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CHILD NON-FINITE CLAUSES AND THE MOOD-ASPECT CONNECTION

*Evidence from child Greek**

1. INTRODUCTION

This paper concerns a well-known phenomenon of early child language: the use of non-finite verbs in root contexts. The best-known example of this is the root infinitive (RI) illustrated in (1). RIs show up in a number of different child languages (notably the Germanic languages, French, and Russian). Children acquiring these languages go through a developmental stage in which infinitives are licensed in root contexts. The root infinitive stage has been widely investigated with regard to its morphosyntactic properties. Less work has been done on the semantic/aspectual properties of this stage (but cf. Brun, Avrutin, and Babyonyshev, 1999; Gavruseva, 2003; and Hoekstra & Hyams, 1998).

(1)	a.	Papa	schoenen	wassen.		Dutch
		Daddy	shoes	wash-INF		
	b.	Michel	dormir.			French
		Michel	sleep-INF			
	c.	Auch	Teddy	fenster	gucken	German
		also	Teddy	window	look-INF	
	d.	Jag	också	hoppa	där å där.	Swedish
		I	also	hop-INF	there and there	

Varlokosta, Vainikka, and Rohrbacher (1998) (henceforth VVR) point to a construction in early Greek, a language without an infinitive, which they identify as an RI analogue. VVR's arguments are based on purported syntactic parallels between RIs and the Greek construction. Although I depart from VVR's specific assumptions and analysis, in this paper I will also suggest that there is an RI analogue in Greek. I will argue for this based on certain aspectual properties of the construction that I refer to as the "bare perfective", properties that this construction shares with RIs.

I will propose that the bare perfective is a non-finite root clause that is licensed by aspectual features in the verb. After discussing the Greek construction, I will extend this analysis to the RI case and I will also suggest that under limited circumstances, we also find aspectually licensed non-finite root clauses in adult

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languages. A crucial feature of this analysis involves the interaction of aspect and mood, the details of which I will discuss below.

2. NON-FINITE STRUCTURES IN EARLY LANGUAGE

2.1. The Root Infinitive Stage (French and the Germanic languages)

Below I will discuss some interesting semantic parallels between RIs and the bare perfective. Before I do this, however, I outline some of the salient morphosyntactic properties of root infinitives that have been discussed in the literature.

The first fact to note is that during the RI stage children are also producing adult-like finite clauses. For this reason this stage is also referred to as the optional infinitive (OI) stage (Wexler, 1994). Although RIs and finite clauses co-occur, there are various properties that distinguish the two clause types. In contrast to finite verbs that occur at the same time, RIs:

(2) i. have infinitival morphology.
ii. occur in sentence final position in OV languages.
iii. occur predominantly with null subjects.
iv. do not have subject clitics (in French).
v. do not occur in *wh*-questions.
vi. do not occur with non-subject topics (in the Germanic languages).

The properties listed in (2) argue strongly against any analysis that treats RIs as hidden finite clauses; for example, proposals suggesting that RIs are finite clauses containing a null auxiliary (Borer & Rohrbacher, 1997; Boser, Lust, Santelmann, & Whitman, 1992; Ferdinand, 1996). (I return to this point below.) Rather, the facts suggest that RIs are true non-finite clauses and thus that the early grammar has a way of licensing non-finite verbs in root contexts. One of the goals of this paper is to uncover this licensing mechanism. This I do in section 4.

2.2 The Greek RI Analogue

The RI analogue produced by (roughly) two-year-old Greek children is illustrated in (3). Greek has perfective and imperfective stems and the verb is marked for person and number agreement. (The Greek verbal paradigms are given in appendix I.) The child's verb in (3) has a perfective stem and a 3rd person (*-i*) affix.

(3) a. Pio vavási (child form of *δiavási*) (CHILDES, Stephany, 1997)
Spiros read.3SG.PERF
b. Ego katiti
I sit.3SG.PERF
c. Kupisi i kateti
wipe.3SG.PERF the mirror

As will be discussed below, in adult Greek a perfective verb must either be marked as past tense (e.g., *δiavási* '(s/he) read.PERF. PST.') or it must be preceded by a perfect auxiliary (e.g., *exi δiavási* '(s/he) has read') or modal particle (e.g., *θa/na δiavási* 'FUT/SUBJ read'). It must occur with either tense or modal morphology. In the child's grammar, in contrast, we find the perfective occurring without tense or modal morphology, hence my use of the term "bare perfective".

In the next section I will compare the bare perfective to the RI. We will see that once we abstract away from some basic typological differences between Germanic and Greek (e.g., Germanic is V2, Greek has no infinitive), the bare perfective shares many of the basic morphosyntactic and aspectual properties of the RI.

2.3. Properties that make the Greek "bare perfective" seem like an RI analogue

The Greek data presented in this paper are from 3 Greek children in the CHILDES database (MacWhinney & Snow, 1985; Stephany, 1997), Spiros, Janna and Mairi, as shown in table 1. Janna's data come from two different developmental periods, labelled Janna I and Janna II. As we will see, Spiros and Janna I are most solidly in the bare perfective/RI-stage. Janna II is basically an adult and Mairi is in the middle.[1]

Table 1. Greek subject data

Child	*Age*	*No. of Files*
Spiros	1;9	2
Janna I	1;11	2
Mairi	1;9	6
Janna II	2;5	1

Let us now turn to the properties that the Greek bare perfective (BP) shares with RIs. These are all properties that relate to temporal anchoring (or the lack thereof), aspect and mood. The BP (like the RI):

(4) i. is (arguably) non-finite, as evidenced by the lack of productive agreement.
ii. has a modal or irrealis meaning, that is, it is volitional, directive, or intentional.
iii. is restricted to eventive predicates.
iv. co-occurs with finite clauses.

These properties are elaborated below.

2.3.1. Agreement

The defining characteristic of RIs is that they are non-finite. Greek does not have an infinitive and the Greek verb is always marked for person and number agreement. (See appendix I.) In child Greek, however, we often find the perfective verb marked

with the 3rd person *–i* affix in non-3rd person contexts. This is illustrated in the sentence in (3b) above. Table 2 reports the rate of correct agreement for 3rd person verbs, that is, the percentage of *–i* forms with 3rd person subjects (either overt or null).[2]

Table 2. Percentage of 3rd person perfective verbs (-i form) with 3rd person subjects[3]

	Number correct	*Percentage correct*
Janna I	28/45	62%
Spiros	58/96	60%
Mairi	109/125	87%
Janna II	---	100%

Focusing on Janna I and Spiros, who are most squarely in the bare perfective stage, we find a 40% error rate in agreement. This is extremely high. The normal error rate for children this age who are acquiring languages with similar agreement properties (e.g., Italian, Spanish, Catalan, etc.) is under 4%. (See Hoekstra and Hyams (1998) for review of the relevant studies.) This strongly suggests that the results in table 2 reflect something other than errors in agreement. This supposition is supported by the observation that the rate of correct agreement for Spiros and Janna I is substantially higher with 1st and 2nd person verbs, as shown in table 3.

