

# TENSE, MOOD AND ASPECT: A FEATURE-GEOMETRIC APPROACH

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## Abstract

This paper provides a feature-geometric analysis of verbal inflection in English, taking as a starting point the assumption that the syntax and semantics of tense, mood and aspect are based on a small set of component features that combine to give the superficially complex tense forms of any given language. This approach contrasts with theories based on the work of Reichenbach (1947), and is closer in spirit to the work of Stowell (1995) and Schmitt (2001). First, the features of the English Infl system are discussed. Second, the theory of Distributed Morphology is brought to bear on the mapping between the features and syntactic structure, with consequences both for the syntactic structure of English tense forms and for the precise formulation of Vocabulary insertion. All possible manifestations of Infl are shown to exist in English, and the range of expected crosslinguistic variation is discussed.

## TENSE, MOOD AND ASPECT: A FEATURE-GEOMETRIC APPROACH

### 1 Introduction

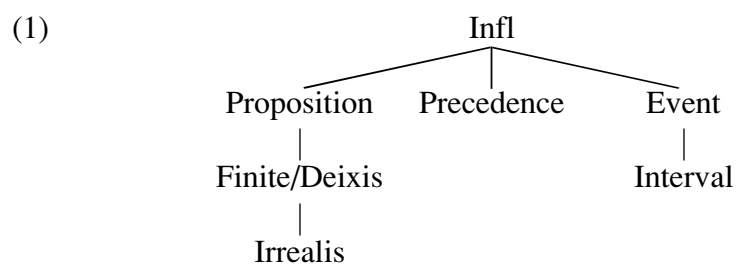
This paper provides a feature-geometric analysis of verbal inflection in English. Feature geometry is widely accepted as an approach to the structure of segments in phonology (Sagey 1986, Rice & Avery 1991, Avery 1996) and has been extended in recent years to tense (Cowper 1999, Cowper and Hall 1999), case (Béjar and Hall 1999) and pronouns (Harley and Ritter 2002). The approach taken here takes as a starting point the assumption that the syntax and semantics of tense, mood and aspect is based on a small set of component features that combine to give the superficially complex tense forms of any given language. Terms like *present perfect* or *simple past*, like *passive* or *causative* (Chomsky 1981) thus have no status in the theory, but rather refer to superficial clusters of properties derivable from the properties of the elements that make them up. This approach contrasts with theories based on the work of Reichenbach (1947), which begin with a set of basic tenses defined in terms of different orderings of the semantic elements S (speech time), R (reference time) and E (event time), and then relate tense forms rather than inflectional features or morphemes to these basic tenses. It is closer in spirit to the work of Stowell (1995) and Schmitt (2001), which seek to integrate the elements of tense into the syntax of the clause, providing syntactic as well as semantic justification for their analyses.

The paper is organized as follows: Section 2 presents the features of the English Infl system, with a discussion of each of its component parts. Section 3 provides a theoretical context for the proposal, showing how the theory of Distributed Morphology sheds light on the way the features are mapped into syntactic structure, and also showing how the feature dependency structure sheds light on the details of vocabulary insertion. Section 4 shows that all of the possibilities permitted by the dependency structure are, in fact, found in English. Section 5 briefly discusses

some crosslinguistic differences and how they might be accounted for within the proposed theory.

## 2 English Clausal Inflection

The features of the English Infl are given in (1).



Infl is merely a convenient label that, for the moment, hosts all the elements that make up the inflectional complex. The mapping from the features of Infl to the syntactic projections in the clause will be discussed as the analysis proceeds. The structure in (1) is a dependency tree, formally similar in some respects to those proposed for segment structure by Sagey (1986), Rice and Avery (1991), and Avery (1996), and for pronouns by Harley and Ritter (2002).<sup>1</sup> The various elements are monovalent features with syntactic or semantic content, which correspond in some cases to particular inflectional morphemes. Thus, for example, the distinction between an event and a state is represented as the presence or absence of [Event], not as a contrast between two specifications such as [+ Event] and [– Event]. Let us now consider each of the elements making up the English Infl. We begin with [Event] and [Interval], whose content is aspectual.

### 2.1 Aspect

Cowper (1999) argued that the event element, corresponding to the Davidsonian *e* (Davidson 1967), heads its own syntactic projection. Such a projection has been proposed by many authors (Travis 1993, Stowell 1995, Zagona 1990, among others), and is generally called Aspect Phrase or Event Phrase. In Section 3 we return to the mapping between the features of

Infl and the syntactic projections they determine; for the moment let us focus on the features themselves.

Implicit in the structure in (1) is the claim that events are, from the point of view of the feature geometry of Infl, more complex than states. That is, clauses denoting events, or propositions about events, contain an element that does not appear in clauses denoting states, or propositions about states. This is consistent with work in the semantics of states and events, but can also be motivated on purely formal grounds. In a theory in which binary oppositions are captured by monovalent features, if one member of such an opposition (Event versus State) can be shown to have a dependent binary opposition (Interval versus Moment), that member can be taken to be the marked member of the opposition. Since it can be shown that eventive clauses in English have two inflectionally distinct varieties, to be discussed below, whereas stative clauses do not, I conclude that [Event] is the marked member of the Event/State opposition. Eventive clauses are thus characterized by the presence of [Event], and stative clauses by its absence.<sup>2</sup>

Interestingly, [Event] does not seem to correspond to any particular morphological element. It is argued in Cowper (1999) that the event/state opposition is independent of the choice of verb, the telicity of the clause, and the presence of a direct object with accusative case. In principle, any non-progressive clause can be interpreted as describing either an event or a state, although certain modifiers favor one or the other interpretation, as do certain verbs. This ambiguity is illustrated in (2). The (a) sentences in (2) and (3) are stative, while the (b) sentences are eventive.

(2) a. Fritz wore a school uniform as a child. (Stative, characterizing sentence)

b. Fritz wore a school uniform twice this week. (Eventive)

(3) a. Anna was generous. (Stative)

b. Katie was generous three times this morning. (Eventive)

If [Event] is not licensed by any particular morpheme, it might be thought that it should be optional in all sentences, and that all sentences would therefore be ambiguous between an eventive and a stative reading. Indeed, many sentences are ambiguous in this way, as we have just seen, but there are two specific circumstances under which only an eventive reading is possible. One of these is when the clause in question is the bare infinitival complement of a perception verb, as shown in (4). These sentences are sensible only to the extent that the embedded clause can be interpreted as describing some sort of event.<sup>3</sup>

- (4) a. They saw [the policeman be polite/?intelligent/?burly].  
 b. We heard [the student heckle/?dislike the teacher].

The second case of an obligatory event reading is when progressive *-ing* appears, as in the sentences in (5).

- (5) a. The children were playing in the yard.  
 b. The heckler was being rude.  
 c. ?The gymnast was being tall.

