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Aspectual Effects on Interpretation in Early Grammar

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This paper focuses on the temporal and modal meanings associated with root infinitives (RIs) and other non-finite clauses in several typologically diverse languages—English, Russian, Greek and Dutch. I discuss the role that event structure, aspect, and modality play in the interpretation of these clauses. The basic hypothesis is that in the absence of a tense specification, the temporal reference of non-finite clauses is determined by the event structure of the predicate, in particular by the property of event closure. General principles of aspectual interpretation, such as the Punctuality Constraint (Giorgi and Pianesi 1997) and the Default Anchoring Requirement (a special case of a broader requirement that all clauses be temporally interpreted) interact with the particular aspectual features of the target language to explain the cross-linguistic differences in the temporal interpretation (past/present/modal) non-finite clauses.

1. INTRODUCTION

The past decade or so has seen a substantial amount of research into the morphosyntactic properties of nonfinite clauses in child language, especially the properties associated with root infinitives (RIs), as in (1).

(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

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Less attention has been paid to the meanings of these nonfinite clauses (some exceptions are Wijnen (1997), Hoekstra and Hyams (1998), Gavruseva (2003), Brun, Avrutin, and Babyonyshev (1999), and Blom (2003)). In this article, I focus on the interpretation of RIs and other nonfinite clauses, especially their aspectual and event-related properties.

To anticipate the discussion, I will propose that the fundamental determinant of temporal reference in nonfinite clauses in child language is event closure. Past, present, and modal meanings result from general principles of aspectual interpretation, in particular the *Punctuality Constraint* (Giorgi and Pianesi (1997)) and what I call the *Default Anchoring Requirement*—which is a special case of a broader requirement that all clauses be temporally interpreted. These general principles operate in combination with language-specific aspectual properties to derive the different interpretations associated with nonfinite root clauses across several typologically diverse child languages.

There are two important observations concerning the interpretation of nonfinite clauses. First, such clauses often have an interpretation that is different from their finite counterparts in both the child and adult languages. For example, Dutch RIs most often have a modal interpretation, expressing volition, obligation, or intention, as illustrated in the parent-child exchanges in (2) (from Wijnen (1997)).

(2) a. Child: Papa bouwen.
Daddy build-INF
Father: Geef jij de blokjes maar aan dan.
'Well, hand me the blocks then.'
b. Child: Drike(n)!
Drink-INF
Father: Wil je in die kamer drinken?
Want you in that room drink
'Do you want to have a drink in that room?'

This is to be contrasted with the present or past tense meanings that are expressed by finite clauses during the same stage.

Similarly, the majority of bare verbs used by English-speaking children have ongoing meaning (Deen (1997), Torrence and Hyams (2004), Madsen and Gilkerson (1999)) in marked contrast to the adult or child finite present tense clauses, which denote only habitual events or have a property reading (e.g., *John dances* means roughly that John is a dancer). To illustrate, the child's bare verb sentence in (3a) refers to an ongoing act of ballplaying while the ungrammaticality of the temporal adverb *now* in (3b) shows that this same meaning is not possible in adult English present tense clauses.

(3) a. Mother: What's she doing with the tiger now?
Child: Play # play ball with him.
b. She plays with him everyday/*now.

A second observation is that apparently identical forms in different child languages can have very different interpretive properties. For example, as just noted, in Dutch (and German, Swedish, etc.) RIs are most often modal in meaning. On the other hand, Russian RIs most often have a temporal meaning, denoting ongoing or past events. The Dutch and Russian data are discussed below.

These two generalizations are summarized in (4):

(4) a. Nonfinite clauses in child language often have an interpretation that is different from their finite counterparts.
b. Similar nonfinite forms (e.g., RIs) across child languages can have very different interpretive properties.

A theory of RIs and other nonfinite forms in early language should aim to account for the properties in (4). More generally, it should explain how temporal or modal reference is determined in clauses that lack a tense specification. That is the goal of this article. I will concentrate on four languages—English, Russian, Greek, and Dutch—because these are languages in which there has been some systematic investigation of the temporal reference of nonfinite forms.

2. CROSS-LINGUISTIC DIFFERENCES IN THE TEMPORAL/MODAL INTERPRETATION OF NONFINITE CLAUSES

I will take the "bare participle" sentences illustrated in (5) as a point of departure. Young children produce sentences that contain a participle, but which lack an auxiliary that would be required in the adult language.

(5) a. He chewing it.
'He is chewing it.'
b. Disegno cascato.
picture fallen
cf. il disegno è/ha cascato. (adult sentence)
'The picture has fallen.'
c. Tukele skrila pikapolonica. (Rus and Chandra (2004))
here hidden ladybug
cf. Tukele se je skrila pikapolonica. (adult sentence)
here se-refl is hidden ladybug
'The ladybug has hidden here.'

d. mm dbytt min ben. (Josefsson (2002))
mm I built-sup. my car
cf. har du byggt en bil. (adult expansion)
'Have you built up the car.'

In sentences such as (5), the temporal interpretation of the clause is determined by the aspectual value of the participle. For example, the English present participle in (5a) denotes an ongoing or open event while the Italian, Slovenian, and Swedish past participles in (5b–d) denote terminated or closed events.

The essence of my proposal will be that the interpretation of *all* nonfinite forms in early language, including RIs, English bare verbs, and others that will be discussed below, are determined by the aspectual properties of the predicate. In other words, participles represent the paradigm case for understanding the interpretive properties of nonfinite clauses in general. Before turning to the analysis, I briefly review some of the basic findings concerning the interpretation of nonfinite verbs in the various languages, beginning with English. I will then discuss each language in more detail in later sections, and return to participles in Section 5. Many of the basic findings that I will note have been discussed elsewhere and so for ease of exposition I will present aggregate data from different children. Where available, individual subject data for each of the languages discussed are presented in the Appendix.

English

Since Wexler (1994) English bare verbs such as in (6) are widely assumed to be the English analogue of the RI. That is, the bare verb is assumed to be nonfinite.[1] (English examples from the Brown and Suppes corpora, Brown (1973), Suppes (1974): CHILDES, MacWhinney and Snow (1985)).

(6) a. He lose it.
b. He fall down.
c. Play ball with him.

As discussed in Hoekstra and Hyams (1998) and references cited there, English bare verbs typically have a temporal meaning, denoting either ongoing or past

[1]Empirical evidence for this hypothesis is not easy to come by. The English bare verb does not exhibit many of the hallmark characteristics of RIs in other languages, such as a preponderance of null subjects and absence in *wh* expressions (cf. Phillips (1995), for example). However, Harris and Wexler (1996) present evidence from negation in support of the RI-analogue hypothesis and we will provide further interpretive evidence below.

TABLE 1
Interpretation of English Bare Verbs
in 3Sg Contexts

Present	*Past*	*Modal/Future*
60% (278)	32% (147)	8% (40)

eventualities. This is illustrated in the parent-child exchanges in (7).[2]

(7) a. Child: He fall down.
Mother: He did?
b. Mother: What's she doing with the tiger now? (= 3a)
Child: Play # play ball with him.

In (7a), based on context and shared experience, the mother understands the child's bare verb to denote a past event. Similarly, in (7b) the child responds to a question about an ongoing event by using a bare verb.

The breakdown of the temporal vs. modal meanings associated with the English bare verb is given in Table 1.[3] These data are based on quantitative studies of five English-speaking children in the CHILDES database, Nina, Naomi, Adam, Eve, and Sarah (Brown (1973), Suppes (1974), Sachs (1983)), during the RI/Bare Verb stage, that is, during the time that these children are producing bare verbs that alternate with finite verbs.[4] The number of actual tokens is given in parentheses. The breakdown for the individual English-speaking children is provided in Table A in the Appendix.

Collapsing across the five children, approximately 92% of bare verbs have a temporal (i.e., nonmodal/nonfuture) meaning, including 32% past and 60% present readings. The 8% modal/future rate, while quite low, is still somewhat

[2]I use the term 'bare verb' in order to distinguish the English-type phenomenon illustrated in (6) and (7) from the case of true morphological infinitives such as in Dutch (cf. 1a,b). Root *to*-infinitives, as in (i), are unattested in English (indicated by the @ symbol).

(i) @He to lose it.
@He to fall down.
@To play ball with him.

[3]In Table 1 and all subsequent tables for the other languages, we include only eventive (nonstative) verbs. As noted by Wijnen (1997) and others, in most languages RIs are restricted to eventive verbs. English-speaking children produce both stative and eventive bare verbs and various proposals have been made to explain this difference between English and other RI languages (e.g. Wijnen (1997); Hoekstra and Hyams (1998); Gavruseva (2003)). The so-called 'eventivity constraint' is beyond the scope of this article, but see Hyams (in preparation) for review and new analysis.

artificially high due in large measure to one child, Eve, who showed an exceptionally high rate of modal bare verbs (25%). For two of the five children, the rate of modal bare verbs was 8% or under and for the other two children there were no occurrences of modal bare verbs (see Table A in the Appendix). If we put Eve's data to the side, the overall rate of modal bare verbs is about 5%. In keeping with general norms that allow for a 10% error rate in spontaneous speech (e.g., Brown (1973)), I will assume that the 8% of bare verbs (or 5% excluding Eve) with modal meaning are simply noise in the data.[5]

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[4]The figures in Table 1 are based on work by Kamil Ud Deen, Jill Gilkerson, Shannon Madsen, and Harold Torrence (UCLA Psycholinguistics Lab) (cf. Deen (1997); Madsen and Gilkerson (1994); Torrence and Hyams (2004)). The temporal reference of bare verbs was determined by looking at the surrounding discourse of each verbal utterance, including parental response and repair, as well as contextual notes. Only sentences with third person singular (3Sg) subjects were counted. We considered both overt subjects and null subjects when the referent was clear from context. Unclear cases were excluded. In coding the data, we followed Wijnen (1997) for Dutch (see note 7). Examples from each temporal category are provided below:

Present

a. Adam write pencil. (while writing on someone's pen)
b. Dat a turn. (while turning a ring on someone's finger)

Past

c. Child: Bite me and big doggie bite me.
   Adult: The fish bit you and the cowboy bit you and a big doggie bit you.
   Child: Yeah.
d. Child: Robin break it, your pen.
   Adult: No, he didn't break it.

