of subject clitics and of the agreement results reported above, consider the difference between a (finite) null subject sentence with a clitic and one without a clitic. The difference lies in the realization of agreement. We already have a measure which purports to tell us the percentage of the time these children's verbs realize agreement; recall Table 3 (non-3sg verb forms out of unambiguously agreeing verbs). If we assume that sentences with and without a subject clitic differ only in whether they realize agreement, we would expect that the rate of appearance for the subject clitic should be the same as the overall rate of realization of agreement.

In Table 8, we computed the rate at which a clitic subject appears with finite null subjects. In Figure 4, this is compared with the rate of realization of agreement (as computed from our data in Table 3, adjusted for the expected proportion of non-3sg agreement, from Table 4). We have also included the line predicted by our analysis from section 4. We see that the lines are indeed roughly the same.³⁰

Table 8: Proportion of finite null subject sentences with agreement clitic

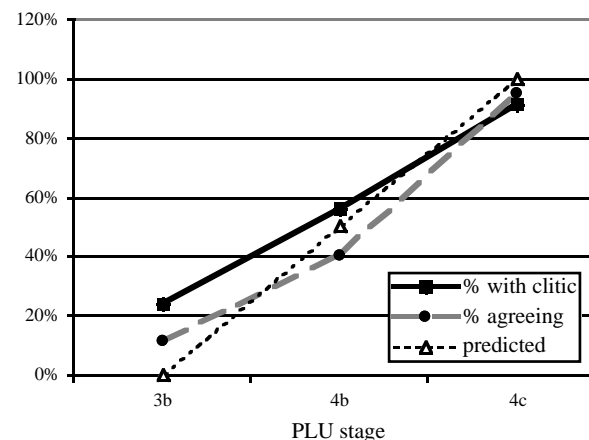
	Stage 3b	Stage 4b	Stage 4c
verb alone	76	117	44
verb with clitic	24	146	467
% with clitic	24%	56%	91%
adjusted % agr.	11%	40%	95%

²⁸ In all of the utterances we examined, we found only three cases are at least arguably nonfinite forms with clitic subjects. We have excluded these from our analysis.

²⁹ Because we do not give an explicit analysis of the subject data (see the discussion in section 5.4), we cannot provide an analysis of the propensity for NRFs to surface with null subjects.

³⁰ We observe slightly more agreeing verbs and clitics at Stage 3b than our analysis predicts. We presume that data from Stage 2b will help shed light on this apparent discrepancy (for example, perhaps our empirical data actually reflects a stage between Stages 3 and 4 in our analysis), but data from Stage 2b was not available to us.

Figure 4. Finite null subjects with agreement clitics



The results shown in Figure 4 support the hypothesis that a clitic subject in French is a realization of agreement features. In fact, given this, the proportion of clitic subjects in null subject sentences is more likely to accurately reflect the actual rate of realization of agreement than the data from Tables 3–4. This is because to compute the rate at which agreement is realized we needed to take our numbers (showing realization of non-3sg forms) and compare them to an “expected” rate of non-3sg forms (taken from the adult data, Table 4). The data in Table 8 and Figure 4, however, are computed exclusively from the child data (see Section 5.4.1 for further discussion of this point).

Our findings are similar to those reported by Pierce’s (1992); she found high rates of null subjects³¹ that remained constant throughout the files that she studied.³² Ferdinand (1996) does not discuss null subjects at length, but she suggests based on the earliest file of one of her subjects (Nathalie, 1;9.3) that a very early stage might exist where no subjects whatsoever occur with non-finite verbs. Nathalie’s production seems to instantiate a stage earlier than what we have observed in our data, possibly PLU Stage 2; she displays rates of NRFs and null subject utterances much higher than what we report for our earliest stage, 3b. Thus, our findings are compatible with those from previous work on the acquisition of French.

5.2 Postverbal subjects

Early child French shows a surprisingly high proportion of post-verbal subjects. Again, this structure is excluded from the adult language, except in cases of right-dislocation (RD). RD constructions in the adult language are obligatorily marked with an utterance-initial subject clitic, which is often absent from the postverbal-subject utterances of young children. Constraints operating in the adult grammar exclude such constructions;

³¹ Pierce (1992) also counted clitic subjects as null subjects with agreement marking, as we do here.

