Remoteness Distinctions in the Tense-Aspect System of Kikuyu [1]

Seth Cable
University of Massachusetts Amherst

ABSTRACT: This paper presents a formal semantic analysis of the tense-aspect system of Kikuyu (Bantu; Kenya), a language that is reported to distinguish four 'grades' of past tense and two grades of future tense. I argue that what are traditionally labeled as 'tenses' in the language do not have the formal characteristics expected of tense. However, they also do not display the behavior expected of temporal adverbs. Rather, they occupy an interesting middle ground between true tenses and adverbs. I defend the hypothesis that – like tenses – these 'temporal remoteness morphemes' (TRMs) introduce temporal presuppositions, but – like adverbs – they serve to restrict the 'Event Time' of the utterance (rather than the topic time).

1. Introduction and Overview

The tense-aspect systems of natural languages provide some of the most difficult puzzles for a theory of cross-linguistic semantic variation. In addition to remarkably subtle differences in the use of particular tense-aspect combinations (*e.g.* Arregui *et al*. 2011), languages can also exhibit rather dramatic differences in the overall organization of these systems. Of these broader differences, one of the best-known concerns the number of distinctions made in the domain of tense.

There are two conceivable ways that a language's tense system might diverge from the familiar three-way distinction between 'past', 'present' and 'future'. The first, and best-studied, is for the language to exhibit fewer distinctions than these three, or perhaps none at all. Several such systems have been explored using the tools of formal linguistic theory (*e.g.* Baker & Travis 1997, Lee 1999, Bohnemeyer 2002, Ritter & Wiltschko 2004, Bittner 2005, Lin 2006, Matthewson 2006, Matthewson & Jóhannsdóttir 2007). Study of these systems has provided a wealth of insights into the scope and limits of semantic variation, as well as an exciting picture of the possible logical systems used by human language for the location of events in time.

There is, however, also a second way in which tense systems might diverge from the well-known Indo-European pattern: conceivably, they could exhibit *more* distinctions than merely 'past/present/future'. Indeed, it has long been reported that there are languages whose tense systems make further, obligatory distinctions within the realm of 'past' and 'future' (Comrie 1985, Dahl 1985, Bybee *et al.* 1994). In such languages, the tense system allegedly tracks not only whether the event occurs before/during/after the time of speech, but also *how remote* the event is in time: whether it just happened, happened a day ago, happened more than a day ago, *etc.* The following data illustrate such a pattern in the tense-aspect system of ChiBemba, a Bantu language of Zambia.

[1] This paper would not have been possible without the tireless work of Nancy Gachigo and Sarah Kahando, the principle Kikuyu language consultants for this project. I am deeply indebted to them both. *Nī wega mũno!* I would also like to thank the following individuals for their insightful comments on earlier versions of this work: Angelika Kratzer (list to be expanded). I would also like to acknowledge the exceptional scholarship of Marion Johnson (1977, 1980, 1981), whose formal insights into the tense-aspect system of Kikuyu provided the foundation and the impetus to the current study.

(1) **Temporal Remoteness Distinctions in ChiBemba (Givón 1972)**

a.	ba**àlée**bomba	*They were working (before yesterday)*
b.	ba**álée**bomba	*They were working (yesterday)*
c.	ba**àcíláá**bomba	*They were working (earlier today)*
d.	ba**á**bomba	*They've just worked (a little while ago)*

Curiously, with the rare exception of Johnson (1977, 1980, 1981), these more articulated tense systems have not been explored with the tools of formal semantic theory. Consequently, many fundamental questions about these systems remain entirely open, including the precise way in which they diverge from the more commonly studied three-way systems. Given that most formal theories of tense are based upon the three-way tense system of English, pitting those theories against systems like that in ChiBemba is of more than peripheral interest.

Despite the lack of study to date, such 'remoteness distinctions' are not especially rare in tense systems. Indeed, they are quite common within some language families, Bantu being one of the best-known (Nurse 2003). In addition to ChiBemba, many other Bantu languages obligatorily mark the relative remoteness of the event from the time of speech. Another such language is Kikuyu, a Bantu language of Kenya, whose tense-aspect system will be the focus of this paper. The following is a brief sketch of the various remoteness distinctions made by the Kikuyu tense-aspect system; a more thorough introduction will be given in Section 2.

(2) **Temporal Remoteness Distinctions in Kikuyu** [2]

a.	Mwangi nĩ**ã**inaga.	*Mwangi was dancing (before yesterday).*
b.	Mwangi nĩa**ra**inaga.	*Mwangi was dancing (yesterday).*
c.	Mwangi nĩe**kũ**inaga.	*Mwangi was dancing (earlier today).*
d.	Mwangi nĩ**ã**ina.	*Mwangi just danced (a little while ago).*
e.	Mwangi nĩa**ra**ina.	*Mwangi is dancing (right now).*
f.	Mwangi nĩe**kũ**ina.	*Mwangi will dance (today).*
g.	Mwangi nĩa**ka**ina.	*Mwangi will dance (tomorrow or later).*

Although the morphological distinctions found in (1) and (2) have traditionally been labeled as ones of 'tense', such labels have typically come from descriptive grammarians who were not operating within any precise semantic theory of tense.[3] Consequently, it remains very much an open question whether the 'temporal remoteness morphology' (TRM) found in Bantu languages should be classified as 'tenses' in the technical sense used by semanticists. Indeed, the central claim of the present paper is that, upon careful scrutiny, the prefixes traditionally labeled as 'tenses' in Kikuyu are anything but. Instead, they occupy an intriguing middle ground between tenses (in the preferred sense) and temporal frame adverbials such as *today, yesterday, tomorrow, etc.*

[2] Unless otherwise indicated, all Kikuyu data are taken from my own interviews with native speakers. Both consultants I worked with were speakers of the Kiambu dialect of Kikuyu.

[3] Again, Johnson (1977, 1980, 1981) is the sole exception to this that I am aware of.

As we will see, 'these temporal remoteness morphemes' (TRMs) possess the presuppositional semantics commonly hypothesized for tenses. However, some also possess an indexical semantics more characteristic of temporal adverbials. In addition, like temporal adverbials, the TRMs in (2) directly locate the so-called 'Event Time' (Klein 1994), and – unlike true tenses – do not directly the 'Topic Time' (Klein 1994). On these grounds, I propose that (like tenses), the TRMs of Kikuyu are temporal pronouns, but (unlike tenses) restrict the Event Time rather than the Topic Time. These proposals will be clearer to the reader after Section 3, where I present my background assumptions regarding the syntax/semantics of tense.

Following the crucial background in Sections 2 and 3, I begin to present the key empirical arguments and theoretical proposals. Section 4 discusses the main differences in meaning between the Kikuyu TRMs and temporal adverbials such as *ira* 'yesterday', *ũmũthĩ* 'today', *etc.* There, we will find that TRMs possess a presuppositional semantics akin to that of true tenses. The key evidence here comes from certain patterns that arise when the speaker possesses incomplete knowledge regarding the time of the event described.

Having shown that TRMs are distinct from adverbs, Section 5 provides evidence that they are also distinct from true tenses. The empirical focus of this section is the behavior of TRMs in embedded clauses. Here, we will find that, unlike tenses, it is not generally possible to shift the evaluation time of the TRM. Rather, the evaluation time of certain TRMs must always be the matrix utterance time, even when the TRM is located within clausal complements to verbs of speech and thought. Thus, some TRMs appear to exhibit an indexical semantics characteristic of temporal adverbs like *yesterday*, and unlike tenses such as 'past' or 'present' in most languages.

Further evidence that TRMs are not tenses comes in Section 6. Here, I argue that semantic interactions between TRMs and perfect aspect indicate that TRMs do not serve to locate the Topic Time. Instead, the presuppositions introduced by TRMs concern the Event Time directly. Given this, I propose that TRMs function as temporal pronouns contributing the Event Time of the clause. Thus, they stand in interesting comparison to true tenses, which are frequently viewed as temporal pronouns denoting the Topic Time. Further evidence for this key proposal will be found in the behavior of TRMs in 'characterizing sentenes' and 'future-in-the-past' contexts.

Taking these facts together, an interesting picture emerges regarding the way in which the tense-aspect system of Kikuyu functions to locate events in time. Within this picture, temporal remoteness morphemes do not play the role expected of tenses, but rather have a function that is more analogous to temporal adverbials in languages like English. Despite this, these prefixes are not merely 'incorporated adverbs'. Rather, they possess a presuppositional semantics akin to that typically proposed for tenses. They are also an obligatory part of Kikuyu inflectional morphology, much like true tenses. Although the formal analysis proposed here faces many empirical challenges and puzzles, it arguably comes closer to the truth than the simple claim that Kikuyu possesses multiple past and future tenses. In the end, the picture of cross-linguistic variation that emerges is one where the categories of (true) tense remain unchanged, but the inventory of possible inflectional categories is expanded.

2. An Introduction to the Temporal Remoteness Morphemes of Kikuyu

This section provides a basic introduction to the tense-aspect system of Kikuyu, especially the variety of so-called 'tenses' that Kikuyu is claimed to possess. The discussion here is based upon various reference grammars of Kikuyu (Barlow 1951, Gecaga 1955, Johnson 1977).

As mentioned in Section 1, a past-tense verb in Kikuyu obligatorily contains a prefix that provides further information about the distance between the event described and the time of speech. Given the morphological complexity of Kikuyu, it is perhaps best to first introduce these prefixes in the context of imperfective verbs. The following illustrate the possible past-imperfectives of Kikuyu.

(3) **Temporal Remoteness Distinctions in Past Imperfectives**

a. Hodiernal Past:
Mwangi **nĩe-kũ-in-aga.**
Mwangi nĩ-a-**kũ**-in-**aga**
Mwangi ASRT-3sgS-**HOD**-dance-**PST.IMP**
Mwangi was dancing (today).

b. Hesternal Past:
Mwangi **nĩa-ra-in-aga.**
Mwangi nĩ-a-**ra**-in-**aga.**
Mwangi ASRT-3sgS-**HEST**-dance- **PST.IMP**
Mwangi was dancing (yesterday).

c. Pre-Hesternal Past:
Mwangi **nĩ-ā-in-aga.**
Mwangi nĩ-a-**a**-in-**aga.**
Mwangi ASRT-3sgS-**PHEST**-dance- **PST.IMP**
Mwangi was dancing (some time before yesterday).

As shown above, there are three possible past-imperfective forms for a Kikuyu verb. Following Dahl (1985), I refer to these forms as 'Hodierinal Past' (HOD), 'Hesternal Past' (HEST), and 'Pre-Hesternal Past' (PHEST).[4] At a very rough level of description, the Hodiernal Past form in (3a) is used to describe actions occurring on the same day as the utterance. Similarly, Hesternal Past in (3b) is used to describe actions occurring on the day preceding the utterance. Finally, the Pre-Hesternal Past in (3c) is used to describe actions occurring any time before the day preceding the utterance.[5]

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[4] Other authors have used entirely different labels for these categories (Barlow 1951; Gecaga 1955; Johnson 1977).

[5] As noted by Johnson (1977, 1980), there are cases where Hesternal Past can be used to describe actions occurring *prior* to the day before the utterance. For example, to refer to the prior year, the locution below is commonly used:

(i) Mwaka ũcio ũ**ra**thirire.
year that passed.HEST
The year that passed. (Johnson 1980: 287)

As shown above, the relative clause modifying 'year' is in the Hesternal Past, even though the actual event of the year passing took place prior to yesterday. On these grounds, Johnson (1977, 1980) proposes that the meanings of the prefixes in (3) make reference to a contextually salient unit of time, one that cannot be smaller than a day (*cont'd*…).

As is clear from comparing the forms in (3), the key morphological difference between these three past-tense forms lies in the identity of a particular prefix. These prefixes, which occur between the subject agreement prefix and the verbal root, are typically referred to as a 'tenses' by both Kikuyu grammarians and Bantu scholars more generally (Nurse 2003). In order not to prejudge the matter, I will break from tradition and refer to these prefixes as 'temporal remoteness morphemes', or 'TRMs'. As shown in (3a), the TRM for Hodiernal Past in imperfective verbs is *kũ-*. Sentence (3b) illustrates the TRM for Hesternal Past, *ra*, and (3c) illustrates the TRM for Pre-Hesternal Past, *a*.

At this point, I should note an orthographic problem relating to Pre-Hesternal Past forms. In this paper, all Kikuyu data are represented using official Kikuyu orthography (Barlow 1951). Unfortunately, this orthography does not distinguish vowel-length in certain parts of the verb (Barlow 1951). Consequently, although the verb in (3c) contains a long /a/ just before the root, this vowel is orthographically rendered as if it were short, the official spelling being "nĩainaga". This convention is very unfortunate, since as we will see, the length of this particular vowel is of key importance in many examples. Therefore, following Barlow (1951), I will break from the official orthography here, and I will use a macron to represent whether the vowels immediately preceding the verb root are long.

The reader will note that the sentences in (3) are provided a morphological decomposition above their English glossing. As is clear from comparing the surface form to the morphological decomposition, various morphophonemic processes serve to obscure the underlying morphological structure of the Kikuyu verb. For this reason, I include such decompositions throughout this paper. For reasons of space, though, I will not provide decompositions for verbal forms I have already decomposed in earlier example sentences.

Thus far, we have noted that the verbs in (3) contain a TRM, a verbal root, and a subject agreement prefix. In addition, these verbal forms all begin with the so-called 'assertive' prefix *nĩ*. Despite the simple gloss as 'ASRT', the nature of this prefix is a very difficult analytic puzzle (Schwartz 2003), one that is entirely orthogonal to the analysis of the tense-aspect system. Finally, these verbal forms also all end in the suffix *aga*. Following Johnson (1980, 1981), I analyze this suffix as encoding both the features 'past' and 'imperfective'; consequently, it is glossed as 'PST.IMP'. The reason for this is two-fold. First, as we will see, this suffix does not appear in present imperfective forms. Secondly, although present and future forms can occur suffixed with *-aga*, such forms have only a generic or habitual reading, as shown below.

To my knowledge, however, such uses of Hesternal Past are rather limited, and seem to be restricted to expressions like that in (i). At any rate, Johnson herself notes that the typical interpretation of the prefixes in (3) is one where the salient unit of time is 'one day'. Therefore, my discussion will abstract away from complexities such as those in (i). If need be, I believe the system I propose can easily be augmented to incorporate the context-sensitivity that forms like (i) may be revealing.

In addition, I should note that one consultant I worked with would occasionally use Hesternal Past when describing events that occurred very early on the day of speaking. Such uses are not discussed in any of the reference works I am aware of, and will be put aside for the purposes of this study.

(4) **The Habitual / Generic Suffix *–Aga*** [6]

a. Generic Interpretation:

(i) *Situation:*
You've bought a brand new paper-making machine. It's never been used before. Your friend Mwangi asks what the machine does:

(ii) *Sentence:*

Machiñĩ	ĩno	ĩthondĩk**aga**	maratathi.
Machiñĩ	ĩno	ĩ-thondĩk-**aga**	maratathi.
Machine	this	AgrS-makes-GEN/HAB	paper

This machine makes paper
Judgment: True/appropriate in this situation (offered as translation).

b. Habitual Interpretation

(i) *Situation:*
Mwangi is a runner. His favorite running time is the morning.

(ii) *Sentence:*

Mwangi	ateng'er**aga**	rũciniĩ.
Mwangi	a-teng'er-**aga**	rũciũ-iniĩ.
Mwangi	3sgS-run-GEN/HAB	morning-in

Mwangi runs in the morning.
Judgment: True/appropriate in this situation (offered as translation).

Thus, following Johnson (1980, 1981), I will assume that the *-aga* suffix in the forms above is a mere homophone of the one appearing in (3).[7]

Having thoroughly examined the past-imperfective forms in (3), let us now turn to past-perfectives. Again, there are three possible forms that a past-perfective verb in Kikuyu can take. These are illustrated below.

(5) **Temporal Remoteness Distinctions in Past Perfectives**

a. Hodiernal Past:

Mwangi	nĩain**ire.**
Mwangi	nĩ-a-∅-in-**ire**
Mwangi	ASRT-3sgS-**HOD**-dance-**PST.PRV**

Mwangi danced (today).

[6] For more on the difference between 'generic' and 'habitual' interpretations, I refer the reader to Green (2000).

[7] Properly speaking, Johnson only considers the habitual/generic suffix in *future* tense forms to be distinct, and she does identify the *–aga* suffix in (4) with that in (3). However, the motivation for making the cut in this way is quite unclear. After all, *-aga* in present-tense forms like (4) is also restricted to a habitual/generic interpretation, which is Johnson's main motivation from separating the suffix in (3) from the homophonous one occurring in future forms.

b. Hesternal Past: Mwangi **nĩa-ra-in-ire.**
Mwangi **nĩ**-a-**ra**-in-**ire.**
Mwangi ASRT-3sgS-**HEST**-dance- **PST.PRV**
Mwangi danced (yesterday).

c. Pre-Hesternal Past: Mwangi **nĩ-ā-in-ire.**
Mwangi **nĩ**-a-**a**-in-**ire.**
Mwangi ASRT-3sgS-**PHEST**-dance- **PST.PRV**
Mwangi danced (some time before yesterday).

As with past-imperfectives, past-perfective verbs must be either Hodiernal Past, Hesternal Past, or Pre-Heternal Past. The meanings of these sub-categories is the same as in the imperfectives in (3), though their morphological expression is slightly different.[8] Although Hesternal Past is still expressed by the prefix *ra*, and Pre-Hesternal by the prefix *a*, Hodiernal Past in perfective verbs is expressed by a null prefix. Consequently, the key phonological difference between (5a) and (5c) lies in the length of the vowel preceding the verbal root; in (5a) the vowel is short, while in (5c) it is long, as indicated by the macron.[9]

In addition to the TRM prefixes, the verbs in (5) all contain the suffix *–ire*. I will follow Johnson (1977, 1980, 1981) in analyzing this suffix as 'perfective' (PRV).[10] However, on analogy with the past-imperfective suffix *–aga*, I will also assume that the suffix *–ire* encodes the feature 'past tense'. Given that perfectives are generally past-tense (Bennett & Partee 1978), this glossing is a bit redundant, but it will ultimately facilitate the analysis.

In addition to perfective and imperfective aspect, Kikuyu verbs can also bear 'perfect aspect' (PERF). As illustrated below, verbs bearing perfect morphology can also bear TRMs.

(6) **Temporal Remoteness Distinctions in Perfects**

a. Simple Perfect: Mwangi **nĩa-in-ĩte.**
Mwangi **nĩ**-a-in-**ĩte.**
Mwangi ASRT-3sgS-dance- **PERF**
Mwangi has/had danced (some time ago).

[8] As we will later see in Section 4, the meaning of Hodiernal Past in perfective verbs differs slightly from its meaning in imperfective verbs. Due to the existence of 'immediate past perfective' forms (7), Hodiernal Past perfectives like (5a) are usually understood to describe actions occurring more than a few minutes ago. Since there is no comparable 'immediate past imperfective', Hodiernal Past imperfectives like (3a) can be understood to describe events that occurred just a few seconds ago.

[9] There also appear to be some slight tonal differences between the verbs in (5a) and (5c). However, tone is not represented in Kikuyu orthography, due to it generally having a minimal functional load. I will follow suit, and so will not represent tone in my transcription of Kikuyu data.

[10] Johnson uses the term 'completive', but this is merely intended as a less-confusing alternative to the more traditional label 'perfective'.

b. Hodiernal Perfect: Mwangi **nĩe-kũ-in-ĩte.**
Mwangi nĩ-a-**kũ-**in-**ĩte.**
Mwangi ASRT-3sgS-**HOD**-dance- **PERF**
Mwangi has/had danced (earlier today).

c. Hesternal Perfect: Mwangi **nĩa-ra-in-ĩte.**
Mwangi nĩ-a-**ra-**in-**ĩte.**
Mwangi ASRT-3sgS-**HEST**-dance- **PERF**
Mwangi has/had danced (yesterday).

d. Pre-Hesternal Perfect: Mwangi **nĩā-in-ĩte.**
Mwangi nĩ-a-**a-**in-**ĩte.**
Mwangi ASRT-3sgS-**PHEST**-dance- **PERF**
Mwangi has/had danced (before yesterday).

As we see here, verbs in the perfect aspect needn't bear a TRM (6a), though they are also able to bear the same TRM prefixes as imperfective verbs (6b-d). I will refer to perfect forms lacking a TRM as 'simple perfects' (6a), while perfects containing a TRM will be dubbed 'complex perfects' (6b-d).

The semantic contrast between these perfect forms has not yet received focused attention by Kikuyu grammarians. Past grammarians have tended to describe simple perfects like (6a) as present perfects, while complex perfects like (6b-d) are treated as past perfects (or 'pluperfects') (Barlow 1951, Johnson 1977). However, as we will see in Section 6, the situation is a bit more complex. Relatedly, the exact contribution of the TRMs in (6b-d) is an empirically delicate matter. Nevertheless, the following formulation by Barlow (1951) is remarkably close to what I will later propose.

> "… (Hodiernal Perfect) expresses an action that had been completed at some time previous on the day of speaking…(Hesternal Perfect) expresses an action that had been completed yesterday…(Pre-Hesternal Perfect) expresses an action which had been completed at some time previous to yesterday…" (Barlow 1951: 135-136).[11]

Again, Section 6 will provide a more detailed discussion of the meaning of the forms above. For now, it is worth noting that we again find the three-way distinction between Hodiernal, Hesternal, and Pre-Hesternal forms.

Before we turn to TRMs in future-tense verbs, we must note the existence of the 'immediate past perfective' form, illustrated below.

[11] Of course, this informal description is itself is somewhat ambiguous. However, given the facts we will consider in Section 6, I take Barlow here to mean that the *completion* itself occurs either on 'the day of speaking', 'yesterday' or 'previous to yesterday', respectively.

(7) **Immediate Past Perfective**

Mwangi **nĩāina.**
Mwangi nĩ-a-**a**-in-**a.**
Mwangi ASRT-3sgS-**IMM.PST.PRV**-dance-**FV**
Mwangi (just) danced.

As the translation indicates, 'immediate past perfective' (IPP) verbs describe actions that have 'just' occurred, usually mere minutes ago.

The immediate past perfective has a somewhat exceptional status within the overall tense-aspect system (Johnson 1977, 1980, 1981). First, there is no comparable 'immediate past' category for imperfective verbs. Secondly, and most notably, although IPP verbs are perfective in aspect, they do not bear the suffix *–ire* that is otherwise indicative of that aspect.[12] Instead, they seem to bear the default suffix *–a*, commonly referred to by Bantuists as the 'final vowel' (FV). The main morphological marker of IPP verbs is the prefix *a-*, homophonous to and found in the same location as the TRM for Pre-Hesternal past. I will follow Johnson (1977, 1980, 1981) in assuming that the prefix *a-* found in IPP verbs is a distinct prefix from the TRM found in Pre-Hesternal forms. I will also follow Johnson in assuming that the *a-* prefix in IPP forms encodes tense, aspect and 'temporal remoteness'. Thus, as the gloss in (7) suggests, I will assume that this prefix bears all three of the features PST (past), PRV (perfective), and IMM (immediate past).

Thus far, the TRMs we have seen serve to locate an event in the past. However, TRMs are also obligatory in future tense verbs, as illustrated below.

(8) **Temporal Remoteness Distinctions in Future Tense Forms**

a. <u>Hodiernal Future:</u> Mwangi **nĩekũina.**
Mwangi nĩ-a-**kũ**-∅-in-**a**
Mwangi ASRT-3sgS-**HOD-FUT**-dance-**FV**
Mwangi will dance / will be dancing (today).

b. <u>Post-Hodiernal Future</u> Mwangi **nĩakaina.**
Mwangi nĩ-a-**ka**-∅-in-**a**
Mwangi ASRT-3sgS-**PHOD-FUT**-dance-**FV**
Mwangi will dance / will be dancing (after today).

The verbs in (8) illustrate two of the three possible future-tense verbs that Kikuyu allows; the third will be discussed briefly below. The future form in (8a) will be dubbed 'Hodiernal Future',

[12] Barlow (1951) and Johnson (1977, 1980, 1981) refer to IPP verbs as being 'perfect'. It is unclear, however, on what grounds that analysis is made. Of course, I myself have no very firm grounds to label them as 'perfective' either. However, since the consultants I have worked with so often translate IPP verbs as simple pasts in English (and *vice versa*), I will take up the view that they are perfective. The matter is still very much an open question.