Future/Modal

e. Child: Read # Mommy read. (handing mother the book)
f. Adult: What do you want?
   Child: Sit up. Sit up. Baby sit up.

[5]Blom (2003) suggests that the low rate of modal bare verbs in English may be a methodological artifact of the coding procedures. As English morphology marks only third person verbs in the present tense, all analyses of nonfinite verbs in English are restricted to verbs with third person subjects (either overt or inferred) because this is the only case in which we can reliably determine if the verb is finite or not. In Dutch, and other languages, in contrast, all persons are considered. According to Blom, it is more likely that verbs with first and second person subjects will have modal reference (e.g., *I want, you must*) than verbs with third person subjects, and hence limiting the analysis to verbs with third person subjects skews the data towards a nonmodal reading. Blom shows that Dutch RIs with first and second person subjects have a modal reading more often than RIs with third person subjects. The 74% modal RI rate drops to 52% when first and second person utterances are excluded. In order to determine whether there is a higher rate of modal bare verbs with non-third person subjects, we examined several files of Nina (Nina 27, 28, 30) and Naomi (Naomi 62, 68, 69, 70) from the CHILDES database and coded all first person subject sentences, including those with an overt pronominal subject (*I*) and null subject sentences in which the reference of the subject could be clearly established as first person. The results of this analysis, provided in the table below, show that the rate of modal meaning in first person contexts is very similar to what is found in third person contexts (cf. Table 1 in the text). Of course, because the first person verb is uninflected in English we do not know for any particular token whether the verb is finite or not, and hence these

TABLE 2
Interpretation of Russian RIs
(Brun p.c.)

Present	*Past*	*Modal/Future*
47% (132)	25% (71)	27% (76)

Russian

Turning next to Russian, this language also shows an RI stage, as observed by Brun et al. (1999) and Snyder and Bar-Shalom (1998). Dina Brun (p.c.) reports that Russian RIs have temporal and modal meanings in the proportions given in Table 2. The breakdown for individual children is given in Table B in the Appendix.

Some Russian child language examples are provided in (8) (from Brun (1999)).

(8) a. Mama maslo kupit.' (past)
mommy butter-buy-INF
'Mommy has bought the butter.'
b. Kupat'sya. (present)
bath-INF
'(He) is bathing.'
c. Rubaška snimat.' (modal/future)
shirt take-off-INF
'(I will/want to) take off the shirt.'

We discuss Russian in more detail in Section 2.1.

Greek

We consider Greek next. The early Greek nonfinite form, first identified by Varlokosta, Vainikka, and Rohrbacher (1998), is not an infinitive. Indeed, Greek does not have an infinitive (Joseph (1983), Joseph and Philippaki-Warburton

results are only approximate.

Interpretation of English Bare Verbs in First Person Contexts

	Present	*Past*	*Modal/Future*
Naomi	77% (20)	15% (4)	8% (2)
Nina	82% (15)	14% (19)	4% (6)

(1987)). Elsewhere, (Hyams (2002; 2005)) I have referred to the Greek non-finite form as the 'bare perfective' because it is a perfective form of the verb with neither past tense morphology nor a modal particle, one of which would be required in the adult language. Thus, the form that children use is ungrammatical in the adult language. Nevertheless, such sentences are quite pervasive in early language, constituting as much as 53% of the Greek child's early verbs. Examples of the bare perfective are given in (9) (from Stephany (1995)). The adult version is given below the child's example.

(9) a. Pio vavási. (child form of *δiavási*)
Spiros read-PERF.3Sg
'Spiro is going to/wants to read.'
cf. O Spíros θa/na δiavási. (adult sentences)
the Spiros FUT/SUBJ read-PERF.3Sg
'Spiros is going to/should read.'
O Spíros theli/prepi na δiavási.
the Spiros want-3Sg /need-3Sg SUBJ read-PERF.3Sg
'Spiros wants/needs to read.'
b. Pári γugunáki?
Take-PERF.3Sg piggy
'May I take the piggy?'
cf. Na páro to γurunáki?
SUBJ take-PERF.1Sg the piggy
'May I take the piggy?'

As noted by Stephany (1995), Tsimpli (1992), Varlokosta (2002), among others, the child's bare perfective virtually always expresses wishes, intentions, and obligations with respect to some eventuality. It is therefore parallel to RIs with modal interpretation (cf. Hyams (2002; 2005) and Varlokosta (2002) for discussion). During this same stage, Greek children also produce adult-like finite forms, the present imperfective (e.g., *gráf-o* 'write-1Sg.') built on the imperfective stem and the past perfective (e.g., *é-graps-a* 'past-write-1Sg.') built on the aorist or perfective stem, to denote ongoing and past eventualities, respectively. The form-meaning relations for the children's finite (perfective and imperfective) and bare perfectives are given in Table 3. The breakdown for individual children is in Table C of the Appendix.

As indicated in Table 3, the vast majority of imperfective verbs have present meaning. The 62 perfective verbs with past tense morphology have past meaning, as illustrated in (10).

(10) Epese (i) (s)kúpa. (Spiros 1;10)
AUGM-fall:PERF-PAST-3Sg (the) broom
'The broom fell down.'

TABLE 3
Interpretation of Greek Verbs (From Hyams (2002); Based on Stephany (1981; 1985; and p.c.))

	Present	*Past*	*Modal/Future*
Perfective			
Past	—	100% (62)	
Bare	—		100% (212)
Imperfective	96% (122)	—	4% (5)

The 212 remaining perfective verbs are bare forms (no tense or modal particle). Virtually all of these have modal meaning.

Varlokosta et al. (1998) note that the bare perfective typically occurs with 3Sg affix *-i* with both third person and non-third person subjects. For example, in (9b) the subject is first person, yet the verb bears an *-i* affix. Thus, the bare perfective is a nonagreeing form. The inconsistent agreement on the bare perfective is to be contrasted with the child's nearly perfect agreement on imperfective verbs at the same stage. Imperfective verbs show a relatively high rate of correct agreement, around 97% at the relevant stage, bringing it in line with other child languages that have been studied (cf. Hyams (2005)). Thus, Greek children do not lack knowledge of agreement. Rather, they appear to have a root nonfinite option parallel to children acquiring RI languages, as argued by Varlokosta et al. (1998) and Hyams (2002; 2005).

Dutch

We turn finally to Dutch. As discussed earlier, Dutch RIs have predominantly a modal meaning with some proportion of verbs referring to ongoing events (present) and virtually no past RIs. The modal reading connected to Dutch RIs was first noted in 1917 by Van Ginneken and has been discussed in Hoekstra and Jordens (1994), Krämer (1993), Wijnen (1997), and Blom (2003). It is also observed in other Germanic languages, for example, Swedish (Plunkett and Strömqvist (1990), Josefsson (2002)); German (Ingram and Thompson (1996), Lasser (1997), Becker and Hyams (2000)).[6] Wijnen (1997) and Blom (2003) provide the most detailed data and analyses of the interpretive properties of RIs and so we focus on Dutch. Some examples of modal (11a,b) and present (11c) RIs are given below (from Blom (2003)).

[6]French also exhibits an RI stage and French RIs often have modal meaning, though the precise breakdown of temporal meanings is not reported (Meisel (1990), Ferdinand (1996), and Labelle (2000)).

(11) a. Peter bal pakken.
Peter ball get-INF
'Peter wants to get the ball.'
b. Eerst kaatje kopen.
First ticket buy-INF
'First buy the ticket!'
c. Ah, mij bril vallen.
Ah, my glasses fall-INF.
'My glasses are falling.'

In (11a), Peter is not describing an ongoing or past event of ball-getting. Rather, he is expressing a desire or intention to get the ball. In (11b) the child is giving a direction to someone to buy a ticket, not describing a ticket-buying event. The utterance in (11c) denotes an ongoing event in which the child's glasses are falling. The breakdown in modal and temporal interpretations is shown in Table 4, from Wijnen's Dutch study; approximately 87% of RIs have modal meaning while roughly 10% have a present tense meaning.[7] The data for individual children are given in Table D in the Appendix.[8,9] The cross-linguistic results presented in Tables 1–4 are summarized in Table 5.

[7]In Wijnen's (1997) study an utterance was taken to be ongoing (present) when the utterance and the eventuality it referred to co-occurred. This was inferred either from contextual information in the transcript or from the response of an adult interlocutor. The utterance was classified as 'past' if context suggested that it referred to a past eventuality, and 'future' if it referred to an as yet unrealized eventuality. Wijnen notes that these were often expressions of the child's wishes or desires, as in (2) in the text, and is also reflected in the fact that an adult interlocutor would recast the utterance using a modal, as in (2b). In our tables we refer to this category as 'future/modal.' Similar criteria are adopted by Blom (2003).