³² Note, however, that Pierce only studied Grégoire up to the age of 2;3, when he was still at PLU stage 4b.

the question then is whether the child's representation of syntax is qualitatively different from that of adults.

We calculated the proportions of postverbal subjects occurring both with finite and with non-finite verbs at each PLU stage. There are two kinds of postverbal subjects which are relevant to our inquiry, those which appear with a subject clitic on the verb and those which do not. Our results appear in Tables 9–12 below. As before, both tensed and agreeing verbs make up the category of finite verbs.

Table 9: Postverbal subjects (of finite verbs) with no subject clitic

Child	Stage 3b	Stage 4b	Stage 4c
Grégoire	27% (50/189)	14% (27/200)	1% (3/605)
Philippe		16% (43/271)	2% (4/190)
Weighted average	27% (50/189)	15% (70/471)	1% (7/795)

Table 10: Postverbal subjects (of finite verbs) and a subject clitic

Child	Stage 3b	Stage 4b	Stage 4c
Grégoire	11% (20/189)	9% (18/200)	6% (37/605)
Philippe		13% (36/271)	12% (22/190)
Weighted average	11% (20/189)	12% (54/471)	7% (59/795)

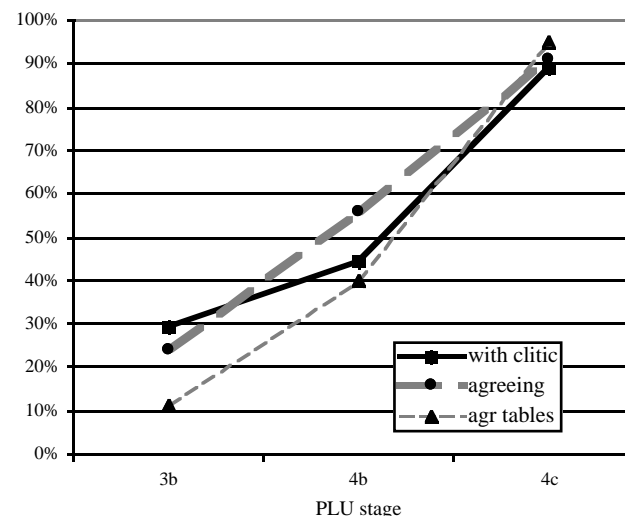
The two types of postverbal subjects illustrated above have generally been taken to be two different constructions in child French. This is in part because only one of the two is ungrammatical in adult French. That is, the utterances reported in Table 10 are grammatical in adult French (as right dislocations), whereas those in Table 9 are not.

Our hypothesis about the utterances recorded in Table 9, in which the subject occurs postverbally without a clitic, is that they are right dislocation structures which lack agreement. We can run the same test on these figures as we did in the previous section on the figures for null subjects. Looking at the proportion of postverbal subjects which appear with a clitic, we find that they again match the profile of the development of agreement (as given in Table 8, following the discussion there). The figures are given in Table 11, and graphed in Figure 5. For comparison, the lines showing estimated development of agreement marking taken from Table 8 (agreement with null subjects) and Tables 3–4 (agreement based on expected rate of non-3sg marking) are also included.

Table 11: Proportion of postverbal subjects with agreement clitic

	Stage 3b	Stage 4b	Stage 4c
verb alone	50	70	7
verb with clitic	20	54	59
% with clitic	29%	44%	89%
agreeing (Table 8)	24%	56%	91%

Figure 5. Proportion of postverbal subjects with agreement clitic



Postverbal subjects in child speech appear not only with finite verbs, but also with NRFs. In Table 12, we give these results. Note again that, while the postverbal subjects with finite verbs were split into those with clitics (Table 10, grammatical right dislocation constructions), and those without (Table 9), there is no similar distinction with NRFs, because a clitic is evidence of agreement, hence of finiteness.