Note, though, that even if we choose to view IPP verbs as 'perfect', they would still exceptionally lack the *–ĩte* suffix that is otherwise characteristic of that aspect.

while that in (8b) will be labeled 'Post-Hodiernal Future'. Roughly speaking, Hodiernal Future forms are used to describe actions occurring later on the day of speaking, while Post-Hodiernal Futures are used to describe actions occurring after the day of speaking. We should also briefly note that future forms in Kikuyu do not distinguish between perfective and imperfective aspect, as reflected by the English translations in (8).

Once again, the key contrast between the forms in (8) lies in a prefix occurring between AgrS and the verb root. In Hodiernal Futures, this prefix is *kũ* (HOD); in Post-Hodiernal Futures, the prefix is *ka* (PHOD). I will follow Johnson (1977, 1980, 1981) in assuming that the 'Hodiernal' prefix in (8a) is the same as that appearing in Hodiernal past-imperfectives (3a) and Hodiernal perfects (6b).[13] Consequently, the future meaning of (8a) cannot be contributed by the TRM prefix alone. The only other overt morpheme in future forms is the suffix *–a.* This suffix, however, is simply the default 'final vowel' so common throughout Bantu, and so is an unlikely source of the future meaning. I assume, then, that the verbs in (8) also contain a null prefix that encodes the feature 'future' (FUT).[14]

In addition to the two forms in (8), Kikuyu also possesses a third future form. Following Johnson (1977, 1980), I refer to this as the 'Indefinite Future'. It is illustrated below.

(9) **Indefinite Future Tense Forms**

Mwangi	**nĩarĩina.**
Mwangi	nĩ-a-**rĩ-∅**-in-**a**
Mwangi	ASRT-3sgS-**INDEF-FUT**-dance-**FV**

Mwangi will dance / will be dancing (some time).

According to existing descriptions (Barlow 1951; Gecaga 1955; Johnson 1977; 1980), there are two main uses of Indefinite Future forms. The first is to describe a future action the time of which is unknown to the speaker. The second is to describe future actions that will occur very late in the day of speaking. Johnson (1977, 1980) collapses the second use with the first, proposing that Indefinite Futures are used whenever the speaker is unsure of whether to use Hodiernal or Post-Hodiernal Future.

I should note, however, that the speakers I worked with did not make significant use of Indefinite Future forms. Such forms were never spontaneously offered by speakers, though they were accepted. Consequently, the present study will not offer much discussion of these forms, though I will in Section 7 make some tentative proposals as to their formal semantics.

The final tense-aspect form to consider is the present imperfective, illustrated below.

[13] This assumption will be weakened somewhat in Sections 4 and 5. In Section 5, we will find that Hodiernal Future behaves differently from the Hodiernal Pasts in embedded contexts. This will motivate a slightly different lexical entry for Hodiernal Future. I am doubtful, however, whether this later analytic move is truly necessary.

[14] Conceivably, one could also propose that the suffix *–a* in these verbs *is* a future tense suffix that is simply homophonous with the default final vowel. This would seem to be of comparable complexity to my hypothesis of a phonologically null future morpheme.

(10) **Present Imperfectives**

Mwangi nĩa**raina.**
Mwangi nĩ-a-**ra**-in-**a.**
Mwangi ASRT-3sgS-**PRS.IMP-**dance**-FV**
Mwangi is dancing.

As noted by Johnson (1977, 1980, 1981), present imperfectives have many of the morphological peculiarities of Immediate Past Perfectives. Although forms like (10) are imperfective, they do not have the suffix *–aga* found in past imperfectives. Instead, the verb root again ends in the default 'final vowel'. Thus, the main morphological marker of present imperfectives is the prefix *ra-*, homophonous to the Hesternal TRM found in the same location. I will follow Johnson (1977, 1980, 1981) in assuming that the prefix *ra-* found in present-imperfective verbs like (10) is a distinct prefix from the TRM found in Hesternal past forms. I will also follow Johnson in assuming that the *ra-* prefix in present-imperfective forms encodes both tense and aspect. Thus, as the gloss in (10) suggests, I will assume that this prefix bears both the features PRS (present), and IMP (imperfective). Furthermore, I assume that these verb forms do *not* contain TRMs. That is, they encode only the categories tense (present) and aspect (imperfective), and so fall outside of the 'temporal remoteness' system illustrated in (3), (5), (6), (7), (8). This point will be returned to in Section 5.

3. Background Assumptions Regarding the Syntax and Semantics of Tense and Aspect

This paper will presuppose familiarity with various key works in the syntax and semantics of tense-aspect systems (Reichenbach 1947; Partee 1973, 1984; Hornstein 1990; Kamp & Reyle 1993; Heim 1994; Klein 1994; Stowell 1996; Abusch 1997; Kratzer 1998; Demirdache & Uribe-Etxebarria 2000, 2004; Schlenker 2004, Kusumoto 2005). Some of the formal assumptions made here are taken directly from the aforementioned works, while others are augmented slightly. For reasons of space, my presentation of these ideas will be rather terse, but they should be comprehensible to those familiar with the works cited above.

I adopt the notion, central to so much work on the syntax and semantics of tense-aspect systems, that tense and aspect together locate events in time by coordinating three distinct temporal parameters: Utterance Time (UT), Event Time (ET), and Topic Time (TT). UT is, of course, the time of the speaker's utterance, while ET is the time of the event/state in question. The notion of 'Topic Time' is difficult to formulate precisely, but roughly speaking it is the time that the assertion in question is 'about' or 'confined to' (Reichenbach 1947, Klein 1994). The distinct status of TT is most clearly illustrated by past perfects, such as the following.

(11) When we got to his house, Dave **had** (already) **made** breakfast.

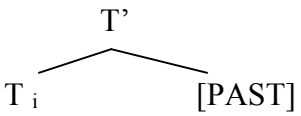
For the main clause in (11), the UT is the moment of speech, while the ET is the period of Dave making breakfast. There is another key time at play in (11), which is the time of our arrival at Dave's house. This is the time identified as the TT. Under this type of analysis, sentence (11) is claimed to assert of the TT – the time of our arrival – that it follows an event of Dave making

breakfast. While the TT in (11) is overtly indicated by the adverbial clause, it is far more common for the TT to merely be implicit in the sentence, and recoverable from discourse.

I will also adopt the notion, originating with Klein (1994), that tense and aspect play two distinct roles in relating UT, TT and ET. While aspect specifies the relation between TT and ET, tense provides in formation about the relation of TT to UT. For example, the perfect aspect in (11) indicates that the TT follows the ET; the time of our arrival follows the breakfast-making. However, the past tense in (11) indicates that the UT follows the TT; the time of our arrival occurred in the past, prior to the moment of utterance. I refer the reader to the works above for more thorough discussion of these key ideas.

While the proposals above have been formally implemented in a variety of ways, I will follow an approach that has become widely used in the semantic literature. It has long been noted that there are interesting semantic parallels between tense and pronouns (Partee 1973, 1984; Heim 1994; Abusch 1997; Kratzer 1998; Schlenker 2004). A rather straightforward way of capturing these is to suppose that tense *is* a pronoun of sorts, a pronoun referring to times.[15] Under this view, the tense features themselves (past, present, *etc.*) serve to constrain the reference of tense in the way that gender features constrain the reference of pronouns. Thus, past-tenses will only refer to past times; present-tenses to present times, etc. To be more precise, I assume that past-tense has the structure illustrated below.

(12) **The Structure of a Past-Tense (Heim 1994, Kratzer 1998)**



Like any pronoun, the tense T bears an index *i*. In addition, it is sister to a tense feature, which can be [PAST], [PRES], *etc.* Following much work on the semantics of pronominal features, I assume that tense features like [PAST] are interpreted as partial identity functions, and so serve to introduce presuppositions regarding the referent of the tense itself (Heim & Kratzer 1998, Sauerland 2003, Sauerland *et al*. 2005). The relevant lexical entries are as follows.

(13) **The Semantic Components of Past Tense**

a. $[[T_i]]^{g, w, t, c} = g(i)$
b. $[[\text{PAST}]]^{g, w, t, c} = [\lambda t' . t' < t : t']$
c. $[[\text{PRES}]]^{g, w, t, c} = [\lambda t' . t \subseteq t' : t']$

As indicated above, I assume that interpretation is relative to a variable assignment *g*, a world index *w*, a time index *t*, and also a context *c*. Contexts are assumed to be tuples containing at least a world, a time, a location, a speaker, *etc* (Schlenker 2004). When need arises, I will write 'c(T)' to mean 'the time of the context c'. Finally, I assume that at the root note – the starting point of interpretation – the time index *t* is equal to c(T). As we'll see, the distinction between *t* and c(T) only surfaces within embedded clauses. With this in mind, (13b) states that at a particular time index *t*, the feature [PAST] denotes the identity function restricted to those

[15] Throughout this paper, 'times' are understood to be intervals of temporal points (Bennett & Partee 1978).

times *t'* which are prior to the index *t*. Consequently, the interpretation function $[[.]]^{g, w, t, c}$ will only assign a meaning to T' in (12) if the assignment function *g* maps the index *i* of the T-node to a time preceding *t* (Heim & Kratzer 1998, Sauerland 2003). Although I will not make much use of it in this paper, I assume that the present tense feature [PRES] has the entry in (13c). Consequently, present tenses can only ever refer to times that include the time index *t*.

One might at this point wonder whether the index time *t* in the identity functions above shouldn't be replaced with 'the time of the context c', or c(T). After all, c(T) is essentially the 'Utterance Time', and so such a replacement would directly encode the notion that tense relates TT to UT. Now, since time indices are assumed to be identical to c(T) at the root node, either formulation will suffice for modeling tense in main clauses. For subordinate clauses, however, the formulation in (13b,c) is a bit more accurate. This point will become clearer in Section 5, where I lay out my assumptions regarding the semantics of embedded tenses. For the moment, though, it will suffice to note the possibility of sentences like the following.

(14) **Past Tense in English is Not Indexical**
In one week, Dave will say that he **danced** the day before then.

Note that, in sentence (14), the Dave's professed event of dancing will allegedly occur six days after c(T), the Utterance Time. Nevertheless, the embedded verb *danced* appears in the past tense. Intuitively, this is because the alleged event of dancing occurs prior to *Dave's assertion*. Consequently, as we will review in Section 5, it is better to view tense features (in English) as constraining the relation between TT and *the temporal index*, rather than c(T) or UT directly.

When we combine the formal assumptions in (12) and (13) with the informal notion that tense features constrain the relation between TT and UT, we are lead naturally to the view that syntactic tense nodes denote the TT itself (Kratzer 1998, *inter multia alia*). This view, which is common throughout much of the semantic literature on tense, will be key to some of my later arguments concerning the nature of TRMs in Kikuyu. Consequently, I will highlight it below.

(15) **Key Hypothesis: Tense Denotes Topic Time (Kratzer 1998)**
The tense node of a clause denotes the Topic Time. The tense features on the tense node constrain the reference the tense node, and thus the identity of the Topic Time.

Having adopted the notion that tenses denote Topic Times, let us now consider the formal semantics of aspect. As noted above, aspect is commonly viewed as describing the relation between TT and ET. Since tense denotes TT directly, it is possible to view aspect as a predicate of the time denoted by tense. Lexical entries such as those in (16) are typical in the literature.

(16) **Aspect as a Predicate of Topic Times**

a. $[[\text{PERF}]]^{g, w, t, c} = [\lambda P_{<it>} : [\lambda t' : \exists t'' . t'' < t' \ \& \ P(t'')]]$
b. $[[\text{PRV}]]^{g, w, t, c} = [\lambda P_{<it>} : [\lambda t' : \exists t'' . t' \supset t'' \ \& \ P(t'')]]$
c. $[[\text{IMP}]]^{g, w, t, c} = [\lambda P_{<it>} : [\lambda t' : \exists t'' . t' \subseteq t'' \ \& \ P(t'')]]$

Each aspect – perfect (PERF), perfective (PRV), imperfective (IMP) – is hypothesized to take as its first argument a predicate of times *P*, typically denoted by the vP. It then takes as argument the TT denoted by tense, and returns '*True*' if there is some other time *t''* which satisfies *P* and is

related to TT in a particular way. Of course, this other time *t''* is the time informally referred to as the 'event time' ET. Thus, PERF (16a) states that the ET *precedes* the TT, while PRV (16b) states that the TT *contains* the ET, and IMP (16c) states that the ET contains the TT.

Finally, let us consider the nature of the <i,t> predicates that combine semantically with aspect. Again, I will follow much of the literature in assuming that these predicates are denoted by the vP of the clause. Moreover, I will make the simplifying assumption that all verbal arguments undergo reconstruction by LF, so that they occupy their base positions inside *v*P. I will abstract away from the internal compositional semantics of the vP, and will simply stipulate Neo-Davidsonian entries such as the following.

(17) **Neo-Davidsonian Event Semantics for vPs**

$$[[\ [_{vP}\ \text{Dave dance}\ ]\ ]]^{g,\,w,\,t,\,c} = [\ \lambda t' : \exists e\ .\ \text{dance}(e,w)\ \&\ \text{Agent}(e) = \text{Dave}\ \&\ T(e) = t']$$

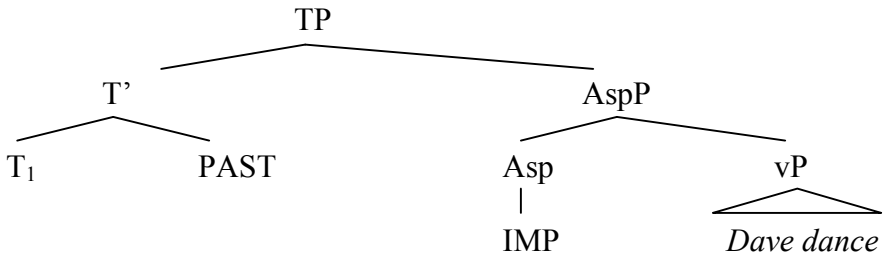
Thus, the denotation of a bare vP like 'Dave dance' will be a predicate that holds of a time *t'* if there is some event of dancing such that Dave is its agent and *t'* is the 'run-time' of the event.

Putting these pieces together, we get the following picture of the syntax and semantics of the sentence "Dave was dancing."

(18) **Illustration of the Syntactic and Semantic Assumptions**

a. Sentence: *Dave was dancing.*

b. LF Structure



c. Predicted T-Conditions

$[[\ \text{TP}\ ]]^{g,\,w,\,t,\,c}$ is defined only if $g(1) < t$
if defined, then it is T *iff:*

$\exists t'' .\ g(1) \subseteq t''\ \&\ \exists e\ .\ \text{dance}(e,w)\ \&\ \text{Agent}(e) = \text{Dave}\ \&\ T(e) = t''$

Thus, we correctly predict that sentence (18a) is only defined if the TT precedes the UT, and when defined, is true *iff* the TT is contained in an ET *t''* which is the run-time of an event of Dave dancing.

There is an interesting asymmetry between TT and ET in the system proposed above. While TT is referential (in main clauses), the ET *t''* is always existentially bound. There are numerous good reasons for accepting this asymmetry, and for not allowing ETs to be referential in the way that TTs are. Nevertheless, I am going to break from the assumption – encoded in the

lexical entries in (16) – that ETs begin life existentially bound in the lexical entry of the Aspect head. Therefore, I will replace the entries in (16) with those in (19).

(19) **Aspect as a Relation Between Topic Time and Event Time**

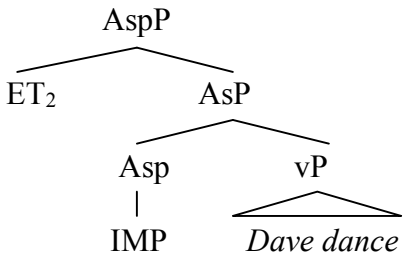
a. $[[\text{ PERF }]]^{g, w, t, c} = [\ \lambda P_{<it>} : [\ \lambda t'' : [\ \lambda t' : t'' < t' \ \&\ P(t'')\ ]\ ]\ ]$

b. $[[\text{ PRV }]]^{g, w, t, c} = [\ \lambda P_{<it>} : [\ \lambda t'' : [\ \lambda t' : t' \supset t'' \ \&\ P(t'')\ ]\ ]\ ]$

c. $[[\text{ IMP }]]^{g, w, t, c} = [\ \lambda P_{<it>} : [\ \lambda t'' : [\ \lambda t' : t' \subseteq t'' \ \&\ P(t'')\ ]\ ]\ ]$

Under the semantics in (19), the aspect heads semantically combine with *two* temporal arguments. Consequently, we must posit an additional temporal argument in the structure of sentences like (18a). I will assume that this new temporal argument, which I will label 'ET', is merged as a specifier of the AspP. Thus, just prior to the merger of the tense head, the AspP appears as in (20).

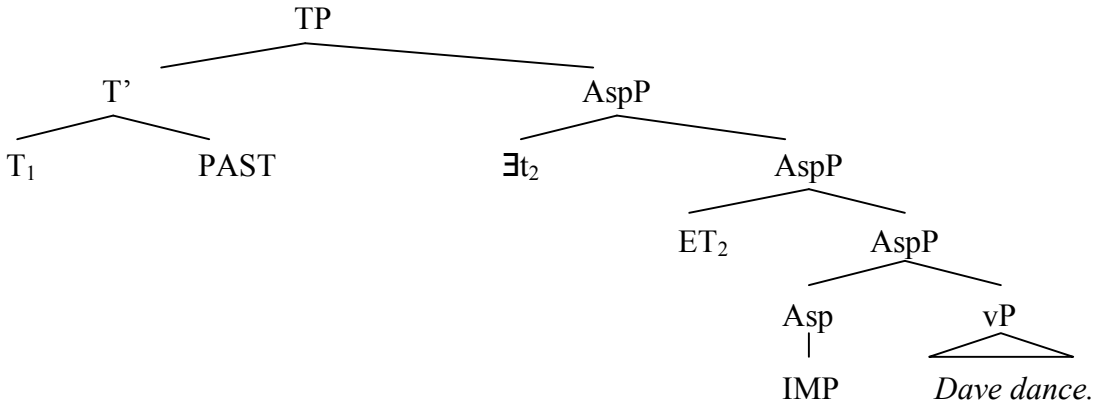
(20) **Syntactic Projection of the Event Time**



I assume that 'ET' is a temporal pronoun like 'T' in (18b). Unlike T, however, ET does not bear any presuppositional features – at least not in English.

While ET is at first syntactically free, this state does not last long. I will assume that, for unknown reasons, merger of T to the AspP triggers a process of 'existential closure' over the index born by ET. Consequently, upon merger of T, the LF of (18a) becomes the following.

(21) **Proposed LF for Sentence (18a), Illustrating Existential Closure over ET**



In the LF above, the existential operator '∃t' has been inserted just below the TP, and is coindexed with the ET pronoun in AspP. Finally, if we assume the lexical entry in (22) for the operator '∃t', then we derive for LF (21) exactly the same T-conditions as are in (18c).

(22) **Semantics of the Operator '∃t'**

$[[\exists t_i \text{ XP}]]^g = [\lambda t' : \exists t''. [[XP]]^{g(i \rightarrow t'')}(t') = T]$

Thus, the system I propose in (19)-(22) is (for English) empirically equivalent to the more standard system developed in (12)-(16). My reasons for deviating from those earlier, simpler assumptions will be made clear in the following sections.

Before we return to the tense-aspect system of Kikuyu, I will also need to clarify my assumptions regarding temporal adverbials and so-called 'future tense'. Beginning with the latter, I will adopt the commonly-held view that future is not really a 'tense'; rather, it is a modal or aspectual category (Copley 2002, 2005). In particular, I will assume that future is an aspectual head, with the semantics indicated below.[16]

(23) **The Semantics of Future (Copley 2005)**

$[[\text{FUT}]]^{g, w, t, c} = [\lambda P_{<it>} : [\lambda t'' : [\lambda t' : t' < t'' \ \& \ P(t'')]]]$

Thus, future indicates that the ET *follows* the TT, and so is a kind of inverse of the perfect aspect.[17] I will provide a more detailed illustration of this semantics in a moment.

As for temporal adverbials, the ones most crucial to the present study are the so-called 'locating adverbs', particularly words such as *today, yesterday, tomorrow*. Following many prior studies, I will assume that these adverbials denote properties of times (Kamp & Ryle 1993, Demirdache & Uribe-Etxebarria 2004). Specifically, I will assume the following lexical entries for the aforementioned adverbs.

(24) **The Semantics of Indexical Temporal Adverbs** [18]

a. $[[\text{yesterday}]]^{g, w, t, c} = [\lambda t' : t' \text{ is on the day preceding c(T)}]$
b. $[[\text{today}]]^{g, w, t, c} = [\lambda t' : t' \text{ is on the day surrounding c(T)}]$
c. $[[\text{tomorrow}]]^{g, w, t, c} = [\lambda t' : t' \text{ is on the day following c(T)}]$

As properties of times, temporal adverbs can easily function as 'modifiers' of temporal arguments. Given the clausal structure proposed in (21), there are two temporal arguments that adverbs may be understood to modify: the ET and the TT. I will again follow prior authors in the

[16] This is mostly likely not the correct analysis of the English 'future tense', which is most profitably analyzed as a modal head. However, the semantics in (23) appears to be sufficient for Kikuyu, and so I will assume it here.

Note that treating FUT in Kikuyu as an aspect captures the fact that future forms in Kikuyu cannot bear IMP or PRV marking. However, this does raise questions about their ability to be translated into English as either Future Imperfectives or Future Perfectives. This latter fact might suggest there is a separate Aspect projection below FUT in Kikuyu. Unfortunately, I will need to leave this difficult matter aside in the current work.

[17] I thank Angelika Kratzer for this interesting observation.

[18] In the entries below, I will be deliberately vague as to what it means for a time *t'* to be located 'on' a given time/day. In most cases, mere 'containedness' seems to be sufficient.

assumption that adverbs may indeed be understood to modifier either the ET or the TT (Hornstein 1990, Demirdache & Uribe-Etxebarria 2002, 2004).

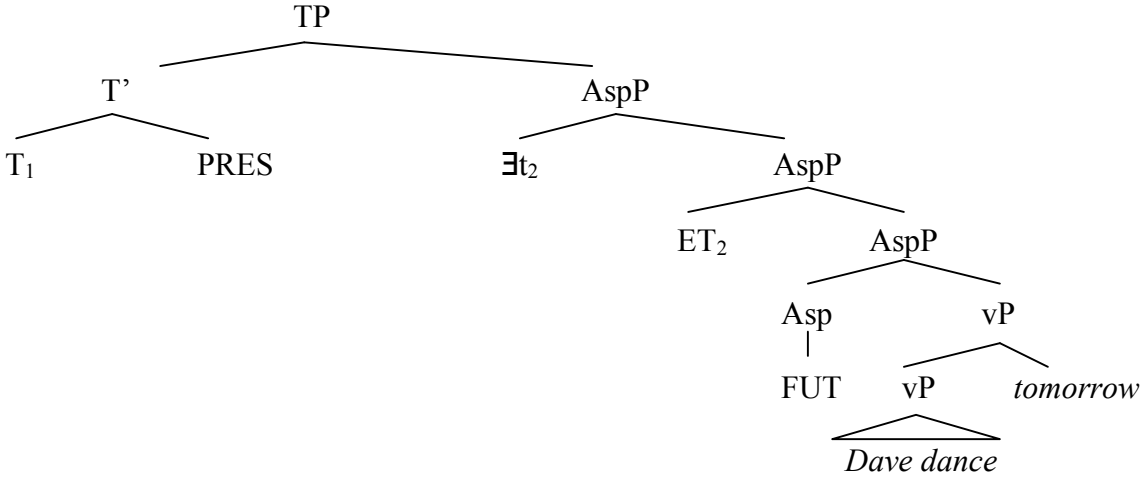
Whether the adverb modifies the ET or the TT depends upon the position it occupies in the clause. First, given that AspP is also an <it> predicate, a temporal adverb could adjoin to AspP and combine semantically via the rule of Predicate Modification (Heim & Kratzer 1998). Since the Topic Time (denoted by T) is the argument of AspP, such a position for the adverb would lead to it being a modifier of TT. However, it is also possible for the adverb to be adjoined to the vP, as vP is also an <it> predicate. Given that ET is ultimately the temporal argument of vP, such a 'low' position of the adverb would lead to it being a modifier of ET.

These key proposals are illustrated below. Given the assumptions in (23)-(24), one possible LF structure for sentence (25a) is that in (25b). As the reader is invited to confirm, this LF structure would be assigned the T-conditions in (25c), whereby the adverb functions as a modifier of the Event Time (the time of dancing).