[8]Blom (2003) reports a somewhat lower rate of modal RIs–around 73%–with a higher rate of present RIs–around 26%. Her findings concerning the past reading are consistent with Wijnen's—only 1% of RIs in her data have a past reading. The reason for the discrepancy between the figures in Blom and Wijnen may be due in part to the fact that the children in Blom's study were younger than Wijnen's at the first data points. Thus, more of her RI data was from an earlier period during which modals are more likely to have a nonmodal meaning—prior to the so-called 'modal shift' (cf. Blom and Wijnen (2000)). The differences in the proportion of RIs with modal vs. present meaning is not relevant to the analysis presented in this article. What is crucial is that all studies agree that both modal and present tense readings are possible in Dutch and that past RIs are extremely rare (under 4%).

[9]Behrens (1993) claims that the five German-speaking children she studied used RIs with both modal and temporal reference. However, she does not provide quantitative data for four of the five children, so it is impossible to determine the relative proportions. Behrens does provide a breakdown of Simone's data (age 1;9—2;7): 79% (range: 70–85%) of Simone's RIs have modal meaning (after age 1;10) and about 16% refer to ongoing events. There were only three instances in which an RI referred to a completed event. Poeppel and Wexler (1993) report a lower proportion of modal RIs for Andreas. They claim that 30 of Andreas' 37 RIs (54%) have a 'realized, nonmodal interpretation.' They do not say how many of these are ongoing vs. past. Lasser (1997) reports that past tense RIs are virtually nonexistent in German. This is expressed in her 'noncompleteness constraint' (NCC), which states that 'the predicate of an RI cannot refer to a completed event.' Overall, the German data seem to parallel to the Dutch results. We will attempt to derive the NCC for Dutch/German below.

TABLE 4
Temporal Reference of Dutch RIs
(Based on Wijnen (1997))

Present	*Past*	*Future/Modal*
10% (194)	3% (64)	87% (1625)

TABLE 5
Temporal and Modal Characteristics of Nonfinite Clauses in Child Language

	Present	*Past*	*Modal/Future*
English	65%	25%	—
Russian	47%	25%	27%
Greek	—	—	Approx. 100%
Dutch*	10–26%	—	73–87%

— < 10% across children.
*Based on Wijnen (1997) and Blom (2003) (cf. note 8).

To summarize the facts thus far, we see that there are substantial differences in the interpretations associated with RIs and other nonfinite clauses in the various child languages. The most striking finding is the virtual exclusion of certain readings in some languages, but not others. Thus, Russian allows past, present, and modal RIs while Dutch excludes past RIs, but allows RIs to have both modal and present tense interpretation. English bare verbs show no modal reference, while Greek bare perfectives are exclusively modal in meaning. These are the facts that I will attempt to explain below. Before doing that, however, I would like to consider the English and Russian data in more detail.

2.1. Aspect and Temporal Reference of English and Russian Nonfinite Verbs

There is a notable finding concerning the temporal reference of the English bare verb that is not reflected in Tables 1 and 5, which is that the reference is strongly contingent on the telicity of the predicate. As observed by Torrence and Hyams (2004), it is generally the case that telic bare verbs describe past events while atelic bare verbs denote present events. For the moment we will define a telic predicate simply as one that has an inherent or natural endpoint, achievements, and accomplishments in Vendler's (1967) sense. Thus, *eat an apple*, *reach the top*, *fall down*, *lose it* are telic, while activity verbs such as *play* and *dance*, as well as stative predicates, are atelic.

The telicity effects are illustrated in the examples in (12).

TABLE 6
Temporal Reference and (a)Telicity in English Bare Verbs (Based on Torrence and Hyams (2004))

	Aspect	
Interpretation	*Telic*	*Atelic*
Past	48 (**94%**)	9 (6%)
Present	16 (15%)	88 (**85%**)

(12) a. He lose it. (past)
b. He fall down. (past)
c. Play ball with him. (present)

Table 6 shows the association between telicity and temporal reference.[10] Ninety-four percent of the bare verbs that appear in past contexts are telic while 85% of the bare verbs that occur in present contexts are atelic.

In Tables E and F in the Appendix these data are broken down into early and later stages. The telicity effects hold at both stages.

The telicity effects found in the English data are strikingly similar to the results discussed by Brun et al. (1999) for Russian RIs. All Russian verbs, including infinitives, are marked for grammatical aspect, perfective, or imperfective. (Im)perfectivity is marked either by prefixation (e.g., *delat'* do-imperf., *sdelat'* do-perf.), suffixation (e.g., *ot dat'* give-perf., *otdavat'* give-imperf.), or suppletion (e.g., *govorit'* say-imperf., *skazat'* say-perf.). Russian children produce both perfective and imperfective RIs, and Brun et al. (1999) show that in Russian RIs (im)perfectivity correlates with temporal reference. Their finding is that RIs that occur in past tense contexts are overwhelmingly perfective (i.e., closed), while RIs that occur in present tense contexts are imperfective (i.e., open). This is parallel to the English finding that bare verbs in past contexts are overwhelmingly telic (i.e., closed) and bare verbs in present contexts atelic (i.e., open). The Russian child results are to be contrasted with the adult language in which there is no strict association between (im)perfectivity and tense (in finite clauses).[11] Brun et al. (1999) also found that RIs with modal interpretation are

[10]Some of the data in Table 6 are from Torrence and Hyams (2004). Additional data were provided by Jill Gilkerson. These data are based on the following CHILDES files: Nina 2;4–3;0 (files 20–32; 39–45); Naomi 2;5–3;5 (files 63–86); Sarah 2;11–3;3 (files 39–53). (CHILDES, Brown (1973); Suppes (1974); Sachs (1983); MacWhinney and Snow (1985)). The percentages are based on 3Sg contexts.

[11]A qualification is in order here. In the adult language finite perfective verbs are never present tense (as per the Punctuality Constraint) (Giorgi and Pianesi (1997); see Section 3). Imperfective verbs are split between past and present. We discuss aspectual properties of finite verbs in Section 7.

TABLE 7
Relation Between (im)Perfectivity and Temporal Reference in Russian RIs (From Brun et al. (1999))

	Past	*Present*	*Modal/Future*
Perfective	**94.6%** (67)	1.7% (2)	53% (40)
Imperfective	5.4% (4)	**98.3%** (130)	47% (36)

evenly split between perfective and imperfective verbs. Brun et al.'s (1999) results are reproduced in Table 7. (Results for individual children are in Table B in the Appendix.)

To account for these facts, Brun et al. propose that when tense is missing, grammatical aspect (perfectivity) provides a temporal anchor for the sentence. Imperfective RIs are related to the here-and-now (Utterance Time) by virtue of their connection with the moment of speech, and completed events are also linked to the here-and-now by virtue of introducing the right boundary of an event that is 'anchored' in the present tense (Enç (1987)).

The account I will propose basically agrees in spirit with Brun et al. (1999), but attempts a further articulation of the relation between the event structure and the temporal reference of nonfinite verbs in early language. The goal is to provide an account of the telicity effects in English and Russian in Tables 6 and 7, as well as the temporal/modal properties of the other languages previously discussed.

3. AN ASPECTUAL FRAMEWORK

In order to address these questions, I will adopt a couple of proposals detailed in Giorgi and Pianesi (1997; 2001). Giorgi and Pianesi propose a theory of aspect in terms of the topological property of *event closure* or *terminativity*: imperfective verbs denote nonclosed (open) events and perfective verbs denote closed events. These situations are schematized in (13a,b), respectively. Importantly, within Giorgi and Pianesi's system a closed event consists of a processual part, which I label *e* (for event), and a boundary, which I indicate by means of brackets in (13b). (13a) is an open event, hence no boundaries.

(13) a. .....*e*..... open/imperfective
b. [.....*e*.....] closed/perfective

Giorgi and Pianesi note that closure of an event can be obtained in two ways. An event can be closed/terminated by perfective aspect, which involves a direct closure of the event, e.g., with perfective morphology, as schematized in (13b),

or an event can be closed by telicity. As proposed by Pustejovsky (1995), Tenny (1994), and Higginbotham (2000), telicity involves the introduction of a second event variable representing the telos or endpoint (as with achievement predicates, such as *reach the top*). Closure by telicity is schematized in (14). *e1* represents the process; *e2* the telos.

(14) [.....*e1*.....] *e2* closed/telic

The Italian sentences in (15) illustrate the schemata in (13) and (14).

(15) a. Gianni ha raggiunto/raggiunse/raggiungeva la vetta (*e la sta raggiungendo tutt'ora).
'John has reached/reached-PERF/reached-IMPF the top (*and he's still reaching it).' (telic/closed)
b. (Alle tre) Gianni ha mangiato/mangió una mela (*e la sta mangiando tutt'ora).
'(At 3 o'clock) John has eaten/ate-PERF an apple (*and he is still eating it).' (perfective/closed)
c. (Alle tre) Gianni mangiava una mela (e la sta mangiando tutt'ora).
'(At 3 o'clock) John ate-IMPF an apple (and he is still eating it).' (imperfective/nonclosed)

The events denoted in the sentences in (15a,b) are closed; in (15a) the event is closed by telicity and in (15b), by perfectivity, and hence there can be no continuation into the present, as illustrated by the starred conjunct. Note that the telic event in (15a) is closed even when the verb is imperfective, illustrating that it is telicity and not perfectivity that is responsible for event closure. The sentence in (15c) is imperfective; it denotes an open event that can therefore continue to the present. Note that the minimal contrast between (15b,c) is the perfectivity of the verb.