This second case follows immediately from the dependency structure in (1). The feature [Interval], a dependent of [Event], encodes imperfective viewpoint aspect (Smith 1991). A perfective event, like a moment, or a temporal point, has no grammatically relevant temporal structure. Comrie (1976) describes a perfective event as having its beginning, middle and end all wrapped up into one. An imperfective event, like an interval, has temporal subparts. In English, an eventive clause is interpreted as perfective unless it is overtly marked, by the feature [Interval], as imperfective. The morphological marking associated with imperfective viewpoint aspect in English is progressive *-ing*. If [Interval] is a dependent of [Event], and if progressive *-ing* appears only when [Interval] is present, it follows that any clause containing progressive

*-ing* must necessarily be eventive.<sup>4</sup> A second, desirable consequence of the dependency structure in (1) is that stative sentences cannot manifest a perfective/imperfective distinction.

## 2.2 *Tense*

Having seen the two aspectual features of Infl, let us now turn to the feature most properly associated with Tense. The narrow tense system of English is very simple, consisting of a single opposition traditionally described as [ $\pm$  Past], and implemented here with the monovalent feature [Precedence]. [Precedence] signifies that the IP in whose head it appears is located temporally prior to its temporal anchor. The temporal anchor may be the temporal deictic centre, frequently referred to as the moment of speech, or it may be a higher temporally indexed expression. The term *past* is often used with this meaning, but since it is also often used to refer to a particular tense form, I avoid using it here. In English, [Precedence] is correlated with one of two different morphemes: the finite past tense marker, often called *-ed*, and the past participial suffix, usually called *-en*. The absence of [Precedence] means that the time reference of the IP will be interpreted as simultaneous with its temporal anchor.

The remaining features determine the clausal properties traditionally referred to as *mood*.

## 2.3 *Mood*

English clauses sometimes denote propositions, and sometimes denote bare events. Davidson (1967) and Parsons (1990) give examples like those in (6) to illustrate the difference between the two types of clauses.

- (6) a. We saw that Mary was reading the book.  
 b. We saw Mary reading the book.

The subordinate clause in (6)a is a proposition. The sentence as a whole means that we came to be aware of the truth of the proposition ‘Mary is/was reading the book.’ The means by

which we came to this understanding may or may not have been visual, since there is a cognitive sense of *see* which may be the correct reading of (6)a. In the second sentence, in contrast, the subordinate clause denotes an event rather than a proposition. The sentence as a whole means that we visually perceived the event of Mary reading the book. The purely cognitive reading of *see* is not available in (6)b. In the system proposed here, the embedded Infl in (6)a contains [Proposition], while the embedded Infl in (6)b does not.

Following Cowper and Hall (1999) and Hall (2001), I take a proposition to be a cognitive manifestation of an event or state. More formally, the feature [Proposition] takes an event or state as its argument and “transforms it into its cognitive manifestation by linking it to a *consciousness*.” (Hall 2001: 20). Hall defines consciousness informally as follows:

“A consciousness comprises the set of all propositions that are indexed to it; it can be referred to by a temporal and personal index. If a proposition is finite and deictic, then the consciousness to which it is indexed is at the deictic centre. This consciousness corresponds roughly to the set of propositions believed by the speaker of the utterance, or, more precisely, the implied speaker at the moment of speech. The speaker is an individual; the consciousness at the deictic centre is a stage of an individual (in the terminology of Carlson (1977) and Kratzer (1988)). It contains those propositions believed at the moment of speech, not the full set of propositions believed by the speaker throughout his or her lifetime.” (Hall 2001: 20)

English propositional clauses can be divided into two subclasses: those bearing the feature [Finite/Deixis], and those lacking it. Examples of non-finite propositional clauses are given in (7), and of finite propositional clauses in (8).

- (7) a. We believe [the square root of four to equal two].  
 b. As a result of our calculations, the square root of four can be seen [t to equal two]  
 c. The students decided [ PRO to work together].  
 d. The assignment seems [t to be very easy].
- (8) a. We believe that [the square root of four equals two].  
 b. As a result of our calculations, it can be seen that [the square root of four equals two].  
 c. The students decided that [they would work together].  
 d. It seems that [the assignment is very easy].

It might seem at first that in non-finite clauses, the infinitival marker *to* spells out the feature [Proposition], and in fact Cowper (1998, 1999) and Cowper and Hall (1999) assume this to be the case. However, as the data in (9) - (11) show, there are non-propositional clauses with infinitival *to*, and nonfinite propositional clauses without it. See Cowper and Hall (2001) for an account of the role played by infinitival *to*.

- (9) a. We made [the children wash their hands]. (non-propositional  $\nu$ P, forms a single event with the matrix clause)<sup>5</sup>  
 b. The children were made [to wash their hands]. (non-propositional  $\nu$ P, as in (9)a.)
- (10) a. We heard [Max play the recorder]. (bare event)  
 b. Max was heard [to play the recorder]. (ambiguous: bare event or proposition)
- (11) a. We consider [Max a good musician]. (propositional small clause)  
 b. We want [the books delivered on Tuesday]. (propositional small clause)

Like the feature [Event], then, [Proposition] seems to be an optional feature of Infl, not requiring specific morphological marking. We now turn to its dependent features, [Finite], [Deixis] and [Irrealis].

The embedded clause in (6)a and those in (8) bear the feature [Finite/Deixis]. As suggested by the label, this feature consists of two components, [Finite] and [Deixis]. In some languages, these features operate separately, with [Deixis] being a dependent of [Finite]. Finite non-deictic clauses are subjunctive, while deictic clauses are indicative. I take the English subjunctive to be a vestigial form (Cowper 1997), and therefore treat [Finite] and [Deixis] as a single feature bundle in English. Languages with robust subjunctive paradigms exhibit slightly different arrangements of these features. Some of these possibilities are outlined in section 5.

The content of the feature [Finite] is syntactic, as argued in Cowper (2002). A clause bearing this feature will check nominative case, normally on the subject, and will exhibit, to the extent characteristic of the language,  $\phi$ -feature agreement between the verb and the nominative argument.

The role of [Deixis], as argued by Hall (2001), is to identify the consciousness to which the proposition is indexed as the deictic centre of the utterance—essentially the speaker at the moment of speech. The index is both temporal and personal. In English, both components of this index, along with finiteness, are bundled together; in Section 5 we shall see that some languages treat them as separate features.

If [Finite] is a dependent of [Proposition], then all finite clauses are necessarily propositional. In other words, [Finite] can appear in Infl only if [Proposition] is present. This claim is supported by the data in (12).

(12) a. We saw that the children were playing in the yard.

b. We heard that the fireworks started at 10:00.

In both of these sentences, the matrix verb has a cognitive rather than a purely sensory interpretation. This cannot be due to the nature of the events described by the subordinate

clauses, since both children playing and fireworks starting are perceptible events. The sensory readings are readily available in the sentences in (13).