Table 3. Percentage of 1st/2nd person verbs with 1st/2nd person subjects

	Number correct	*Percentage correct*
Janna I	21/23	91%
Spiros	15/18	83%
Mairi	57/57	100%
Janna II	105/106	99%

These results show that (perfective and imperfective) verbs marked for 1st/2nd person generally occur with a 1st/2nd person subject, in contrast to the 3rd person perfective verb, which occurs with all subjects. Although the error rate is still a bit high, the results for 1st/2nd person verbs are more in line with the agreement facts of other child languages.

Imperfective verbs also show a high rate of correct agreement, as illustrated in table 4. It is worth noting that most of the errors in table 4 involve imperfective verbs that do not have a perfective counterpart, so it is possible that some or all of these forms are treated as perfective by the children. If these unclear cases are eliminated, then the adjusted combined rate of correct agreement for Janna I and Spiros is about 97% and the adjusted rate for Mairi is 86%.

Table 4. Percentage of 3rd person imperfective verbs with 3rd person subjects

	Number correct	*Percentage correct*	*Adjusted*
Janna I	29/35	83%	97%
Spiros	35/45	78%	97%
Janna II	----	100%	100%
Mairi	106/132	80%	86%

The results in tables 2 through 4 show that the low rate of agreement with 3rd person *(-i)* perfectives cannot be due to the absence of spec-head agreement in the early grammar. Greek children in the bare perfective stage (i.e., Spiros and Janna I) have productive agreement with imperfective verbs and with non-3rd person perfective verbs. And in fact the rates of agreement for Spiros and Janna I for imperfectives and 1st and 2nd person perfective verbs approaches the rates for Janna II and Mairi, who are already out of the bare perfective stage. If the bare perfective does not involve an agreement error, it must be the case that the structure does not provide the syntactic context for agreement. In other words, the structure is not specified for T/Agr features, as in the RI case. This is the line I will pursue below. More specifically, I will argue that the interaction of mood and aspect results in an underspecification of T/Agr features. In order to pave the way for this discussion, let us consider the modal properties of children's non-finite clauses, noted in (4ii).

2.3.2. The Modal Reference Effect (MRE)

It has been observed in a number of child languages, notably Dutch and German, that RIs typically have a modal or irrealis meaning, expressing volition, direction (in the sense of a command) or intention. This is in contrast to finite verbs, which have a temporal (present or past) reference (Hoekstra & Hyams, 1998; Wijnen, 1996). Hoekstra and Hyams refer to this as the Modal Reference Effect (MRE). Some examples are provided in (5) (from Wijnen).[4,5]

(5) a. Niekje buiten spelen.
Niekje outside play.INF
Niek (talking about himself) wants to play outside.'

b. Papa ook boot maken.
Papa also boat make.INF
'Papa must also build a boat/I want Papa to also build a boat.'

c. Eerst kaartje kopen!
First ticket buy.INF
'We must first buy a ticket.'

Table 5 reports the quantitative results of an analysis of the interpretation of RIs and finite verbs for four Dutch children.

Table 5. Temporal/modal reference of RIs and finite verbs in four Dutch children (adapted from Wijnen (1996))

	Present	*Future/Modal*	*Past*	*Total*
RI	194 (10%)	1625 (86%)	64 (3%)	1883
Finite	657 (93%)	21 (3%)	21 (3%)	699

The modality expressed is deontic or volitional. Children under age 3 or 4 do not have an epistemic use of modality (cf. Hirst and Weil (1982), Kuczaj and Maratsos (1975), Stephany (1986)). The restriction to deontic modality will be an important component of the analysis of the bare perfective in section 4.

Interestingly, as noted in (4ii) the Greek bare perfective also expresses desires, directives, and intentions (Katis, 1984; Stephany, 1981, 1986; Tsimpli, 1992) (as indicated by the translations of the child utterances in (6)) (6b,c = 3b,c).

(6) a. Pári γuγunáki
take.PERF.3SG Piggy
'May I take the piggy?'

b. Ego katiti
I sit.PERF.3SG
'I will/want to sit.'

c. Kupisi i kateti
wipe.PERF.3SG the mirror
'I want to wipe the mirror.'

The modal meaning associated with the bare perfective is to be contrasted with the imperfective verbs in early Greek, which have mainly a present ongoing meaning, as illustrated in example (7).

(7) Spiros pezi
Spiros play.IMP.3SG
'Spiros is playing.'

The difference in interpretation is shown clearly in table 6, which presents the combined quantitative data for the two children (Spiros and Janna I) in the bare perfective stage.

Table 6. Temporal/Modal reference of Greek eventive verbs according to aspect (based on Stephany (1985) and p.c.)

	Modal	*Non-modal*	*Total*
Perfective	212 (78%)	62 (23%) (past)	274
Imperfective	5 (4%)	122 (96%) (present)	127

Looking across table 6, we see that the vast majority of perfective verbs have a (deontic or volitional) modal meaning (78%), while imperfectives do not. Only 4% of the imperfectives have a modal meaning, while 96% refer to ongoing eventualities. The parallel behavior of bare perfectives and RIs with respect to modality suggests that the bare perfective is an RI analogue. Note also that the 23% non-modal perfective verbs are marked for past tense. These verbs, like the imperfectives, are finite verbs that license TP. As noted in (4iv) the bare perfective stage shows an alternation between non-finite verbs (with modal reference) and finite verbs (with temporal reference).

2.3.3.. The Eventivity Constraint

Another property of RIs concerns the lexical aspect of RI predicates. RIs are largely restricted to eventive predicates (while finite verbs can be either eventive or stative). In Hoekstra and Hyams (1998) we express this as the Eventivity Constraint (EC) (cf. also Ferdinand (1996), Gavruseva (2003) and Wijnen (1996) for discussion of the eventivity of RIs). Table 7 reports the proportions of eventive and non-eventive (stative) RIs and finite verbs in early Dutch.