Giorgi and Pianesi propose the Punctuality Constraint in (16) as a universal constraint on the temporal anchoring of closed events:

(16) *The Punctuality Constraint* (Giorgi and Pianesi (1997))
A closed event cannot be simultaneous with the speech event/time.

The technical underpinnings of the Punctuality Constraint (henceforth PC) need not concern us here. For our purposes it is sufficient to understand that the PC blocks perfective verbs from having ongoing reference (cf. also Smith's (2003) 'bounded event constraint'). The examples in (17) from Russian and Greek, languages that have perfective morphology, illustrate the effects of the PC. The 'reading' event cannot take place at utterance time (UT), i.e., now.

(17) a. *Misha pročitaet knigu sejčas.
Misha reads-PERF book now
cf. Misha čitaet knigu sejčas.
Misha reads-IMPF book now
b. *O Georgos δiavási to vivlio.
the George read-PERF the book
cf. O Georgios δiavázi to vivlio.
the George read-IMPF the book
'George reads the book.'

4. THE ASSIGNMENT OF TEMPORAL REFERENCE IN EARLY GRAMMAR

Returning now to the acquisition data, I will adopt what I will call the Closed Event Hypothesis, as stated in (18).

(18) *The Closed Event Hypothesis*
In the early grammar temporal reference is assigned (to a nonfinite clause) according to the topological property of event closure.

In Section 7, I will discuss the reason for the parentheses around 'to a nonfinite clause.'

I will further assume, uncontroversially, that in order to be interpreted, events must be assigned a temporal reference, as in (19), the Temporal Anchoring Requirement.

(19) *The Temporal Anchoring Requirement* (TAR)[12]
Events must be temporally interpreted, that is, they must be ordered with respect to a reference time (which, following Stowell (1997) and others, I take to be UT).

Finally, I propose the Default Anchoring Requirement (DAR) in (20), which says that in the absence of a tense specification, there is a default assignment of event time (ET) to utterance time (UT). The Default Anchoring Requirement is really just a last resort or default condition to satisfy (19).

[12]Becker (2000; 2002) proposes a more formal version of the TAR according to which languages may vary with respect to whether the tense operator (in CP) binds Infl or Asp. In the former case, the clause is finite, in the latter, nonfinite (as in child language). Becker is specifically concerned with explaining certain aspectual restrictions on copula drop in early English (e.g., *this empty, my pen down there*), and does not discuss the nonfinite clause types presented here. It would be interesting to examine the extent to which aspectual properties can license RIs, bare verbs, etc. along the lines proposed by Becker for null copulas, but this enterprise is beyond the scope of this article.

(20) *Default Anchoring Requirement* (DAR) (Hyams (1996), Brun et al. (1999))[13]
In the absence of a tense specification, the event time coincides with the utterance time, UT = ET.

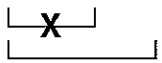
The assumptions in (18) through (20), together with the Punctuality Constraint (cf. (16)), lead to a rather restricted set of temporal options in the early grammar. Events are either open or closed. An open event consists of an unbounded single event, as illustrated by the schema in (13a). By the Default Anchoring Requirement, the event variable is linked to UT and the event is construed as ongoing at UT. This is as schematized in (21).

(21) UT.....e..... present ongoing reference

If the event is closed there are two options corresponding to (13b) and (14). If the event is closed by a second event variable, *e2*, the telic option in (14), then by the PC *e1* (the process) is not accessible to UT. However, the Default Anchoring Requirement requires an anchoring to UT. The PC and the DAR thus impose conflicting requirements. This conflict can be resolved if UT is linked to the second event variable, the telos. If UT is anchored to the telos, then the processual part of the event, *e1*, leading up to the telos is prior to the telos, that is, past. So the past tense reading is derived as an entailment. The anchoring to the telic event captures the intuition, expressed by Antinucci and Miller (1976) and others, that children's reference to past events is focused on the end state or result of the process (cf. also Boland (2003)).

The telic anchoring schema is given in (22).

(22) UT [.....*e1*...] *e2* past reference



This account is in the spirit of Brun et al.'s (1999) proposal, with the crucial difference that it is the telos, *e2*, that provides the second anchor point, not the event boundary. The relevance of this difference will be obvious shortly.

The second closure mechanism is direct closure by perfectivity, as in (13b), in other words, without a second event variable. As before, the Punctuality Constraint blocks the UT from linking to the event, as schematized in (23a). In this instance, there is no event in the structure to anchor to UT, in violation of the Default Anchoring Requirement. I suggest that in this case the DAR is

[13]This roughly follows Hyams (1996) where I proposed that in RIs, T has a zero index and hence is not bound to a tense operator. The temporal reference of T is supplied contextually, that is, it overlaps with UT.

satisfied by the insertion of a null modal, symbolized by the Greek letter μ. This is schematized in (23b). I will return to the null modal option below. For the time being, we can think of this as a last resort option, though that assumption may be wrong in the general case, as I will discuss later.

(23) a. UT [.....e.....] →

b. UT ....μ[.....e.....] modal reference

An important point concerning the null modal option in (23b) is that it is still a nonfinite structure. Thus, in contrast to null Aux analyses in Boser, Lust, Santelmann, and Whitman (1992), Ferdinand (1996), and elsewhere, I am not proposing that RIs contain a null finite modal. There are a number of empirical problems with the traditional null Aux analysis, in which RIs and other nonfinite clauses are analyzed as 'hidden' finite clauses. In particular, this analysis fails to explain why RIs show very different distributional properties from the finite clauses that occur at the same time. Such distributional properties include the lack of *wh* phrases in RIs (as well as nonsubject topics in the V2 languages) and the preponderance of null subjects. I will not repeat these arguments here, but see Hoekstra and Hyams (1998) for review of the many differences between RIs and finite clauses.

The options schematized in (21)–(23) are those that are made available by the general principles of aspectual interpretation given earlier, specifically the PC and the DAR. But how these options play out in a particular child language also depends on the aspectual system of that language. In what follows, I describe the effects for each of the languages presented above. This will provide an account of the cross-linguistic facts summarized in Table 5, as well as the aspectual contingencies shown in Tables 6 and 7. I begin with the English bare verb.

4.1. English Bare Verbs

Given the system just outlined, the strong contingency between telicity and temporal reference shown in Table 6 is explained as follows: Atelic predicates denote open events, as illustrated in (13a). Since there is no tense specification in the bare verb, the Default Anchoring Requirement requires that the single event variable be linked to UT.[14] Accordingly, temporal interpretation is ongoing

[14]The analysis of telic predicates proposed in the text has something in common with the analysis of perfects (e.g., *John has eaten*), in which the resulting state, viz. the state of 'having' is linked to UT, while the process denoted by *e1* is ordered prior to UT (cf. Stowell (1997)). In adult grammar, the endstate (telos) denoted by a telic predicate is not accessible to UT in the same way that the resulting state of a perfect predicate is. It is possible that access to *e2* in telic predicates in the child's grammar is related to the lack of a tense specification in nonfinite clauses. If we assume that

TABLE 8
Summary of Possible Event/Temporal Structures of Nonfinite Verbs in Different Child Languages

		Language			
Temporal Schema	*Reference*	*English*	*Russian RIs*	*Greek Bare Perfectives*	*Dutch RIs*
21	Present	Atelic	Imperfective	—	
22	Past	Telic	Perfective	—	—
23a→23b	Modal	—	Perfective		—
23b	Modal	—			

at UT (present), as schematized in (21). Telic bare verbs, in contrast, denote closed events; specifically, they are closed by a second event variable, *e2*, as schematized in (22). The requirement that the event be linked to UT is satisfied by the telic subevent, *e2*, and the interpretation is therefore past by the entailment described earlier: if the closure of an event is at UT then the event itself is past. The predicted temporal schemas of the English aspectual system are given in the third column of Table 8, indicated by the shaded cells. These include past and present, but not modal (cf. Table 5). We return to the modal exclusion below.

We now turn to the other languages in Table 8.

4.2. Russian RIs

As noted earlier, Russian RIs are marked for perfectivity. Since imperfective verbs denote open events, the Default Anchoring Requirement links the single event variable to UT and the imperfective has ongoing reference, as schematized in (21). Perfective verbs denote closed events. There is considerable debate over the exact nature of Russian perfective affixes, whether they are in fact markers of perfectivity or telicity. What seems clear from the extensive discussion is that at least some of the perfective prefixes in combination with some verbs add lexical meaning to the verb rather than simply changing grammatical aspect (cf. Verkuyl

a specified T can only bind a single event (cf. for example, Guéron and Hoekstra (1995)), then *e1* and *e2* must be analyzed as a complex (closed) event and *e2* is inaccessible to UT. On the other hand, according to Stowell's analysis (cf. also Demirdache and Uribe-Extebarria (1998)), the perfect has two tenses, the time of "having" (the resulting state) and the time of the event denoted by the thematic verb (e.g., the time of eating). Thus, in the adult grammar (in which Tense is obligatory), access to *e2* is available only for the perfect and the progressive, which involve 2 TPs. In the (present) perfect, the resulting state is linked to UT, while in the progressive (e.g., *John is building a house*), *e2* is cancelled.