(25) **Illustration of the Syntactic and Semantic Assumptions**

a. Sentence: *Dave will dance tomorrow.*

b. LF Structure



c. Predicted T-Conditions

$[[\ TP\ ]]^{g,\,w,\,t,\,c}$ is defined only if $t \subseteq g(1)$
if defined, then it is T *iff:*

$\exists t'' \,.\, g(1) < t''$ &
$\exists e \,.$ dance(e,w) & Agent(e) = Dave & $T(e) = t''$ & t'' is on the day following c(T)

Thus, we correctly predict that sentence (25a) is only defined if the TT contains UT, and when defined, is true *iff* the TT is followed by an ET *t''* which is the run-time of an event of Dave dancing and occurs on the day following the UT.

Finally, let us note a key feature of the lexical entries in (24). Unlike what was proposed for tense in (13), the denotation of the adverbs *today, yesterday*, and *tomorrow* directly depend

upon the time of the context c, and not the temporal index *t*. The motivation for this difference can be seen from the semantic contrast between sentence (14) and the one below.

(26) **Temporal Adverbs in English *Are* Indexical**
In one week, Dave will say that he danced **yesterday**.

The only interpretation allowed for (26) is one in which Dave's professed dancing occurs on the day *prior to utterance of (26)*. It cannot be interpreted as equivalent to (14), where the professed dancing occurs on the day prior to Dave's (future) utterance. Consequently, as we will review in Section 5, it seems that adverbs like *yesterday* make reference to the c(T) (or UT) directly, rather than the temporal index.

Although additional technical assumptions will be introduced as they are needed, the proposals outlined above form the essential core upon which our formal analysis of the Kikuyu tense-aspect system will be built.

4. The Presuppositional Semantics of TRMs in Kikuyu

In this section, we will begin examining in more detail the semantics of the TRMs introduced in Section 2. The main empirical claim of this section is that, contrary to previous descriptions, the TRMs of Kikuyu have overlapping temporal denotations. For example, the interval of time associated with Hesternal Past actually includes the day of speaking, in addition to the previous day. However, as we will see, only Hodiernal Past may be used when the event in question is *known* to occur on the day of speaking. This fact motivates the key theoretical claim of this section: TRMs in Kikuyu possess a presuppositional semantics akin to tense in (13). Given a particular formulation of 'Maximize Presuppositions' (Heim 1991, Singh 2011), it will follow that speakers must use the most specific TRM consistent with their knowledge. In this way, the analysis will explain the general validity of traditional descriptions of the Kikuyu TRMs, such as that given in Section 2.

4.1 The Tense Remoteness Morphemes: An Informal Semantic Analysis

In this section, we will examine the use of TRMs in contexts where the speaker has incomplete knowledge regarding the time of the event described. We will see that such contexts reveal important semantic differences between TRMs and temporal adverbs. These differences will motivate a particular, informal semantic analysis of TRMs. Although this informal analysis will be found to capture many of the key facts, a particular failing of the analysis will necessitate a more formal implementation in Section 4.2.

4.1.1 Semantic Contrasts Between TRMs and Temporal Adverbs

Section 2 provides a rough, informal description of the meanings of Kikuyu TRMs, one that is in line with the descriptions found in standard reference grammars (Barlow 1951, Gecaga 1955). According to such descriptions, use of the Hesternal Past would seem to be equivalent to the use in English of the adverbial *yesterday*. Similarly, Hodiernal Past would seem to be equivalent to English *today*, Pre-Hesternal Past to English *before yesterday*, et cetera.

Interestingly, in addition to its TRMs, Kikuyu does possess temporal adverbials translatable as 'yesterday', 'today', etc. As expected by the traditional descriptions, Kikuyu speakers do report that, in 'out-of-the-blue' contexts, the contribution of such adverbials is equivalent to that of the TRM. Thus, the presence of these adverbs is felt to have no effect on T-conditions, and merely 'reinforces' the temporal location of the event. To illustrate, in each of the sentences below, the presence or absence of the adverb is reported to have no effect upon the intuitive T-conditions of the sentence.

(27) **Apparent Equivalence Between TRMs and Certain Adverbials**

a. Hodiernal Past:
Mwangi **nĩain*ire*** (ũmũthĩ)
Mwangi ASRT-3sgS-**HOD**-dance-**PST.PRV** today
Mwangi danced today.

b. Hesternal Past:
Mwangi **nĩa*rain*ire** (ira)
Mwangi ASRT-3sgS-**HEST**-dance- **PST.PRV** yesterday
Mwangi danced yesterday.

c. Pre-Hesternal Past:
Mwangi **nĩā*in*ire** (kamũira ira)
Mwangi ASRT-3sgS-**PHEST**-dance- **PST.PRV** before yesterday
Mwangi danced some time before yesterday.

d. Immediate Past:
Mwangi (no hĩndĩ) **nĩā**thie.
Mwangi just time ASRT-3sgS-**IMM.PST.PRV**-dance-**FV**
Mwangi left just now.

e. Hodiernal Future:
Mwangi **nĩe*kũin*a** (ũmũthĩ)
Mwangi ASRT-3sgS-**HOD-FUT**-dance-**FV** today
Mwangi will dance today.

f. Post-Hodiernal Future
Mwangi **nĩa*kain*a** **(**mũthenya o wothe
Mwangi ASRT-3sgS-**PHOD-FUT**-dance-**FV** day any

kuma ũmũthĩ).
after today
Mwangi will dance some time after today.

Given these facts, one might be inclined to hypothesize that Kikuyu TRMs are some form of incorporated adverb. The phonological similarity between the HEST prefix and the adverb *ira* 'yesterday' lends further plausibility to the initial idea.

However, despite the apparent redundancy of the adverbs in (27), there are cases where the presence of an adverb does affect the meaning of a sentence containing the associated TRM. In such cases, it appears that the meaning of the adverb is actually *stronger* than that of the TRM. This difference in meaning comes out most clearly in cases where the speaker is ignorant of the exact time of the event in question. Given that temporal wh-questions require such ignorance, they are one area where the semantic distinction between adverbs and TRMs comes out most clearly. Consider the data below.

(28) **Situation:** You are visiting your friend Mwangi, who you haven't seen in weeks. There is a brand new TV in his living room. You have no idea when he bought the TV. It could have been several days ago; it could have been yesterday; it could have been today. You want to ask when he bought it:

a. Wagũrire rĩ TV iyo?
u-a-gũr-ire rĩ TV iyo
2sgS-**PHEST**-buy-**PST.PRV** when TV that
When did you buy that TV?
Judgment: Correct in this context. (Offered as translation of the English)

b. Kamũira ira wagũrire rĩ TV iyo?
before yesterday 2sgS-**PHEST**-buy-**PST.PRV** when TV that
When did you buy that TV before yesterday?
Judgment: *Not* correct in this context. Would only be used if you were *certain* that the purchasing happened before yesterday.

c. Uragũrire rĩ TV iyo?
u-ra-gũr-ire rĩ TV iyo
2sgS-**HEST**-buy-**PST.PRV** when TV that
When did you buy that TV?
Judgment: *Not* correct in this context. Would only be used if you were *certain* that the purchasing happened yesterday (or later).

d. Ugũrire rĩ TV iyo?
u-∅-gũr-ire rĩ TV iyo
2sgS-**HOD**-buy-**PST.PRV** when TV that
When did you buy that TV?
Judgment: *Not* correct in this context. Would only be used if you were *certain* that the purchasing happened today.

As shown by (28a,c,d), if a speaker is completely ignorant as to whether an event occurred either today, yesterday or before yesterday, Pre-Hesternal Past must be used. This is, of

course, in conflict with the traditional claim that Pre-Hesternal is used when the event occurs prior to yesterday. Such a description, however, seems to be accurate for the adverbial *kamũira ira* 'before yesterday'. As shown by (28b), *kamũira ira* indeed requires that the event in question occur prior to yesterday, and so cannot be used in a context such as that sketched in (28).

Thus, in such cases of 'temporal ignorance', we find that the Pre-Hesternal TRM has a weaker meaning than that of the adverb *kamũira ira* 'before yesterday'. While (28) uses wh-questions to demonstrate this, it can also be shown using declaratives, as long as a clear enough context is spelled out. The following illustrates.

(29) **Situation:** Today, you visited a group of your friends who live together. You've not seen them for quite some time. When you go to their house, you notice that they've got a new TV. You have absolutely no idea when they bought it: it could have been today, yesterday or weeks ago. Later that day, you get home. Your roommate asks how everyone is. You want to tell her about the new TV.

a.

Nĩmāgũrire		TV	njeru!
Nĩ-ma-a-gũr-ire		TV	njeru!
ASRT-3plS-**PHEST**-buy-**PST.PRV**		TV	new
They bought a new TV!			
Judgment:	Correct in this context. (Offered as translation of the English)		

b.

Nĩmāgũrire		TV	njeru	kamũira	ira
ASRT-3plS-**PHEST**-buy-**PST.PRV**		TV	new	before	yesterday
They bought a new TV before yesterday!					
Judgment:	*Not* correct in this context. Would only be used if you were *certain* that the purchasing happened before yesterday.				

c.

Nĩmaragũrire		TV	njeru!
Nĩ-ma-ra-gũr-ire		TV	njeru!
ASRT-3plS-**HEST**-buy-**PST.PRV**		TV	new
They bought a new TV!			
Judgment:	*Not* correct in this context. Would only be used if you were *certain* that the purchasing happened yesterday (or later).		

Again, we find that PHEST is used when the speaker does not know whether an event occurred either today, yesterday, or the day before. Moreover, we again find that this distinguishes the meaning of this TRM from that of the superficially similar adverb *kamũira ira* 'before yesterday'. Given the importance of these facts to our analysis, they are summarized below.

(30) **Informal Generalizations Regarding Pre-Hesternal Past (PHEST)**

a. PHEST is used when a speaker does not know whether an event occurred on the day of the utterance, the day prior to the utterance, or some time prior to that.

b. The adverb *kamũira ira* 'before yesterday' can only be used if the speaker is certain the event occurred prior to the day before the utterance.

In a similar way, we can distinguish the meaning of the Hesternal Past from that of the adverb *ira* 'yesterday'. The following data are parallel to those in (28).

(31) **Situation:** You are visiting your friend Mwangi, who you haven't seen since yesterday. There is a brand new TV in his living room. You don't know exactly when he bought it. It could have been yesterday, after your visit. It could have been earlier today. However, it definitely could not have been before yesterday. You want to ask when he bought it:

a. Uragũrire rĩ TV iyo?
2sgS-**HEST**-buy-**PST.PRV** when TV that
When did you buy that TV?
Judgment: Correct in this context. (Offered as translation of the English.)

b. Ira uragũrire rĩ TV iyo?
yesterday 2sgS-**HEST**-buy-**PST.PRV** when TV that
When did you buy that TV yesterday?
Judgment: *Not* correct in this context. Would only be used if you were *certain* that the purchasing happened yesterday.

c. Ugũrire rĩ TV iyo?
2sgS-**HOD**-buy-**PST.PRV** when TV that
When did you buy that TV?
Judgment: *Not* correct in this context. Would only be used if you were *certain* that the purchasing happened today.

d. Wagũrire rĩ TV iyo?
2sgS-**PHEST**-buy-**PST.PRV** when TV that
When did you buy that TV?
Judgment: *Not* correct in this context. Not consistent with the fact that you were in touch with him yesterday, and therefore know that the TV wasn't bought before then.

As shown by (31a,c,d), Hesternal Past is used when a speaker does not know whether an event occurred either today or the day before, *but does know that it occurred on one of those two days*. This is again in conflict with the traditional description of HEST, whereby it limits the event to the day before the utterance. However, this description does seem accurate for the adverb *ira* 'yesterday'. As shown by the contrast between (31a,b), *ira* requires the event to occur on the day prior to the utterance, and so cannot be used in 'ignorance contests' such as that in (31). While these facts are easily revealed by the wh-questions in (31), the data in (32) shows that they can also be found at play in declaratives.

(32) **Situation:** Today, you visited a group of friends who live together. You saw them yesterday, but are stopping by again today. When you go to their house, you notice that they've got a new TV. You don't know exactly when they bought it: it could have been after your visit yesterday, but it could also have been today. Later that day, you get home. Your roommate asks how everyone is. You want to tell her about the new TV.

a. Nĩmaragũrire TV njeru!
ASRT-3plS-**HEST**-buy-**PST.PRV** TV new
They bought a new TV!
Judgment: Correct in this context. (Offered as translation of the English.)

b. Nĩmaragũrire TV njeru ira!
ASRT-3plS-**HEST**-buy-**PST.PRV** TV new yesterday
They bought a new TV yesterday!
Judgment: *Not* correct in this context Would only be used if you were *certain* that the purchasing happened yesterday .

c. Nĩmagũrire TV njeru!
Nĩ-ma-∅-gũr-ire TV njeru!
ASRT-3plS-**HOD**-buy-**PST.PRV** TV new
They bought a new TV!
Judgment: *Not* correct in this context. Would only be used if the speaker was sure the purchased happened today.

d. Nĩmãgũrire TV njeru!
ASRT-3plS-**PHEST**-buy-**PST.PRV** TV new
They bought a new TV!
Judgment: *Not* correct in this context. Not consistent with the fact that you were in touch with them yesterday, and therefore know the TV wasn't bought before then.

These patterns will again be crucial for our semantic analysis, and so they are therefore highlighted below.

(33) **Informal Generalizations Regarding Hesternal Past (HEST)**

a. HEST is used when a speaker does not know whether an event occurred on the day of the utterance or the day prior to the utterance, *but does know that it occurred on one of those two days.*

b. The adverb *ira* 'yesterday' can only be used if the speaker is certain the event occurred on the day before the utterance.

Finally, let us consider the meaning of the Post-Hodiernal Future (PHOD). According to traditional descriptions like that in Section 2, it is used when the event in question occurs after

the day of the utterance. Again, however, cases of 'temporal ignorance' reveal it to have a rather broader use, one that distinguishes it from the adverb *mũthenya o wothe kuma ũmũthi* 'some day after today'.

(34) **Situation:** You know I am planning a trip to New York soon, but you have no idea when I will be leaving. It could be today for all you know, but it could also be several days from now. You want to ask when I am leaving:

a. Ugathie rĩ New York? [19]
u-ka-∅-thi-a rĩ New York
2sgS-**PHOD-FUT-**go-**FV** when New York
When will you go to New York?
Judgment: Correct in this context. (Offered as translation of the English.)

b. Ugathie rĩ New York mũthenya o wothe
2sgS-**PHOD-FUT-**go-**NP** when New York day any

kuma ũmũthi?
after today

When will you go to New York after today?
Judgment: *Not* correct in this context. Would only be used if the speaker was certain the trip was after today.

c. Ugũthie rĩ New York?
u-kũ-∅-thi-a rĩ New York
2sgS-**HOD-FUT-**go-**FV** when New York
When will you go to New York?
Judgment: *Not* correct in this context. Would only be used if the speaker was certain the trip was today.

The contrast between sentences (34a,c) demonstrates that Post-Hodiernal Future is used when a speaker does not know whether an event will occur either today or some time afterwards. This is, of course, in conflict with the notion that PHOD limits the event to some time after the day of the utterance. This more restrictive meaning, though, does seem accurate for the adverbial *mũthenya o wothe kuma ũmũthi* 'some day after today', as shown by the contrast between (34a,b). As

[19] Although my consultants never themselves used the 'Indefinite Future' in (9), they did accept it in contexts like that in (34). That is, in this context, speakers also accepted (but did not produce) sentences like the following:

(i) Urĩthie rĩ New York?
u-rĩ-∅-thi-a rĩ New York
2sgS-**INDEF-FUT**-dance-FV when New York
When will you go to New York.

before, we can also see these contrasts play out in declarative clauses, so long as the context is carefully controlled. The following illustrates.

(35) **Situation** You know that Mwangi will leave for New York soon. However, you're not sure exactly whether he is leaving today or tomorrow. I see that Mwangi is hurring about, going shopping, cleaning his house, etc. I ask "What is up with Mwangi?" You answer:

a. Mwangi nĩagathie New York. [20]
Mwangi nĩ-a-ka-∅-thi-a New York
Mwangi ASRT-3sgS-**PHOD-FUT**-go-**FV** New York
Mwangi will leave for New York.
Judgment: Correct in this context. (Offered as translation of the English)

b. Mwangi nĩagathie New York
Mwangi ASRT-3sgS-**PHOD-FUT**-go-**FV** New York

mũthenya o wothe kuma ũmũthi.
day any after today

Mwangi will leave for New York some day after today.

Judgment: *Not* correct in this context. Would only be used if the speaker was *certain* the trip was after today.

c. Mwangi nĩegũthie New York.
Mwangi nĩ-a-kũ-∅-thi-a New York
Mwangi ASRT-3sgS-**HOD-FUT**-go-**FV** New York
Mwangi will leave for New York.
Judgment: *Not* correct in this context. Would only be used if the speaker was *certain* the trip was today.

Since these facts will be of key importance, they are summarized below.

(36) **Informal Generalizations Regarding Post-Hodiernal Future (PHOD)**

a. PHOD is used when a speaker does not know whether an event will occur on the day of the utterance or some time after that.

[20] Again, although my consultants never produced these forms, they did accept the 'Indefinite Future' in contexts like that in (35):

(i) Mwangi nĩarĩthie New York
Mwangi nĩ-a-rĩ-∅-thi-a New York
Mwangi ASRT-3sgS-INDEF-FUT-go-FV
Mwangi will go to New York.

b. The adverb *mũthenya o wothe kuma ũmũthi* 'some day after today' can only be used if the speaker is certain the event will occur after the day of the utterance.

4.1.2 An Informal Semantic Analysis of TRMs

Given the facts in (28)-(36), the Kikuyu adverbs *ira* 'yesterday', *kamũira ira* 'before yesterday', and *mũthenya o wothe kuma ũmũthĩ* 'some day after today' appear to behave exactly like their English counterparts. It is notable that the English translations of (28b), (29b), (31b), (32b), (34b) and (35b) are also not licit in the associated contexts. Therefore, those Kikuyu adverbs seem amenable to an analysis where they, like their English translations, have the denotations in (37). As we will see later, this semantics will account for their behavior in (28)-(36).

(37) **Semantics of the Kikuyu Temporal Adverbs**

a. $[[\ \textit{ira}\ ]]^{g,\,w,\,t,\,c}$ = [λt' : t' is on the day preceding c(T)]

b $[[\ \textit{kamũira ira}\ ]]^{g,\,w,\,t,\,c}$ = [λt' : t' precedes the day preceding c(T)]

c. $[[\textit{mũthenya} \ldots \textit{ũmũthĩ}\ ]]^{g,\,w,\,t,\,c}$ = [λt' : t' follows the day surrounding c(T)]

But what of the behavior of the TRMs in (28)-(36)? Before we develop a formal analysis of their meaning, let us explore the informal hypotheses below.

(38) **Informal Semantic Hypotheses Regarding Kikuyu TRMs**

a. Pre-Hesternal (PHEST) 'means' the event is contained in the following interval:

(i) *Informal Statement:*
The interval ending with UT and stretching back through all of time

(ii) *Formal Notation:* (_ , c(T)] [21]

b. Hesternal (HEST) 'means' that the event is contained in the following interval:

(i) *Informal Statement:*
The interval beginning with the day prior to UT and ending with UT

(ii) *Formal Notation:* $[\text{YEST}_{c(T)}\ ,\ c(T)]$

c. Hodiernal (HOD) 'means' that the event is contained in the following interval:

(i) *Informal Statement:* The day surrounding UT

(ii) *Formal Notation:* $\text{TOD}_{c(T)}$

[21] The formal notation used here for intervals is based upon that found in Condoravdi (2002).

d. Post-Hodiernal (PHOD) 'means' the event is contained in the following interval:

(i) *Informal Statement:*
The interval beginning with UT and stretching forward through all of time

(ii) *Formal Notation:* [c(T), _)

e. Immanent Past (IMM) 'means' the event is contained in the following interval:

(i) *Informal Statement:*
The interval beginning 'just a moment' before UT and ending with UT.

(ii) *Formal Notation:* [$JUST_{c(T)}$, c(T)]

Although they are only informally stated, these hypotheses can account for many of the key patterns in (28)-(36). To illustrate, let us consider the behavior of PHEST in (28)-(30). As we saw there, PHEST is the only TRM allowable when the speaker does not know whether the event occurred on the day of speaking, the day prior, or some time prior to that. Note that in such a context, the speaker *does* know that the event occurred within the interval described in (38a), since they know it occurred some time in the past. Thus, under the semantics in (38a), the speaker's knowledge would warrant the use of PHOD in contexts (28) and (29). In contrast, the speaker would not know whether the event occurred in the interval described in (38b) or (38c), since they don't know whether the event occurred yesterday or later. Consequently, under the semantics in (38b,c), the speaker's knowledge would *not* warrant the use of either HEST or HOD in contexts (28) and (29). Therefore, the only allowable TRM in these contexts is PHOD.

Similarly, we can understand the contrast between PHEST and the adverbial *kamũira ira* 'before yesterday'. As we will see in the following section, the semantics in (37b) predicts that a sentence like (29b) will only be true if the event in question occurred prior to the day preceding the utterance of (29b). Since the context in (29) is one where the speaker does not know if the event occurred at that time, they would not be warranted in asserting (29b). Thus, in a context like (29), only (29a) is warranted by the knowledge of the speaker.

We find, then, that the informal semantics in (38a) can account for the key patterns summarized in (30). Similarly, the hypotheses in (38b-e) can be used to account for many of the key patterns in (31)-(36). For example, in context (31), use of the HEST is predicted to be acceptable, since the speaker knows the event occurs within the interval in (38b). However, since the speaker doesn't know whether the event occurs 'today' or 'yesterday', the use of HOD or *ira* is predicted to be illicit.

Some further evidence in support of (38) can be found in sentences that describe events or states spanning several days. Consider the facts below.

(39) **Situation:** Our friend Wambui is having her birthday today. It is before the party, and we are discussing what each of us gave her. Our friend Kamau painted a picture for her. It's been a labor of love that he began a few weeks ago. However, he just finished yesterday, just in time for Wambui's party.

a. Kamau nĩãcũrire mbica ya Wambui
Kamau nĩ-a-a-cũr-ire mbica ya Wambui
Kamau ASRT-3sgS-**PHEST**-make-**PST.PRV** picture of Wambui
Kamau painted a picture for Wambui.
Judgment: Correct in this context. (Offered as translation of the English)

b. Kamau nĩaracũrire mbica ya Wambui
Kamau nĩ-a-ra-cũr-ire mbica ya Wambui
Kamau ASRT-3sgS-**HEST**-make-**PST.PRV** picture of Wambui
Kamau painted a picture for Wambui.
Judgment: *Not* correct in this context.

As indicated above, when an event spans both 'yesterday' and a period prior to that, only PHEST is permitted. This pattern is nicely predicted by the semantics in (38). Note that of the intervals in (38), the only one that contains the event of painting in (39) is that in (38a). Consequently, our semantics predicts that only PHEST may be used in asserting the existence of this event.

In a similar way, our semantics can account for the facts in (40) below.

(40) **Situation:** Mwangi ran today. He also ran yesterday.

a. Mwangi nĩarateng'erire ũmũthĩ na ira
Mwangi nĩ-a-ra-teng'er-ire ũmũthĩ na ira
Mwangi ASRT-3sgS-**HEST**-run-**PST.PRV** today and yesterday
Mwangi ran today and yesterday.
Judgment: Correct in this context. (Offered as a translation of the English.)

b. * Mwangi nĩateng'erire ũmũthĩ na ira
Mwangi nĩ-a-∅-teng'er-ire ũmũthĩ na ira
Mwangi ASRT-3sgS-**HOD**-run-**PST.PRV** today and yesterday
Judgment: Ill-formed sentence.

c. Mwangi nĩateng'erire ũmũthĩ na
Mwangi ASRT-3sgS-**HOD**-run-**PST.PRV** today and

nĩarateng'erire ira
ASRT-3sgS-**HEST**-run-**PST.PRV** yesterday
Mwangi ran today, and he ran yesterday.
Judgmenet; Correct (and well-formed) in this context.

The contrast between (40a,b) demonstrates that the only TRM compatible with the complex adverb *ũmũthĩ na ira* 'today and yesterday' is HEST. If one wishes to use a HOD verb to describe the events in (40), one must conjoin it with a verb bearing HEST, as in (40c). Although a more precise account will be offered later, we can begin to see how the informal hypotheses in (38)

account for this pattern. Informally speaking, the events described in (40) span both the day of speaking and the day prior. Consequently, the interval in (38c) does not contain both these events, and so HOD alone cannot be used to assert their existence. However, since both events in (40) are contained within interval (38b), HEST is predicted to be licit in sentences like (40a).

4.1.3 The 'Specificity Principle' for TRMs

Thus far, we've seen that the informal hypotheses in (38) can account for many of the key patterns introduced in Section 4.1.1. However, there is one pattern seen consistently in (28)-(36) that the simple hypotheses in (38) offer no explanation for: if a particular TRM α is licit in some context, then speakers are *not* permitted to use any TRM that is weaker than α.