Table 7: Finiteness of eventive and stative verbs in 4 Dutch children (from Hoekstra & Hyams (1998); based on Wijnen (1996))

	Finite	*Ris*
Eventive	350 (50%)	1790 (95%)
Stative	349 (50%)	93 (5%)
Total	699	1883

We see that 95% of RIs are eventive, while the finite verbs are evenly split between eventives and statives. So it is not the case that children fail to use statives early on. Rather, statives are limited in their distribution to finite contexts.

Looking at the Greek data in table 8, we again see the EC at work (cf. 4iii). There are no stative perfectives, while imperfectives can be either eventive or stative. This uneven distribution of aspect provides further support for the hypothesis that the bare perfective is an analogue of the RI, and that the opposition

between finite verbs and RIs is mirrored in Greek by the opposition between imperfective and perfective verbs.

Table 8. Aspect of eventive and stative verbs in child Greek (based on Stephany (1985) and p.c.)

	Imperfective	*Perfective*
Eventive	127 (60%)	274 (100%)[b]
Stative[a]	82 (40%)	---
Total	210	274

[a] The verbs *exo* (have) and *ime* (be) were excluded because they do not have separate perfective and imperfective forms.
[b] This figure includes past tense verbs and bare perfective.

The imperfective form shows correct agreement (cf. table 4) and has a temporal reference—usually present. Thus, with respect to both its form and meaning, the imperfective behaves like a finite form, analogous to the simple finite forms that co-occur with RIs in the RI languages. We can therefore conclude that child Greek exhibits an alternation between finite verbs and non-finite verbs in root contexts, as noted in (4iv).

Summing up the discussion thus far, the evidence suggests that the Greek bare perfective is a non-agreeing, non-finite form that shares the central semantic properties of RIs. The early grammar expresses a semantic opposition between modal and non-modal (temporal) expressions that maps onto an opposition between non-finite and finite structures. We see this in languages that are morphologically quite distinct—the Germanic languages, French (and perhaps Russian), all of which have an infinitival form, and Greek, which does not.[6] Nevertheless, the expression of modality in early Greek is tied to a non-finite structure and more to the point, to one in which a specific aspectual form occurs. The facts presented thus far raise two questions: first, why is modality linked to a lack of finiteness, and second, why is non-finiteness linked to eventivity? We return to these questions in section 4. In the next section I consider two analyses of the bare perfective that seem to fall short of the empirical mark. Following that I will propose an alternative account that more adequately addresses the various issues we are considering.

3. TWO ANALYSES OF THE GREEK BARE PERFECTIVE

Prima facie, there are two plausible structures for bare perfective sentences such as (3a). The first is a reduced participle version of the adult sentence in (8).

(8) O Spíros exi ðiavási (adult sentence)
Spiros has read.PART
'Spiros has read.'

The sentence in (8) illustrates that the perfect participle in adult Greek is homophonous with the *–i* form, the verb that occurs in the bare perfective. It is thus plausible a priori that the child's bare perfective arises through simple omission of the auxiliary. This is in fact the analysis of Varlokosta et al. (1998), who propose that the bare perfective is a bare participle of the sort that we find in early Italian, illustrated in (9a), whose source is arguably the adult structure in (9b).

(9) a. Presa Checco campana (child utterance)
taken Checco bell
b. Francesco ha preso la campana (adult target)
'Francesco has taken the bell.'

A second possible source for the bare perfective is a reduced version of the adult structure in (10). The sentences in (10a,b) illustrate the future/modal structure in adult Greek, which is marked by the future/modal particle *θa/na*.

(10) a. O Spíros θa/na δiavási (adult sentence)
the Spiros FUT/SUBJ read.PERF PRES.3SG
'Spiros is going to/should read'
b. O Spíros theli/prepi na δiavási
the Spiros want.3SG/need.3SG SUBJ read.PERF.3SG
'Spiros wants/needs to read.'

As in the previous scenario, it is plausible that the Greek child simply drops the *θa/na* leaving behind a bare perfective, as in (11a). This would parallel the null modal analysis proposed by Boser et al. (1992) for German RIs, illustrated in (11b).

(11) a. [$_{IP}$ O Spíros [$_{I}$ 0 [δiavási]]
the Spiros read
'Spiros wants to/is going to read.'
b. [$_{CP}$ Papa [0 [$_{IP}$ Buch lesen] t]
Daddy (must) book read
'I want Daddy to read the book.'

Despite their initial plausibility, both the bare participle hypothesis and null modal hypothesis are problematic. First, the irrealis/modal interpretation of the bare perfective renders the participle analysis implausible. In general, children adhere to a strict (in fact, overly strict) mapping between aspectual class and morphological form. For example, English *-ing* is initially restricted to activity predicates, while *-ed* is restricted to telic predicates.[7] In languages such as Italian, where children use bare participles (cf. 9a), the participles tend to be restricted to telic predicates and typically have a perfective meaning, not ongoing nor modal (Antinucci & Miller, 1976). The bare participle analysis proposed by Varlokosta et al. (1998) for Greek

entails a strong mismatch between morphological form (perfect participle) and meaning (modal), contrary to expectations.

The null modal hypothesis fares better with respect to interpretation. However, it is problematic as an account of the Greek child's bare perfective for the same reason that it is an unlikely explanation for the RI phenomenon, namely, it entails that the child's grammar and the adult's differ only with respect to the overtness of the auxiliary. The structures are otherwise identical and, crucially, on this account the child's structure is finite. The null modal analysis thus fails in principle to provide a basis for explaining the salient differences that do exist between the child's irrealis clause and the adult's.

There are three differences of particular interest. First, in the child's grammar the modal/irrealis interpretation is associated with the perfective verb, while in the adult grammar both perfective and imperfective verbs may occur in *na/θa* clauses, as illustrated in (12).

(12) a. O Spíros θa δiavási/ δiavázi
the Spiros FUT read.PERF/IMPERF.3SG
'Spiros will read/be reading.'

b. O Spíros theli/prepi na δiavási/ δiavázi
the Spiros want.3SG/need.3SG SUBJ read.PERF/IMPERF.3SG
'Spiros wants/needs to read/be reading.'

c. O Spíros na δiavási/δiavázi
the Spiros SUBJ read.PERF/IMPERF.3SG
'Spiros should read/be reading.' or 'I want Spiros to read/be reading.'