(1999), Schoorlemmer (1995), Borer (2004), among others). The sentences in (24) are illustrative. Using the *in x time/for x time* test for telicity, we see that the perfective markers *nu*, *ot*, *na* induce telicity, that is, they introduce a second event variable.

(24) a. Petux kukareknul tri raza za pjat' minut/*čas.
cock crowed-once-PERF three times in five minutes/for hour
'The cock *crowed once* three time in five minutes/for an hour.'
b. Vasja otobedal za polčasa/*čas.
Vasja lunched-PERF in half-hour/for-hour
'Vasja *finished his lunch* in half an hour/for an hour.'
c. Ivan naguljálsja po górodu za polčasa/*čas.
'Ivan *walked to his heart's content* around town in half an hour/for an hour.'

I will thus assume that perfective verbs in Russian are of two types. The first are those that introduce a second event variable, a telos. Within the system outlined here, these will give rise to a past interpretation, as schematized in (22). The second type of perfective denotes a simple closed event, as schematized in (23a), and these will have modal meaning. As discussed earlier, the representation in (23a) is subject to the conflicting requirements of the Punctuality Constraint and the Default Anchoring Requirement: viz. a closed event cannot link to UT, but there must be some link in order for the sentence to be temporally interpreted. The conflict is resolved by the insertion of a null modal whose evaluation time is linked to UT, as schematized in (23b). As shown in Table 5, the possible meanings associated with Russian RIs include present, past, and modal.

Brun (1999) suggests a null modal analysis of Russian RIs (following Boser et al.'s (1992) analysis of German). She points out that the vast majority (96.3%) of modal RIs in Russian have volitional meaning corresponding to the verb *xočet* (want), exemplified in (25). As also illustrated in (25a,b), *xočet* selects for both perfective and imperfective complements. I return to imperfective RIs with modal meaning (cf. Table 7) in Section 4.4.

(25) a. Maša xočet spet.'
Masha want-3rd.sg.pr sing-PERF-INF
'Masha wants to sing.'
b. Maša xočet pet.'
Masha want-3rd.sg.pr sing-IMPF-INF
'Masha wants to sing.'

In the null modal structure in (23b) the time of 'wanting' is linked to UT (cf. also Brun (1999)). This satisfies the DAR. In the account suggested here,

the null modal option is instantiated when there is no telos to link to UT. Thus, I am proposing that the availability of both past and modal RIs in Russian, in contrast to English which does not show the modal option, is related to the complexity of the Russian aspectual system. Russian-speaking children must learn for each aspectual prefix if it is a marker of perfectivity, i.e., the verb denotes a simple event closure, or if it is a marker of telicity, i.e., closure involves a second event variable.[15]Such lexical learning is likely to take time and may also give rise to individual variation across children. Until such learning is complete the Russian child's event representations may be distinct from the adult's or inconsistent.[16] The predicted Russian temporal schemas are shown in the shaded cells in Table 8.

As I noted earlier, the assumption that Russian 'perfective' affixes induce telicity is not uncontroversial and the adult data are not entirely straightforward in this regard. Thus, this may be a case in which the acquisition data help to clarify the situation. The behavior of the Russian children's RIs favors an analysis in which at least some (but not all) of the affixes mark telicity. As we will see in a moment, early Greek—a language that also has perfective-imperfective verb pairs—behaves quite differently from early Russian. The Greek bare perfective behaves like a perfective verb, not a telic one.

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[15]The verb *pisat'* 'write' illustrates the complexity of the system to be acquired. Like most Russian verbs, *pisat'* occurs with a wide range of perfective prefixes, some of which denote activities (atelic) and others accomplishments (telic) (cf. Smith (1997) and Schoorlemmer (1995), among others). The following list, from Smith, illustrates the point:

Accomplishment	*Activity*
o-pisat' (to prepare an inventory)	na- pisat' (to write onto)
is-pisat' (to cover with writing)	do-pisat' (to add in writing)
vy-pisat'-sja (to write oneself out)	nad-pisat' (to write above)
za-pisat' (to begin writing)	po-pisat' (to write for a while)

In Russian all telic predicates require perfective morphology but not all perfective verbs are telic. The child must learn the aspectual value of each prefix and there is no simple morphological cue. A possible trigger that would separate out the telic prefixes from the purely perfective ones is the process of secondary imperfectivization, viz, perfectives that are telic typically allow a secondary imperfective affix, e.g., -(yv)aj- as in *pere-pis-yva-t'* 'to write over, copy.' According to Stephany and Voeikova (2003), secondary imperfective verbs do not show up in the early acquisition data.

[16]Brun and Babyonyshev (2006) take issue with the analysis proposed here, which they refer to as the 'dual interpretation theory,' arguing instead that Russian children treat all perfective RIs similarly, arbitrarily assigning either a modal or past interpretation. Their data show that children assign both past and modal meanings to verbs that B&B identify in the adult grammar as 'purely' perfective ('conventionally paired verbs') as well as to verbs that they identify as lexically perfective, i.e., telic. This result is consistent with the proposal here, that children have not yet classified a particular prefix as perfective or telic and hence allow both past and modal meanings.

4.3. Greek Bare Perfectives

On that note, let us now turn to Greek and recall that the bare perfective has modal meaning virtually 100% of the time, as shown in Table 5. Why should this be? I propose that the Greek bare perfective has the temporal schema in (23a), that is, the perfectivity of the verb closes the event. As before, the Punctuality Constraint blocks a link between UT and the single event variable. The only way to satisfy the Default Anchoring Requirement is through the insertion of a null modal, as in (23b). The temporal option of Greek is given in the fifth column of Table 8. Given that perfectivity is responsible for event closure in Greek, by hypothesis, we expect to find both telic and atelic bare perfectives. This expectation is confirmed. According to data presented in Stephany (1985; p.c.), about a quarter of all bare perfectives are atelic. In some cases, the proportion is considerably higher; Stephany and Voeikova (2003) note that in the corpus of Christos (2;1–2;3) bare perfectives are split between telics and atelics (43% telic, 57% atelic). There is, however, a question concerning the structure of the telic predicates: Given that these verbs contain a second event variable (telos), why do they never have a past meaning, as predicted by the schema in (23)? We return to this issue in Section 6 where I propose a linking algorithm that assigns a preferential value to the null modal option.

4.4. Dutch RIs

We come finally to Dutch. In fact, Dutch poses somewhat of a challenge to the system of aspectual interpretation as it has been outlined thus far. Recall from Table 4 that Dutch RIs sometimes denote present events, but most often they have modal reference.

Before turning to the RI facts, we need to consider the aspectual properties of the Dutch verb. It is often noted that Dutch verbs are aspectually neutral (cf. Boogaarts (1999), Giorgi and Pianesi (1997)). For example, the simple present in Dutch can denote either an ongoing or habitual event, as illustrated in (26a), and the simple past is neutral between a perfective and imperfective reading, as illustrated in (26b). The infinitive (as in perceptual reports) is also neutral between a closed or open reading. So (26c) is true whether or not John has reached the other side of the street and hence the sentence *Ik zag Jan de straat ovesteken* (I saw John cross the street) is consistent with the continuation *toen hij door auto aangereden werd* (when he was hit by a car).

(26) a. Jan eet een appel.
'Jan eats/is eating an apple.'
b. Jan at een appel.
'John ate/was eating an apple.'
c. Ik zag Jan de straat ovesteken toen hij door auto aangereden werd.
'I saw John cross/crossing the street when he was hit by a car.'

All the evidence suggests that the Dutch verb is neither overtly nor covertly marked for perfectivity.[17] The absence of an event closure means that the schema in (21) is possible, giving rise to RIs with present ongoing interpretation. But there is no way to derive the temporal schemas in (22) or (23a)—the closed schemas—with a simple verb (see note 17). This provides an explanation for why Dutch RIs do not have past tense reference; according to the proposed analysis past reference requires event closure (and so derives Lasser's (1997) noncompleteness constraint).[18] However, this result also raises a problem. It was claimed earlier that the modal reference of RIs, that is, the insertion of a null modal, is a last resort when there is no accessible event variable, as illustrated in (23). Thus, if there is no closure in the event structure of the Dutch verb, there is no source for the modality, given the temporal schemas above. We must therefore assume that the null modal option is not necessarily a last resort, but is rather an option that is freely available as a way to satisfy the Default Anchoring Requirement. So the modal option schematized in (23b) will turn out to be the last resort in precisely those cases in which the verb denotes a simple closed event, as in Greek, but it will be an option in other cases as well. In Dutch, then, we find both the open event structure in (21) that gives rise to RIs with ongoing reference, and the modal schema in (23b), now a free option. The lack of perfectivity in the Dutch verb means that schemas (22/23a) are unavailable and we should not therefore find Dutch RIs with past tense reference, which is the case, as indicated in Tables 4 and 5. The predicted schemas for Dutch are given in the last column of Table 8.[19,20]

This 'free-choice' treatment of the null modal option also provides an explanation for a property of Russian not previously explained, the fact that imperfective RIs can also have a modal reading (cf. Table 7), which is clearly not due to event closure. But the free-choice hypothesis also raises a question for

[17]Note that we are referring to simple tenses and not to the perfect formed with auxiliary *hebben/zijn* 'have/be' and a participle. In Dutch, the perfect is a past tense and, as noted earlier, the participle is aspectually marked. We return to the perfect in Sections 5 and 7.