Table 12: Postverbal subjects (of non-finite verbs)

Child	Stage 3b	Stage 4b	Stage 4c
Grégoire	39% (32/83)	20% (9/45)	0% (0/5)
Stéphane	29% (15/51)	36% (4/24)	0% (0/3)
Philippe		19% (19/102)	10% (1/10)
Weighted average	35% (47/134)	19% (32/171)	6% (1/18)

5.3. Left dislocation

Adult French has a left dislocation construction with a structure similar to that of the right dislocation construction discussed above. In this construction, the subject appears to the left of a clitic "double." The subject clitic on the verb is obligatory for left dislocations in adult French. We looked at the production of left dislocation structures in child French as well, with the results given in Tables 13–14. Again, we are interested in looking at the proportion of the time a preverbal subject appears with a clitic double on the verb.

Table 13: Left-dislocated subjects (of finite verbs) (with a subject clitic)

Child	Stage 3b	Stage 4b	Stage 4c
Grégoire	3% (6/189)	5% (10/200)	30% (179/605)
Philippe		8% (21/271)	5% (10/190)
Weighted average	3% (6/189)	7% (31/471)	24% (189/795)

Table 14: Preverbal subjects (of finite verbs) with no subject clitic

Child	Stage 3b	Stage 4b	Stage 4c
Grégoire	7% (13/189)	13% (25/200)	4% (25/605)
Philippe		10% (28/271)	2% (4/190)
Weighted average	7% (13/189)	11% (53/471)	4% (29/795)

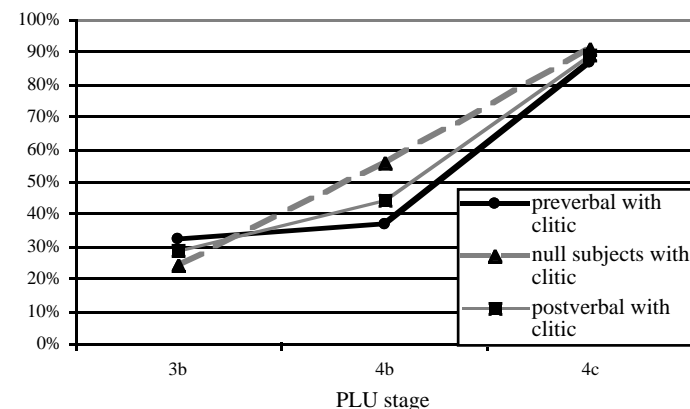
Before we look at the proportion of these preverbal subjects which appear with clitics, there is one further point to be aware of. In adult French, a preverbal subject can appear with a clitic or without a clitic; that is, the types of utterances reported in Tables 13–14 are all grammatical in adult French. Assuming that the children are sometimes “trying to say” a sentence which in adult French would not have a clitic, a certain number of the child utterances without clitics are of that type. This means that we will underestimate the percentage of agreeing verbs if we simply compare the number of preverbal subjects with a clitic to the number of preverbal subjects without a clitic. Unfortunately, there is no precise way to subtract out the cases counted in Table 14 whose “targets” were adult cliticless constructions (see section 5.4 for more discussion). Keeping this in mind, we make this comparison anyway, given in Table 15.

Table 15: Proportion of preverbal subjects with subject clitic

	Stage 3b	Stage 4b	Stage 4c
verb alone	13	53	29
verb with clitic	6	31	189
% with clitic	32%	37%	87%
agreeing (Table 8)	24%	56%	91%

The results are graphed in Figure 6. Notice that, despite the fact that the percentages are almost certainly underestimated (by an unknowable amount), the shape of the curve is consistent with the other graphs showing the development of agreement (which have been plotted as well for comparison).

Figure 6. Proportion of preverbal subjects with subject clitic



5.4. Summary and discussion of the subject facts

5.4.1. Features in the input

The existing analyses of the syntax of the adult grammar of French are sufficiently complex and controversial that we cannot provide a real account of the child grammar of subject placement. However, our data has shown us a few things that can constrain analyses proposed in the future.