Second, bare perfectives "trade-off" with *na/θa* clauses over time. That is, bare perfectives decrease and *na/θa* clauses increase as a function of age, with *na/θa* clauses occurring infrequently or not at all during the early stage. This is shown in table 9. Table 9 gives the percentage of modal utterances out of all the verbal utterances for the both the child and adult in particular transcripts.

Table 9. Percentage of child and adult verbal utterances containing modal particles

	Child	*Adult (CDS)*
Janna I	<1% (1/88)	17.75%
Spiros	8% (10/127)	29%
Mairi	17% (23/133)	19.6%
Janna II	23% (42/178)	15%

Overall, in child directed speech (CDS) 15%–30% of the adults' verbs are preceded by modal particles, while children in the bare perfective stage (i.e., Janna I and Spiros) use modals in approximately 1%–8% of their verbal utterances. The third important difference is that in adult *na/θa* clauses the verb embedded under the

modal particle agrees with the subject in person and number while the bare perfective need not, as shown in example (3b) and in table 2.

While the null modal analysis can account for the second property—the increase in (overt) modals over time—it fails to explain the aspectual restriction to perfective verbs and the agreement properties of early Greek. An adequate account of the bare perfective stage should capture the relation of the bare perfective to the adult *na/θa* clauses, as well as its relation to the RI phenomenon. It must also explain the adult-child differences just outlined. Finally, it should explain the relation between modality and the lack of finiteness (MRE) and also the relation between the lack of finiteness and eventivity (EC). These desiderata are outlined in (13).

(13) i. relation to adult *na/θa* clause
ii. relation to the RI phenomenon
iii. adult-child differences, viz. modality restricted to perfective verb, bare perfective trade-off with modals, and lack of agreement in the early grammar.
iv. relation between modality and the lack of finiteness (MRE)
v. relation between the lack of finiteness and eventivity (EC)

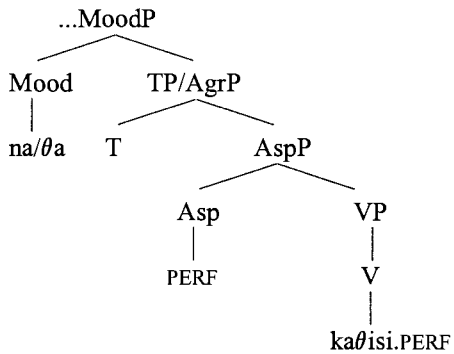
In the following section I present an analysis that I believe achieves these goals.

4. A MOOD-BASED ANALYSIS OF THE BARE PERFECTIVE

As a point of departure, I make several assumptions concerning the morphosyntax of Tense, Aspect and Mood. First, as is standard in recent theory, I assume that the temporal, aspectual and modal interpretation of an event is determined by the functional structure of the clause consisting of TP, AspP, and MoodP. Functional heads must be licensed. That is, they have features that have to be checked, either through Merge or Attract (Chomsky, 1995). Under Merge a lexical element with appropriate features is inserted into the head position, for example a modal in Mood. Under Attract the functional head—in this case, Mood—attracts an appropriate feature in the verb that percolates to VP. What counts as an appropriate (i.e., matching) feature for the purposes of checking will be a central point of this paper. I take it that functional elements/morphology have no inherent semantic value.[8] Rather, they are simply the spell-out of morphosyntactic features that license the corresponding functional structure, either by Merge or Attract. Attract requires that the functional category be in a local relation with the verb. The precise locality condition that I adopt will be presented below.

Concerning adult Greek clausal structure, I follow Roussou (2000) and others in adopting the structure in (14) in which Mood is licensed by the (modal/future) particle (*na/θa*, respectively) and the perfective verb (e.g., *kaθisi-* 'sit') checks its aspectual feature in Asp).[9]

(14)



Let us return now to the child's grammar. My hypothesis concerning the structure of the bare perfective in early Greek is given in (15).

(15) In the child's bare perfective structure, the perfective feature in the verb licenses Mood.

I assume that in the child's grammar, as in the adult grammar, irrealis meaning is structurally represented by MoodP. The grammars differ, however, in how Mood is licensed. In the adult grammar the modal particles are merged into Mood, while in the child's grammar the licensing happens by attracting the perfective feature in the verb. On the face of it, the claim that the perfective feature is responsible for the modal interpretation seems strange given the temporally closed or completive meaning usually ascribed to the perfective. So before I turn to the child's structure, I would like to briefly consider a related phenomenon in adult grammar that should lend some initial plausibility to the perfective hypothesis.

It has often been noted that in many languages past tense morphology can be construed either temporally or modally (cf. Iatridou, 2000); Lyons, 1977; Palmer, 2001). The modal interpretation is exemplified in counterfactual wishes or conditionals, as in (16a,b). In (16a,b) the past tense verb does not have a past tense reference. To get a past interpretation two features are necessary, as in (16c).

(16) a. I wish I <u>were/lived</u> in Italy now.
b. If Michael <u>took</u> driving lessons now, he could use the car this summer.
c. If Michael <u>had</u> tak<u>en</u> driving lessons last year, he could use/have used the car this summer.

Iatridou (2000) identifies a common semantic element shared by the temporal and modal categories. On her analysis the past tense is an "exclusion feature" which operates in both a temporal dimension and a world dimension. As a temporal feature

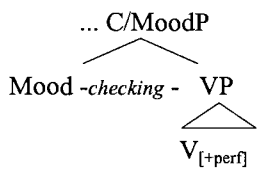
it excludes the topic time (the time for which an assertion is made, cf. Klein (1995)), from the utterance time, and as a modal feature (as in counterfactuals) it excludes the topic sphere from the present world. If we translate these observations into the syntactic model that we are assuming, this means that a past tense feature in the verb can license either TP or MoodP, but not both. In (16c) there are two past features, one feature licensing Mood and the other Tense.

Suppose we assume that an aspectual feature can also have this dual function and that under appropriately local conditions, the perfective feature on the verb can license MoodP. The locality condition I will adopt, adapted from Bobalijk and Thráinsson (1995), is given in (17).

(17) Features are checked in all and only local relations to a head, viz. head–spec, head–complement, head–head (adjoined head).