[18]I assume the same analysis for German RIs, which, as mentioned earlier, show the same interpretive properties as Dutch (cf. Behrens (1993); Lasser (1997)).

[19]Blom (2003) proposes that the interpretation of Dutch (and German) RIs is due to their status as 'default' or 'elsewhere' forms that fill in for finite forms and/or modals that have not yet been acquired. The absence of past tense/perfective interpretation for Dutch RIs does not follow straightforwardly from her account, however, because children do not use past tense forms early on (except for a small number of participles) which would be needed to push out the RI option. Blom thus suggests that children simply do not talk about completed events very much. This claim is directly at odds with the English and Russian data we have discussed, as well as with the participle data in Section 5.

[20]Dutch and German children also produce bare verbs (e.g., *Dese hoor neit daar* 'that belong-0 not there'). Blom (2003) reports that the majority of stem forms are finite verbs (with dropped inflection), which raise to second position (Comp). Similar findings are reported for German (Bittner (2003)).

English: If the modal option is free, why does it show up to varying degrees in Russian, Greek, and Dutch, but not in the English bare verb?[21] I will propose that the modal option is in fact realized in English, but it is realized uniquely by a null pleonastic *do*—the only English 'modal' that is compatible with a nonfinite structure (because the true modals are inherently finite).[22,23] The insertion of *do* provides an anchor to UT to satisfy the Default Anchoring Requirement, but does not impose a modal reading.[24]

5. PARTICIPLES REVISITED

We began our discussion of the aspectual influences on the interpretation of nonfinite verbs by pointing out that the temporal reference of children's bare participle sentences depends on the aspect of the participle (cf. Section 2). In this section we return to these participial structures and explore the implications of the current analysis for their interpretation and distribution.

5.1. Bare Progressive Participles

Turning first to the English bare progressive participle, illustrated in (5a) (repeated below), the analysis of these sentences is relatively straightforward.

(5) a. He chewing it.
'He is chewing it.'

[21] Hoekstra and Hyams (1998) proposed that the modal reference in RI languages such as Dutch, German, Swedish, etc., is due to a [+irrealis] feature associated with the infinitival morphology (-en). The English bare verb lacks infinitival morphology and hence has no modal reference. This simple analysis turns out to be too simple to handle the complexity of the phenomenon as described in this article. As we have seen, Russian RIs have infinitival morphology, but can have temporal meanings, while the Greek bare perfective, not a morphological infinitive, shows modal reference. In light of these facts, the relation between infinitival morphology and modality hypothesized by Hoekstra and Hyams cannot be maintained.

[22] I am grateful to Kyle Johnson for originally suggesting this idea to me. A null *do* analysis is also proposed in Pesetsky (1993) for all RI languages to handle those cases in which the clause is nonmodal. To the best of my knowledge, Pesetsky assumed that null *do* was finite. For further discussion of the null *do* idea, see Hyams (in preparation).

[23] The modal verb 'want' has a nonfinite form, but 'want,' in contrast to English auxiliary modals, does not select a bare verb, viz. *I want Daddy to build a tower*. Thanks to Lisa Travis for bringing this issue to my attention.

[24] It is reasonable to wonder how English-speaking children convey modal meaning during the bare verb stage given that they do not produce overt modals and their bare verbs do not carry modal meaning. Elsewhere I have suggested that the semi-auxiliaries *wanna*, *hafta*, *gonna* fulfill this function (Hyams (2001)).

As noted in Torrence (2002), these sentences virtually always (98%) have an ongoing interpretation.[25] This follows from the fact that the progressive participle denotes an open event. As schematized in (21), repeated below, the event is linked to UT.

(21) UT.....e..... present ongoing reference
└──┘

Bare progressives thus have the same event/temporal structure as atelic bare verbs.

5.2. Bare Perfect Participles

The bare participle sentences in (5b–d) (repeated below) are a reduced version of the adult present perfect. (The fully specified sentences are given in the adult examples.)

(5) b. Disegno cascato. (Berger-Morales and Salustri (2003))
picture fallen
cf. il disegno è/ha cascato. (adult sentence)
'The picture has fallen.'
c. Tukele skrila pikapolonica. (Rus and Chandra (2004))
here hidden ladybug
cf. Tukele se je skrila pikapolonica. (adult sentence)
here se-refl is hidden ladybug
'The ladybug has hidden here.'
d. mm dbytt min ben. (Josefsson (2002))
mm I built-sup. my car
cf. Har du byggt en bil. (adult expansion)
'Have you built up the car?'

In these languages, the perfect does not have the 'current relevance' property of the English perfect (cf. Comrie (1976)) and is semantically a simple past tense.[26] It has been proposed, however, that in early language participles denote resulting or end states rather than past events, and are therefore directly linked to the 'here and now,' viz. UT (Antinucci and Miller (1976)). According to our analysis, the bare participle is perfective; hence it denotes a closed event. The Slovenian example is of particular interest in this regard because the participle is

[25] In this regard, bare progressives do not differ from full progressives, which also have an ongoing meaning 98% of the time (cf. Torrence (2002)).

[26] As far as I know, young English-speaking children do not produce bare or full past participle sentences (e.g., *Mommy (has) driven/eaten*, etc.) of the sort that we find in Italian and the other languages discussed in the text (cf. also Brown (1973)).

overtly marked with the perfective morpheme (*l-*). By the Punctuality Constraint the event cannot link to UT, as schematized in (23a), repeated below:

(23) a. UT [.....e.....]
└X┘

Earlier, we hypothesized that the remedy for this situation in the RI case is the insertion of a null modal whose evaluation time is liked to UT, as schematized in (23b), repeated below.

(23) b. UT ...μ [.....e.....] modal reference
└──┘

Note, however, that the null modal option will not save the bare participle. This is because modals do not select participles, as illustrated by the Italian and German examples in (27).

(27) a. *Voglio/devo partito.
b. *Ich will/muss gegangen.
'I want/must left.'

As modals do not select participles in the relevant languages, insertion of a null modal is not an option and bare participles do not have modal readings, in contrast to what we observe with RIs. There is, however, another option open to the bare participle, and that is the inclusion of a second event variable, a telos, as in (22), repeated below.

(22) UT [.....*e1*...] *e2* past reference
└X┘
└──────┘

The inclusion of *e2* provides the necessary temporal anchor and gives rise to the desired reading, viz. the telos (resulting state) is linked to UT, and the event that gives rise to the telos is past by entailment.

Notice that the system of aspectual anchoring that we have set up makes a clear prediction for bare past participle structures, namely, that they will be restricted to telic predicates. As first shown by Antinucci and Miller (1976) for Italian-speaking children, this is in fact the case. Antinucci and Miller observed that the Italian child's early participles are restricted to verbs that are classified as "change of state verbs with clear result," essentially telic verbs.[27]

[27] Antinucci and Miller (1976) do not distinguish between bare participles and full participles, observing a telicity effect for both. We return to this issue in Section 6.

6. A LINKING ALGORITHM

In the system outlined in this article, there is an inherent tension in nonfinite clauses between satisfying the temporal anchoring requirement, which in the absence of tense requires an event to link to UT, and the block against linking a closed event to UT imposed by the Punctuality Constraint. There appear to be two options available to a closed event structure to resolve the tension—the null modal option and the telic option. We can summarize the anchoring system proposed in this article in the form of a linking algorithm, outlined in (28).

(28) Linking algorithm
  (a) If open, link e to UT.
  (b) If closed/perfective, then
    (i) if sectional restrictions permit, insert null modal, and link to UT,
    (ii) if not, insert telos (telic predicate), and link to UT.

The statement in (28a) describes the situation with atelic verbs, and bare progressives (as in English) or imperfective roots (as in Russian); (28bi) describes the situation for perfective RIs because modals select infinitives. As described above, however, this will not work for perfect participles; hence only the telic option remains.

Notice that the algorithm in (28) assigns a kind of default status to the null modal option (for closed predicates, viz. option (bi)). We thus predict that in a language in which a modal (or modal-like element) can select a perfective form, a bare perfective will have a modal reading and not a past one (as per (bii)). The Greek bare perfective illustrated in (9) is such a case. In contrast to the Italian/German examples in (27), in Greek the modal/future particles (*na/θa*) can select a perfective verb, as in (29).

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

Thus, the Greek bare perfective satisfies the linking requirement in (28bi) for insertion of a null modal.

Recall that young Greek children produce both telic and atelic bare perfectives (cf. Section 4.3). Stephany (1985; p.c.) reports that for the children discussed earlier 78% (166/212) of their bare perfectives are telic and 23% atelic (46/212).

This raises a question: In the telic bare perfectives, why doesn't the telos (*e2*) provide an anchor to UT, giving rise to a past construal rather than a modal reading? According to the linking algorithm in (28), this is because the two options are not equally accessible or economical and insertion of a telic event variable arises only where the null modal option is blocked.

7. COMPARING TELICITY EFFECTS IN NONFINITE AND FINITE CLAUSES

In Section 5, we noted that telicity effects are predicted for bare participles since these do not have a tense to anchor to UT and so rely on aspectual anchoring, by *e2* in particular. In this section, we compare telicity effects in finite and nonfinite clauses. The prediction is that telicity effects will be relaxed in finite clauses because tense provides the anchor to UT. We first discuss Italian participles and then turn to English and Greek.