As has been alluded to earlier, there are four relevant options for subjects in adult French. A subject can be realized in a “canonical” SVO sentence such as (25a), it can be realized as simply a clitic as in (25b), it can be “left dislocated” (where both the subject and the clitic appear) as in (25c), or it can be “right dislocated” (again, where both the subject and the clitic appear).

(25) *Subject positions in adult French:*

- a. Canonical SVO sentence. *Grégoire est parti.*
- b. Clitic-only (null subject) sentence. *Il est parti.*
- c. Left dislocation sentence. *Grégoire il est parti.*
- d. Right dislocation sentence. *Il est parti Grégoire.*
he is left Grégoire
'Grégoire left.'

It is well established that what determines which of these options is chosen is made on pragmatic grounds (see Ashby (1988), Lambrecht (1981, 1994)). In a generative theory of the type we assume, this means that the *input* to each of these forms differs. For a

given input, which will encode the relevant information about the pragmatic context, only one of the four options given in (25) will be generated by the grammar. So, for example, if the correct analysis of subject left dislocation turns out to be that subjects which are discourse topics are left dislocated, this means that the subject in the input is specified as having a “topic feature” to which the positioning constraints are sensitive.

If the task is to come up with an analysis of child grammar that can predict percentages of each construction that appear in the output, a necessary prerequisite is that we have accurate knowledge of what percentage of the time crucial features appear in the input. That is, to know that a child has reached adult performance on left dislocation, we need to know that 100% of the time when the input contains a “topic feature” on the subject, the resulting output contains a left dislocation.

In theory, this could be achieved if we could make the assumption that the distribution of these features in the input for the child matches the distribution of the same features in the input of the adult language (cf. Smolensky (1996)). That is, if 6% of the adult speech contains left dislocations, we might assume that 6% of child’s input contains the “topic feature” that would trigger left dislocation.

There are two problems with this approach in the current study. The first problem is that the assumption that the child’s input distribution matches the adult distribution is a very tenuous one, although without it (or some other very specific theory of what the child’s input distribution looks like), any frequency numbers predicted by the analysis will be essentially meaningless.³³ The second problem is that the pragmatic properties of dislocations in the *adult* language, particularly right-dislocations, are highly varied (see Ashby (1988)), and is a complex problem that requires further study independently. Without an understanding of what features need to be present in the input in the adult language to force one output over another, any attempt to characterize the effects of a grammar with different constraint rankings (e.g., child language), would necessarily be arbitrary.

The reader will recall that we used essentially this logic to determine the child’s performance with respect to agreement in section 3.4 (Tables 2, 3, and 4); we measured how often the child’s verb forms unambiguously expressed tense or agreement (measuring non-present tense and non-3sg agreement), and compared this to the percentage of non-present tense and non-3sg agreement found in adult speech. This suffers from the same pitfalls, although we believe the danger here is far less acute than with the subject positioning data. First, the realization of tense and agreement has a (basically uncontroversial) simple analysis: Tense and agreement features must be realized. Second, the usage of present tense and 3sg agreement is almost certainly less sensitive to small nuances in the context than the subject realization and positioning phenomena. In addition, we have other sources of data on the development of agreement

³³ There is a delicate terminological point of clarification to make here. We assume (following Smolensky (1996)) that the input to the child’s grammar is the same as the input to the adult’s grammar in the sense that they are drawn from the same set. The question we are addressing in this section is not about the identity of the set from which individual inputs are drawn, but rather the *distribution* (frequency) of the inputs which are actually used. Put another way, we assume that adults and children alike have the option of providing their grammar with an input containing a “topic feature” on the subject. The assumption being discussed in the text is whether adults and children make use of this option with the same frequency.

which do not need this assumption about the input (see, e.g., Tables 8 and 11) yet give the same results.

The conclusion we reach is that, while it is not in principle impossible to propose an analysis in the same spirit as that given in section 4 to predict the distribution of subject realization and positioning in child development, such an analysis is premature. Once the adult grammar is better understood, we may be able to “backtrack” to get an idea of what the child input must look like to yield the observed percentages, but without an understanding of the adult system, this effort would be futile.