For example, consider again the facts in (31). Although our semantics in (38) predicts the facts in (31a-c), the unacceptability of (31d) remains a mystery. Speakers report that the use of PHEST in (31d) is not consistent with the speaker's knowledge that the event did not occur before yesterday. However, according to our semantics in (38a), PHEST only states that the event in question occurred some time in the past. Since that *is* known by the speaker in (31), our informal semantics predicts that (31d) should be licit.

The impossibility of PHEST in (31d) would, however, follow from the auxiliary assumption stated below.

(41) **The Specificity Principle**
Speakers must use the most specific TRM consistent with what their knowledge entails. That is, if the use of a particular TRM α is licit in some context, then speakers are *not* permitted to use any TRM that is weaker than α.

When combined with this 'Specificity Principle', our semantics in (38) now predicts the full range of facts in (31). Although the use of PHEST in (31d) would be consistent with the speaker's knowledge, so would be the use of HEST as in (31a). Moreover, according to our semantics in (38), the PHEST sentence in (31d) is *logically weaker* than the HEST sentence in (31a). Therefore, the Specificity Principle in (41) would require that speakers in such contexts use the HEST sentence in (31a). Furthermore, principle (41) predicts that PHEST can only be used if the speaker's knowledge does not entail that the event occurred yesterday or later. Thus, we account for the intuition voiced by consultants that (31d) is not consistent with the imagined speaker's knowledge that the event occurred some time after the beginning of 'yesterday'.

In this way, principle (41) can account for the facts in (31d) and (32d). It can also account for the fact, documented in (27), that in out-of-the-blue contexts speakers feel that TRMs are essentially equivalent to various temporal adverbials. For example, although we've seen HEST and *ira* 'yesterday' differ in meaning, the presence of *ira* in sentence (27b) is felt to be somewhat redundant. The Specificity Principle can account for this, if we assume that in out-of-the-blue contexts, speakers are presumed to have (relatively) complete knowledge of the time when an asserted event occurs. That is, when language consultants are asked to judge sentences 'out-of-the-blue', they naturally imagine a 'typical' context for the utterance of the sentence. Arguably, a context where an imagined speaker knows whether an event occurred yesterday or today is more 'typical' than one where they know only that an event occurred yesterday or today (but aren't sure which). Therefore, when asked to judge (27b) 'out-of-the-blue', consultants will assume the former context; they will assume that the imagined utterer of (27b) knows whether the event of

dancing occurred yesterday or today. Having made that assumption, the principle in (41) will entail that the utterer knows that the dancing occurred yesterday. After all, if the dancing had occurred on the day of speaking, principle (41) would have required the utterer of (27b) to use HOD rather than HEST. Consequently, when interpreting (27b) out-of-the-blue, speakers of Kikuyu are lead to imagine a context where the utterer of the sentence knows the event of dancing occurred on the day prior to the utterance. Therefore, the presence of the adverb *ira* 'yesterday' is felt to contribute little to the meaning of the sentence in these circumstances.

In a similar way, we can understand the other judgments in (27). We also understand the rationale behind more traditional semantic descriptions of the Kikuyu TRMs, such as the one given in Section 2. For example, it is not really misleading to say that Pre-Hesternal Past is used when the event described occurs 'prior to yesterday'. Given the principle in (41), PHEST can only be used if the speaker's knowledge does not entail that the event occurred either yesterday or today. Arguably, the most typical case where this holds is one where the speaker's knowledge entails that the event occurred prior to yesterday. Thus, most uses of PHEST one encounters will conform to the traditional description. It should be clear that this reasoning will extend to all the other TRMs of Kikuyu, thus (partially) validating their traditional descriptions as well.

We find, then, that the Specificity Principle in (41) can serve to explain certain key facts regarding the use of Kikuyu TRMs. Moreover, we can directly see this principle at work in the judgments reported below.

(42) **The Specificity Principle and Hodiernal Past (*cf.* (29) and (32))**

Situation: Mwangi left for Nairobi earlier today. You know this. Your friend, Kamau, asks where Mwangi is. You answer:

a. Mwangi nĩathiire Nairobi.
Mwangi nĩ-a-∅-thi-ire Nairobi
Mwangi ASRT-3sgS-**HOD**-go-PST.PRV Nairobi
Mwangi left for Nairobi.
Judgment: Correct in this context. (Offered as translation of the English)

b. Mwangi nĩarathiire Nairobi.
Mwangi nĩ-a-ra-thi-ire Nairobi
Mwangi ASRT-3sgS-**HEST**-go-PST.PRV Nairobi
Mwangi left for Nairobi.
Judgment: *Not* correct/appropriate in this context.

c. Mwangi nĩāthiire Nairobi.
Mwangi nĩ-a-a-thi-ire Nairobi
Mwangi ASRT-3sgS-**PHEST**-go-PST.PRV Nairobi
Mwangi left for Nairobi.
Judgment: *Not* correct/appropriate in this context.

As we see above, when a speaker knows that a given event occurred on the day of speaking, HOD *must* be used, and both HEST and PHEST are not felicitous. A similar set of facts holds for HEST, as shown in (43), and for the Immediate Past in (44).

(43) **The Specificity Principle and Hesternal Past (*cf.* (29) and (32))**

Situation: Mwangi left for Nairobi yesterday. You know this. Your friend, Kamau, asks where Mwangi is. You answer:

a. Mwangi nĩarathiire Nairobi.
Mwangi nĩ-a-ra-thi-ire Nairobi
Mwangi ASRT-3sgS-**HEST**-go-PST.PRV Nairobi
Mwangi left for Nairobi.
Judgment: Correct in this context. (Offered as translation of the English)

b. Mwangi nĩāthiire Nairobi.
Mwangi nĩ-a-a-thi-ire Nairobi
Mwangi ASRT-3sgS-**PHEST**-go-PST.PRV Nairobi
Mwangi left for Nairobi.
Judgment: *Not* correct/appropriate in this context.

(44) **The Specificity Principle and Immediate Past Perfective**

Situation: Mwangi has just left for the store in the last couple minutes. You know this. Your friend Kamau walks in and asks where Mwangi is. You answer:

a. Mwangi nĩāthie nduka.
Mwangi ASRT-3sgS-**IMM.PST.PRV**-go-**FV** store
Mwangi left for the store.
Judgment: Correct in this context. (Offered as translation of the English)

b. Mwangi nĩathiire nduka. [22]
Mwangi ASRT-3sgS-**HOD**-go-PST.PRV store
Mwangi left for the store.
Judgment: *Not* correct/appropriate in this context.

[22] Note that since there is no 'immediate past *imperfective*', it is possible for Hodiernal Past imperfective sentences to describe events that have just taken place.

(i) Situation: You are at a party. Mwangi is in one room dancing. You leave the room for a moment, and see your friend Kamau in the hallway. He says, "Oh man, I would love to see Mwangi dance!" You want to tell him that Mwangi was just dancing a second ago.

a. Mwangi no hĩndi nĩekũinaga.
Mwangi no hĩndi nĩ-a-**kũ**-in-aga
Mwangi just time ASRT-3sgS-**HOD**-dance-PST.IMP
Mwangi was just dancing.

Finally, the data below demonstrate the activity of (41) in the use of Hodiernal Future.

(45) **The Specificity Principle and Hodiernal Future (*cf.* (34) and (35))**

Situation: Mwangi will leave for New York today. You know this. Your friend, Kamau, sees that Mwangi is hurring about, going shopping, cleaning his house, etc. He asks you "What is up with Mwangi?" You answer:

a. Mwangi nĩegũthie New York.
Mwangi ASRT-3sgS-**HOD- FUT**-go-**FV** New York.
Mwangi will go to New York.
Judgment: Correct in this context. (Offered as translation of the English)

b. Mwangi nĩagathie New York.
Mwangi ASRT-3sgS-**PHOD-FUT**-go-**FV** New York.
Mwangi will go to New York.
Judgment: *Not* correct/appropriate in this context.

In each of the contexts in (42)-(45), our informal semantics in (38) predicts that several TRMs are consistent with the knowledge of the speaker. Nevertheless, we find that only one TRM is accepted by consultants as appropriate in each context. In every case, the TRM chosen by speakers of Kikuyu is the one that our semantics in (38) hypothesizes as the logically strongest. Thus, the data in (42)-(45) provide further evidence that our semantics in (38) must be augmented by the Specificity Principle in (41).

Thus far, we've seen that our semantics in (38) requires that we additionally stipulate the principle in (41). Our need for this principle, however, might be legitimately viewed as a failing of our informal semantics. After all, it is at present unclear what the origin of this principle is. Why are Kikuyu speakers compelled to choose the most 'specific' TRM consistent with their knowledge? At this point, it should be noted that this 'Specificity Principle' cannot be reduced to more general pragmatic principles, such as the Gricean maxim of 'Quantity'. The clearest demonstration of this is the differing behavior of temporal adverbs in Kikuyu. As shown below, when choosing between temporal adverbs in non-finite clauses, Kikuyu speakers are free to make their assertion logically weaker than what their knowledge allows for.

(46) **No Specificity Principle With Temporal Adverbials in Non-Finite Clauses**

Situation: Mwangi was planning a trip to New York for a long time. He was supposed to leave yesterday evening, but found out at the last minute that his flight was cancelled. He's now stuck at home, and feeling very disappointed. You know all this. Your friend Kamau asks why Mwangi looks so glum. You answer:

Mwangi nĩarendaga
Mwangi nĩ-a-ra-end-aga
Mwangi ASRT-3sgS-HEST-want-PST.IMPF

gũthie	New York	(ira)	/	(ira	hwainĩ).
gũ-thi-a	New York	(ira)	/	(ira	hwainĩ).
INF-go-FV	New York	yesterday	/	yesterday	evening

Mwangi wanted to go to New York (yesterday / yesterday evening).

Judgment: Sentence is fine either with or without *ira* 'yesterday'
Sentence is fine either with or without *ira hwainĩ* 'yesterday evening'

The context in (46) is one where the speaker knows that Mwangi's desired time of departure was yesterday evening. In this context, the speaker can choose to be maximally informative, by including the adverbial phrase *ira hwainĩ* 'yesterday evening'. However, they are also free to be less informative, by including simply the adverbial *ira* 'yesterday', or no adverbial at all.

The differing behavior of temporal adverbs in sentences like (46) raises important questions for our 'Specificity Principle' and our semantics in (38). Given that the Specificity Principle only governs TRMs, it would be ideal if that principle could be shown to follow from the semantics of TRMs themselves. Furthermore, while the informal semantics in (38) appears promising, we should aim to make those proposals more formally precise. In particular, we should attempt to embed those proposals within a broader semantic theory of tense and aspect, such that reviewed in Section 3. In the following section, I will attempt to resolve both these deficiencies. I will argue that a particular formalization of the proposals in (38) will indeed predict the 'Specificity Principle' in (41), and will explain why this principle is tied specifically to temporal remoteness morphemes.

4.2 A Formal Semantic Analysis of Kikuyu Temporal Remoteness Morphemes

In this section, I will develop the formal analysis of Kikuyu TRMs that will be defended throughout this paper. The analysis rests on two key ideas. The first is that the Kikuyu TRM features (HOD, HEST, PHEST, *etc.*) have a semantics akin to that proposed for tense in (13). The lexical entries I will assume for the TRM features are as follows.

(47) **The Formal Semantics of Kikuyu TRMs** [23]

a. $[\![\text{PHEST}]\!]^{g, w, t, c} = [\lambda t' . t' \text{ is on the interval } (\_ , c(T)] : t']$ [24]

b. $[\![\text{HEST}]\!]^{g, w, t, c} = [\lambda t' . t' \text{ is on the interval } [\text{YEST}_{c(T)} , c(T)] : t']$

c. $[\![\text{HOD}_{\text{PST}}]\!]^{g, w, t, c} = [\lambda t' . t' \text{ is on the interval } [\text{TOD}_{c(T)} , c(T)] : t']$

d. $[\![\text{HOD}_{\text{FUT}}]\!]^{g, w, t, c} = [\lambda t' . t' \text{ is on the interval } [t , \text{TOD}_t] : t']$

[23] The reader will note that (47) does not contain an entry for the 'Indefinite Future' (INDEF) in (9). Although it does not appear to be actively used by my consultants, I offer some speculations on its meaning in Section 7.

[24] As with the lexical entries for temporal adverbs in (24), I will be deliberately vague as to what it means for a given time to be 'on' a given interval. In most cases, mere 'containedness' will be sufficient.

e. $[\![\text{PHOD}]\!]^{g, w, t, c}$ = [λt' . t' is on the interval [t , _) : t']

f. $[\![\text{IMM}]\!]^{g, w, t, c}$ = [λt' . t' is on the interval [JUST_t , t] : t']

Like tense features, TRM features are interpreted as restricted identity functions on times. For example, recalling the notation introduced earlier for intervals, the entry in (47b) states that relative to a context *c*, HEST is interpreted as an identity function restricted to those times which are 'on' the interval ending with *c*(T) and beginning with the day preceding *c*(T).

The reader will note, however, that the intervals invoked in (47) are not perfectly identical to those in (38). The first key difference is that, for some TRMs, the interval they are restricted to depends upon the context time c(T), while for others the interval is calculated from the index time *t*. For example, while the meaning of HEST in (47b) is claimed to depend on c(T), the meaning of IMM in (47f) is tied to the index time. The motivation for this will be given in Section 5, where it will be shown to capture differences in the way that TRMs behave in embedded clauses.

The second innovation of the entries above concerns the feature HOD. We will henceforth break from the assumption that Hodiernal Future verbs contain the same TRM feature as Hodiernal Past forms (imperfective, perfective, perfect). Thus, we will propose that there are two Hodiernal 'subfeatures': HOD_{PST} and HOD_{FUT}. According to (47c), HOD_{PST} is an identity function restricted to times preceding the *context* time c(T) and contained within the day of c(T). On the other hand, HOD_{FUT} is stated in (47d) to be an identity function restricted to times following the *index* time *t*, and limited to the day of *t*. Again, the motivation for this distinction will come in Section 5.

In addition to the lexical entries in (47), our account will rest on the central assumption stated below.

(48) **The Syntax of Kikuyu TRMs**
Kikuyu TRM features are adjoined to the pronoun ET.

Recall that tense features such as PAST are assumed to be adjoined to the pronoun T, which contributes Topic Time (18b), (25b). The hypothesis in (48) states that TRMs have a similar syntactic status: they are adjoined to the pronoun ET, which contributes Event Time (25b). Thus, the claim is that TRMs are the equivalent of tenses for ET. They introduce presuppositions that must be satisfied by ET, and so serve to further restrict the identity of the ET.

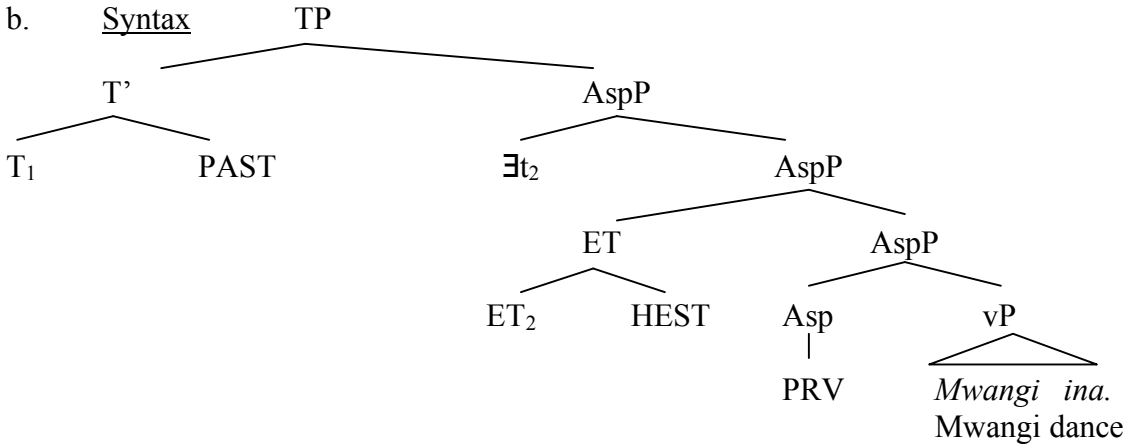
Given these hypotheses, the sentence in (49a) below is assumed to have the LF in (49b), and thus the T-conditions in (49c). Of course, given the nature of identity functions, the T-conditions in (49c) are equivalent to those in (49d).

(49) **The Syntax and Semantics of Kikuyu HEST** [25]

a. <u>Sentence</u> Mwangi ŋ̃ia**rai**n**ire**
Mwangi ASRT-3sgS-**HEST**-dance- **PST.PRV**
Mwangi danced (yesterday).

[25] I will be agnostic as to how the morphological structure of the verb is related to the syntactic structure in (49b).

b. Syntax



c. Truth-Conditions, Direct Statement

$[\![\text{TP}]\!]^{g, w, t, c}$ is defined only if $g(1) < t$
if defined, then it is T *iff:*

$\exists t'' \,.\, g(1) \supset$ **[λt' . t' is on the interval [YEST$_{c(T)}$, c(T)] : t']**(t'') &
$\exists e \,.\, \text{dance}(e,w)$ & $\text{Agent}(e) = \text{Mwangi}$ & $T(e) = t''$

d. Truth-Conditions, Equivalent Statement

$[\![\text{TP}]\!]^{g, w, t, c}$ is defined only if $g(1) < t$
if defined, then it is T *iff:*

$\exists t''$. **t'' is on the interval [YEST$_{c(T)}$, c(T)]** & $g(1) \supset t''$ &
$\exists e \,.\, \text{dance}(e,w)$ & $\text{Agent}(e) = \text{Mwangi}$ & $T(e) = t''$

That is, since the pronoun sister to the TRM is existentially bound, the presupposition introduced by the TRM is effectively a further restriction on the scope of the existential quantifier.[26] Therefore, I will henceforth write the T-conditions predicted by our theory as is done in (49d), with the presuppositional content of the TRM serving as a further restrictor to the scope of the operator '∃t'.

The remainder of this section will now be devoted to exploring the ways in which the hypotheses in (47) and (48) account for the key patterns observed in Section 4.1. To begin, let us observe that this semantics can account for the contrasts observed in (29). We saw in (29) that in contexts where the speaker does not whether an event occurred either today, yesterday, or the day before, the Pre-Hesternal Past must be used; neither HEST nor HOD is warranted by the speaker's knowledge. As the reader is invited to confirm, our semantics predicts that sentences (29a) and (29c) receive the T-conditions below.[27]

[26] After all, as the reader is invited to confirm, a time *t* will satisfy the predicate in (i) *iff* it satisfies the one in (ii).

(i) [λt'' : $g(1) \supset$ **[λt' . t' is on the interval [YEST , c(T)] : t']**(t'') & P(t'')]

(ii) [λt'' : **t'' is on the interval [YEST , c(T)]** & $g(1) \supset t''$ & P(t'')]

[27] Note that the T-conditions in (50) assume an LF where the tense node T bears the index '1', as in (49b).

(50) **The Truth-Conditions of Sentences (29a) and (29c)**

a. T-Conditions of (29a), In the Pre-Hesternal Past
∃t''. **t'' is on the interval (_ , c(T))** & *g*(1) ⊃ t'' &
∃e . buy(e,w) & Agent(e) = 'they' & Theme(e) = 'new TV' & *T*(e) = t''

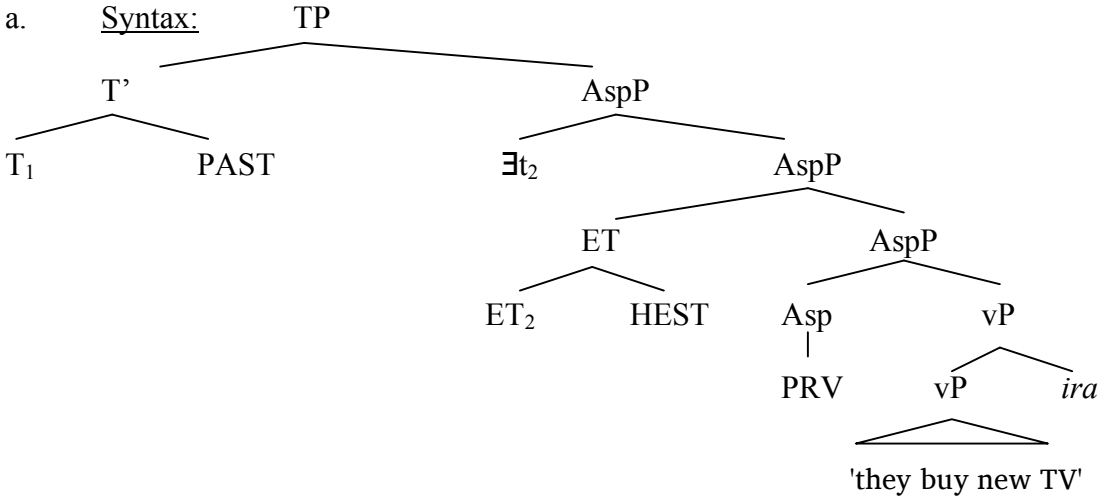
b. T-Conditions of (29c), in the Hesternal Past
∃t''. **t'' is on the interval [YEST$_{c(T)}$, c(T)]** & *g*(1) ⊃ t'' &
∃e . buy(e,w) & Agent(e) = 'they' & Theme(e) = 'new TV' & *T*(e) = t''

The T-conditions in (50a) hold *iff* there is some time t'' in the past that is the run-time of an event of 'them' (the speaker's friends) buying a new TV. In the context spelled out in (29), the speaker's knowledge does entail these T-conditions, and so we predict that she is warranted in an assertion of (29a). The T-conditions in (50b), however, hold *iff* there is some time t'' on either *the day of speaking or the day before* that is the run-time of an event of 'them' buying a new TV. Since the speaker's knowledge in (29) does not entail these T-conditions, we correctly predict that that an assertion of (29c) would not be warranted in that context. The reader is invited to confirm that a similar explanation can be offered for the contrasts between (32a,c) and (35a,c).

Our analysis also predicts the observed contrasts between TRMs and temporal adverbs. For example, the LF posited for sentence (32b) would be that in (51a), and so its predicted T-conditions would be those in (51b).[28]

(51) **The Syntax and Semantics of Sentence (32b)**

a. Syntax:



b. T-Conditions of Structure (51a)

∃t''. t'' is on the interval [YEST$_{c(T)}$, c(T)] & *g*(1) ⊃ t'' & **t'' is on the day preceding c(T)**
& ∃e . buy(e,w) & Agent(e) = 'they' & Theme(e) = 'new TV' & *T*(e) = t''

[28] Note that (32b) could also have a structure where the adverb *ira* 'yesterday' is an adjunct to AspP, and so predicates the TT. As the reader is invited to confirm, the T-conditions of such an LF would also not lead to a warranted assertion in context (32).

In the context associated with (32), the speaker knows only that the purchasing event occurred either today or yesterday. Thus, their knowledge does entail the T-conditions of sentence (32a), which are the same as those in (50b). The T-conditions in (51b), however, hold only if the purchasing event takes place on the day prior to the utterance. Thus, the speaker's knowledge in (32) does not entail the T-conditions of (32b), and so an assertion of (32b) would not be licit in that context. The reader is invited to confirm that, given our entries in (37), a similar explanation can be offered for the key contrasts in (29a,b) and (35a,b).

At this point, however, the reader might rightly wonder about the contrasts observed in the wh-questions (28), (31), and (34), as well as those contrasts that were attributed to the 'Specificity Principle'. Regarding the former, an analysis of (28), (31), (34) will be presented in the subsection 4.2.2, after I have spelled out my assumptions regarding the semantics of temporal wh-questions. As for the 'Specificity Principle', we will see in Section 4.2.1 that our semantics in (47) predicts it as a consequence of the more general principle 'Maximize Presuppositions' (Heim 1991, Singh 2011).

Before we come to that, however, let us finally observe that (47) and (48) account for the facts in (40), repeated below.

(52) **Only HEST is Consistent with *Ũmũthĩ na Ira* 'Today and Yesterday'**

a.	Mwangi	nĩarateng'erire	ũmũthĩ	na	ira
	Mwangi	ASRT-3sgS-**HEST**-run-**PST.PRV**	today	and	yesterday
	Mwangi ran today and yesterday.				
b.	* Mwangi	nĩateng'erire	ũmũthĩ	na	ira
	Mwangi	ASRT-3sgS-**HOD**-run-**PST.PRV**	today	and	yesterday

As shown above, only Hesternal Past can be used when the vP is modified by the adverbial phrase *ũmũthĩ na ira* 'yesterday and today'. To begin our explanation, note that the English translation of (52a) – "Mwangi ran today and yesterday" – should have the T-conditions in (53b).