Returning first to the Italian bare participles discussed above, we note that auxiliary omission is optional. During the bare participle stage we also find full participle sentences, as in (30) (from Antinucci and Miller (1976) and Berger-Morales and Salustri (2003)).

(30) a. Mamma se n'é andata.
Mommy self from here is left
'Mommy left.'
b. La signora ha chiusa la porta.
The missus has closed the door.
c. Ho sbagliata strada.
Have-1Sg mistaken street
'(I) have taken the wrong street.'

The full participle structure contains a tensed auxiliary (*avere* 'have' or *essere* 'be') and this auxiliary provides an anchor to UT.[28] Our analysis thus predicts that full (i.e., with a tensed auxiliary) participial clauses should not be aspectually restricted in the way that bare participles are (cf. also Behrens (1993)). In other words, we predict that tensed participle clauses will also permit atelic verbs. Antinucci and Miller (henceforth A&M) do not discuss differences between full and bare participle clauses nor do they provide any quantitative results. They do note, however, that there were two activity (atelic) verbs that occurred in participle form, *aspettare* (wait) and *dormire* (sleep) (cf. A&M's Table 2).

[28] We can assume, following Stowell (1997), that the present tense on the auxiliary (*avere/essere* 'have/be') denotes a resulting state (a state of 'having') and the verb denotes the process, though nothing crucial hangs on this assumption.

These two cases are unpredicted by their analysis. The examples they provide show that both these verbs occurred in tensed participial clauses, as we predict. The relevant sentences are given in (31).

(31) a. Abbiamo aspettato Paola.
'(We) have waited (for you) Paola.'
b. Ho dormito insieme co Pippo, ho dormito.
'(I) have slept together with Pippo, (I) have slept.'

We also examined the transcripts of another Italian-speaking child in the CHILDES database—Diana (Diana 01–09; age 1;8–2;6) in order to test the hypothesis that full participle clauses show a broader range of aspectual types than bare participles. In fact, Diana's results were very similar to what we observed in A&M's data. There were a total of 14 verb types that occurred as bare participles. All of these were included in A&M's list of telic verbs. The verbs include: *aprire* 'open,' *cadere* 'fall,' *levare* 'take off,' *finire* 'finish,' *cascare* 'fall,' *buttare via* 'throw away,' *soffiare* 'blow out (the candles),' *arrivare* 'arrive,' and *caccare* 'poop.' There were two stative verbs, *sentire* 'hear' and *vedere* 'see,' that occurred in bare participle form and there were several cases in which it was difficult to determine the telicity of the predicate, in particular with the verbs *mettere* 'put' and *fare* 'do.' During the same period the range of verbs that occurred in full participle clauses (i.e., with finite auxiliaries) was much greater. It included many of the telic verbs just noted and others, such as *venire* 'come,' *rompere*, 'break' and *fare la pippi* 'pee,' *volare via* 'fly away' and also the stative verbs *vedere* 'see,' *capire* 'understand.' But the full participle list also includes the first clear atelic (activity) verbs including *bruciare* 'burn,' *guardare* 'watch,' *scrivere* 'write,' *mangiare* 'eat,' *bere* 'drink' (the latter two without direct objects). Some relevant examples follow. Note that these sentences occur during a period in which bare participles are restricted to telic verbs, i.e., no activity verbs.[29]

(32) a. Ho pallato (= parlato) co' Nicola. (Diana 08)
'(I) have spoken with Nicola.'
b. Ho bevuto l'acqua tasela (= stasera) oggi.
'(I) have drunk water this evening today.'
c. Pinocchio ha detto di bugie. (Diana 09)
'Pinocchio has told some lies.'
d. Ha ancora fame ha mangiato mangia.
'(He) is still hungry has eaten eats.'

[29] We looked at a second Italian-speaking child in the CHILDES database, Martina (files 02–16; age 1;7–2;7). In Martina's case, both bare participle and full participle clauses were restricted to telic predicates. Thus, Martina's data are neutral with respect to the hypothesis under consideration. Diana and Martina's data are from the Calambrone Corpus (CHILDES).

The data are limited and there are some unclear cases. Nevertheless, these results suggest that the expression of the auxiliary (which is finite) in a participle construction allows temporal anchoring by tense, and thus eliminates the requirement for a second event variable (a telos) to act as an escape hatch to anchor to UT. We therefore find activity verbs in full participle clauses, but not as bare participles. In the next section, I will have more to say about aspectual effects in finite clauses.

A similar asymmetry is found in English bare and finite verbs. According to the logic just outlined, we expect telicity effects in nonfinite clauses to be stronger than in finite clauses, in which tense is available to provide an anchoring to UT. Data presented in Olsen and Weinberg (1999) (their Table 2) show that about 77% (537/696) of verbs marked with *-ed* or irregular past tense morphology were telic while 23% (159/696) were atelic.[30] We can compare these percentages to the bare verb data in our Table 6, which shows that of the bare verbs with a past meaning 90% (88/97) are telic and 10% (9/97) atelic. The comparison suggests that telicity effects are stronger in the English bare verbs than in the finite verbs (90% vs. 77%), as predicted. Again, a note of caution is due, however. As with the participle data discussed in the previous section, these results are merely suggestive because the data sets for finite and bare verbs are very different in size and in the number of children. Further comparisons need to be done comparing finite and bare verbs within a single population.[31]

The Greek situation is more complex. As mentioned earlier (Sections 4.3 and 6), bare perfectives can be either telic or atelic. For the two Greek children discussed earlier, approximately 23% (46/212) of their bare perfectives are atelic (Stephany p.c.). This is very close to the rate of atelic verbs in finite past perfective clauses, which is 27% (17/62). Prima facie, the parallel behavior of finite and nonfinite perfective clauses with respect to telicity runs counter to the predictions of the analysis proposed here. More needs to be said, however. Recall that in a language like Italian, bare participles are anchored through the insertion of a telic event argument, hence the restriction to telic predicates (cf. Antinucci and Miller, 1976) On the other hand, the Greek bare perfective

[30]Olsen and Weinberg (1999) based these figures on data from eight children in the CHILDES database. They compiled a list of 664 different verbs used by both adults and children in these files. The verb tokens were then coded for aspectual features (telicity, durativity, dynamicity) and for inflectional type (*-ed, -s, -ing, 0*). The percentages given in the text are based on the figures from Olsen and Weinberg's earliest stage (corresponding to Brown's Stages 1 and 2), which roughly corresponds to the ages we looked at for the bare verb data. See Table A in the Appendix.

[31]Shirai and Andersen (1995) report higher figures for Adam, Eve, and Naomi. According to their analysis the percentage of past tense verbs that are telic ranges from 94 to 100% for these children. Two of these children, Adam and Eve, are included in Olsen and Weinberg's analysis. The discrepancy between the two studies may be due to the fact that Olsen and Weinberg's (1999) figures are based on a much larger corpus of data–669 tokens (from Brown's Stages 1 and 2) as opposed to Shirai and Andersen's 42 tokens (from Brown's Stage 1)—and also the fact that Olsen and Weinberg's data include a later stage.

satisfies the criterion for insertion of a null modal, the default anchoring option for perfective verbs according to the linking algorithm in (28). Hence, we do not expect to find the restriction to telic predicates in Greek bare perfectives. Indeed, there is no reason they should differ from finite clauses with respect to the frequency of telic/atelic predicates.

7.1. 'Aspect First' Effects in Finite Clauses

This article has focused on aspectual influences on the assignment of temporal reference in RIs and other nonfinite clauses. However, in the previous section we saw that although telicity effects are weaker in finite clauses than in nonfinite clauses, there are nevertheless such effects in finite clauses, for example, the finding that in English 78% of *-ed* and irregular past verbs are telic (Shirai and Andersen (1995), Olsen and Weinberg (1999)). Indeed, there is a cross-linguistic line of research dating back to the 1970's that has investigated the effects of telicity on the expression of finite morphology in early development. The basic result across a wide range of languages is that children undergeneralize finite morphology according to aspectual criteria. Specifically, past/perfective morphology (e.g., English *-ed* and Italian perfect participles, *cascato* 'fallen') occurs predominantly on telic verbs while present tense (e.g., in Italian and French) or imperfective/progressive morphology (e.g., English *-ing*) occurs most often with atelic verbs (Bronckart and Sinclair (1973), Bloom, Lifter, and Hafitz (1980), Antinucci and Miller (1976), Shirai and Andersen (1995), Olsen and Weinberg (1999), Torrence (2002), among many others). In short, a finite past tense (or perfective) verb is mostly likely to be telic, while a finite present tense (or imperfective) verb is most likely to be atelic.

There are various explanations for the telicity effects observed in finite clauses. One early hypothesis was that children (mis-)analyze tense/aspect morphology as markers of telicity and that they do this because they lack tense as a grammatical and/or conceptual category. This is often referred to as the Aspect First Hypothesis (Wagner (1998)).[32] The first proposal along these lines, within a Piagetian framework, was that children lack time as a conceptual category and therefore substitute event properties for time (Bronckart and Sinclair (1973)). More recently, Shirai and Andersen (1995) argue that children initially have a "prototypical" category collapsing completion and pastness and associate this prototype with the relevant morphology (e.g., English *-ed*). Antinucci and Miller (1976) claimed that the past participle in the Italian perfect (*passato prossimo*) (e.g., (30)) has the function of attribution and refers to a resulting or end state of an event and not the event itself or the time of the event.[33]

[32]The Aspect First Hypothesis is also referred to as the Aspect before Tense Hypothesis (Antinucci and Miller (1976)) and the Defective Tense Hypothesis (Weist et al. (1984)).