We can provide a simple example of how these assumptions will fail for the realization of left dislocations. We looked at the adult speech recorded in Grégoire 7 to get an idea of the adult frequencies with respect to subject positioning. The results are given in Table 16.

Table 16: Adult subject positions (from adults in Grégoire 7)

clitic	NP alone	Right dislocation	Left dislocation	Total
376	25	53	29	483
78%	5%	11%	6%	

According to these figures, adults produce left dislocations roughly 6% of the time. If we suppose that there is a feature F which, when in the input, forces the adult grammar to produce a left dislocation, we would be able to reason that the child’s input has the feature F 6% of the time. However, when we look at the children’s use of left dislocation at stage 4c, we find that (Table 13) they use left dislocations 24% of the time.³⁴ Clearly, something must be wrong: either 24% of the child’s input contains the feature F at this stage, or the grammar is right dislocating subjects with a feature F’ that has a greater frequency than F has. Without an understanding of the features involved and their impact on the grammar, there is no clear way to go from here.

5.4.2. Implications for the analysis of right dislocation

The existing analyses of postverbal subjects such as (6b) in early child French consider them either to be VP-internal, or instances of Right Dislocation with a missing or empty subject clitic pronoun. The first line of argument is defended in Déprez & Pierce (1993), who propose that the subject is left in its underlying Spec(VP) position, with the main verb has raised over the subject to Infl, resulting in the word order Verb-Subject.

Déprez & Pierce’s analysis has been criticized by Ferdinand (1996) and Labelle & Valois (1996) for making incorrect predictions about word order in sentences with more than one argument, i.e. both a subject and an object. The structure proposed by Déprez & Pierce predicts a VSO order (a raised verb, but both subject and object in base positions). However, Labelle & Valois find only a single VSO utterance out of the 190 postverbal subject sentences that they analyzed (data from Grégoire and Philippe), as opposed to 81 utterances of the form VXS. They conclude that the empirical evidence strongly disfavors Déprez & Pierce’s analysis.

³⁴ Note, however, that this number is basically due to Grégoire. Philippe at stage 4c, from the data we have, appears to be using left dislocation at 5%, about the adult rate.

Ferdinand (1996) presents an alternative analysis, proposing it to be a form of adult RD. She presents evidence that postverbal subjects obeying the definiteness restriction of the adult RD construction. Her argument begins with the observation that in adult French, right-dislocated subjects must be definite. She then observes that all of the postverbal subjects produced by the French-speaking children were definite, which accords with this. However, it turns out that *all* subjects produced by children at this stage were definite, which undermines Ferdinand's claim that the children know the adult restriction.³⁵

Labelle & Valois (1996) add two new arguments in support of the right-dislocation analysis of postverbal subjects using the adverbial modifier *tout seul* 'alone'. In the adult language, *tout seul* always follows the NP it modifies. However, it *precedes* child postverbal subjects, supporting an analysis under which the subject NP has been moved rightward, adjoined to VP or IP. The second argument Labelle & Valois provide comes from the intonation of child utterances with a postverbal subject. They note that in the adult language, there is a distinctive intonation contour that accompanies right-dislocated subjects. Looking at the intonation of the child utterances, they report that the intonation contour of the postverbal subjects matches the intonation of adult right dislocations.

Our results in this paper further support the analysis of postverbal subjects as being right dislocations in which the clitic does not appear. Our explanation here is that these are simply cases in which agreement is not realized. Our data shows that the rate of clitic "drop" in postverbal subjects is the same as the rate of non-realization of agreement as determined by the frequency of non-3sg agreement. This is the same as the rate of clitic "drop" in null subject sentences, which is the same as the rate of the clitic "drop" in preverbal subject sentences. In other words, it appears from our results that the realization of agreement crosscuts all of these processes.

5.4.3. French as a null subject language with NRFs

Throughout this paper, we have been assuming that French is a null subject language. Specifically, sentences with only a clitic subject are analyzed as being sentences with a null subject, the clitic being a realization of agreement. Our data supports this conclusion, for the same reasons that it supports the view of right dislocation outlined in the previous section. Considering sentences with either no subject indication or just a clitic, the rate at which we see a clitic is the same as the rate of realization of agreement we arrived at from other sources.