In this analysis we focus on the head–complement relation. According to the perfective hypothesis in (15), in child Greek Mood attracts the perfective feature in the verb. In order for Mood and the verb (VP) to be local in the relevant sense (head–complement relation), there can be no intervening heads. Locality is achieved through the underspecification (i.e., elimination) of the time-denoting heads, T/Agr (and Asp). Thus, the structure I assume for the early Greek bare perfective (cf. (6b)) is given in (18).

(18)



In the structure in (18) the perfective feature has percolated to VP and is checked against Mood.[10]

Notice that this hypothesis basically derives the modal reference effect, discussed in section 2.3.2, that is, the association between non-finiteness and the expression of modality in the early grammar (cf. 13iv). Mood is in a local configuration with (and thus attracts) the perfective feature iff T/Agr is underspecified.

Bobalijk and Thráinsson's locality condition is designed to explain the relation between rich morphology and verb movement in adult grammar. Briefly, they propose that that the internal structure of IP is parameterized such that languages either have a split IP (Pollock, 1989) or a fused T/Agr projection.

In the next section I lay out the other empirical consequences of this analysis. Following that I come back to the conceptual issue of why the perfective feature (like the past feature) should license irrealis mood.

4.1. Explaining the facts

In (13) I outlined various properties and relations that should be explained by an analysis of the bare perfective. With respect to the desideratum in (13i)—the relation between the bare perfective and the adult *na/θa* clause—both structures involve a Mood projection yielding an irrealis interpretation. In the adult grammar Mood is licensed by the merging of *na/θa*. During the bare perfective stage, modal particles are missing or infrequent (cf. table 9). In the absence of modal particles, the early grammar avails itself of the Attract option. The adult system emerges as the modal particles become productive. We may assume, as proposed in Chomsky (1995) that Merge takes precedence over Move/Attract. Hence, once the modal particles are productive the less marked Merge mechanism prevails, the Attract option is eliminated, and bare perfectives cease.

The adult–child differences noted in (13iii) are also accounted for under this analysis. The first difference is that in the child's grammar only the perfective verb has an irrealis interpretation, while both perfectives and imperfectives occur in *na/θa* clauses in the adult grammar. In child grammar it is the perfective feature that licenses MoodP by Attract, while in adult Greek *na/θa* licenses MoodP and the aspectual feature in the verb is thus free to do the aspect job. Since in the adult grammar the perfective feature is not doing the modal job, it follows that there will be no aspectual restriction on the verb and adult *na/θa* clauses may be perfective or imperfective. The second difference concerns the trade-off over time between the bare perfective and the modals (cf. table 9). Bare perfectives in the child's grammar fulfill the grammatical function that *na/θa* have in the adult grammar (the licensing of Mood). Thus, there is a trade-off between functionally equivalent structures.[11] The final adult-child difference in (13iii) concerns agreement. In adult *na/θa* clauses the verb agrees with the subject, while the child's bare perfective does not. The lack of agreement on the bare perfective follows as a direct structural consequence of the licensing relation discussed above. Given the locality constraint on Attract/feature checking, the bare perfective is necessarily a non-agreeing form, with the unmarked 3rd person *-i* affix emerging as the default when T/Agr is unspecified.

In the next section we consider the question of why it is the perfective feature that licenses Mood. In this context we will also address the relation between lack of finiteness and eventivity (cf. 13v). Then in section 5 we extend the analysis of the bare perfective to RIs (cf. 13ii).

4.2. The relation between perfectivity and (deontic) modality

It is natural to ask why it is the perfective feature that licenses Mood, as opposed to, say, the imperfective feature, and why there is a syncretism between aspect and mood morphology. A syncretism of inflectional forms should not be a matter of chance. Indeed, we have seen that the past-irrealis (as in counterfactuals) syncretism is not accidental, but has to do with a shared semantic feature—exclusion. Thus, a productive strategy for understanding the role of the perfective in licensing Mood would be to uncover some feature that perfective aspect shares with the kind of

modality expressed by the bare perfective. Recall that the bare perfective, like the RI, expresses deontic or volitional modality. According to Barbiers (1995), this kind of modality (in contrast to epistemic modality) involves a polarity transition, that is, a negative and positive stage of an event. Thus, the expression *wants to/must/will P* presupposes a present stage in which P is not the case and states that the transition from 'not P to P' is desired, required, or intended. Perfective aspect involves a similar transition in so far as it denotes an event and its termination or closure, 'E and not E'. Following this line of reasoning, we can identify the semantic feature shared by deontic/volitional modality and perfective aspect as a "transition feature". The transition feature operates in both the modal and temporal (=aspectual) domains. In the temporal domain it licenses AspP, as in the (adult) perfective sentences in (12), in which *na/θa* does the modal job, and in examples such as (19), in which T is specified as past. In the latter structure the specification of T/Agr blocks the perfective feature from reaching Mood and the sentence has a simple past perfective (terminative) meaning.

(19) Extes edosa ena doraki ston Kosta.
Yesterday PAST.give.PERF.1SG a gift to Kosta
'Yesterday I gave a gift to Kosta.'

In the modal domain the transition feature licenses a deontic MoodP, as illustrated by the early Greek bare perfective. The reason the imperfective does not license deontic modality is because it denotes an unbounded process consisting of a sequence of homogeneous events and thus lacks the transition feature.

The (deontic) modality-perfectivity connection is mirrored by a similar relationship between perfectivity and the eventivity (or aktionsart) of the predicate. Since perfectivity involves a polarity transition, it is largely incompatible with stative predicates, which have a homogenous event structure. This effect is most clearly seen in languages such as Russian in which eventive verbs come in perfective–imperfective pairs, while statives have only an imperfective form. It is also the case that in languages in which statives can be perfectivized, Italian and Greek for example, the perfective stative has an inchoative (i.e., eventive) reading, as illustrated in (20).

(20) a. Gianni ha saputo la veritá.
John has known the truth
'John came to know the truth.'

b. Gnorisa pollous anthropous sti zoi mou.
know.PAST PERF many people to.the life my
'I got to meet many people in my life.'