(13) a. We saw the children playing in the yard.

b. We heard the fireworks start at 10:00.

I therefore assume that all finite clauses in English are indeed propositional. Given the dependency structure in (1), the presence of [Finite], and its morphological reflex case and agreement, is sufficient to force the presence of [Proposition].

The most marked dependent of [Proposition] in English is the feature [Irrealis]. This feature is spelled out by various modals, along lines suggested by Hall (2001). The semantic effect of this feature is to change the relation between the proposition and the consciousness it is indexed to (recall that the consciousness is taken to be a set of propositions)<sup>6</sup>. The proposition denoted by a realis clause belongs to the set of propositions making up the consciousness. The proposition denoted by an irrealis clause bears one of two modal relations to the consciousness: either it follows from the consciousness, or it is compatible with the consciousness. The former relation is determined by modals like *will* and *must*, while the latter is determined by modals like *can* and *may*. A detailed discussion of the featural semantics of English modals, and an account of the root/epistemic alternation, can be found in Hall (2001).

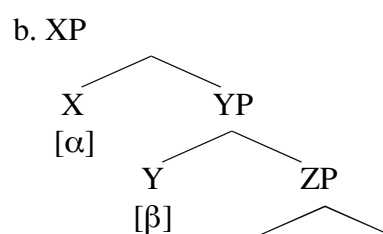
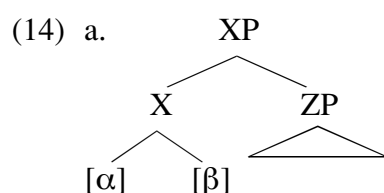
### **3 From Features to Projections: the Morphology-Syntax Interface**

In this section we consider the question of how the feature dependency structure developed in the previous section is mapped into syntactic structure.

I assume a version of Distributed Morphology (Halle and Marantz 1993), in which the syntactic computation manipulates only those elements, or features, that are grammaticalized in the language in question. Vocabulary items are inserted cyclically, after syntactic computation on

the cycle is finished. For the purposes of this discussion, I assume that each syntactic projection constitutes a cyclic domain for vocabulary insertion. See Cowper and Hall (2002) for an exploration of this approach with respect to the features of the English nominal system.

Under this view, the insertion of inflectional morphemes will depend both on which features are present in the syntactic structure, and on how they are arranged in syntactic projections. If two features  $\alpha$  and  $\beta$  occupy the head of a single syntactic projection, as in (14)a, then on the XP cycle, the best vocabulary item will be one that carries both features. However, if the two features are on different syntactic heads, as in (14)b, then vocabulary insertion will apply to the lowest head first, choosing a morpheme bearing only  $\beta$ . If the language also has a morpheme carrying both  $\alpha$  and  $\beta$ , it may under some circumstances be inserted on the XP cycle, giving an output in which  $\beta$  is morphologically realized twice. The existence of such a morpheme, however, will not block the insertion of a morpheme carrying only  $\beta$  on the YP cycle. An example of such double realization can be found in the English nominal *these dogs*, in which the plural suffix *-s* is inserted on the #P cycle to spell out the feature [Group], and the plural demonstrative *these* is inserted on the DP cycle, spelling out features of D as well as spelling out [Group] a second time.



This mechanism of vocabulary insertion will prove crucial in accounting for a set of apparently stative progressive sentences, and also for the difference between the simple past and the present perfect. We will see that in English, finite progressive sentences and infinitival

perfects may be either monoclausal or biclausal, while finite perfect tense forms are biclausal.

We turn first to the progressives.

### 3.1 Progressives.

An ordinary progressive sentence like (15) has the inflectional features given in (16).

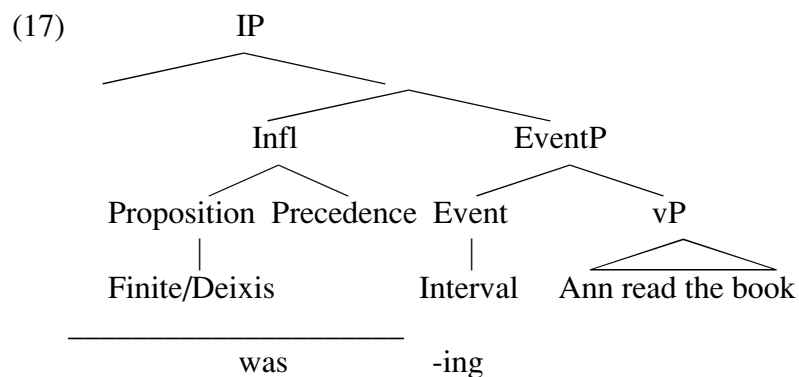
(15) Ann was reading the book.

(16)

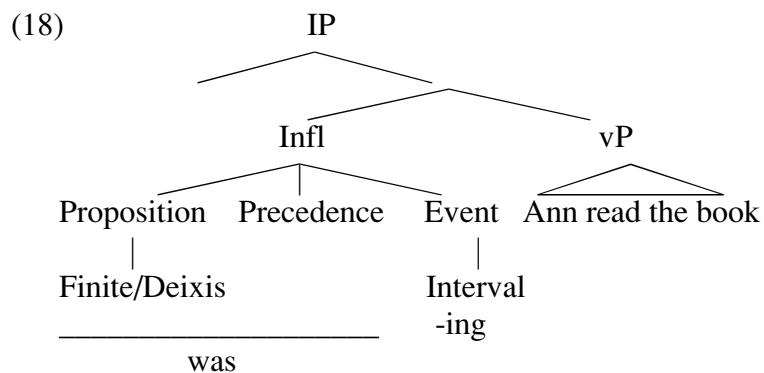
Proposition   Finite/Deixis	Precedence	Event   Interval
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The feature [Interval] triggers insertion of the present participial morpheme *-ing*, while the features [Finite/Deixis] and [Precedence] trigger the insertion of the finite past auxiliary *was*.

This suggests that, as proposed by Travis (1993) and others, the aspectual features [Event] and [Interval] head a lower projection (EventP), while the features determining tense and mood head one or more higher projections, giving a structure like (17).