³⁵ We found exactly two cases in which Philippe used an indefinite subject, which are given below in (i–ii) (we found no such cases from Grégoire). It is important to notice that whatever point is made by the presence of (i) in the production data, it is undermined by the presence of (ii) (a left dislocation with an indefinite subject) in the same file, ungrammatical in adult French. While it is not completely clear how to interpret these facts, it weakens the case for the claim that Philippe is obeying the restriction against right-dislocated indefinites if he disobeys the same restriction on left-dislocation.

- | | | |
|------|--|---------------------------|
| (i) | Des garçons va à l'école.
boys go-3sg to school
'Boys go to school.' | (Philippe 2;2.3, file #3) |
| (ii) | # Une voiture elle roule.
a car it rolls
'A car goes.' | (Philippe 2;2.3, file #3) |

However, if French is indeed a null subject language, this has implications for the claim made in previous literature (see, e.g., Wexler 1998) that NRFs do not appear in languages which license null subjects. It is clear that NRFs appear in French, which will make French a counterexample to this generalization. This suggests that the generalization might be better stated taking overt realization of agreement into account, although we do not pursue this point further here.

6. Concluding remarks

Using a new analysis of the production data of three French children (Grégoire, Philippe, and Stéphane, from CHILDES), we have uncovered previously overlooked properties of the acquisition of tense and agreement. First, tense and agreement do not follow the same course of acquisition. While the use of tense starts and ends strong (at Stages 3b and 4c all finite verbs are tensed), it suffers a "dip" between these stages (at Stage 4b only about half of the finite verbs are tensed). Meanwhile, agreement develops in a more linear way; at Stage 3b none of the finite verbs were agreeing, at Stage 4b about half were, and at stage 4c all of the finite verbs agreeing. At the same time, the proportion of NRFs is dropping; while a full third of the verbs are NRFs at Stage 3b, only a fifth are NRFs at Stage 4b, and almost none are NRFs by Stage 4c.

The distinctive profile of tense production over the three stages naturally leads to an analysis in which, at Stage 4b, tense and agreement are *competing* for realization. In particular, an Optimality-Theoretic analysis making use of "floating constraints" (defining partial ranking orders) that allow us to predict not only the *occurrence* of the observed types of utterances, but their *frequency* as well. In previous analyses, there is no clear way even to *describe* the frequency facts, whereas under our proposal the frequency predictions are a consequence of the re-ranking mechanism. The fundamental principle of OT, that grammars share the same constraints but rank them differently with respect to one another, requires that the acquisition process be one of re-ranking constraints. We have proposed that this re-ranking occurs not in sudden jumps but by spreading constraints across ranges in the rankings, narrowing in on the correct adult ranking. These "floating" or partially ranked constraints allow our model to make frequency predictions. As we saw in Section 4, a very simple model can produce predictions which match the observed proportions quite closely.

Finally, an examination of several constructions in French (clitic subjects, right dislocations, left dislocations) led to the discovery that children produce them in both agreeing (adult-like) and non-agreeing (non-adult-like) forms. That is, null subjects without a clitic are the non-agreeing counterparts to clitic subjects, postverbal subjects without a clitic are the non-agreeing counterparts to right dislocation, and (many) preverbal subjects without a clitic are the non-agreeing counterparts to left dislocation. This claim is supported by the relative frequency of the "agreeing" and "non-agreeing" constructions. In fact, the proportion of agreeing forms matched for each stage across all of the constructions, as well as with an independent measure based on the proportion of non-3sg agreement found in the finite verbs.

Appendix. The PLU (Predominant Length of Utterance) measure

To determine which stage in the developmental schedule a particular child transcript is in, we made use of a Predominant Length of Utterance (PLU) measure, which we define and

motivate in this appendix (described in more detail in Vainikka, Legendre & Todorova (1999)). The PLU has two advantages over the commonly used MLU (Mean Length of Utterance) measure (Brown (1973)): (a) it identifies stages without resorting to arbitrarily assigned cut-off values, and (b) it is more empirically successful than prescribed MLU ranges at matching observed developmental stages.