We can schematize the relationship between modality, perfectivity and eventivity as in (21).[12]

(21) deontic modality >perfectivity > eventivity

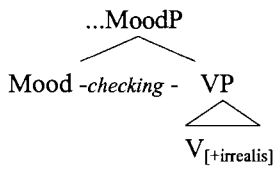
Given the association between deontic modality and perfectivity and eventivity, it follows that the bare perfective will be restricted to eventive predicates—the eventivity constraint noted in (13v).[13]

5. EXTENSION TO ROOT INFINITIVES

Recall from our earlier discussion (section 2.3.2) that RIs also show a modal reference effect. We propose that the modal interpretation of RIs in languages such as Dutch and German is also associated with an active MoodP. In RIs, MoodP is licensed by the infinitival morpheme, which I assume has an irrealis feature (cf. Duffley, 1992; Hoekstra & Hyams, 1998; Stowell, 1982).[14]

As was the case for the bare perfective, in order for Mood to attract the irrealis feature in the verb, the infinitive must be in a local relation with Mood. Hence, T/AgrP and AspP must be unspecified. There are three important consequences of this hypothesis. First, it entails an underspecification of T/Agr in precisely those cases in which a modal interpretation of infinitives arises. This derives the essential properties of the RI, viz., a lack of finiteness and a modal meaning. The structure we assume for RIs is as in (22).

(22)



Second, the underspecification of AspP means that there can be no aspectual RIs.[15] This prediction is borne out by the data. As illustrated in (23), in languages with an otherwise robust RI stage, e.g., French (Ferdinand, 1996), Dutch (de Haan, 1986) and German (Poeppel & Wexler, 1993) we do not find RIs consisting of non-finite aspectual auxiliaries (@ indicates that an utterance type is unattested):

(23) a. @Maman avoir mangé glace
Mommy have.INF eaten ice cream
b. @De pop zijn gevallen
the doll be.INF fallen

Finally, under this analysis we expect that RIs will decrease as modals increase (as in Greek). Wijnen (1994) and Blom (2002) note that there is such a trade-off in Dutch.

6. EXTENSION TO ADULT GRAMMAR

Thus far we have been concerned with properties of developing grammars. However, we do not expect child grammars to make use of principles not otherwise available to adult grammars. Indeed, we have argued that the RI/bare perfective grammar is structurally parallel to the adult grammar and that the early grammar is subject to the same locality principles that hold in adult grammar. The hypothesis that child grammars fall within the limits imposed by UG (Hyams, 1983; S. Klein, 1982; White, 1981; among others), often referred to as the Continuity Hypothesis (Pinker, 1984), leads us to expect that there will be cases in which aspectual features license Mood in adult grammar.

6.1. Romance negative imperatives

Indeed, we can formulate the following prediction: When (adult) T/Agr is underspecified and MoodP is projected—essentially, the conditions children find themselves in—Mood can be licensed by features lower down in the tree. Romance negative imperatives, discussed in Zanuttini (1997), seem to be such a case. In the negative imperative, infinitival or subjunctive features on the verb can license Mood because, by hypothesis, imperatives have a defective tense specification.

Zanuttini's (1997) generalization is that preverbal negative markers are incompatible with true imperatives. Relevant examples are given in (24).

(24) a. Telefona! (Italian)
call.IMP.2SG
'Call!' (familiar)

b. * Non telefona!
Neg call.IMP.2SG
'Don't call!'

Zanuttini proposes that the negative marker triggers the activation of MoodP, which must be licensed by functional features.[16] She assumes that lexical imperatives are deficient in the features required to license Mood. Instead, the licensing requirement on Mood is satisfied by either non-imperative inflectional features on the verb, e.g., subjunctive features, infinitival features (25a,b), or by a functional element merged into the head of MoodP, e.g., the subjunctive particles *mi/mu/ma* in the southern dialects of Italian (related to Greek *na*), as in (25c), or aspectual auxiliaries such as 'stay' (25d,e), 'have' (25,f), and 'go' (25g).

(25) a. Non telefoni!
NEG call.3SG.SUBJ.
'Don't call!' (polite)

b. Non telefonare!
NEG call.INF
'Don't call!' (familiar)

c. Mi nun nèsci! (Eastern Sicilian)
PRT NEG leave
'Leave!' (polite form)

d. No sta (a) crodi! (Friulian)
NEG AUX.IMP *a* believe.INF
'Don't believe that!'

e. No stá parlare (Paduan)
NEG stay.IMP talk.INF
'Don't talk!'

f. Nnə vv'avəssí a credərə (Molisse)
NEG you'had.PST.SUBJ *a* believe.INF
'Don't believe that!'

g. Não vá se afogar, moço! (Portuguese)
NEG go.IMP self drown, young man
'Don't drown yourself, young man!'

Note that the aspectual auxiliaries in (25d–g) are in the imperative form. Zanuttini assumes that in contrast to main verb imperatives, which do not have features to license Mood, imperative aspectual auxiliaries license Mood through Merge, like the modal particles in (25c). However, if imperatives are lacking in those features necessary to license Mood, as Zanuttini proposes, it is not obvious how imperative auxiliaries are able to overcome this deficiency. We would like to propose that it is the aspectual feature in the auxiliary that licenses Mood. The aspectual feature is doing the modal job and loses its aspectual value. Thus, *sta*, normally associated with progressive meaning, *va* with future/intentional meaning, *avəssí,* a form of the perfect auxiliary, do not have aspectual value in the sentences in (25d–f). If this proposal is on the right track, then the Romance negative imperatives constitute a case of aspectual licensing of Mood in the adult grammar.[17]

6.2. Summary

Let us sum up the proposal. We have argued that under appropriate structural conditions certain temporal/aspectual features may license Mood, giving rise to modal/irrealis meaning. The bare perfective structure in early Greek is an instance of aspectually licensed Mood. In structural terms, MoodP is licensed by the perfective feature (i.e., the transition feature) under Attract. In adult grammar the past feature can license Mood, as in counterfactual wishes and conditionals. In the child's grammar the underspecification of T/Agr creates the locality that allows Mood to attract the perfective feature. Perfective aspect can license deontic mood because they share a "transition" feature. We also proposed that the aspectual licensing of Mood is a property of adult grammar under certain conditions, namely

when T is deficient and Mood is active, as in Romance negative imperatives. According to our analysis, RIs also have a Mood licensing (i.e., irrealis) feature, evidenced also by Italian negative imperatives (cf. 25b) and more generally, by the similar distribution of infinitives and subjunctives across languages. Finally, I have suggested that the transition to the adult system happens when modals (or modal particles in Greek) become productive. We may assume, as proposed in Chomsky (1995), that Merge takes precedence over Move/Attract and hence, as the modals become productive they push out the (more marked) feature checking option.