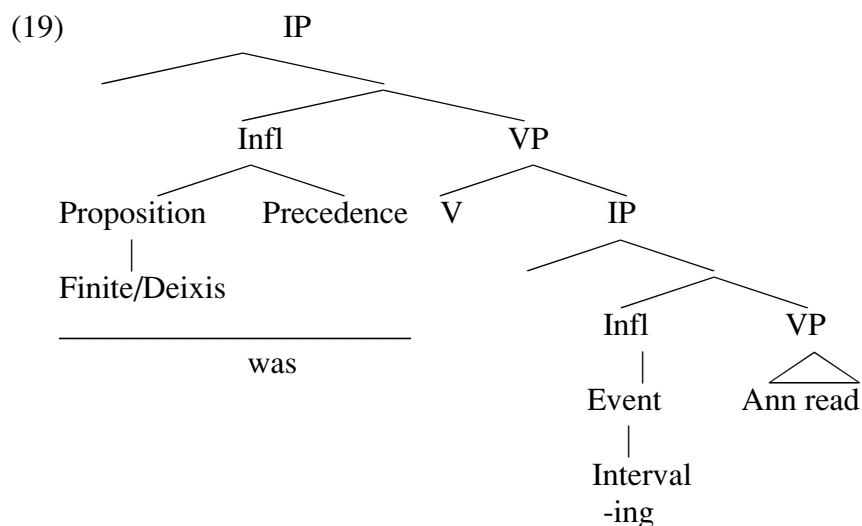


However, a sentence like (15) can also be accounted for with a single IP projection as in (18), in which a single syntactic head hosts the aspectual features as well as those determining mood and narrow tense.



The structure in (17) corresponds to syntactic structures that have been proposed in the literature, and would be consistent with a possible requirement that no more than one morpheme be inserted per syntactic head.<sup>7</sup> The structure in (18) minimizes the number of syntactic projections, a desirable result *ceteris paribus*. It is to be hoped that empirical, syntactic evidence will ultimately choose between these two possibilities.

A third possible syntactic realization of the features characterizing the progressive is the biclausal structure shown in (19). To simplify the discussion, I will use a single inflectional head per clause, rather than giving [Event] its own projection.



This structure embodies the claim that progressive sentences are stative at the matrix level, though they contain an eventive subordinate clause.<sup>8</sup> I claim that while ordinary, eventive

progressive sentences are monoclausal and as such have either the structure in (17) or the structure in (18), the biclausal structure characterizes an otherwise baffling set of apparently stative progressive clauses, exemplified in (20).

- (20) a. Ann's reading a lot these days.  
 b. Kate was smoking very little before the war.  
 c. Barry's working too hard at the moment. That's why he's losing his temper so much.  
 It's a good thing he's asleep right now; otherwise he'd probably be yelling at us.

These sentences are similar to the so-called "characterizing" use of the simple tenses (Krifka et al. 1995), exemplified in (21).

- (21) Bill drives an old pickup truck.

Characterizing sentences do not describe a particular event or set of events, but rather attribute a property to their subject, and I take them to be stative (Cowper 1998). The matrix Infl in such a sentence therefore does not contain [Event]. The sentences in (20) differ from characterizing sentences in the simple present in that the state or property in question is seen as temporary.

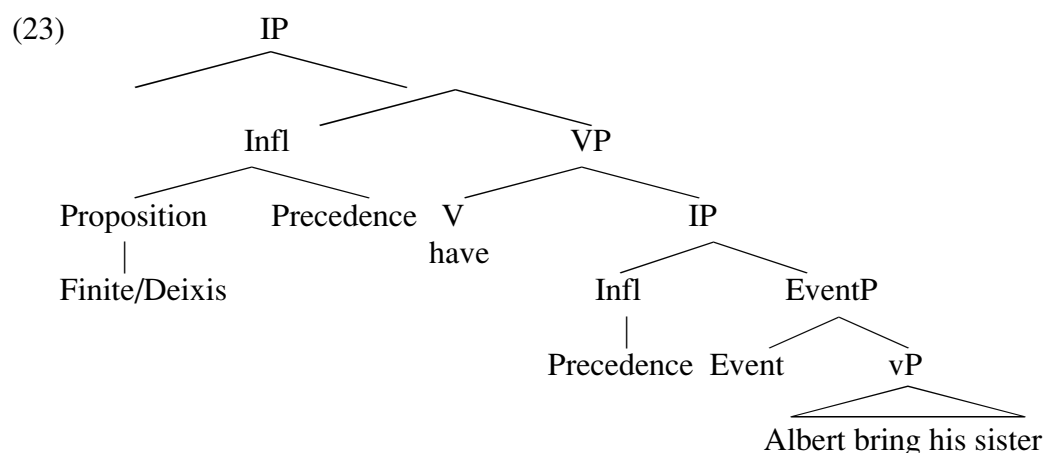
A biclausal structure such as (19) captures the meaning of the stative progressives in (20). The matrix Infl is indeed stative, and the embedded Infl has the aspectual features of the imperfective event that is at the heart of the property being predicated of the subject. Essentially, the state or property being predicated of the subject is the event denoted by the lower clause. The temporal span of the state is determined by the adverbial modifiers such as "these days," "before the war," and "at the moment," which take scope over the matrix clause. If no temporal modifier is present, then the normal interpretation of a progressive clause is eventive and monoclausal.

### 3.2 *Perfects.*

Let us now turn to the perfect tense forms. I begin with the past perfect, shown in (22).

(22) Albert had brought his sister.

As is well known, the English past perfect has a backshifted meaning, with the event of the main verb situated earlier than a reference time (Reichenbach 1947), which is in turn earlier than the moment of speech. This follows from the featural analysis being pursued here, since both the past tense on the auxiliary verb and the past participle spell out the feature [Precedence]. The dependency structure of a single Infl can accommodate only one instance of [Precedence]. A second occurrence of [Precedence] thus requires the presence of a second Infl. The structure of (22) is thus as shown in (23).



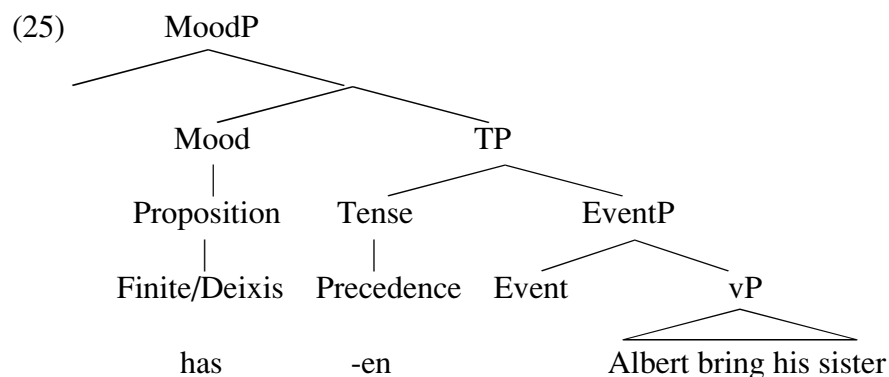
The case of the present perfect is slightly more interesting, and sheds light on the syntactic structure in a way that the past perfect does not. Consider the sentences in (24).

(24) a. Albert has brought his sister

b. Albert brought his sister.