There are two components to a PLU stage. The first correlates with predominant length of child utterances, and the second (the secondary stage) is a measure of the proportion of verbs in the child utterances. Definitions of the PLU stages are listed below, followed by definition of the secondary stages. In these definitions, one-word, two-word and multi-word utterances are treated as three distinct sentence types. We arrived at these definitions through consideration of data from several languages, intending to have a metric which will have crosslinguistic applicability.

(26) *Definitions of PLU stages*

Stage 1: *Predominantly one-word stage*

- Almost all utterances (90%) are of the one-word sentence type

Stage 2: *Intermediate stage between one-word and two-word stages*

- The one-word sentence type is still very common (60%–89% of the utterances are of the one-word sentence type)

Stage 3: *“Two-word” stage*

- The one-word sentence type no longer clearly predominates (i.e. fewer than 60% of all utterances are one-word utterances)
- Of the three sentence types, the multi-word sentence type is not the most common one

Stage 4: *Predominantly multi-word stage*

- Of the three sentence types, the multi-word sentence type is the most common one

(27) *Definitions of secondary PLU stages:*

Secondary stage a: at most 10% of all utterances contain a verb

Secondary stage b: 11%–60% of all utterances contain a verb

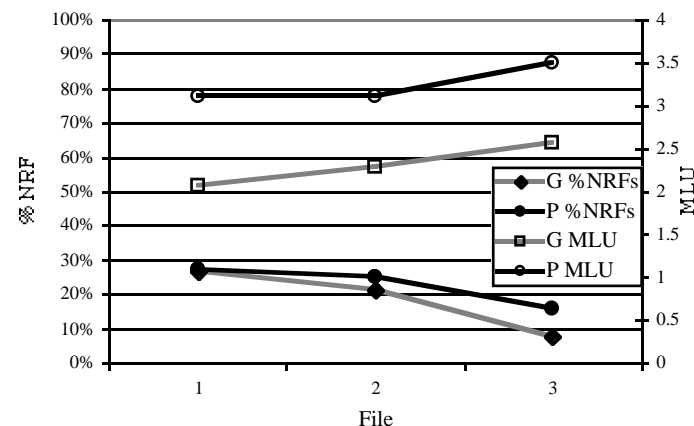
Secondary stage c: more than 60% of all utterances contain a verb

The PLU stages yielded a good fit with an observable sharp decrease in the child’s use of NRFs in languages such as French and Swedish (languages in which the use of NRFs is a pervasive phenomenon). For each of the languages we investigated, the PLU stages do correlate with other measures of advancement in syntactic development. Generalizing across languages, we found that in languages which show NRFs (English, French, Swedish), NRFs are common in Stage 2–3, dropping significantly in Stage 4. We also

found that development of the pronominal system (Russian), case-marking systems (Polish, English), and placement of subjects (French) correlate well with the PLU stages proposed above. Acquisition of tense appears to precede acquisition of agreement, but happens earlier in French than in English.

This PLU-based approach to identifying stages of syntactic development has its conceptual grounding in the traditional observation that children progress through one-word, two-word, and multi-word stages; the PLU measure reveals these stages directly. Another advantage is in its generality. The PLU measure can classify child data reliably into syntactic stages much more accurately than a simple MLU cutoff would allow. Although, roughly speaking, higher MLUs correlate with more advanced PLU stages, it is clear that a direct mapping from MLU to PLU stage is not possible. We can see this point more clearly by looking at Figure A1, which shows three files each from Grégoire and Philippe, all at PLU Stage 4b. We have plotted the percentage of NRFs and each file’s MLU measure. Notice that the percentage of NRFs is about the same for both children, indicating that we are looking at the same stage of syntactic development, but the MLU measures are quite far separated. We can conclude from this that it is not possible to simply compute the PLU stage from the MLU measure across children.

Figure A1. *Grégoire and Philippe, MLUs and NRFs at PLU stage 4b.*



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