7. FURTHER ISSUES

7.1. Optional(??) infinitives

One of the theoretical implications of this analysis is that the underspecification of T/Agr is not a true grammatical option (as proposed, for example, in Wexler's (1994) Optional Infinitive analysis). The underspecification of T/Agr does not result in non-finite verbs with a temporal meaning, as would be predicted if the underspecification were truly optional. Rather, underspecification is predominantly associated with modality, or in our terms, is structurally represented by MoodP, and the alternation between finite and non-finite verbs during the RI (or bare perfective)-stage maps onto a semantic opposition between realis and irrealis mood.

7.2. English bare verbs

We have proposed that the aspectual licensing of Mood is a marked option (Merge being the unmarked case) that arises because of the lack of productivity of the modals (or modal particles) in early grammar. English-speaking children also go through a stage, analogous to the RI stage, in which we find a very high percentage of bare, i.e., uninflected verbs, as illustrated in (26).

(26) a. Adam write pencil
b. Robin break it, your pen.
c. Ann need Mommy napkin.

As discussed in Hoekstra and Hyams (1998) and Hyams (2001), however, the early English bare verb structure does not typically have a modal interpretation. Only about 9%–13% of English bare verbs have a modal meaning.[18] This is to be compared, for example, to the 86% of Dutch RIs that have a modal interpretation, shown in table 5.[19] The English bare verb has either a present tense meaning or less frequently, a past tense meaning.

Interestingly, the bare verb can refer to ongoing eventualities.[20] This is in marked contrast to the English finite verb, which has only a generic or habitual meaning for adults, as well as for children (Hyams, 2001). According to Giorgi and Pianesi (1997), the English verb is inherently perfective and the ongoing

interpretation of present tense verb (*John crosses the street*) is blocked by the 'punctuality constraint'. The punctuality constraint states (roughly) that a closed (perfective) event cannot be simultaneous with the speech time, which is itself punctual.[21] Elsewhere I have argued that because the child's bare verb is not temporally anchored to the speech time it avoids the effects of the punctuality constraint and therefore has free reference (ongoing, habitual, past) (Hyams, 2001). This proposal rests on the assumption that verbs in the early grammar of English are inherently perfective, as Giorgi and Pianesi postulate for the adult grammar. The finding that children's finite verbs adhere to the punctuality constraint in that they only have generic meaning (as in the adult grammar) supports this assumption. It thus appears that young English-speaking children know the inherent semantics of the English verb.[22] This raises an interesting question: if the early English verb is perfective, why doesn't this feature license Mood as it does in the early grammar of Greek? To answer this question I will assume, again in line with Giorgi and Pianesi's analysis, that because the English verbal system is morphologically impoverished, the perfective (i.e., transition) feature is required to categorically identify and license V. It is therefore unavailable to license Mood.[23]

7.3. Italian bare participles

A final issue to consider concerns the bare (perfect) participle structure that shows up in early Italian, illustrated in (9). The occurrence of such sentences raises the question of the relation between the perfect and perfective aspect. If the perfect bears a perfective feature, then we might expect these utterances to have a modal interpretation, contrary to fact.[24] As we noted earlier, the Italian bare participle typically denotes (past) closed events and does not have a deontic or volitional meaning. Reasons of space prevent a detailed discussion of the Italian bare participle construction. However, I will briefly outline a solution to this problem.

There is a rather large literature on the perfect construction and its relation (if any) to the perfective and the past (see for example Comrie (1976), Giorgi & Pianesi (1997), W. Klein (2000), and references cited therein). Following Giorgi and Pianesi, I assume that the perfect participle is marked for perfective aspect (it denotes a consequent state), as well as (past) tense and agreement.[25] I further assume, roughly following Belletti (1990), that the Italian perfect (the *passato prossimo*) consists of two VP shells—one housing the auxiliary, the other the participle—and that each shell contains its own T/Agr projection. Given this bipartite structure, we may hypothesize that the perfective feature in the participle is simply too far from MoodP to act as a licenser. While the higher T/Agr may be eliminated (as evidenced by the missing auxiliary in (9)), the lower T/Agr (associated with the lexical participle) cannot be. As hypothesized by Belletti, the Italian participle—like the lexical infinitive—has Agr features that must be checked.[26] The requirement that the verb (whether finite or infinitive) check Agr features precludes an RI stage in Italian (Guasti, 1994; Rizzi, 1994; Berger-Morales & Salustri, 2003). I am proposing that a similar mechanism blocks the elimination of T/Agr in the Italian Participle Phrase and hence, also blocks a licensing relation

between Mood and the perfective feature in the participle. Thus, a perfective verb, as in Greek, can license MoodP, while the periphrastic perfective, as in Italian, does not. The transition feature is a necessary but not sufficient condition for aspectual licensing of mood. Structural requirements must be met as well.

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APPENDIX

Aspect, tense and mood in Greek

		Aspect	
Mood	*Tense*	*Imperfective*	*Perfective*
	Present	δiaváz-o[a]	---
Indicative	Past	δiávaz-a	δiávas-a
	Future	θa δiaváz-o	θa δiavás-o
Subjunctive		na δiaváz-o	na δiavás-o
Imperative		δiávaz-e	δiávas-e

[a]δiavázo 'I.read'

Non-past and past verbal endings in Greek

		Classes I and 2		*Class 2*
		Non-past	*Past*	*Imperfective Non-past*
SG	1	-o	-a	-ó, -áo/-ó, -ó
	2	-is	-es	-ís, -ás, -ás
	3	-i	-e	-í, -ái/-í, -í
PL	1	-ume/-ome	-ame	-úme, -áme/-úme, -úme
	2	-ete	-ate	-íte, -áte, -áte
	3	-un(e)	-an(e)	-ún(e), -án(e)/-ún(e), -ún

NOTES

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[1] Unless otherwise indicated, the figures reported in the various tables are based on the data presented by Varlokosta et al. (1998).

[2] Where the subject is null its reference is determined from contextual information.

[3] Mairi's data presented in tables 2 and 3 were compiled by Dimitris Ntelitheos and include 6 files from Mairi 1;9 (CHILDES: MacWhinney & Snow, 1985; Stephany, 1997).

[4] In this paper I use the terms 'modal' and 'irrealis' interchangeably. Other studies reporting a modal reference effect for RIs are the following: Dutch: Hoekstra & Jordens (1994), Kraemer (1993), Wijnen (1996); German: Behrens (1993), Lasser (1997), Ingram & Thompson (1996), Becker & Hyams (1999);

Swedish: Plunkett & Strömqvist (1990); French: Meisel (1990), Ferdinand (1996). For further discussion of the MRE see Hoekstra & Hyams (1998).