(53) **Targeted Truth-Conditions**

a. Sentence: "Mwangi ran today and yesterday"

b. Truth-Conditions:
[[(53a)]]$^{g, w, t, c}$ is defined only if $g(1) < t$. If defined, then it is T *iff:*

∃t'' . $g(1) \supset$ t'' & ∃e . run(e,w) & Agent(e)=Mwangi & $T(e) =$ t'' & t'' is on the day of c(T) & ∃t'' . $g(1) \supset$ t'' & ∃e . run(e,w) & Agent(e)=Mwangi & $T(e) =$ t'' & t'' is on the day before c(T)

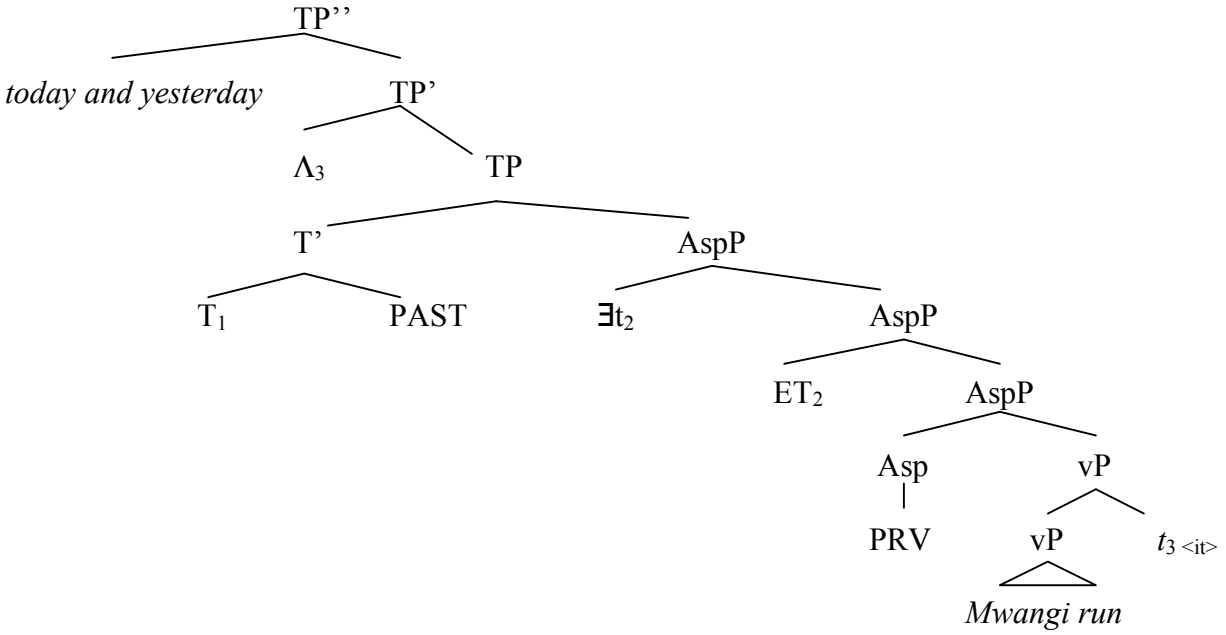
That is, English sentence (53a) is T *iff* there are two events of Mwangi running: one today and one yesterday. Thus, the T-conditions of (53a) seem to make two existential claims, as is reflected in the formalized T-conditions in (53b).

In order to derive these T-conditions for (53a), I will assume that the complex adverb *yesterday and today* has the semantics in (54).

(54) $[\![\textit{today and yesterday}]\!]^{g, w, t, c}$ =
$[\ \lambda P_{<it,t>} : P([\![\text{today}]\!]^{g, w, t, c}) = T \ \& \ P([\![\text{yesterday}]\!]^{g, w, t, c}) = T\ ]$

Thus, *today and yesterday* takes as argument a predicate of type <it,t>, and return T *iff* this predicate holds of both *yesterday* and *today*. Given this lexical entry, I will assume that sentence (53a) has the LF in (55).

(55) **The LF of Sentence (53a)**



Under this LF, the adverb *today and yesterday* undergoes movement, leaving behind a trace of type <it>. Consequently, the sister of this adverb is of type <it,t>, and so can serve as the adverb's argument. Finally, the reader is invited to confirm that, given the entry in (54), the LF in (55) will indeed be assigned the desired T-conditions in (53b).

Having laid this conceptual groundwork, let us return to the Kikuyu sentences in (52). First, I will assume that the Kikuyu adverb *ũmũthĩ na ira* 'yesterday and today' has the same semantics as its English equivalent in (54). Moreover, I will assume that (52a) has essentially the LF in (55), with the minor difference that ET_2 is modified by the feature HEST. Finally, I will assume that (52b) has a similar LF, one where ET_2 is modified by the feature HOD_{PST}.

With these assumptions in place, we predict that sentence (52a) will receive the T-conditions in (56a), while sentence (52b) will receive the T-conditions in (56b).

(56) **The Predicted T-Conditions for (52)**

a. <u>The T-Conditions for (52a)</u>

∃t'' . **t'' is on the interval [YEST$_{c(T)}$, c(T)]** & $g(1) \supset$ t'' &
∃e . run(e,w) & Agent(e)=Mwangi & T(e) = t'' & t'' is on the day of c(T) &
∃t'' . **t'' is on the interval [YEST$_{c(T)}$, c(T)]** & $g(1) \supset$ t'' &
∃e . run(e,w) & Agent(e)=Mwangi & T(e) = t'' & t'' is on the day before c(T)

b. The T-Conditions for (52b)

∃t'' . **t'' is on the interval [TOD$_{c(T)}$, c(T)]** & $g(1) \supset$ t'' &
∃e . run(e,w) & Agent(e)=Mwangi & $T(e) =$ t'' & t'' is on the day of c(T) &
∃t'' . **t'' is on the interval [TOD$_{c(T)}$, c(T)]** & $g(1) \supset$ t'' &
∃e . run(e,w) & Agent(e)=Mwangi & $T(e) =$ t'' & t'' is on the day before c(T)

Note that only the T-conditions in (56a) are satisfiable. In (56b), the second main conjunction states that there is a time *t''* which is on the day surrounding the UT and also on the day preceding the UT. Clearly, no such time can exist. Therefore, we predict that the sentence in (56b) will appear 'anomalous' to speakers, while the one in (56a) will be sensible and T *iff* there are two events of running, one yesterday and one today.

4.2.1 The Specificity Requirement on TRMs

Thus far, we have seen that our formal semantics in (47) and (48) accounts for the same phenomena as our informal semantics in (38).[29] Recall, however, that our informal semantics needed to be augmented with the 'Specificity Principle' in (41), an *ad-hoc* principle that was stipulated to hold only of TRMs. Does our formal analysis require a similar such stipulation?

Happily it does not. Rather, given the presuppositional semantics posited in (47), all the action of the 'Specificity Principle' can be seen to follow from the more general condition 'Maximize Presuppositions' (Heim 1991, Singh 2011). Although there are numerous formulations of this principal, the following will suffice for our purposes.

(57) **Maximize Presuppositions (MP)**

Suppose that the following holds:
- a. LF_1 and LF_2 are identical, except that LF_1 contains lexical item α where LF_2 contains lexical item β
- b. The domain of $[[\alpha]]$ is a strict subset of the domain of $[[\beta]]$
- c. A speech act using either LF_1 and LF_2 would be licit in context.

If all these conditions hold, then the speech act must be made with LF_1 , not LF_2

I should note, however, that the formulation in (57) does not perfectly correspond to independent formulations of 'Maximize Presupposition' (Singh 2011). Moreover, one potential issue with (57) is the vagueness of (57c). Whereas earlier formulations of MP appeal to the logical or 'contextual' equivalence of LF_1 and LF_2, for various technical reasons these notions will not be of use to us here.[30] For this reason, we will employ the more informal statement of MP in (57).

[29] The reader is invited to confirm that our formal semantics also predicts the facts in (39), which follow from the simple fact that PHEST places weaker constraints on the ET than HEST.

[30] The 'technical reasons' in question are the following. First, to capture contrasts such as those in (31a,d), we will want MP to evaluate pairs of questions. Thus, a formulation of MP in terms of 'logical' or 'contextual' equivalence will require us to develop a notion of such equivalence for questions, which would take us too far afield in the present study. Secondly – and more importantly – since ET is existentially bound, two LFs containing two different TRMs will never be logically equivalent. Therefore, a formulation of MP in terms of logical/contextual equivalence

Unlike our 'Specificity Principle', the principle of Maximize Presuppositions has a general utility within the theory of grammar. For example, it is classically used to account for contrasts such as the following.

(58) **Maximize Presuppositions Drives the Use of Definites**

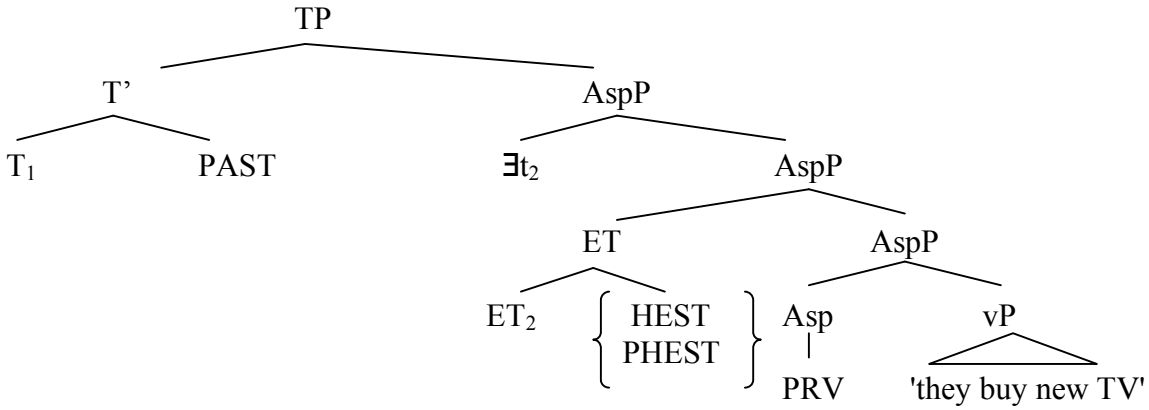
a. The sun came up.

b. ?? A sun came up.

According to some analyses, the T-conditions of (58a,b) are logically equivalent. It is therefore a puzzle why (58b) should be illicit. As formulated in (57), Maximize Presuppositions can provide the answer. After all, the LFs of (58a,b) are identical, except that (58a) contains the lexical item *the* while (58b) contains *a.* Moreover, the domain of [[the]] is a strict subset of the domain of [[a]].[31] Finally, since they are logically equivalent, an assertion of (58a) would be licit *iff* an assertion of (58b) is. Thus, the conditions in (57a-c) hold, and so MP requires that our speech act be made with (58a), the LF containing the presuppositionally stronger element *the*.

Having established its general validity, let us now examine the way in which MP in (57) predicts the contrasts in (32a,d) and (42)-(45).[32] First, let us note that the LF structures of (32a) and (32d) are identical, except that (32a) contains HEST where (32d) contains PHEST.

(59) **The LF Structures of (32a) and (32d)**



Furthermore, under our semantics in (47), the domain of [[HEST]] is a strict subset of the domain of [[PHEST]]. After all, any time which is on the interval '[$YEST_{c(T)}$, c(T)]' will also be on the interval '(_ , c(T)]', but not *vice versa*. Finally, in the context imagined in (32), the speaker's knowledge entails the T-conditions of both (32a) and (32d). Therefore, in context (32), an assertion of either (32a) or (32d) would be licit. Thus, the conditions in (57a-c) hold for (32a) and (32d). Consequently, Maximize Presuppositions states that – of the two LFs – only the one in (32a) may be used to make an assertion.

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will not permit MP to regulate the identity of the TRM in a given sentence. It is for these reasons that I employ the more general – and vaguer – notion that both LFs can be 'used in licit speech acts'. Whether this formulation can be adequately explicated or independently motivated remains a question for future work.

[31] The domain of [[a]] is all $D_{<et>,}$ whereas [[the]] is restricted to <et> predicates that are true of exactly one entity.

[32] The contrasts in (31a,d) will be discussed after I've presented my semantics for temporal wh-questions.

It is important to note, however, that MP in (57) will not require use of HEST in context (29). In that context, the speaker's knowledge does not entail that the event of purchasing occurred on either today or yesterday. Consequently, as has been noted several times, an assertion of (29c) would not be licit in the imagined context. Thus, condition (57c) does not hold of (29a) and (29c), and so MP would not require use of LF (29c).

In summary, then, we find that the principle of Maximize Presuppositions in (57) requires that speakers use the 'most specific' (logically strongest) TRM consistent with their knowledge. The reader is invited to confirm that this principle will therefore account for all the facts attributed to our earlier 'Specificity Principle', including the data in (42)-(45). Finally, let us consider the differing behavior of temporal adverbials noted in (46), repeated below.

(60) **Situation:** Mwangi was planning a trip to New York for a long time. He was supposed to leave yesterday evening, but found out at the last minute that his flight was cancelled. He's now stuck at home, and feeling very disappointed. You know all this. Your friend Kamau asks why Mwangi looks so glum. You answer:

Mwangi	nĩarendaga				
Mwangi	ASRT-3sgS-HEST-want-PST.IMPF				
gũthie	New York	(ira)	/	(ira	hwainĩ).
INF-go-FV	New York	yesterday	/	yesterday	evening

Mwangi wanted to go to New York (yesterday / yesterday evening).

Judgment: Sentence is fine either with or without *ira* or *ira hwainĩ*

As observed above, when choosing amongst temporal adverbials, Kikuyu speakers are not compelled to use the most specific form consistent with their knowledge. Importantly, our principle in (57) would not force such a choice. After all, the two adverbials in (60) would be assumed to have the semantics in (37a) and (61) below.

(61) $[[\ \textit{ira hwainĩ}\ ]]^{g, w, t, c}$ = [λt' : t' is on the evening of the day preceding c(T)]

Since adverbs are assumed to all be <it>-predicates, both *ira* 'yesterday' and *ira hwainĩ* 'yesterday evening' have the same exact domain. Thus, the condition in (57b) does not hold between the LFs of the sentences in (60), and so MP as formulated in (57) would not apply.

We find, then, that unlike our original informal proposals, our formal semantics in (47) has no need of the 'Specificity Principle' in (41). Rather, all the content of that principle follows from the more general condition 'Maximize Presuppositions'. Thus, besides embedding our proposals within a broader semantic theory, hypotheses (47) and (48) are analytically superior.

Finally, let us note that, given the entries in (37) and (47), TRMs are semantically distinct from temporal adverbs in two key ways. The first is that the intervals associated with TRMs are actually broader than those found with temporal adverbs. The second, and more notable, is that TRMs possess the presuppositional semantics of tenses. Whereas adverbs are predicates of times, TRMs are restricted identity functions on times. Consequently, the choice of TRM in a given

sentence is regulated by 'Maximize Presupposition', with the result that TRMs often appear to have a stronger meaning than what is stated in their lexical entry.

4.2.2 TRMs and Questions

The behavior of TRMs in temporal wh-questions provided the first indication that traditional descriptions of their meaning are critically incomplete. In this section, we will see how our formal analysis in (47) and (48) can capture those key facts in (28), (31) and (34). I will first lay out my background assumptions regarding the semantics of temporal wh-questions. We will then see that, when combined with those assumptions, the account in (47) predicts the key data.

4.2.2.1 Syntactic and Semantic Assumptions Regarding Temporal Wh-Questions

Following much prior work (Hamblin 1958, Karttunen 1977), I assume that the meaning of a wh-question is the set of its possible answers. Thus, a wh-question like that in (62a) will be assumed to denote the set of propositions in (62b), which can represented compactly as in (62c).

(62) **The Semantics of Wh-Questions**

a. What did Dave eat?
b. { [λw : Dave ate pie in w] , [λw : Dave ate sole in w], [λw : Dave ate cod in w]}
c. [$\lambda p_{<st>}$: ∃x . p = [λw : Dave ate x in w]]

Perhaps controversially, I will assume that temporal wh-questions ask the addressee to help identify the Event Time of a particular proposition.[33] Intuitively, a temporal wh-question like "*When did Bill turn off the stove?*" asks the addressee to identify the time *within a given Topic Time* when the event of Bill turning off the stove occurred. Furthermore, the answers to such a question – like "*Bill turned off the stove* ***yesterday***" – provide a predicate of times that serves to restrict the identity of the Event Time. Consequently, I will assume that temporal wh-questions like (63a) have the meaning in (63b).

(63) **The Semantics of Temporal Wh-Questions** [34]

a. When did Bill dance?

b. [$\lambda p_{<st>}$: $\exists P_{<it>}$. p = [λw : ∃t'' . $g(1) \supset$ t'' **& P(t'') = T**
& ∃e . dance(e,w) & Agent(e) = Bill & τ(e) = t'']]

That is, the meaning of a question like "*When did Bill dance*" are all those propositions *p* such that there is some predicate of times *P* such that *p* is the proposition 'The Event Time of Bill's dancing satisfies *P*'. To help spell this out further, note that the answer-set in (63b) contains all the propositions indicated below.

[33] I think that there may also be cases where temporal wh-questions ask that the addressee help to identify the Topic Time. If this is indeed the case, I do not believe it affects the main proposals of this section.

[34] Note that the PAST tense in (63a) will contribute the presupposition, omitted here, that the topic time g(1) precedes the temporal index / Utterance Time of (63a).

(64) **Propositions in the Answer-Set to (63a)**

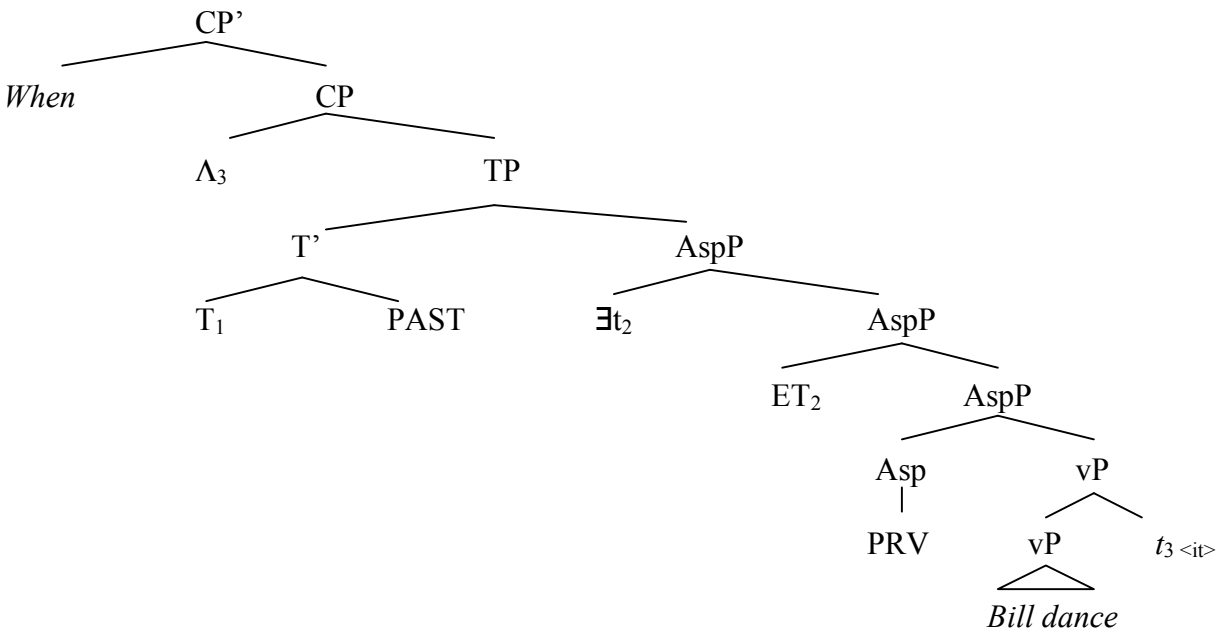
a. [λw : ∃t'' . *g*(1) ⊃ t'' **& t'' is on yesterday**
& ∃e . dance(e,w) & Agent(e) = Bill & *T*(e) = t''],
Bill danced yesterday.

b. [λw : ∃t'' . *g*(1) ⊃ t'' **& t'' is on today**
& ∃e . dance(e,w) & Agent(e) = Bill & *T*(e) = t''],
Bill danced today.

c. [λw : ∃t'' . *g*(1) ⊃ t'' **& t'' is at 3 o'clock**
& ∃e . dance(e,w) & Agent(e) = Bill & *T*(e) = t''], … }
Bill danced at 3 o'clock.

In order to map wh-questions like (63a) to their proposed meanings in (63b), I will assume that they have the LF structure below.

(65) **The LF Structure of Temporal Wh-Questions**



As indicated above, I will assumed that *when* is initially merged as a modifier of *vP*. It subsequently undergoes movement, leaving a trace of type <it>. Thus, the sister of the wh-word is interpreted as a higher-order predicate of type <it>-predicates. Finally, let us assume that the wh-word *when* has the semantics in (66).

(66) **Semantics of Temporal Wh-Word**

[[*when*]] = [λ$Q_{<it,st>}$: [λ$p_{<st>}$: ∃$P_{<it>}$. p = *Q*(P)]]

As the reader is invited to confirm, the assumptions in (65) and (66) together (basically) predict that temporal wh-questions like (63a) will have the interpretation in (63b).[35]

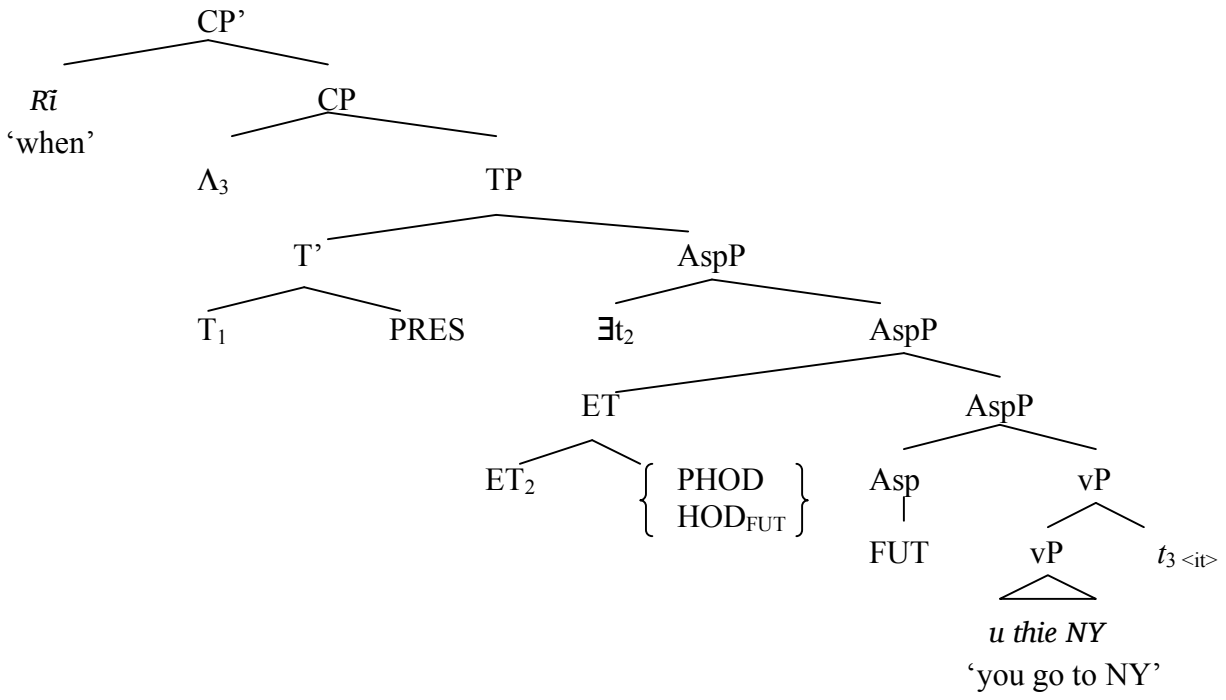
One final background assumption concerns the pragmatics of asking a wh-question. Following much prior work, I will assume that a speaker can only ask a wh-question if their knowledge entails that there is at least one true answer to it. For example, a speaker could only ask the question in (63a) if their knowledge entailed that there was some proposition in (63b) that was true. This requirement is commonly formulated as a presupposition associated with the interrogative operator or wh-word. In order to streamline our discussion, however, I will state it as a separate principle, highlighted below.