An alternative approach, due to Olsen and Weinberg (1999), maintains that children have tense and grammatical aspect categories, but restrict tense/aspect morphology to verbs of particular lexical classes for learnability reasons. Olsen and Weinberg point out that there are adult languages in which tense/aspect morphology is restricted to particular aspectual classes; for example, the Korean aspectual auxiliary *-e issta* only occurs with telic intransitives (e.g., *cwuk-ta* 'to die,' *nwup-ta* 'lie down,' *anc-ta* 'sit down'), while Mandarin imperfective *-zhe* only occurs with activity verbs. Because children do not know if they are acquiring a strict mapping language like Korean or Chinese, or a less restrictive language such as English (viz. *-ed* and *-ing* occur on telic and atelic verbs alike), they must hedge their bets and start with the more restrictive option. On this view, telicity/aspect first effects are the result of learnability requirements (the Subset Principle) and not of a deficient tense category or concept.

The telicity effects we observe in nonfinite clauses are relevant to the 'aspect first' debate. We find interesting parallels in finite and nonfinite clauses: In finite clauses past tense/perfective morphology is largely restricted to telic predicates; in nonfinite clauses past tense interpretation is largely restricted to telic predicates. In finite clauses present/imperfective morphology is restricted to atelic predicates; in nonfinite clauses present ongoing interpretation is restricted to atelic predicates. This means that telicity effects observed in finite clauses are not simply about the mapping of morphology onto aspectual type, whether for conceptual or learnability reasons. The focus on morphology misses the point that event structure figures crucially in the temporal reference of nonfinite clauses as well. Thus, the generalization seems to be that in the absence of tense, temporal reference is fully determined by the event structure while in finite clauses the value of tense is influenced, if not strictly determined, by the event structure. It is possible that the system of temporal interpretation based on event structure is present in the computation of temporal reference in finite clauses, perhaps as a parallel e(vent)-structure representation.[34]

[33]One of Antinucci and Miller's (1976) arguments for an adjective analysis of early participles is that the children in their study showed agreement between the participle and the direct object (cf. (30b,c)) which is not grammatical in the dialect of Italian these children were exposed to. In fact, Borer and Wexler (1992) base their Unique External Argument Principle in part on this finding. However, in a study of 23 Italian-speaking children from northern Italy, Hyams (1983) failed to find more than a handful of such agreement errors. Moreover, Schaeffer (1996) also failed to find systematic errors of the sort Antinucci and Miller describe even though she examined two of the children in Antinucci and Miller's own study.

[34]It is worth noting that telicity effects in finite clauses are also observed in adult language. Olsen and Weinberg (1999), Shirai and Andersen (1995), and Boland (2003) found that the English-speaking adults in their studies restricted their use of progressive morpheme (*-ing*) to activity verbs to the same degree as the children. Interestingly, Boland finds that telicity effects are stronger in child-directed language than in adult-to-adult language, suggesting that when talking to children, adults adjust their language to reflect a less marked mapping.

8. CONCLUSIONS

To conclude, I have proposed that the fundamental determinant of temporal reference in nonfinite clauses in child language is *event closure*. Past, present, and modal meanings result from general principles of aspectual interpretation, in particular the Punctuality Constraint and the Default Anchoring Requirement—which is a special case of a broader requirement that all clauses be temporally interpreted—in combination with language-specific aspectual properties. These natural assumptions allow us to derive the different interpretations associated with nonfinite root clauses across several typologically diverse child languages.

A central finding that emerges from this study is that children quickly converge not only on the morphosyntax of the target, but also on the (sometimes quite subtle) aspectual properties of the adult language. This is demonstrated by the variation that we find in the different child languages.[35]

Finally, the aspectual effects that we find in nonfinite clauses have implications for the analysis of 'aspect first' effects in children's finite clauses, that is, the mapping of past/perfective morphology onto telic predicates and present/imperfective morphology onto atelic predicates (cf. Shirai and Andersen (1995), Olsen and Weinberg (1999), Wagner (1998), among many others). Our results argue against any strictly morphological account of aspect first effects. Rather, the generalization seems to be that in nonfinite clauses temporal reference is fully determined by event structure, while in finite clauses the value of tense is influenced, if not strictly determined, by the event structure. The data presented in this article suggest that the system of temporal interpretation based on event structure is present in the computation of temporal reference in finite clauses, perhaps as a parallel e(vent)-structure representation. This is a subject for future investigation.

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[35] A particular aspectual property of English noted in Section 1 is that present tense morphology on eventive verbs gives rise to a habitual or property reading and not an ongoing one, as illustrated in (3b). Giorgi and Pianesi (1997) explain this effect by claiming that the English verb is inherently perfective, and hence, according to the Punctuality Constraint cannot be linked to utterance time. Our data show that English-speaking children know this property of English at a very early age and treat bare and finite verbs differently in this regard (cf. Torrence and Hyams (2004)). In Hyams (in preparation), I provide an explanation for the different behavior of finite and bare verbs within the framework adopted here, and I also propose a revision to Giorgi and Pianesi's analysis of the English aspectual system based on the acquisition results.

2005) (published as Hyams (2006)) and also at the University of Maryland (November 2003), McGill University, and the 2nd Lisbon Meeting in Language Acquisition at the University of Lisbon, Portugal (June 2004). Much of the material in this article was developed during a seminar I taught at UCLA in Spring 2004. I would like to thank the BU, GALANA, Maryland, McGill, and Lisbon audiences, as well as the participants of my seminar—Manola Salustri, Eleni Christodoulou, Nihan Ketrez, Lisa Brunetti, and Alessandra Giorgi, for their comments and criticisms. I am especially indebted to Alessandra Giorgi whose work with Fabio Pianesi greatly influenced my thinking about aspectual issues in early language. I would also like to express my appreciation to my former students—Jill Gilkerson, Shannon Madsen, Kamil Ud Deen, and Harold Torrence for their work on the English data and to Dina Brun and Ursula Stephany for sharing their Russian and Greek data with me and helping me to understand these languages. Finally, my thanks to two anonymous *Language Acquisition* reviewers and Misha Becker for their many comments on earlier drafts. This work was partially supported by UCLA Faculty Senate grants. All errors of fact and interpretation are mine alone.

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APPENDIX

TABLE A
Interpretation of English Bare Verbs:
Breakdown for Individual Children

Child	*Present*	*Past*	*Future/Modal*	*Total*
Nina	65 (60%)	39 (35%)	6 (5%)	110
Naomi	18 (60%)	12 (40%)	0	30
Adam	142 (75%)	32 (17%)	15 (7%)	189
Eve	30 (39%)	27 (36%)	19 (25%)	76
Sarah	23 (38%)	37 (61%)	0	60
Total	278 (60%)	147 (32%)	40 (8%)	465

*Adam: 2;3–3;5; Eve: 1;6–1;11 Naomi: 2;1–3;5; Nina: 2;4–3;0; Sarah 2;11–3;0 (MacWhinney and Snow, CHILDES, (1985), Brown (1973), Suppes (1974), Sachs (1983).

TABLE B
Interpretation of Russian RIs: Breakdown for Individual Children
(D. Brun, p.c.)

	Past		*Present*		*Future/Modal*	
Child	*Perf*	*Impf*	*Perf*	*Impf*	*Perf*	*Impf*
Sasha P	31	0	1	63	21	17
Sasha J	14	1	0	18	8	2
Varya	9	1	0	15	10	9
Zhenya	13	2	1	34	1	8
Total	67	4	2	130	40	36

*Children between the ages 1;7–1;9.

TABLE C
Interpretation of Greek Finite and Bare Verbs: Breakdown for Individual Children (Based on Stephany (1981; 1985; p.c.))

	Finite			*Nonfinite*
	Past Perfective	*Present Imperfective*		*Bare Perfective*
Form	*Past*	*Present*	*Modal*	*Modal/Future*
Spiros	5	41	3	69
Janna	57	81	2	143
Total	62	122	5	212

*Spiros 1;9; Janna 1;11.

TABLE D
Interpretation of Dutch RIs: Breakdown for Individual Children
(From Wijnen (1997))

Child	*Present*	*Past*	*Future/Modal*	*Total*
Josse	49 (17%)	25 (8%)	212 (74%)	286
Matthijs	83 (12%)	15 (2%)	603 (86%)	701
Niek	15 (4%)	5 (1%)	343 (94%)	363
Peter	47 (9%)	19 (4%)	467 (87%)	533
	194 (10%)	64 (3%)	1625 (87%)	1883

*Josse: age 2;0–2;6; Matthijs 1;11–2;8; Niek 2;7–3;2; Peter 1;9–2;1.

TABLE E
Temporal Reference and (a)Telicity in
English Bare Verbs: Early Stage

	Aspect	
Interpretation	*Telic*	*Atelic*
Past	21 **(75%)**	7 (25%)
Present	6 (11%)	47 **(89%)**

TABLE F
Temporal Reference and (a)Telicity in
English Bare Verbs: Later Stage

	Aspect	
Interpretation	*Telic*	*Atelic*
Past	27 **(93%)**	2 (7%)
Present	10 (20%)	41 **(80%)**