[5] The meaning of the child's utterance is determined by linguistic and extra-linguistic context, including, for example, parental response or repair.

[6] Brun et al. (1999) find that Russian perfective RIs most often have a past rather than modal reading (and imperfective RIs have ongoing meaning). The RI stage in Russian occurs much earlier than in the other languages discussed, peaking at age 1;8–1;9. It is thus possible that these young children have not yet analyzed the infinitival morphology and hence do not distinguish between finite and non-finite forms. This issue requires further investigation.

[7] See Shirai and Anderson (1995) for a review of much relevant literature, and Olsen and Weinberg (1999) for a learnability-theoretic account of the restrictions.

[8] This is a departure from the assumptions of Hoekstra and Hyams (1998), who assumed that morphology itself gives rise to an irrealis meaning. See note 13.

[9] Roussou (2000) and others argue that in the adult grammar the modal and future particles *na/θa* occur in a C-related position. Following Roussou (2000), I assume that *na* and *θa* are both generated in a lower C head that is specified for mood, $C_{M(ood)}$ (roughly equivalent to Rizzi's Fin (the lowest of his CP projections). In Roussou's analysis n*a* (but not *θa*) raises to C_{op} (Rizzi's Force). The movement of *na* is not relevant to our discussion.

[10] In Bobalijk and Thráinsson's (B&T) analysis non-locality triggers movement, as for example in split Infl languages such as Italian in which V moves to T to check the higher AGR features. For B&T the functional structure is parameterized (a split I—à la Pollock (1989)—or a unitary Il) and the choice of one or another structure determines whether a language has verb raising or not. It also follows that in languages with multiple I heads to check, the verb has multiple affixes, e.g., Italian tense and agreement morphemes. See Johnson (1990) for an earlier incarnation of this idea. In the bare perfective and RI cases under discussion the non-finite verb does not carry the necessary features to check the intermediate I heads, hence movement to check Mood is precluded. In this sense, then, we can consider underspecification as the non-movement option (available to children and to adults in limited circumstances) for feature checking.

[11] This is similar to the suggestion in Hyams and Wexler (1992) that there is a trade-off in early grammar between null subjects and functionally equivalent overt pronouns.

[12] The mood-aspect-aktionsart connections have been the subject of very interesting and insightful analysis and certainly warrant a much more thorough discussion than is possible here given the length constraints. See Barbiers (1995), Abraham (2002), Lyons (1977), van Gelderen (to appear) for discussion and also van Gelderen and van der Meulen (1998) and Ferdinand (1996) for similar approaches to the mood–aspect connection in the acquisition of Russian and French, respectively.

[13] RIs also show an eventivity constraint, as discussed in section 2.3.3. Since Dutch, German and the other RI languages do not formally mark (im)perfectivity, it must be that in such languages the matching effect is realized as a direct relation between modality and the inherent (eventive) aspect of the predicate (cf. Barbiers, 1995; Hoekstra & Hyams, 1998). At this point I leave open the formal implementation of this proposal within the framework developed here.

[14] Here I depart from the analysis of RIs in Hoekstra and Hyams (1998) in which it was proposed that the modal reading of the RI comes from the infinitival morpheme itself. In the current analysis the infinitival morpheme is responsible for the licensing of MoodP and the modal reading comes from the functional structure (including the eventivity of the predicate. Cf. previous note).

[15] We return to the Italian bare participle construction (illustrated in 9) in section 7.3.

[16] Zanuttini's hypothesis that negation (and not the imperative) triggers Mood receives some support from the pattern of Mood morphemes in Swahili. Swahili shows a 3-way opposition in mood morphology—indicative, subjunctive, negative. Imperatives are marked with the default indicative vowel, while negative imperatives have the negative mood morpheme (cf. Deen, 2002).

[17] Other examples of aspectually licensed modality in adult grammar are jussives in adult Dutch, and the perfect of evidentiality in languages such as Turkish and Bulgarian (Izvorski, 1997). These cases are discussed briefly in Hyams (2002).

[18] Only verbs (bare and inflected) with 3rd person subjects are included in this analysis since agreement is marked only in this person in English. The percentages in the text are based on the files of Adam, Nina and Naomi in the Childes database (MacWhinney & Snow, 1985). See Deen (1997), Madsen and

Gilkerson (1999) and Hyams (2001) for further discussion of these data.

[19] Hoekstra and Hyams (1998) propose that English does not show a MRE because there is no infinitival morphology on the bare verb and hence no irrealis feature to license Mood (cf. note 14). In Hyams (2001) I propose that infinitival *to* is a mood marker and that the semi-auxiliaries *hafta, gonna, wanna,* which incorporate *to*, are the functional equivalent of the RI in early English.

[20] For example, Adam uttered the sentence in (26a) while writing on someone's pen (Brown, 1973; MacWhinney & Snow, 1985).

[21] Smith (1997) refers to this as the 'bounded event constraint' based on Kamp and Reyle (1993).

[22] Giorgi and Pianesi (2002) propose that verbs are inherently perfective in languages with weak agreement morphology, for example English, Igbo, Vatà, and Haitian Creole. This association between weak agreement and perfectivity would allow the child to deduce the semantics from the morphology (or lack thereof).

[23] My thanks to Alessandra Giorgi for suggesting this idea to me.

[24] I am indebted to Hagit Borer for first bringing this problem to my attention.

[25] In Italian the participle is inflected for number and gender (see examples below). Evidence for the presence of tense features is provided by the absolutive construction, in which the participle is temporally situated with respect to the main verb, as illustrated by the contrast in (i) and (ii) (from Giorgi and Pianesi (1997)).

(i) Salutati gli amici alle quattro, Maria partì alle cinque.
Greeted.MASC.PL the friends at (the) four, Maria left at (the) five
'Having said goodbye to her friends at four, Maria left at five.'

(ii) * Salutati gli amici alle cinque, Maria partì alle quattro.
Greeted.MASC.PL the friends at (the) five, Maria left at (the) four
'Having said goodbye to her friends at five, Maria left at four.'

[26] In the case of the infinitive the Agr features are abstract. Guasti (1994) and Rizzi (1994) have proposed that the lack of an RI stage in Italian is due to the fact that the Italian verb (whether finite or infinitive) raises to T/Agr. I am proposing that a similar mechanism blocks the underspecification of T/Agr in the Participle Phrase.