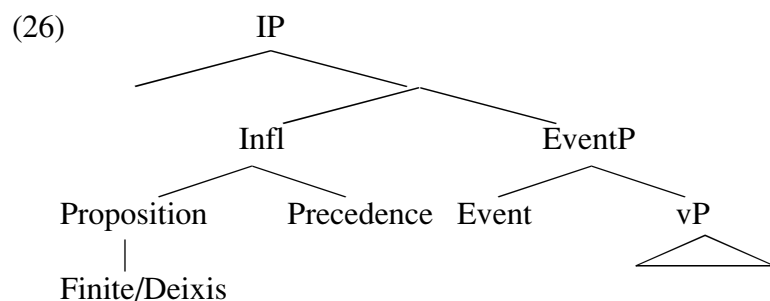
The auxiliary verb *has* carries the feature [Finite/Deixis], and the participle carries [Precedence]. This situation seems analogous to that of the progressive, and one might consider accounting for it in a similar fashion. With the progressive, one possible syntactic structure had

the participle spelling out a feature of an aspectual head, with the auxiliary spelling out tense and mood under Infl. A parallel account of the present perfect would have tense and mood features realized on distinct syntactic heads, as in (25).

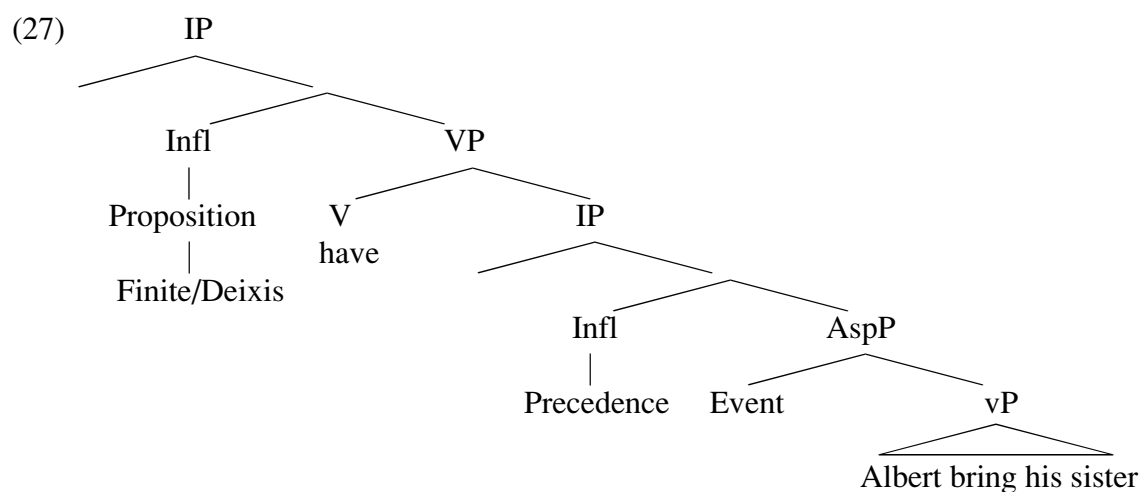


This structure accommodates the morphemes of the present perfect in a single clause, while also giving substance to the frequent observation (Stowell 1995, among others) that the English present tense encodes not tense, but only agreement. However, this analysis cannot be maintained, for two reasons. First, it predicts that there should not be a simple past tense in English, since, as discussed at the beginning of this section, the past participle would always be inserted before the computation reached the projection bearing [Finite/Deixis]. On the MoodP cycle, we would expect the insertion of an auxiliary verb, as we saw with the progressive, or perhaps the insertion of the finite past tense marker *-ed*, giving a doubly-inflected verb. In any case, even if the insertion of the past participle could be blocked somehow when the simple past is required, the analysis would wrongly predict that the English present perfect should have exactly the same meaning as the simple past.

Let us therefore retain the assumption that the features determining tense and mood occupy a single syntactic head, as in (26).



A monoclausal structure with the features required for the present perfect will include both [Precedence], for the participle, and [Finite/Deixis], for the auxiliary. However, when vocabulary insertion applies to such an IP, it will always choose the simple past over the present participle, since the simple past carries both [Finite/Deixis] and [Precedence], while the participle carries only [Precedence]. In order for the present perfect to arise, then, [Precedence] must occupy a different syntactic projection from the one occupied by [Finite/Deixis]. Since we saw that these two features cannot occupy distinct projections in a single clause, and since they must both appear in the same syntactic head in the simple past, we conclude that the English present perfect has a biclausal structure, as shown in (27).<sup>9</sup>



The structure in (27) readily accounts for the particular semantics associated with the present perfect. The matrix IP is a present tense clause, and brings with it the familiar constraint of current relevance, illustrated in (28) and (29).

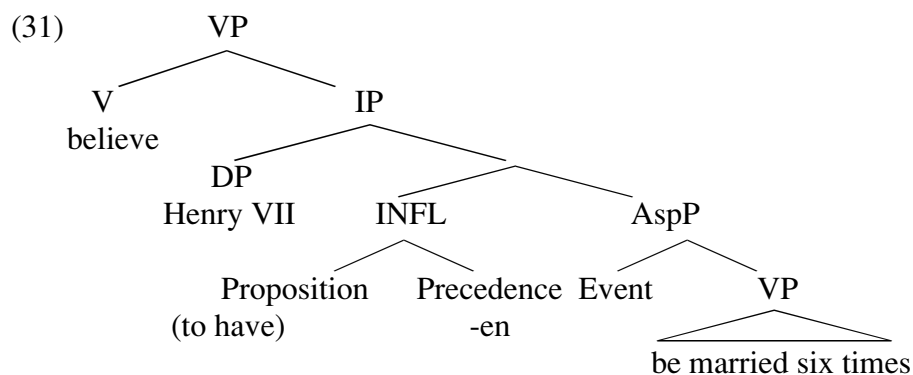
- (28) a. #Henry VIII has been married six times.  
 b. #Henry VIII is the first English king to be a Protestant.

- (29) a. Henry VIII was married six times.  
 b. Henry VIII was the first English king to be a Protestant.

Interestingly, however, infinitival perfect clauses lack the current relevance restriction, even when the clause governing them is in the present tense, as shown in (30).

- (30) We believe Henry VIII to have been married six times.

This difference between finite and non-finite perfect clauses receives a straightforward account under the proposed analysis of Infl. While a finite present perfect clause must, as argued above, have a biclausal structure, nothing prevents an infinitival perfect clause from having a monoclausal structure. The structure of such a clause is given in (31).



In a finite clause such as (26), the insertion of the past participle is blocked by the simple past, which more closely matches the feature specification of Infl than the participle does. In the infinitival structure, the participle is, in fact, the best match for the features of Infl; the participle carries [Precedence], and [Proposition] occurs freely. There is thus no need for a biclausal structure, and the absence of the current relevance requirement is expected.