(67) **Pragmatic Condition on Wh-Questions**
A speaker can only ask a wh-question Q in a context c if their knowledge in c entails that there is at least one true proposition in $[[Q]]^c$

4.2.2.2 The Behavior of TRMs in Questions

With these assumptions as background, we can now offer a clear explanation for the data in (28), (31), and (34). For example, our account predicts that only (34a) is licit in the associated context, not (34b,c). To begin, let us consider the contrast between (34a,c). The LFs of these two sentences would be as represented in (68).

(68) **The LF Structure of Sentences (34a) and (34c)** [36]



[35] The reader might note that there is a slight lacuna in our present account. Our semantics requires that the sister of the wh-word be of type <it,st>. However, since we've so far been ignoring world-dependency, our system currently predicts that this phrase will be of type <it,t>.

[36] Note that I assume, purely for convenience, that Kikuyu wh-words like *rĩ* 'when' undergo covert movement.

Our semantics therefore predicts that sentence (34a) will receive the interpretation in (69a), while (34c) will receive that in (69b).[37]

(69) a. Interpretation of (34a):

[$\lambda p_{<st>} : \exists P_{<it>} . p = [\lambda w : \exists t''.$ **t'' is on the interval [*t* , _)** & $g(1) < t''$ & **P(t'') = T**
& $\exists e$ .go(e,w) & Agent(e) = 'you' & Goal(e) = NY & $T(e) = t''$]]

b. Interpretation of (34c):

[$\lambda p_{<st>} : \exists P_{<it>} . p = [\lambda w : \exists t''.$ **t'' is on the interval [*t* , TOD_t]** & $g(1) < t''$ & **P(t'') = T**
& $\exists e$ .go(e,w) & Agent(e) = 'you' & Goal(e) = NY & $T(e) = t''$]]

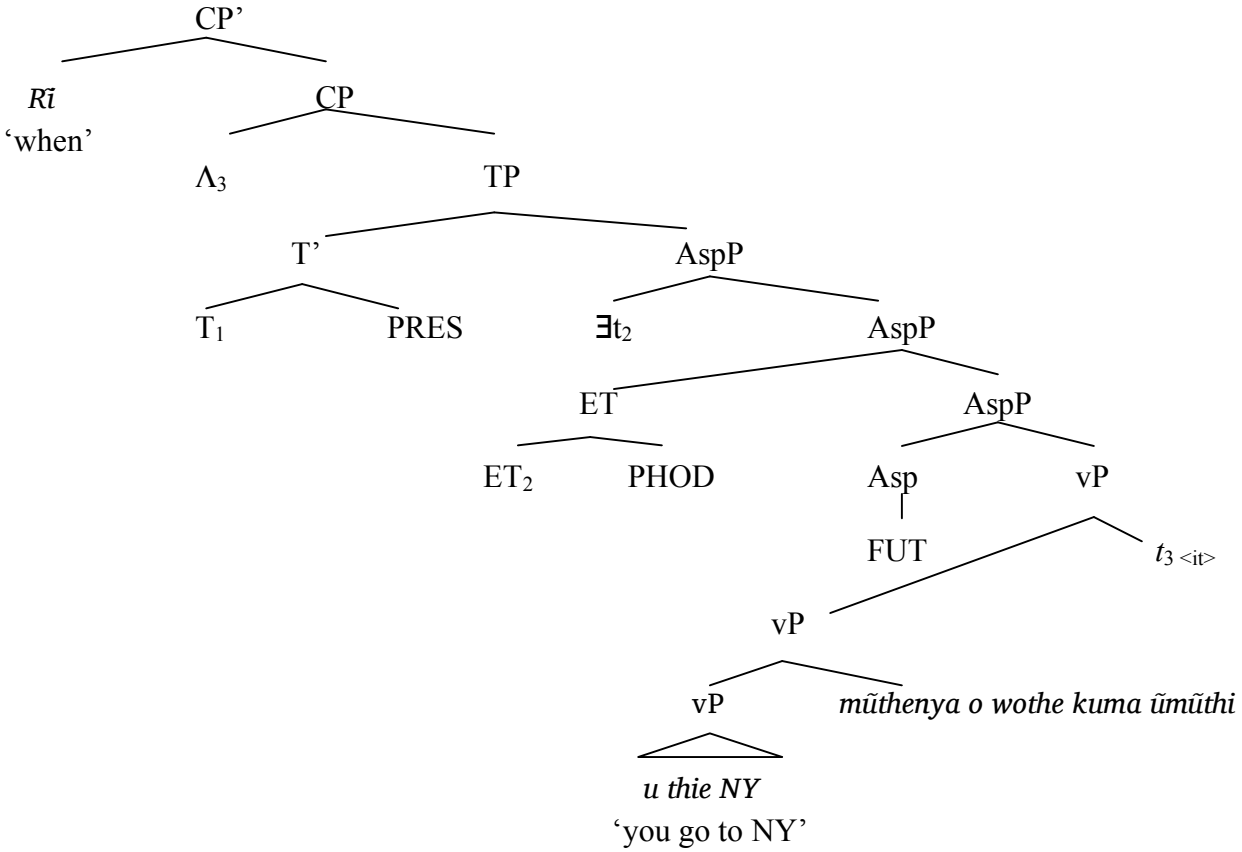
Note that all the propositions in answer-set (69a) place the Event Time of the departure some time after the Utterance Time, while all the propositions in (69b) place the future Event Time within the day surrounding the Utterance Time.[38] Now recall that, in the context associated with (34), the speaker is presumed only to know that the event will take place some time in the future. Therefore, in context (34), the speaker *does* know that there is at least one true proposition in (69a). Our pragmatic principle in (67) thus correctly predicts that (34a) is a licit question. However, the speaker's knowledge in (34) does *not* entail that there is a true proposition in (69b); again, for all they know, the departure could be several days away. Consequently, (67) correctly predicts that (34c) is *not* a licit question in that context.

In a similar way, we can explain the contrast between (34a,b). The LF of (34b) would be as in (70).

[37] I assume that, like their English translations, the verbs in (34) bear present tense, and so the TT g(1) is presupposed to contain the UT. Thus, the FUT aspect serves to put the Event Time in the future of both the TT g(1) and the UT.

[38] Recall that at the root node, the temporal index *t* is identical to the context time c(T).

(70) **The LF Structure of Sentences (34b)**



Thus, given (37c), the meaning predicted for (34b) would be the following set of propositions.

(71) <u>The Interpretation of (34b)</u>

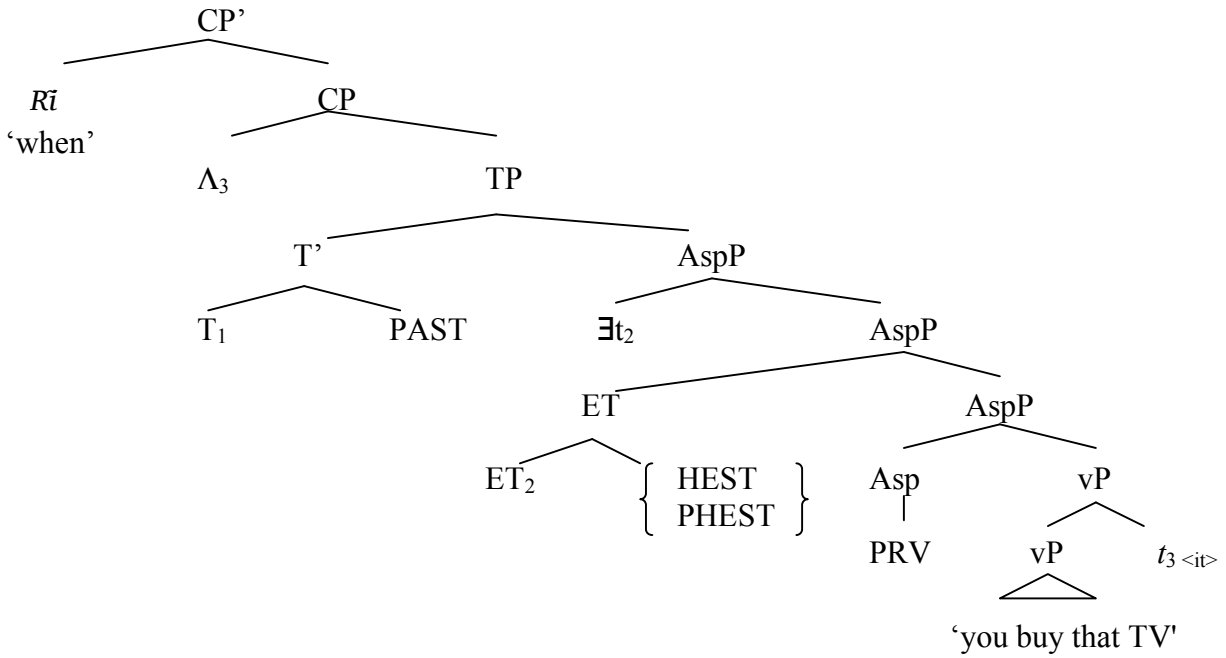
[$\lambda p_{<st>} : \exists P_{<it>}$. p = [λw : $\exists$t''. **t'' is on the interval [*t* , _)** & *g*(1) < t'' & **P(t'') = T**
& **t'' follows the day surrounding c(T)**
& $\exists$e .go(e,w) & Agent(e) = 'you' & Goal(e) = NY & *T*(e) = t'']]

Due to the addition of *mũthenya o wothe kuma ũmũthi* 'some day after today', all the propositions in (71) are ones where the ET of the departure is located after the day of speaking. Since the speaker in (34) only knows that the event will happen some time in the future, their knowledge again does not entail that there is a true proposition within (71). Therefore, our pragmatic principle in (67) correctly predicts that (34b) is not licit in its associated context.

We find, then, that our formal semantics is able to account for the contrasts seen in (34). The reader is invited to confirm that similar explanations can be offered for all the contrasts in (28), as well as for the contrasts in (31a-c).

But, what of the contrast between (31a) and (31d)? Why is the use of PHEST not licit in context (31)? Here, the explanation rests upon our principle of Maximize Presuppositions (57). First, note that the LFs of (31a,d) are as in (72), and so their interpretations are as in (73).

(72) **The LF Structure of Sentences (31a) and (31d)**



(73) a. <u>The Interpretation of (31a)</u>

[$\lambda p_{<st>} : \exists P_{<it>}$. p = [$\lambda$w : $\exists$t''. **t'' is on the interval [YEST$_{c(T)}$, c(T)]** & $g(1) \supset$ t'' & **P(t'') = T**
& $\exists$e .buy(e,w) & Agent(e) = 'you' & Theme(e) = TV & T(e) = t'']]

b. <u>The Interpretation of (31d)</u>

[$\lambda p_{<st>} : \exists P_{<it>}$. p = [λw : $\exists$t''. **t'' is on the interval (_ , c(T))** & $g(1) \supset$ t'' & **P(t'') = T**
& $\exists$e .buy(e,w) & Agent(e) = 'you' & Theme(e) = TV & T(e) = t'']]

In the context associated with (31), the speaker knows that the Event Time of the purchase was either the day of speaking or the day prior. Therefore, she knows that there is at least one true proposition in *both* (73a) and (73b). Our pragmatic principle in (67) thus states that *either* question (31a) or (31d) would be licit in the associated context. So, why is (31d) not felt to be 'correct'?

Note that the LFs of (31a) and (31d) are identical, except that (31a) has HEST where (31d) has PHEST. Moreover, note that the domain of HEST is a strict subset of that of PHEST. Finally, note that (as just observed), it would be licit in context (31) to ask either (31a) or (31d). Therefore, conditions (57a-c) hold of both (31a) and (31d). Consequently, our principle of Maximize Presuppositions states that only LF (31a) may be used to make the inquiry. Although asking (31d) would otherwise be 'pragmatically licit', it runs afoul of Maximize Presuppositions.

Finally, we should note that Maximize Presuppositions will not require use of HEST in context (28). Since the reasoning here should be familiar by now, I will be brief. Although (28a) and (28c) do indeed satisfy conditions (57a,b), they do not satisfy (57c). As the reader can confirm, question (28c) is interpreted as a set of propositions, each of which locate the Event Time of the purchase either on the day of speaking or the day prior. However, the speaker in (28)

is presumed to only know that the purchase took place some time in the past; their knowledge does not entail that there is a true answer to (28c). Therefore a speech act based on (28c) would not be licit, and so (57) will not apply to (28a) and (28c).

5. The Behavior of Temporal Remoteness Morphemes in Embedded Clauses

Thus far, we've seen that the lexical entries in (47), repeated below, can account for the key facts presented in Sections 2 and 4.1.

(74) **The Formal Semantics of Kikuyu TRMs**

a.	$[\![\text{PHEST}]\!]^{g, w, t, c}$	=	[λt' . t' is on the interval (_ , c(T)] : t']
b.	$[\![\text{HEST}]\!]^{g, w, t, c}$	=	[λt' . t' is on the interval [$\text{YEST}_{c(T)}$, c(T)] : t']
c.	$[\![\text{HOD}_{\text{PST}}]\!]^{g, w, t, c}$	=	[λt' . t' is on the interval [$\text{TOD}_{c(T)}$, c(T)] : t']
d.	$[\![\text{HOD}_{\text{FUT}}]\!]^{g, w, t, c}$	=	[λt' . t' is on the interval [t , TOD_t] : t']
e.	$[\![\text{PHOD}]\!]^{g, w, t, c}$	=	[λt' . t' is on the interval [t , _) : t']
f.	$[\![\text{IMM}]\!]^{g, w, t, c}$	=	[λt' . t' is on the interval [JUST_t , t] : t']

As noted earlier, there is one striking feature of these entries that has yet to be explained. Unlike what was proposed for tenses in (13), some of the entries above relate the meaning of the TRM to the *context time* c(T) rather than the *temporal index* t. As we will see in this section, the empirical motivation for this choice is the ways in which TRMs behave in embedded clauses.

I will begin by first laying out my assumptions regarding the semantics of clausal complementation and embedded tense. Following this, we will take an extended tour of the behavior of Kikuyu TRMs in embedded environments.

5.1 The (Basic) Semantics of Clausal Complementation and Embedded Tense

In the discussion to follow, the semantics of sentences like (75) plays a central role. For that reason, I will spend some time clarifying my assumptions regarding such sentences.

(75) Dave said that Tom danced.

I will of course assume that the verb *say* and its Kikuyu equivalent *kũuga* are of type <ist,et>. But what kind of relation does *say* establish between a proposition and an entity? Unfortunately, unlike the verbs *believes/thinks/knows*, there has been rather little work on the semantics of verbs of speech. I will therefore assume a semantics for *say* based heavily upon the approaches taken for other propositional attitude verbs, especially Lewis (1979) and related works (*e.g.* Cresswell & von Stechow 1981, Percus & Sauerland 2003).

It is commonly assumed that the verb *believes/thinks* quantifies over a set of 'doxastic alternatives', defined roughly as follows.

(76) **Doxastic Alternatives**
The *doxastic alternatives* of an entity *x* at a world *w* at time *t* - Dox(*x,w,t*) - are those worlds and times that, given what *x* believes, could be *w* and *t.*

That is, the doxastic alternatives for *x* at <w,t> are those worlds that *x* would recognize as possibly being the world and time they are currently located in, namely, <w,t>. With this notion at hand, the semantics for *believes/thinks* is commonly given as follows.

(77) **The Semantics of *Believes/Thinks***

$$[\![\textit{believes/thinks}]\!]^{g, w, t, c} = [\lambda p_{<ist>} : [\lambda x : \forall <w',t'> \in Dox(x,w,t) : p(<w',t'>) = T]$$

Thus, an entity x *believes/thinks* p at w and t *iff* p is true in all of x's doxastic alternatives at w and t, which basically amounts to x believing that *p* holds at <w,t>.

I will attempt a parallel analysis of the verb *say*. First, I will assume that *say* quantifies over a set of 'asserted alternatives', defined as follows.

(78) **Asserted Alternatives**
The *asserted alternatives* of an entity *x* at a world *w* and time *t* – Asrt(*x,w,t*) – are those worlds and times that, given only what *x* has asserted at *w* and *t*, could be *w* and *t*.

That is, the asserted alternatives for *x* at <w,t> are those worlds that *someone believing only what x has asserted* would recognize as possibly being the world and time at the moment of x's assertion. Having accepted this notion, we can provide the following semantics for *say*.

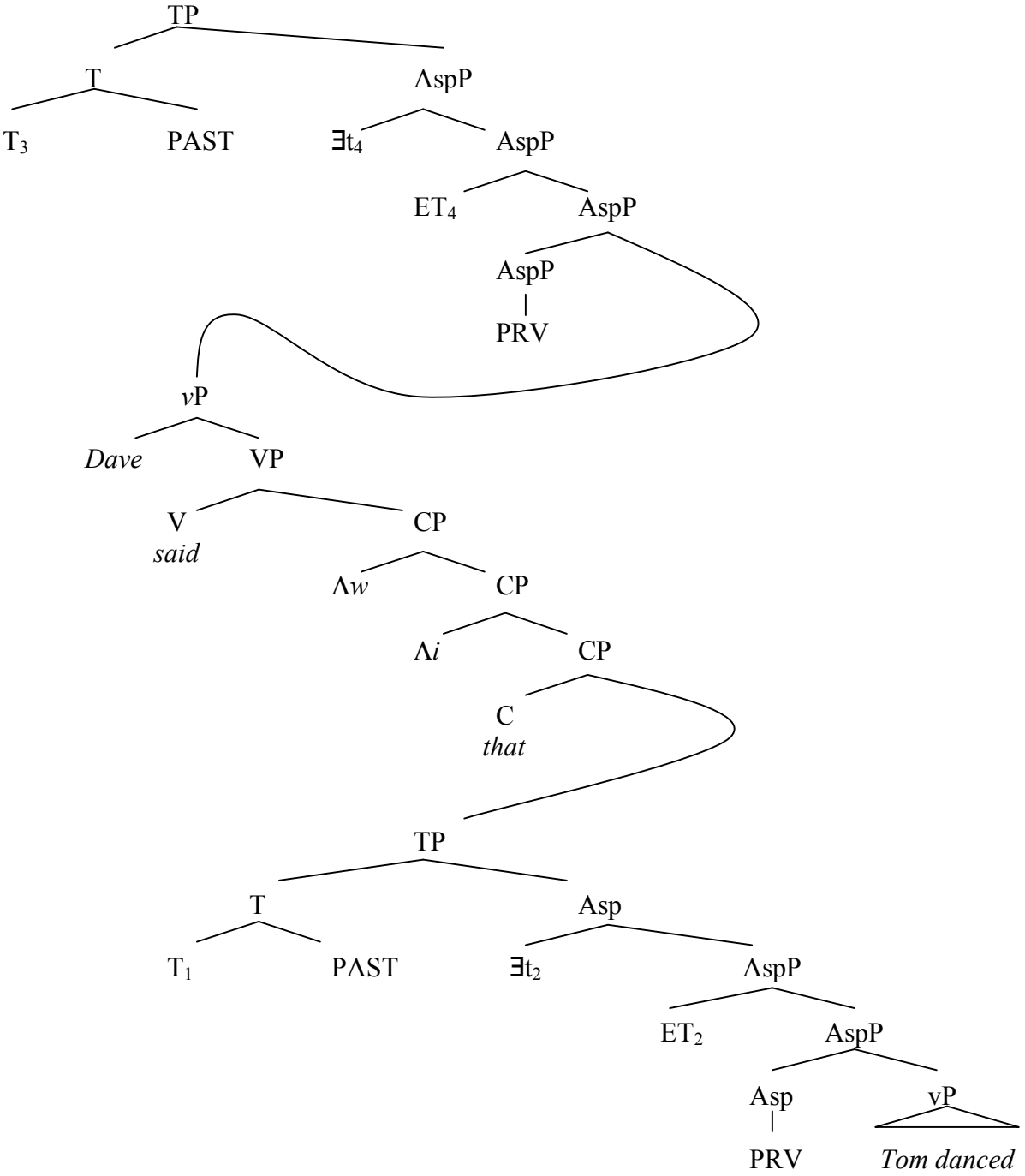
(79) **The Semantics of *Say***

$$[\![\textit{say}]\!]^{g, w, t, c} = [\lambda p_{<ist>} : [\lambda x : \forall <w',t'> \in Asrt(x,w,t) : p(<w',t'>) = T]$$

Thus, an entity *x* has *said* p at w and t *iff* p is true in all of x's asserted alternatives at w and t, which basically amounts to x having said that p is true at w and t.

We will explore these T-conditions further in just a moment. First, however, I would like to clarify the way in which a propositional attitude verb semantically composes with its clausal complement. In order for the complement clause to be of propositional type, I will assume that such clauses contain syntactic lambda operators in their left periphery (Percus 2000). These lambda operators bear the features *w* and *i*, respectively. Thus, the LF of (75) is as follows.

(80) **The Logical Form of (75)**



I will assume that lambda operators bearing the features *w* and *i* have the semantics below, whereby they serve to bind the world and time indices of the subordinate clause.

(81) **The Semantics of World and Time Lambdas**

a. $[\![\Lambda w \text{ XP }]\!]^{g, w, t, c} = [\lambda w' : [\![\text{XP }]\!]^{g, w', t, c} = T]$

b. $[\![\Lambda i \text{ XP }]\!]^{g, w, t, c} = [\lambda t' : [\![\text{XP }]\!]^{g, w, t,' c} = T]$

With this in place, the semantics of the subordinate clause *that Tom danced* in (75)/(80) will be as in (82) below.

(82) **The Semantics of Subordinate Clauses** [39]

[[*that Tom danced*]]$^{g, w, t, c}$ =

[λw' : [λt' . g(1) < t' : ∃t_2 . *g*(1) ⊃ t_2 & ∃e . dance(e,w') & Agent(e) = Tom & *T*(e) = t_2]]

As the reader is invited to confirm, because 'Λ*i*' binds the time index *i*, the presupposition contributed by PAST effectively becomes a restriction on the domain of [[Λ*i* CP]].[40] Finally, given our entry in (79), the predicted T-conditions for (80) are (essentially) those in (83).[41]

(83) **Predicted T-Conditions for (75)**

[[*Dave said that Tom danced*]]^{g,w,t,c} is defined only if *g*(3) < *t*
if defined, then it is T *iff:*

∃t_4 . *g*(3) ⊃ t_4 & ∀<w',t'> ∈ Asrt(*Dave* , w , t_4) :
g(1) < t' & ∃t_2 . *g*(1) ⊃ t_2 & ∃e . dance(e,w') & Agent(e) = Tom & *T*(e) = t_2]]

According to these T-conditions, sentence (75) is true *iff* the time g(3) preceding the UT contains a time t_4, at which all of Dave's 'asserted alternatives' <w',t'> are such that the time g(1) preceding *all* the alternative times t' contains a time t_2 which is the run-time of an event of Tom dancing at w'. Thus, all of these 'asserted alternatives' contain an event of Tom dancing *in their past*. Given the definition in (78), this means that at time t_4, Dave asserted that there was an event of Tom dancing prior to t_4. Thus, these T-conditions amount to the statement that at some past time t_4, Dave asserted that there was an event of Tom dancing prior to t_4, which does seem to match the intuitive meaning of (75).[42]

---

[39] Due to the complexity of the formulae below, I will now use subscripts on temporal variables, rather than primes.

[40] After all, for any given time *t'*, it will only be the case that [[*that Tom danced*]]$^{g, w,t', c}$ = T if g(1) < *t'*.

[41] Actually, the precise T-conditions we predict are the ones below. However, those are equivalent to (83).

(i) ∃t_4 . *g*(3) ⊃ t_4 & ∀<w',t'> ∈ Asrt(*Dave* , w , t_4) :
[λw' [λt' . g(1) < t' : ∃t_2 . *g*(1) ⊃ t_2 &
∃e . dance(e,w') & Agent(e) = Tom & *T*(e) = t_2]](<w',t'>) =T

[42] The reader may note that this semantics predicts that an utterance of (75) requires that there be two salient Topic Times: the time g(3) prior to the UT and the time g(1) prior to all Dave's asserted alternatives. Kratzer (1998) argues that this prediction is incorrect for English sentences like (75), though it is correct for their German equivalents. I will leave this important issue aside here. However, I will note in passing that embedded past perfectives in Kikuyu behave like those in English, and do not fit the pattern reported for German by Kratzer (1998).

Another potential issue for the T-conditions in (83) is that they require the embedded topic time g(1) to precede *all* the 'asserted alternatives'. Consequently, the content of Dave's assertion is predicted to contain the information that g(1) precedes the moment of speech. I am very unsure of this, and worry whether it may be too strong a condition to put on the truth of (75).

In general, I believe there are many empirical inadequacies of the semantics proposed above. However, it will suffice for our limited purposes, and will provide a relatively simple theory that builds upon the formal proposals made thus far.