This difference between finite and infinitival perfect clauses is confirmed by the sentences in (32). (32)b, with a lower clause in the simple past, rather than (32)c, with a lower clause in the

present perfect, is closer in meaning to (32)a. In addition, a finite clause in the simple past tense can be modified by a point adverbial that identifies the time at which the event took place. In contrast, a finite clause in the present perfect cannot be modified by such an adverbial. The acceptability of the point adverbial in (32)a indicates that perfect infinitives behave more like the simple past than like the present perfect in this respect.

- (32) a. We believe the children to have eaten the ice cream (at exactly three o'clock).  
 b. We believe that the children ate the ice cream (at exactly three o'clock).  
 c. We believe that the children have eaten the ice cream (\*at exactly three o'clock).

Note that while the analysis under discussion permits a monoclausal analysis of infinitival perfects, nothing rules out a biclausal analysis. Thus, we predict that infinitival perfects should be structurally ambiguous. The monoclausal structure would spell out the meaning of a past infinitive, whereas the biclausal structure would spell out the meaning of a truly perfect infinitive, which refers to a state resulting from a prior event.

Evidence for the existence of a biclausal perfect infinitive is difficult to come by, since any diagnostics, such as the one in (32), that rely on sentences being ungrammatical, will fail due to the availability of the monoclausal structure. However, there is one positive diagnostic for the English perfect construction, illustrated by the sentences in (33).

- (33) a. Anna has lived in Kenora all her life.  
 b. Anna lived in Kenora all her life.

The current relevance requirement of the present perfect construction in (33)a, along with the adverbial *all her life*, implies that Anna is still alive. The perfective simple past in (33)b, again with the adverbial *all her life*, implies that Anna has died at some time prior to the moment of speech. Thus, if a clause contains the adverbial *all X's life*, and if it is implied that X is still

alive, then the clause has a perfect rather than a simple past Infl. If the clause is truly ambiguous, then it should be possible to interpret X as being either alive or dead. Let us apply this diagnostic to the infinitival clauses in (34).

- (34) a. We believe Anna to have lived in Kenora all her life. She certainly lives there now.  
 b. We believe Anna to have lived in Kenora all her life. She certainly lived there the year before she died.

Since both (34)a and (34)b are well-formed, I conclude that the embedded clause in (34)a has a biclausal, perfect Infl, while the embedded clause in (34) has a monoclausal, past Infl.

#### 4 The Manifestations of INFL

The dependency structure in (1) provides a total of twenty-four distinct combinations of features. All of these are attested in English; they are given below with the relevant IP in each case enclosed in brackets.

(35) INFL I've never seen him hit the kids, but I've seen [him angry at them]

(36) INFL We heard [the dog bark].  
 |  
 Event

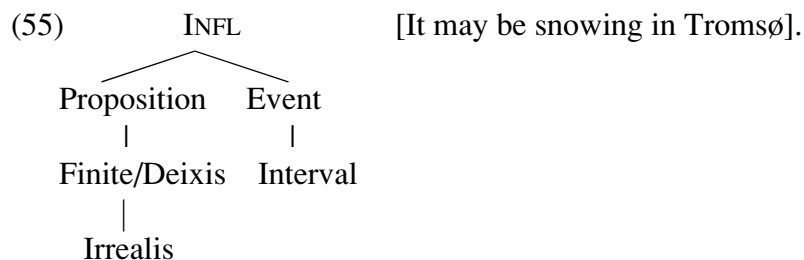
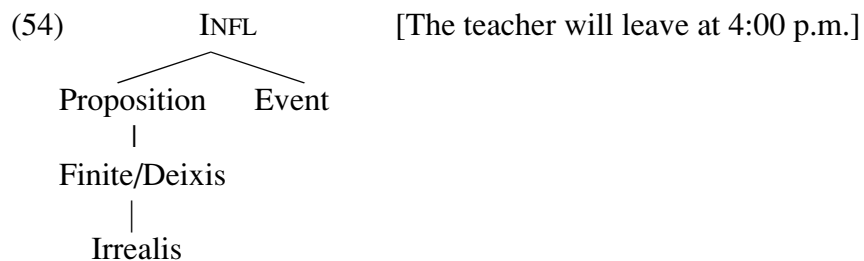
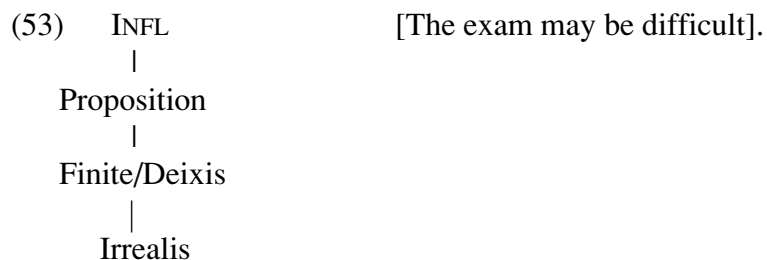
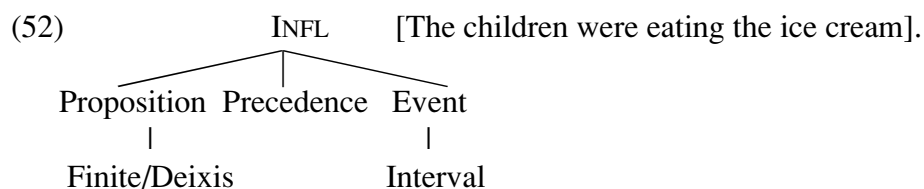
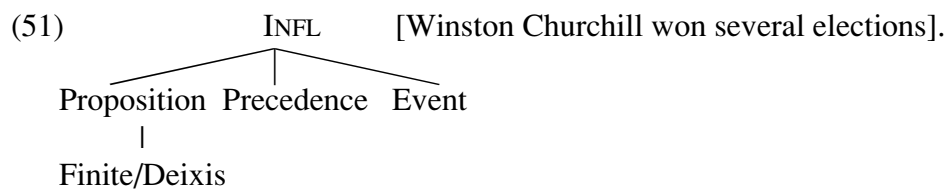
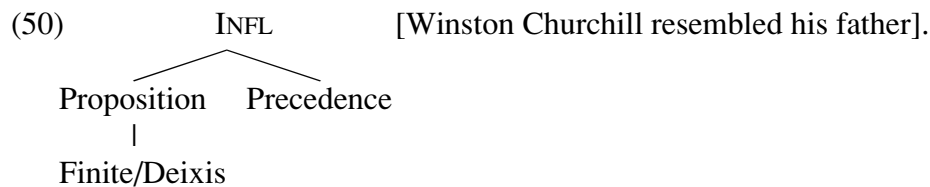
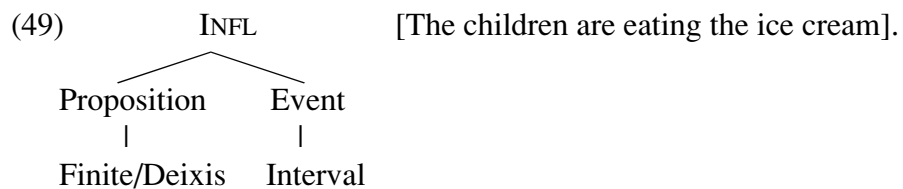
(37) INFL We heard [the dog barking].  
 |  
 Event  
 |  
 Interval

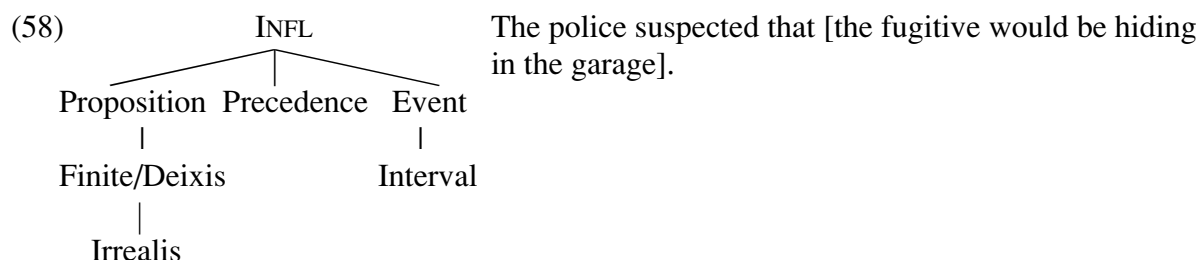
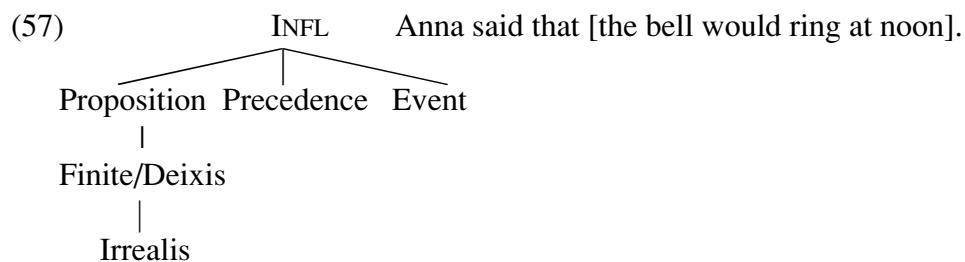
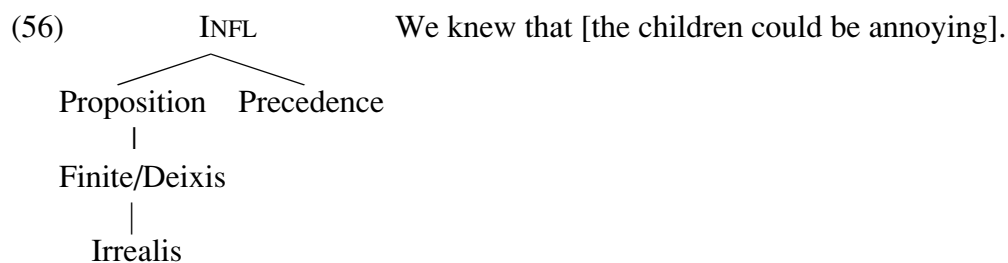
(38) INFL The Smiths have (always) [ t been rich].  
 |  
 Precedence

(39) INFL The Smiths have [ t bought a new car].  
 / \  
 Precedence Event

(40) INFL The Smiths have [ t been looking for a house]  
 / \  
 Precedence Event

- Interval  
|
- (41) INFL We believe [the children to be intelligent].  
|  
Proposition
- (42) INFL We expect [the children to eat the popsicles].  
/ \  
Proposition Event
- (43) INFL We believe [the children to be watching the movie].  
/ \  
Proposition Event  
|  
Interval
- (44) INFL We believe [Winston Churchill to have been a talented politician].  
/ \  
Proposition Precedence
- (45) INFL We believe [the children to have watched the movie].  
/ | \  
Proposition Precedence Event
- (46) INFL We believe [the children to have been watching the movie].  
/ | \  
Proposition Precedence Event  
|  
Interval
- (47) INFL [The children like ice cream].  
|  
Proposition  
|  
Finite/Deixis
- (48) INFL [The inspector enters the room]. He walks over to the desk, and  
/ \ turns on the light. (reportive present)  
Proposition Event  
|  
Finite/Deixis





## 5 Crosslinguistic Variation

An analysis such as the one presented here is interesting and useful to the extent that it sheds light on tense, mood and aspect systems crosslinguistically. In principle, the account permits three sources of crosslinguistic variation. First, it might be the case that a feature is active in one language but not in another. So, for example, Harley and Ritter (2002), in their discussion of pronominal systems, show that the feature [Minimal], which underlies the dual/plural distinction, is active in some languages but not in others. We might therefore expect other languages to use features that English lacks, or to lack features found in English.

The second source of crosslinguistic variation has to do with whether features are bundled together, as with [Finite] and [Deixis] in English, or treated separately, as with [Event] and [Interval]. It was mentioned earlier that in languages that make full use of the subjunctive,

[Finite] and [Deixis] are treated as separate features. It is impossible to tell from English data exactly how this feature bundle might be split in such a language.

The third source of crosslinguistic variation is found in the syntax-morphology interface. During vocabulary insertion, the existence of a more specified morpheme will block the insertion of a less specified morpheme in a given featural context. Also, as Cowper and Hall (2002) found, features in other dimensions, such as register features, may block the insertion of an otherwise perfectly matching morpheme.<sup>10</sup> Since languages differ widely in their inventories of vocabulary items, and since superficially similar morphemes in related languages may differ somewhat in the features they spell out, it is to be expected that similarities in the inflectional feature structures might in some cases be obscured by different blocking effects, and conversely, that differences in inflectional feature structure might be hidden by a limited inventory of vocabulary items.

Preliminary examination of several European languages has found all three of these types of crosslinguistic variation. In Spanish, for example, [Precedence] has a dependent feature, [Entirety], which distinguishes the preterite from the imperfect, while it seems that [Interval] may not play a role in the system. The discussion in Schmitt (2001) suggests that in Portuguese, [State], rather than [Event], may be the marked aspectual setting. And while both Spanish and French have a robust subjunctive system, they have slightly different feature specifications. In both languages, subjunctives carry the feature [Finite]. In Spanish, however, subjunctives also carry temporal deixis ([T-deixis]), leaving only personal deixis ([P-deixis]) as the feature distinguishing indicatives from subjunctives. The time reference of a subjunctive clause in Spanish is computed with respect to the moment of speech rather than the governing clause. Thus Spanish makes full and frequent use of the past subjunctive in past-tense contexts, while in

French, where subjunctives carry [Finite] but not [T-deixis], the present subjunctive is used essentially across the board. The effect of register features can be observed in the behavior of the French *passé défini*. As we saw earlier, the existence of the simple past in English blocks the insertion of the present perfect with a monoclausal past finite Infl. The French *passé composé* is morphologically almost identical to the English present perfect, but it can be used where the simple past must be used in English, and where one might expect French to require the use of the *passé défini*. What prevents the *passé défini* from blocking the *passé composé* in French is the fact that the *passé défini* carries a marked register feature, limiting its use to formal discourse.