Although there are many potential issues for this semantics, it does help us to understand the contrast between sentences (14) and (26), repeated below.

(84) **The Contrast Between Tense and Indexical Adverbs**

a. Dave will say that he **danced**.
b. Dave will say that he danced **yesterday.**

As noted earlier, (84a) can be true in a situation where Dave says in one week that he danced the day before, whereas (84b) can only be true if Dave says that danced one day before *the matrix utterance time*. We can now see in detail how this contrast follows the assumption that tense is semantically tied to the temporal index while adverbs like *yesterday* are tied to the context time.

To begin, note that the embedded clauses in (84a,b) will have the interpretations below.

(85) a. The Interpretation of Clausal Complement in (84a)
[[*that he danced*]]$^{g, w, t, c}$ =
[λw' : [λt' . **g(1) < t'** : ∃t_2 . $g(1) \supset t_2$
& ∃e . dance(e,w') & Agent(e) = Dave & $T(e) = t_2$]]

b. The Interpretation of Clausal Complmenet in (84b)
[[*that he danced yesterday*]]$^{g, w, t, c}$ =
[λw' : [λt' . **g(1) < t'** : ∃t_2 . $g(1) \supset t_2$ & **t_2 occurred the day before c(T)**
& ∃e . dance(e,w') & Agent(e) = Dave & $T(e) = t_2$]]

That is, as we saw in (82), the past tense in (84a,b) contributes a restriction on the domain of the embedded clause, so that it can only take as argument those pairs <w',t'> where t' follows the time embedded TT g(1). However, the adverb *yesterday* also adds the requirement that the Event Time of the proposition (the time of dancing) occur on the day prior to the context time c(T).

Given the denotations in (85), sentence (84a) will have the T-conditions in (86a), while (84b) will have those in (86b).

(86) a. The T-Conditions of (84a):
[[(84a)]]$^{g, w, t, c}$ = is defined only if $t \subseteq g(3)$
if defined, then it is T *iff:*

∃t_4 . $g(3) < t_4$ & ∀<w',t'> ∈ Asrt(*Dave* , w , t_4) :
g(1) < t' & ∃t_2 . $g(1) \supset t_2$ & ∃e . dance(e,w') & Agent(e) = Dave & $T(e) = t_2$]]

b. The T-Conditions of (84a):
[[(84b)]]$^{g, w, t, c}$ = is defined only if $t \subseteq g(3)$
if defined, then it is T *iff:*

∃t_4 . $g(3) < t_4$ & ∀<w',t'> ∈ Asrt(*Dave* , w , t_4) :
g(1) < t' & ∃t_2 . $g(1) \supset t_2$ & **t_2 occurred the day before c(T)**
& ∃e . dance(e,w') & Agent(e) = Dave & $T(e) = t_2$]]

The T-conditions in (86a) state that the TT g(3) containing the UT precedes some time t_4, at which Dave's 'asserted alternatives' <w',t'> will all have the following property: they follow the embedded TT g(1) at which in w' Dave dances. Thus, all these 'asserted alternatives' contain an event of Dave dancing *in their past*. Given (78), this means that at the future time t_4, Dave will assert that there is some time preceding t_4 where he danced. Most importantly, the T-conditions in (86a) place no constraints on where the embedded Event Time t_2 of dancing occurs. Thus, the T-conditions in (86a) would hold if Dave were to say in one week that he danced one day before.

The T-conditions in (86b), however, are stronger than those in (86a). Due to the contribution of *yesterday*, they require that the embedded Event Time t_2 of dancing occur *on the day prior to c(T)*, the matrix UT. Thus, these T-conditions will only hold if at the future time t_4, Dave asserts that there is some time before t_4 *located on the day before UT* where he danced. Thus, we predict that (86b)/(84b) will only be true if Dave asserts that he danced one day before the utterance of (84b).

We see, then, that our semantics predicts the contrast in (84) from the key difference noted earlier in the lexical entries for tense and adverbs. As repeated below, the meaning of tenses like PAST is linked to the temporal index *t* while that of adverbs like *yesterday* is linked to the context time c(T).

(87) **The Semantic Difference Between Tense and Adverbs**

a. $[\![\text{PAST}]\!]^{g, w, t, c} = [\lambda t' . t' < t : t']$
b. $[\![\text{yesterday}]\!]^{g, w, t, c} =$ [λt' : t' is on the day preceding c(T)]

Given the lexical entry in (81b), the temporal index of the subordinate clause is ultimately bound by the propositional attitude verb. Consequently, in such configurations, the meaning of an embedded tense is tied to the moment of reported speech or thought. Thus, we find that embedded tenses are able to 'shift' their evaluation time; they can be evaluated relative to the time of the *reported* utterance rather than the actual utterance. Adverbs, on the other hand, are not semantically linked to the temporal index. Consequently, their meaning can never be determined by the time of the reported speech act, and is instead always linked to that of the actual utterance.

In the section below, we will see the ways in which this reasoning is crucial for our semantic analysis of Kikuyu TRMs

5.2 Temporal Remoteness Morphemes in the Complement of Past-Tense Verbs

Let us now consider the question of why the entries in (74) tie the meaning of HOD_{PST} and HEST to the context time, rather than the temporal index. What, for example, would go wrong with the entries in (88b) below?

(88) **Possible Lexical Entries for HOD_{PST} and HEST**

a. Correct Entries

(i) $[\![\text{HEST}]\!]^{g, w, t, c} =$ [λt' . t' is on the interval $[\text{YEST}_{c(T)}$, c(T)] : t']
(ii) $[\![\text{HOD}_{\text{PST}}]\!]^{g, w, t, c} =$ [λt' . t' is on the interval $[\text{TOD}_{c(T)}$, c(T)] : t']

b. Incorrect Entries

(i) $[[\text{ HEST }]]^{g,w,t,c}$ = [λt' . t' is on the interval [YEST$_t$, t] : t']
(ii) $[[\text{ HOD}_{PST}\text{ }]]^{g,w,t,c}$ = [λt' . t' is on the interval [TOD$_t$, t] : t']

To begin, let us consider the data below.

(89) **No Shifting of Hodiernal Past**

Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I danced today."

a. Mwangi araugire ati nĩa**ra**inire.
Mwangi a-ra-ug-ire ati nĩ-a-**ra**-in-ire.
Mwangi 3sgS-HEST-say-PST.PRV that ASRT-3sgS-**HEST**-dance-PST.PRV
Mwangi said that he danced.
Judgment: True in this context. (Offered as translation of the English)

b. Mwangi araugire ati nĩainire.
Mwangi a-ra-ug-ire ati nĩ-a-∅-in-ire.
Mwangi 3sgS-HEST-say-PST.PRV that ASRT-3sgS-**HOD**-dance-PST.PRV
Mwangi said that he danced.
Judgment: *Not* true in this context.

As we see here, if Mwangi asserted one day ago that he danced on that day, an indirect report of that assertion must use *Hesternal Past* in the embedded clause, and not Hodiernal Past.

Importantly, only the entries in (88a) will predict these facts. First, consider the T-conditions that (88a) predicts for (89). As the reader is invited to confirm, they are as follows.

(90) **T-Conditions for (89a,b) Predicted by (88a)** [43]

a. Predicted T-Conditions for (89a)

$[[\text{ (89a) }]]^{g,w,t,c}$ = is defined only if g(3) < t If defined, then it is T *iff:*

$\exists t_4$. **t_4 is on the interval [YEST$_{c(T)}$, c(T)]** & $g(3) \supset t_4$ &
$\forall \langle w',t' \rangle \in$ Asrt(*Mwangi* , w , t_4) :
g(1) < t' & $\exists t_2$. **t_2 is on the interval [YEST$_{c(T)}$, c(T)]** & $g(1) \supset t_2$
& $\exists$e . dance(e,w') & Agent(e) = Mwangi & T(e) = t_2]]

[43] These T-conditions assume an LF for (89a,b) where the matrix T node bears index '3' and the embedded T bears index '1'.

b. Predicted T-Conditions for (89b)

[[(89b)]]$^{g, w, t, c}$ = is defined only if g(3) < *t* If defined, then it is T *iff:*

$\exists t_4$. **t_4 is on the interval [YEST$_{c(T)}$, c(T)]** & $g(3) \supset t_4$ &
$\forall$<w',t'> $\in$ Asrt(*Mwangi* , w , t_4) :
g(1) < t' & $\exists t_2$. **t_2 is on the interval [TOD$_{c(T)}$, c(T)]** & $g(1) \supset t_2$
& $\exists$e . dance(e,w') & Agent(e) = Mwangi & *T*(e) = t_2]]

The T-conditions in (90a) hold if at some time t_4 on the day preceding c(T), Mwangi asserted that there was some time t_2 *also falling on the day before c(T)* that preceded t_4 and was the run-time of an event of Mwangi dancing.[44] In other words, (90a) holds if Mwangi asserted at t_4 that there was an event of Mwangi dancing that occurred earlier that same day. Thus, our account correctly predicts that (89a) will be true in the situation described.

On the other hand, the T-conditions in (90b) hold if at some time t_4 on the day preceding c(T), Mwangi asserted that there was some time t_2 *falling on the day of the c(T)* that was the run-time of an event of Mwangi dancing. That is, (90b) holds if Mwangi asserted at t_4 that there was an event of Mwangi dancing that occurred *on the day when (89b) is uttered*. Since Mwangi made no such assertion in the scenario under (89), we correctly predict that (89b) is false there.

Now let us consider the T-conditions predicted by the entries in (88b). As shown below, the predictions made by those entries are completely opposite to the observed facts.

(91) **T-Conditions for (89a,b) Predicted by (88b)**

a. Predicted T-Conditions for (89a)
[[(89a)]]$^{g, w, t, c}$ = is defined only if g(3) < *t* If defined, then it is T *iff:*

$\exists t_4$. **t_4 is on the interval [YEST$_t$, t]** & $g(3) \supset t_4$ &
$\forall$<w',t'> $\in$ Asrt(*Mwangi* , w , t_4) :
g(1) < t' & $\exists t_2$. **t_2 is on the interval [YEST$_{t'}$, t']** & $g(1) \supset t_2$
& $\exists$e . dance(e,w') & Agent(e) = Mwangi & *T*(e) = t_2]]

b. Predicted T-Conditions for (89b)
[[(89b)]]$^{g, w, t, c}$ = is defined only if g(3) < *t* If defined, then it is T *iff:*

$\exists t_4$. **t_4 is on the interval [YEST$_t$, t]** & $g(3) \supset t_4$ &
$\forall$<w',t'> $\in$ Asrt(*Mwangi* , w , t_4) :
g(1) < t' & $\exists t_2$. **t_2 is on the interval [TOD$_{t'}$, t']** & $g(1) \supset t_2$
& $\exists$e . dance(e,w') & Agent(e) = Mwangi & *T*(e) = t_2]]

The T-conditions in (91a) hold if at some time t_4 on the day preceding the matrix UT, Mwangi asserted that there was some time t_2 *falling on the day before* t_4 that was the run-time of an event of Mwangi dancing. In other words, (91a) holds if Mwangi asserted at t_4 that there was an event

[44] From now on, in my informal statements of truth-conditions, I will implicitly give TRMs the strengthened interpretation they would receive from Maximize Presuppositions.

of Mwangi dancing that occurred on the day *before* t_4. Since Mwangi made no such assertion in the scenario under (89), the entries in (88b) incorrectly predict that (89a) is false in that scenario.

Furthermore, those entries in (88b) incorrectly predict that (89b) will be true in that scenario. The T-conditions predicted in (91b) hold if at some time t_4 on the day preceding c(T), Mwangi asserted that there was some time t_2 *falling on the same day as* t_4 that was the run-time of an event of Mwangi dancing. Thus, (91b) holds if Mwangi asserted at t_4 that there was an event of Mwangi dancing that occurred *on the day surrounding* t_4, the time of his utterance. Since Mwangi *did* make such an assertion in the scenario under (89), the entries in (88b) incorrectly predict that (89b) is true there.

In summary, the facts in (89) demonstrate that, like the adverbs *yesterday* and *today*, the meaning of the TRMs HEST and HOD_{PST} are always tied to the actual utterance time of the main clause, and never to the moment of reported speech/thought. For this reason, our entries in (88a) are correct to tie their meaning to c(T), rather than to the temporal index. This inability to 'shift' their meaning to the time of reported speech is a very general feature of the TRMs HOD_{PST}, HEST and PHEST. As shown below, the general pattern in (89) also holds for clauses embedded under PHEST verbs.

(92) **No Shifting of Hodiernal Past**

Situation: Our friend Mwangi speaks only English. Two days ago, he said literally the following: "I danced today."

a. Mwangi āugire afi nīāinire.
Mwangi a-a-ug-ire afi nī-a-**a**-in-ire.
Mwangi 3sgS-PHEST-say-PST.PRV that ASRT-3sgS-**PHEST**-dance-PST.PRV
Mwangi said that he danced.
Judgment: True in this context. (Offered as translation of the English)

b. Mwangi āugire afi nīainire.
Mwangi 3sgS-PHEST-say-PST.PRV that ASRT-3sgS-**HOD**-dance-PST.PRV
Mwangi said that he danced.
Judgment: *Not* true in this context.

The truth of (92a) in the situation described shows that the meaning of PHEST is likewise determined by the actual utterance time, rather than the moment of reported speech, as predicted by the entry in (74a). Moreover, the data in (93) and (94) further confirm that the meaning of HEST can never 'shift' to the moment of reported speech.[45]

[45] It is not possible to test the prediction that PHEST can *never* 'shift' its evaluation point to the moment of reported speech. For reasons that will be made clear in the next section, this could only ever be tested by examining PHEST in the complement of a past-tense verb. However, if at some past time *t* an asserted event occurred at least two days prior to *t*, then that event will have also occurred at least two days prior to the present time. Thus, even under our semantics in (74a), any past assertion containing PHEST can be reported using PHEST in the embedded clause.

(93) **No Shifting of Hesternal Past**

Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I danced yesterday."

a. Mwangi araugire atĩ nĩā**i**nire.
Mwangi 3sgS-HEST-say-PST.PRV that ASRT-3sgS-**PHEST**-dance-PST.PRV
Mwangi said that he danced.
Judgment: True in this context. (Offered as translation of the English)

b. Mwangi araugire atĩ nĩa**ra**inire.
Mwangi 3sgS-HEST-say-PST.PRV that ASRT-3sgS-**HEST**-dance-PST.PRV
Mwangi said that he danced.
Judgment: *Not* true in this context.

(94) **No Shifting of Hesternal Past**

Situation: Our friend Mwangi speaks only English. Two days ago, he said literally the following: "I danced yesterday."

a. Mwangi āugire atĩ nĩā**i**nire.
Mwangi 3sgS-PHEST-say-PST.PRV that ASRT-3sgS-**PHEST**-dance-PST.PRV
Mwangi said that he danced.
Judgment: True in this context. (Offered as translation of the English)

b. Mwangi āugire atĩ nĩa**ra**inire.
Mwangi 3sgS-PHEST-say-PST.PRV that ASRT-3sgS-**HEST**-dance-PST.PRV
Mwangi said that he danced.
Judgment: *Not* true in this context.

The reader may note that all the sentences in (89)-(94) contain *kũuga* 'say' as the main verb. As the data below illustrate, these patterns can also be replicated for sentences where the embedded clauses are complement to other propositional attitude verbs.

(95) **No Shifting of HEST/PHEST Below *Gũĩcĩria* 'Think'**

Situation: We were at a party on two days ago. At that party, someone just walked up and kissed Wambui. At first, since it was so dark, she had no idea who it was. Then, yesterday, she heard that Kamau wanted to apologize to her. She drew the conclusion that Kamau was the one who kissed her. Today, though, she learned that Mwangi was actually the one who kissed her, and Kamau wanted to apologize for something else.

a. Ira, Wambui arĩcĩragia ati Kamau
Ira Wambui a-ra-ĩcĩria-aga ati Kamau
Yesterday Wambui 3sgS-HEST-think-PST.IMP that Kamau

wamũmumunyire.
u-**a**-mũ-mumuny-ire
3sgS-**PHEST**-3sgO-kiss-PST.PRV

Yesterday, Wambui thought that Kamau kissed her.
Judgment: True in this context (Offered as translation of the English)

b. Ira, Wambui arĩcĩragia ati Kamau
Yesterday Wambui 3sgS-HEST-think-PST.IMP that Kamau

u**ra**mũmumunyire.
u-**ra**-mũ-mumuny-ire
3sgS-**HEST**-3sgO-kiss-PST.PRV

Yesterday, Wambui thought that Kamau kissed her.
Judgment: Not true in this context.

In the scenario sketched under (95), the imagined event of kissing took place one day prior to Wambui's event of thinking. Thus, if HEST could be interpreted relative to the moment of reported thought, then (95b) should allow for a true reading. That it cannot, and that only (95a) is true, supports the conclusion that the meanings of PHEST and HEST are always determined by the matrix utterance time. The data in (96) demonstrate that this also holds for complements to the verb *kũmeny* 'learn'.

(96) **No Shifting of HEST/PHEST Below *Kũmeny* 'Learn'**

Situation: We were at a party two days ago. At that party, someone just walked up and kissed Wambui. At first, since it was so dark, she had no idea who it was. Then, yesterday, she learned that Mwangi was indeed the person who kissed her.

a. Ira, Wambui aramenyire ati Kamau
Ira Wambui a-ra-meny-ire ati Kamau
Yesterday Wambui 3sgS-HEST-learn-PST.PRV that Kamau

wamũmumunyire.
3sgS-**PHEST**-3sgO-kiss-PST.PRV

Yesterday, Wambui learned that Kamau kissed her.
Judgment: True in this context (Offered as translation of the ENglish)

b. Ira, Wambui aramenyire ati Kamau
Yesterday Wambui 3sgS-HEST-learn-PST.PERF that Kamau

uramũmumunyire.
3sgS-**HEST**-3sgO-kiss-PST.PRV
Yesterday, Wambui thought that Kamau kissed her.
Judgment: Not true in this context.

We should also note that TRMs within relative clauses behave similarly. When modifying the complements of past-tense verbs, TRMs in relative clauses are still semantically tied to the time of the actual utterance, and not the predication time of the event described in the main clause.

(97) **No Shifting of HEST/PHEST in Relative Clauses**

Situation: We were at a party two days ago. At that party, some man just walked up and kissed Wambui. We didn't know who he was, and he walked off soon afterwards. Yesterday, Mwangi saw the man who kissed Wambui the day before.

a. Ira, Mwangi ñiaronire mũndũ
Ira Mwangi ñĩ-a-ra-on-ire mũndũ
yesterday Mwangi ASRT-3sgS-HEST-see-PST.PRV person

ũria wamumunyire Wambui
that 3sgS-**PHEST**-kiss-PST.PRV Wambui

Yesterday, Mwangi saw the man who kissed Wambui.
Judgment: True in this context (Offered as translation of the English)

b. Ira, Mwangi ñiaronire mũndũ
yesterday Mwangi ASRT-3sgS-HEST-see-PST.PRV person

ũria uramumunyire Wambui
that 3sgS-**HEST**-kiss-PST.PRV Wambui

Yesterday, Mwangi saw the man who kissed Wambui.
Judgment: Not true in this context.

Thus, we find that the behavior of the TRMs in (89)-(94) is no mere quirk of the Kikuyu verb for 'say'. Moreover, we can also note that it is no mere quirk of the perfective aspect found on the main verb in those sentences. In sentence (95), the main verb bears imperfective aspect, and the TRMs are found to behave no differently. Moreover, in the sentences below, the main verbs bear perfect aspect, and we find that the embedded HEST and PHEST still do not 'shift' their meaning to the time of the reported speech.

(98) **No Shifting of HEST/PHEST in the Complement to Verbs Bearing Perfect Aspect**

Situation: Two days ago, we were at a party. At that party, Mwangi kissed Wambui. It was a mistake, but luckily she didn't recognize him because it was so dark. We told Mwangi not to tell Wambui that it was him, and to simply let the matter alone. Yesterday, though, he said he was going to confess. We ran over to his house to stop him, but by the time we got there, he had already confessed.

a. Rĩĩria tũrakinyire kwa Mwangi,
rĩĩria tũ-ra-kiny-ire kwa Mwangi
when 1plS-HEST-come-PST.PRV of Mwangi

nĩarĩrĩ**ĩte** Wambui aĩ
nĩ-a-ra-ĩr-**ĩte** Wambui aĩ
ASRT-3sgS-HEST-tell-**PERF** Wambui that

nĩāmũmumunyire
nĩ-a-**a**-mũ-mumuny-ire
ASRT-3sgS-**PHEST**-3sgO-kiss-PST.PRV

When we arrived at Mwangi's (house), he had told Wambui that he kissed her.
Judgment: True in this context (Offered as translation of the English)

b. Rĩĩria tũrakinyire kwa Mwangi,
when 1plS-HEST-come-PST.PRV of Mwangi

nĩarĩrĩ**ĩte** Wambui aĩ
ASRT-3sgS-HEST-tell-**PERF** Wambui that

nĩaramũmumunyire
nĩ-a-**ra**-mũ-mumuny-ire
ASRT-3sgS-**HEST**-3sgO-kiss-PST.PRV

When we arrived at Mwangi's (house), he had told Wambui that he kissed her.
Judgment: Note true in this context.

Finally, we should also consider the behavior of TRMs in the complements of future-tense verbs. However, we will delay discussion of these cases until the next subsection, where we will see that some very puzzling patterns arise.

Thus far, we've seen that the meaning of HOD_{PST}, HEST and PHEST is always tied to the actual utterance time of the main clause, a fact predicted by their lexical entries in (74), repeated below.

(99) **The Formal Semantics of Kikuyu TRMs**

a. $[\![\text{PHEST}]\!]^{g, w, t, c}$ = [λt' . t' is on the interval (_ , c(T)] : t']
b. $[\![\text{HEST}]\!]^{g, w, t, c}$ = [λt' . t' is on the interval [$\text{YEST}_{c(T)}$, c(T)] : t']
c. $[\![\text{HOD}_{\text{PST}}]\!]^{g, w, t, c}$ = [λt' . t' is on the interval [$\text{TOD}_{c(T)}$, c(T)] : t']
d. $[\![\text{HOD}_{\text{FUT}}]\!]^{g, w, t, c}$ = [λt' . t' is on the interval [t , TOD_t] : t']
e. $[\![\text{PHOD}]\!]^{g, w, t, c}$ = [λt' . t' is on the interval [t , _) : t']
f. $[\![\text{IMM}]\!]^{g, w, t, c}$ = [λt' . t' is on the interval [JUST_t , t] : t']

It is notable, however, that the other three lexical entries in (99) tie the meaning of the TRM to the temporal index *t*. Thus, our entries for IMM, HOD_{FUT}, and PHOD predict that, unlike the TRMs we've just seen, they *should* shift their meaning in embedded clauses.

As odd as this prediction might seem, these do appear to be the facts. For example, the data below demonstrate the accuracy of our entry for IMM in (99f).

(100) **Shifting of Immediate Past**

a. Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I just danced."

Mwangi	araugire	aĩ
Mwangi	3sgS-HEST-say-PST.PRV	that

nĩãina.
ASRT-3sgS-**IMM.PST.PRV-**dance-FV
Mwangi said that he danced.
Judgment: True in this context. (Offered as translation of the English)

b. Situation: Our friend Mwangi speaks only English. Two days ago, he said literally the following: "I just danced."

Mwangi	āugire	aĩ
Mwangi	3sgS-PHEST-say-PST.PRV	that

nĩãina.
ASRT-3sgS-**IMM.PST.PRV-**dance-FV
Mwangi said that he danced.
Judgment: True in this context. (Offered as translation of the English)

As the reader is invited to confirm, our semantics predicts that sentence (100a) should receive the T-conditions below.

(101) **T-Conditions Predicted for (100a)** [46]

$[\![(100a)]\!]^{g, w, t, c}$ = is defined only if $g(3) < t$
if defined, then it is T *iff:*

$\exists t_4$. t_4 is on the interval $[YEST_{c(T)}$, c(T)] & $g(3) \supset t_4$ &
$\forall$<w',t'> $\in$ Asrt(*Mwangi* , w , t_4) :
g(1) < t' & $\exists t_2$. **t_2 is on the interval [$JUST_{t'}$, *t'*]** & $g(1) \supset t_2$
& $\exists$e . dance(e,w') & Agent(e) = Mwangi & $T(e) = t_2$]]

Thus, our semantics predicts that (100a) will be T *iff* at some time t_4 on the day prior to the utterance of (100a), all of Mwangi's 'asserted alternatives' <w',t'> have the following property: they follow the time g(1) which contains a time t_2 *that is just prior to t'*, and that is the run-time of an event of Mwangi dancing in w'. Given the nature of 'asserted alternatives', this amounts to the condition that at the time t_4, Mwangi asserted that there is some time *just prior to* t_4 where Mwangi danced. Since those circumstances indeed hold in the scenario paired with (100a), we correctly predict that (100a) is T in that scenario. A comparable demonstration can be made to establish that our semantics correctly predicts the facts in (100b). Finally, as the reader is invited to confirm, if we were to assign IMM a semantics akin to that of HEST, where its meaning is tied to c(T) rather than the temporal index t, we would wrongly predict that (100a,b) are false in their associated scenarios.