Another difference attributable to the morphology-syntax interface is found in the way different languages spell out [Irrealis]. In English, modal verbs carry this feature, whereas in many other languages it is spelled out by morphological tense forms such as the future and the conditional, and modal verbs behave more canonically as verbs than they do in English.

A reasonable question to consider at this point is exactly where the dependency structure given in (1) resides, and what form it takes. It has been assumed in recent years (Chomsky 1995, 1998) that the specification of language-particular properties is to be found in the lexicon, rather than in the system of rules and principles governing syntactic computation. Following Halle and Marantz 1993), I distinguish between lexical items, that is, bundles of formal features manipulated by the syntactic computation, and vocabulary items that spell out the lexical items after syntactic computation has taken place. I assume that crosslinguistic variation can be found in the lexical items proper, and also in the vocabulary items.

The features making up the dependency tree in (1) are assumed to be elements of the lexicon, which can form part of the lexical array that serves as input to the syntactic computation. The dependency relations among the features, it is to be hoped, are part of Universal Grammar.

Some of the dependencies are derivable from the semantic representations of the features themselves. Thus, [Interval] is essentially a modifier of [Event], altering the semantic content of [Event] so that it pertains to a non-singleton set of moments, rather than to a single moment. The semantics of [Interval] can thus be composed with the rest of a clause only if [Event] is also present. Not all of the dependencies are purely semantic, however. The feature [Finite] has purely syntactic content, as argued in Cowper (2002). Dependencies in which this feature participates will therefore have to be stated as part of Universal Grammar. The dependency structure in (1) is equivalent to the set of entailments given in (59), together with the language-particular set of lexical items in (60).

- (59) a. Irrealis  $\rightarrow$  Deixis  
 b. Deixis  $\rightarrow$  Finite  
 c. Finite  $\rightarrow$  Proposition  
 d. Interval  $\rightarrow$  Event

(60) [Irrealis], [Finite/Deixis], [Proposition], [Precedence], [Interval], [Event]

The addition of the entailment in (61), and the substitution of the list of lexical items in (62), gives an initial approximation of the Spanish Infl system.

(61) Entirety  $\rightarrow$  Precedence

(62) [Irrealis], [P-deixis], [Finite/T-deixis], [Proposition], [Entirety], [Precedence], [Event]

We can see from these examples that while the dependencies themselves are universal, languages can vary in which features they make use of, and in how these features are bundled into lexical elements. An exploration of the full range of crosslinguistic variation is left for future work.

## 6 Conclusion

I have shown that a wide range of English tense forms can be accounted for with the relatively simple dependency structure given in (1), assuming a postsyntactic, cyclic process of vocabulary insertion. Both morphological tense forms and periphrastic tenses are accounted for, as well as clauses with modals. The mechanism of vocabulary insertion was shown to shed light on the mapping of the dependency structure to syntactic projections. While the limits of crosslinguistic variation remain to be explored in detail, the approach proposed here provides a framework within which a limited number of small differences can derive a superficially very diverse set of tense, aspect and mood systems.

## 7 Notes

\* I am grateful to Daniel Currie Hall for his work on English modals and on the semantics of inflectional elements, and to all the members of the University of Toronto Syntax group for their comments and suggestions, and especially for helping me to figure out where this paper should end.

<sup>1</sup> Phonological feature structures are not simply dependency trees, however; they also represent something akin to constituency relations. Thus in phonology, a feature may spread from one segment to an adjacent segment, or be delinked, deleted or inserted by a rule. Association lines thus represent structural relations between elements as well as entailment relations. The feature structures given in the present paper here are intended simply as graphic representations of dependency relations.

<sup>2</sup> Schmitt (2001) argues that the simple present in Portuguese is necessarily stative—essentially that the simple present tense selects a state. This would necessitate taking State, rather than

[Event], to be the marked value for the event/state opposition in Portuguese. The consequences of such difference are left for future work.

<sup>3</sup> It is possible to construct sentences containing complement clauses denoting bare states, as in (i) and (ii). However, for clauses containing verbs, the stative reading requires very specific aspectual properties in the main clause; if these are not present then the eventive reading becomes more salient, as in (iii).

(i) We haven't seen the children hit each other, but we have seen [them angry at each other].

(ii) I've never seen anyone resemble his father as much as Arthur does.

(iii) #Last week I saw Arthur resemble his father more than ever before.

<sup>4</sup> We are dealing here with only one of the two morphemes in English realized phonologically as *-ing*. The other one is nominal, and has no consequences for the structure of Infl. See Cowper (1995) for a discussion of both of these morphemes. In addition, there is a systematic set of apparent exceptions, exemplified by sentences like (i), which will be discussed in section 3.1.

(i) Mary's working out a lot these days.

<sup>5</sup> I follow Wurmbrand (2001) in assuming that so-called restructuring infinitives project no inflectional categories, and may even lack a vP, as in (i). One of Wurmbrand's diagnostics for such structures is the inability of the lower clause to take its own temporal modifier.

(i) On Friday, Katie tried [<sub>VP</sub> to hand the paper in (\*on Monday)].

<sup>6</sup> The role played by the consciousness in Hall (2001) is analogous to that of the modal base and ordering source in Kratzer's (1977, 1981, 1991a, 1991b) work on modals.

<sup>7</sup> Much work in the syntax of functional categories makes this assumption, at least implicitly. See, for example, Cinque (1995), Travis (1991, 1993, 1995).

<sup>8</sup> Schmitt (2001) assumes that progressive sentences in general are stative.

<sup>9</sup> This is not a new proposal. Schmitt (2001), for example, treats the present perfect in Portuguese and English as biclausal. What is new here is the explanation for the fact that the English present perfect is necessarily biclausal.

<sup>10</sup> Specifically, Cowper and Hall show that the unstressed determiner *this* carries the feature [specific], while the ordinary indefinite determiner *a/an* does not. *This* also carries a marked register feature, so that it can only be inserted in a markedly informal context. Thus in a neutral or formal context, a specific determiner is spelled out by *a/an*, rather than by *this*, as illustrated in (i) and (ii).

(i) The committee considered a proposal by *a/#this* newly-elected member.

(ii) So, *this* giant panda walks into a bar, and ...

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