Our semantics for HOD_{FUT}, and PHOD is also correct to tie their meaning to the temporal index *t*, as the data below demonstrate.

(102) **Shifting of Hodiernal Future**

a. Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I will dance today."

Mwangi araugire afi **nĩekũ**ina.
Mwangi 3sgS-HEST-say-PST.PRV that ASRT-3sgS-**HOD**-FUT-dance-FV
Mwangi said that he would dance.
Judgment: True in this context. (Offered as translation of the English)

b. Situation: Our friend Mwangi speaks only English. Two days ago, he said literally the following: "I will dance today."

Mwangi āugire afi **nĩekũ**ina.
Mwangi 3sgS-PHEST-say-PST.PRV that ASRT-3sgS-**HOD**-FUT-dance-FV
Mwangi said that he would dance.
Judgment: True in this context. (Offered as translation of the English)

[46] As before, these T-conditions assume an LF for (100a) where the matrix T bears index 3 and the embedded T bears index 1.

(103) **Shifting of Post-Hodiernal Future**

a. Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I will dance tomorrow."

Mwangi araugire afĩ nĩa**ka**ina.
Mwangi 3sgS-HEST-say-PST.PRV that ASRT-3sgS-**PHOD**-FUT-dance-FV
Mwangi said that he would dance.
Judgment: True in this context. (Offered as translation of the English)

b. Situation: Our friend Mwangi speaks only English. Two days ago, he said literally the following: "I will dance tomorrow."

Mwangi āugire afĩ nĩa**ka**ina.
Mwangi 3sgS-PHEST-say-PST.PRV that ASRT-3sgS-**PHOD**-FUT-dance-FV
Mwangi said that he would dance.
Judgment: True in this context. (Offered as translation of the English)

As one illustrative case, let us consider the T-conditions predicted for (102a). Given our entry in (99d), our system predicts the following.[47]

(104) **T-Conditions Predicted for (102a)**

$[\![\text{(102a)}]\!]^{g, w, t, c}$ = is defined only if $g(3) < t$
if defined, then it is T *iff:*

$\exists t_4$. t_4 is on the interval $[\text{YEST}_{c(T)}, c(T)]$ & $g(3) \supset t_4$ &
$\forall \langle w', t' \rangle \in \text{Asrt}(\textit{Mwangi}, w, t_4)$:
$t' \subseteq g(1)$ & $\exists t_2$. **t_2 is on the interval $[t', \text{TOD}_{t'}]$** & $g(1) < t_2$
& $\exists e$. dance(e,w') & Agent(e) = Mwangi & $T(e) = t_2$]]

According to these T-conditions, sentence (102a) is T *iff* at some time t_4 on the day prior to the utterance of (102a), all of Mwangi's 'asserted alternatives' <w',t'> have the following property: they are contained the time g(1) which is followed by a time t_2 *that is within the day of t'*, and that is the run-time of an event of Mwangi dancing in w'. Thus, these T-conditions hold if Mwangi asserted at t_4 that there is some time *after* t_4 *but within the day of* t_4 where Mwangi dances. Since Mwangi did make such an assertion in the scenario paired with (100a), we correctly predict its truth there. Again, similar demonstrations can be made that our system captures the data in (100b), and (101a,b).

Finally, I will note in passing that, since our system ties the meaning of the adverbs *ũmũthĩ* 'today' and *rũciũ* 'tomorrow' to the context time c(T) and not the temporal index, we successfully predict the falsity of the sentences below.

[47] The T-conditions in (104) would be derived from an LF where the embedded clause bears PRES tense, FUT aspect and HOD_{FUT} as the TRM. The assumed LF would also have index 3 on the matrix T and index 1 on the embedded T.

(105) **No Shifting of The Adverb *Ʊmũthĩ* 'Today'**

a. Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I will dance today."

Mwangi	araugire	afĩ
Mwangi	3sgS-HEST-say-PST.PRV	that

nĩe**kũ**ina	ũmũthĩ
ASRT-3sgS-**HOD**-FUT-dance-FV	today

Mwangi said that he would dance today
Judgment: Not true in this context.

b. Situation: Our friend Mwangi speaks only English. Two days ago, he said literally the following: "I will dance today."

Mwangi	āugire	afĩ
Mwangi	3sgS-PHEST-say-PST.PRV	that

nĩe**kũ**ina.	ũmũthĩ
ASRT-3sgS-**HOD**-FUT-dance-FV	today

Mwangi said that he would dance today
Judgment: Not true in this context.

(106) **No Shifting of The Adverb *Rũciũ* 'Tomorrow'**

a. Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I will dance tomorrow."

Mwangi	araugire	afĩ
Mwangi	3sgS-HEST-say-PST.PRV	that

nĩa**ka**ina	rũciũ
ASRT-3sgS-**PHOD**-FUT-dance-FV	tomorrow

Mwangi said that he would dance today
Judgment: Not true in this context.

b. Situation: Our friend Mwangi speaks only English. Two days ago, he said literally the following: "I will dance tomorrow."

Mwangi	āugire	afĩ
Mwangi	3sgS-PHEST-say-PST.PRV	that

nĩa**ka**ina.	rũciũ
ASRT-3sgS-**PHOD**-FUT-dance-FV	tomorrow

Mwangi said that he would dance today

Judgment: Not true in this context.

It is apparent from the facts examined above that different TRMs behave differently in embedded clauses. Although PHEST, HEST and HOD_{PST} must derive their interpretation from the utterance time of the sentence, IMM, PHOD and HOD_{FUT} derive their interpretation from the time of the reported speech act. This disparity is perhaps the most surprising in regards to the Hodiernal forms. Although HOD_{FUT} and HOD_{PST} are (mostly) morphologically identical, their differing behavior in embedded clauses suggests they must be semantically distinguished.[48] It would, of course, be attractive to derive these observed differences from the semantics of the aspect heads they appear with, but at the moment it is unclear how this can be achieved.[49] Consequently, it seems we are forced to simply stipulate this curious effect of tense-aspect upon the 'shift-ability' of HOD.

Before we conclude this section, let us briefly consider the behavior of present imperfectives in embedded clauses. As in many languages, embedded present imperfectives in Kikuyu exhibit a 'shifted' interpretation.

(107) **Shifting of Present Imperfectives**

a. Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I am dancing now."

Mwangi	araugire	atĩ	nĩa**ra**ina.
Mwangi	3sgS-HEST-say-PST.PRV	that	ASRT-3sgS-**PRS.IMP**-dance-FV

Mwangi said that he was dancing.

Judgment: True in this context. (Offered as translation of the English)

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[48] It might be observed, however, that the actual allomorph realizing HOD in (89)-(92) differs from that in (102). Lest one think this is significant, we will see in Section 6 that Hodiernal Past imperfectives, which also bear the allomorph *kũ*, share with Hodiernal Past perfectives the inability to 'shift' the evaluation point of the TRM. The following illustrates.

(i) Situation: Our friend Mwangi speaks only English. Yesterday, he said "I was dancing today."

a.

Mwangi	araugire	atĩ	nĩa**ra**inaga
Mwangi	3sgS-HEST-say-PST.PRV	that	ASRT-3sgS-HEST-dance-PST.IMP

Mwangi said that he was dancing.

Judgment: True in this context. (Offered as translation of the English.)

b.

Mwangi	araugire	atĩ	nĩe**kũ**inaga
Mwangi	3sgS-HEST-say-PST.PRV	that	ASRT-3sgS-HOD-dance-PST.IMP

Mwangi said that he was dancing.

Judgment: *Not* true in this context.

[49] We will see in the following subsection that *future* tense verbs trigger the 'shifting' of all TRMs in their complements, even PHEST, HEST, and HOD_{PST}. It would be highly desirable to link this to the facts in (102) and (103). However, as stated above, it is not clear to me at present how this can be done.

b. Situation: Our friend Mwangi speaks only English. Two days ago, he said literally the following: "I am dancing now."

Mwangi āugire aťi nĩa**ra**ina.
Mwangi 3sgS-PHEST-say-PST.PRV that ASRT-3sgS-**PRS.IMP**-dance-FV
Mwangi said that he was dancing.
Judgment: True in this context. (Offered as translation of the English)

As briefly stated in Section 2, I assume that present imperfective verbs in Kikuyu do not contain any TRMs. Thus, they contain only the tense PRES and the aspect IMP. With these assumptions, we easily predict the data in (107). As the reader can confirm, sentence (107a) is predicted to have the T-conditions in (108) below.

(108) **T-Conditions Predicted for (107a)** [50]

[[(107a)]] $^{g, w, t, c}$ = is defined only if g(3) < *t* If defined, then it is T *iff:*

$\exists t_4$. t_4 is on the interval [$YEST_{c(T)}$, c(T)] & *g*(3) $\supset$ t_4 &
$\forall$<w',t'> $\in$ Asrt(*Mwangi* , w , t_4) :
t' $\subseteq$ g(1) & $\exists t_2$. *g*(1) $\subseteq$ t_2
& $\exists$e . dance(e,w') & Agent(e) = Mwangi & *T*(e) = t_2]]

Thus, (107a) is predicted to be T *iff* at time t_4, Mwangi asserted that t_4 was contained within the embedded TT g(1), which was in turn contained within a time t_2 that is the run-time of an event of him dancing. Therefore, (107a) is predicted to be T *iff* Mwangi asserted at t_4 that he was dancing at t_4, and so is correctly predicted to be T in the scenario provided for (107a).[51]

5.3 Temporal Remoteness Morphemes in the Complement of Future-Tense Verbs

In the preceding section, we saw that the temporal remoteness morphemes HEST and HOD_{PST} in the complement of a past-tense verb cannot 'shift' their interpretation to the moment of reported speech. Amazingly, when in the complement of future-tense verbs, such shifting *does* become possible for these TRMs. The facts below illustrate.

(109) **Shifting of HOD_{PST} When Complement to Future-Tense Verb**

Situation: Our friend Mwangi speaks only English. Tomorrow, he is sure to say the following: "I danced today."

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[50] Again, I assume an LF where matrix T bears index 3 and embedded T bears index 1.

[51] As might be expected from the facts in (107), 'present-under-past' in Kikuyu does not exhibit the so-called 'double access reading' that is obligatory for such structures in English. The following illustrates.

(i) Mwaka mũthiru, Mwangi āĩcĩragia aťi Wambui nĩ mũrĩtũ.
year last Mwangi 3sgS-PHEST-think-PST.IMP that Wambui is.PRES pregnant
Last year, Mwangi thought that Wambui was pregnant.
Judgment: Coherent and an accurate translation of English sentence above.

Mwangi	akauga	ati	ɲiainire.
Mwangi	a-ka-∅-ug-a	ati	ɲi-a-∅-in-ire
Mwangi	3sgS-PHOD-FUT-say-FV	that	ASRT-3sgS-**HOD**-dance-PST.PRV

Mwangi will say that he danced.

Judgment: True in this context. (Offered as translation of the original English.)

(110) **Shifting of HEST When Complement to Future-Tense Verb**

Situation: Our friend Mwangi speaks only English. Tomorrow, he is sure to say the following: "I danced yesterday."

Mwangi	akauga	ati	ɲia**ra**inire.
Mwangi	a-ka-∅-ug-a	ati	ɲi-a-**ra**-in-ire
Mwangi	3sgS-PHOD-FUT-say-FV	that	ASRT-3sgS-**HEST**-dance-PST.PRV

Mwangi will say that he danced.

Judgment: True in this context. (Offered as translation of the original English.)

The reader is invited to confirm that our current system would not predict the data above. Instead, it would predict that (*e.g.*) sentence (109) would only be T if Mwangi asserts at a time t_4 tomorrow that he danced at some time preceding t_4 and falling on *the day of the matrix utterance time*. Since the situation paired with (109) does not conform to that condition, our semantics wrongly predicts that (109) should be false in its associated context.

We therefore find that our semantics in (99), which ties the meaning of HEST and HOD_{PST} to c(T), is directly challenged by the ability of these TRMs to shift their interpretation in the complement of future-tense verbs. Importantly, however, our semantics for the temporal adverbs in (37), which also ties their meaning to c(T), correctly predicts those adverbs to *not* shift their interpretation in these structures. That is, unlike (109)-(110), sentences (111)-(112) are reported *not* to be licit in their associated scenarios.

(111) **No Shifting of *ũmũthĩ* 'Today' When Complement to Future-Tense Verb**

Situation: Our friend Mwangi speaks only English. Tomorrow, he is sure to say the following: "I danced today."

Mwangi	akauga	ati	ɲiainire	ũmũthĩ
Mwangi	3sgS-PHOD-FUT-say-FV	that	ASRT-3sgS-**HOD**-dance-PST.PRV	today

Mwangi will say that he danced today.

Judgment: *Not* true in this context.[52]

[52] Speakers report, moreover, that there is no sensible interpretation of (111). In order to 'correct' the sentence to one with a sensible interpretation, one must convert it to a direct speech report, by changing the verb to *nĩndĩinire* 'I danced', removing *atĩ* 'that', and enclosing the entire subordinate sentence in quotation marks.

(112) **No Shifting of *Ira* 'Yesterday ' When Complement to Future-Tense Verb**

Situation: Our friend Mwangi speaks only English. Tomorrow, he is sure to say the following: "I danced yesterday."

Mwangi akauga afĩ nĩa**ra**inire ira
Mwangi 3sgS-PHOD-FUT-say-FV that ASRT-3sgS-**HEST**-dance-PST.PRV yesterday
Mwangi will say that he danced yesterday.
Judgment: *Not* true in this context.[53]

The contrast between (109)-(110) and (111)-(112) effectively shows that the parameters of semantic evaluation we currently assume – *g, w, t, c* – are too narrow. Under our current assumptions, there are two temporal parameters that can determine the interpretation of a lexical item: the index *t* and the context time c(T). In the previous section, we saw that the interpretation of HEST and HOD_{PST} should not be tied to the temporal index *t*; such a semantics would wrongly predict those TRMs to always shift their interpretation in any complement clause. On the other hand, tying their interpretation to c(T) wrongly predicts that these TRMs *never* shift their interpretation to the time of reported speech. Of course, such a prediction is correct for temporal adverbs like *ũmũthĩ* and *ira*, which validates our semantics in (37). We are therefore forced to conclude that the meaning of HEST and HOD_{PST} is tied to neither the index *t* nor the (matrix) context time c(T). Thus, we must posit an additional temporal parameter to our evaluation function.

Following Schlenker (2003, 2010) and many others, I will assume that natural language contains operators that are able to bind the contextual parameter *c*. Thus, elements whose meanings are tied to *c* can sometimes appear to be bound by other operators in the sentence. Of course, there are certain context-dependent expressions whose meaning seems never to shift in this way, such as *yesterday* in English or *ira* in Kikuyu. Schlenker (2003, 2010) proposes that such expressions are stipulated in the lexicon to not be interpretable relative to a bound contextual parameter. I will follow suit, but will implement this key idea in fashion somewhat different from Schlenker (2003, 2010).[54] I will assume that interpretation is relative to *five* parameters: a variable assignment *g*, a world index *w*, a time index *t*, an 'intermediate' context *c*, and a matrix context *c**. Furthermore, I assume that at the root node, the 'intermediate' context *c* is equal to the matrix context *c**, and the temporal index *t* is equal to *c*(T) (= *c**(T)). Finally, I

[53] Again, speakers report that (112) does not really have a sensible interpretation. If the adverb is to be kept, then the sentence must be converted to a direct speech report.

[54] There are two main ways in which the system proposed here differs from that in Schlenker (2003, 2010). The first is that Schlenker makes use of object-language variables/pronouns over contexts. Although empirically necessary, such pronouns introduce complications that are not necessary in the present study.

The second, more interesting deviation from Schlenker (2003, 2010) is that he does not make use of a separate temporal index *t*. Rather, the work of that temporal index is done by the binding of the context parameter *c*. Unfortunately, as Schlenker himself notes (2003: 74), such a system predicts only two classes of elements: ones whose meaning is always determined by matrix utterance time, and those that can freely shift their interpretation in embedded contexts. As noted above, however, there are *three* classes of items in Kikuyu: the two predicted by Schlenker (2003, 2010), and those elements that can shift *only under future tense verbs* (*e.g.*, HEST). Thus, we are forced to make a three-way distinction between the temporal index *t* (bound by propositional attitude verbs), the 'intermediate' context parameter *c* (bound by future tense), and the parameter *c**, which is never bound.

assume that any 'context-shifting' operators only ever bind the 'intermediate' context parameter *c*; binding of the parameter *c** is not linguistically possible.

With these assumptions in place, let us consider the following amendment to our semantics for Future aspect.

(113) **New 'Context-Shifting' Semantics for FUT**

$$[\![\text{FUT XP}]\!]^{g, w, t, c, c^*} = [\lambda t'' : [\lambda t' : t' < t'' \ \& \ \exists c' . c'(T) = t'' \ \& \ [\![XP]\!]^{g, w, t, c', c^*}(t'') = T]$$

According to (113), relative to a context *c*, the interpretation of FUT and its vP complement is a relation that holds between times t' and t'' *iff* t' precedes t'', there is some context c' such that t'' is the time of that context (c'(T)), and [[vP]] interpreted relative to that context c' is true of t''.

In a moment, we will see this amended semantics at play in some illustrative sentences. First, though, let us also amend our semantics for temporal adverbs in the following way.

(114) **New Semantics for Temporal Adverbs**

a. $[\![\textit{ira} / \text{yesterday}]\!]^{g, w, t, c, c^*} = [\lambda t' : t' \text{ is on the day preceding } c^*(T)]$

b. $[\![\textit{ũmũthĩ} / \text{today}]\!]^{g, w, t, c, c^*} = [\lambda t' : t' \text{ is on the day surrounding } c^*(T)]$

c $[\![\textit{kamũira ira} / \text{before yesterday}]\!]^{g, w, t, c, c^*} =$
$[\lambda t' : t' \text{ precedes the day preceding } c^*(T)]$

d. $[\![\textit{mũthenya} \ldots \textit{ũmũthĩ} / \text{some day after today}]\!]^{g, w, t, c, c^*} =$
$[\lambda t' : t' \text{ follows the day surrounding } c^*(T)]$

Thus, we assume that temporal adverbs are interpreted relative to the matrix context c*. As we'll see in a moment, this correctly predicts that these adverbs will not 'shift' their interpretation in the complements of future-tense verbs.

To illustrate how this semantics operates, let's walk through three key examples. To begin, let us consider the simple sentence in (115a). As the reader is invited to confirm, our new semantics predicts it to have the T-conditions in (115b).

(115) **The Operation of Our Amended Semantics in Simple Main Clauses** [55]

a. Sentence: Mwangi **nĩe-kũ-ina** ũmũthĩ.
Mwangi ASRT-3sgS-HOD-FUT-dance-FV today
Mwangi will dance today.

b. Predicted T-Conditions
$[\![(115a)]\!]^{g, w, t, c, c^*}$ is defined only if $t \subseteq g(1)$ If defined, then it is T *iff:*

$\exists t''$. t'' is on the interval $[t, \text{TOD}_t]$ & $g(1) < t''$ & $\exists c' . c'(T) = t''$
& $\exists e$. dance(e,w) & Agent(e) = Mwangi & $T(e) = t''$ & t'' is on the day of c*(T)

[55] The T-conditions in (115b) assume an LF where the tense node bears index 1.

Thus, our new semantics predicts that (115a) is T *iff* the TT g(1) contains the UT and is followed by a time t'' that is on the same day at the time index *t*, and contains an event of Mwangi dancing, one that is on the same day as the matrix context time c*(T). Since the time index *t* is equal to c*(T) at the root node, and since no operators in (115a) bind the time index, we therefore predict that (115a) is T *iff* Mwangi dances at some future time t'' which falls on the same day as the assertion of (115a). As these are the reported T-conditions of (115a), we find that our amendment to FUT in (113) has no significant consequences for simple future-tense sentences.

Now let us consider a more interesting case: sentence (109), repeated in (116a). As the reader can confirm, our new semantics predicts it to have the T-conditions in (116b), which are equivalent to those in (116c).

(116) **Shifting of TRMs Under Future** [56]

a. Sentence:

Mwangi akauga afi nĩainire.
Mwangi 3sgS-PHOD-FUT-say-FV that ASRT-3sgS-**HOD**-dance-PST.PRV
Mwangi will say that he danced.

b. Predicted T-Conditions

$[\![(119a)]\!]^{g, w, t, c, c*}$ is defined only if $t \subseteq g(3)$ If defined, then it is T *iff:*

$\exists t_4$. **t_4 is on the interval [*t* , _)** & $g(3) < t_4$ & $\exists c'$. $c'(T) = t_4$
& $\forall \langle w', t' \rangle \in$ Asrt(*Mwangi* , w , t_4) :
$g(1) < t'$ & $\exists t_2$. **t_2 is on the interval [$TOD_{c'(T)}$, c'(T)]** & $g(1) \supset t_2$
& $\exists e$. dance(e,w') & Agent(e) = Mwangi & $T(e) = t_2$]]

c. Predicted T-Conditions

$[\![(116a)]\!]^{g, w, t, c, c*}$ is defined only if $t \subseteq g(3)$ If defined, then it is T *iff:*

$\exists t_4$. **t_4 is on the interval [*t* , _)** & $g(3) < t_4$ & $\exists c'$. $c'(T) = t_4$
& $\forall \langle w', t' \rangle \in$ Asrt(*Mwangi* , w , t_4) :
$g(1) < t'$ & $\exists t_2$. **t_2 is on the interval [TOD_{t4} , t_4]** & $g(1) \supset t_2$
& $\exists e$. dance(e,w') & Agent(e) = Mwangi & $T(e) = t_2$]]

Thus, as stated in (116b), our semantics predicts that (109) is T *iff* at some future time t_4 on the day after the utterance of (109), Mwangi will assert that the time g(1) precedes t_4 and contains a time t_2 which is the run-time of an event of him dancing, *and falls on the interval [$TOD_{c'(T)}$, c'(T)]*, where c' is a context whose time is equal to t_4. Since c'(T) = t_4, these T-conditions are equivalent to those in (116c), and so amount to the assertion of there being a future time t_4 where Mwangi will assert that he danced at some earlier time *on the same day as t_4.* Since these T-conditions indeed hold in the scenario paired with (109), our new semantics correctly predicts that sentence (109) will be judged as true in that scenario. Furthermore, as the reader is invited to

[56] These T-conditions assume an LF for (116a) where matrix T bears index 3 and the subordinate T bears index 1.

confirm, a similar argument will show that our semantics correctly predicts that sentence (110) is judged as true in its associated scenario.

The 'trick' by which our augmented semantics for FUT achieves these effects is that it introduces a new context *c'* and sets the time of that context to the Event Time of its clause. It then binds the 'intermediate' context of its vP complement, setting it equal to *c'*. Consequently, any PHEST, HEST, or HOD_{PST} TRMs in the vP complement will be interpreted relative to *c'*(T), and so relative to the Event Time of the main clause. Finally, since the Event Time of a propositional attitude (PA) verb is the time of thought/speech, our semantics predicts that any TRMs in the complement of future-tense PA verbs will be interpreted relative to the time of reported thought/speech, and not the matrix utterance time. Moreover, since our system ties this shifting of the contextual parameter *c* to the meaning of FUT, we retain all the predictions made for *past*-tense PA verbs in Section 5.2.

Although this 'context-shifting' semantics for FUT is somewhat surprising from a formal standpoint, it is rather natural from a functional standpoint. Consider that if HEST and HOD_{PST} were unable to shift in the complement of future-tense verbs, there would be no way for Kikuyu speakers to indirectly report at time *t* a future speech act where the agent asserts that something was true on a time *after t*. For instance, there'd be no way to say "Mwangi will say in one week that he danced the day before." After all, the subordinate clause in such a sentence would need to be past perfective, and so Kikuyu grammar would force it to bear either PHEST, HEST, or HOD_{PST}. However, if those TRMs had to be interpreted relative to matrix UT, then the resulting sentence would be contradictory, and so the desired proposition would remain ineffable.

Let us now consider the behavior of the temporal adverbs in (111)-(112). Sentence (111), repeated below, will be predicted to have the T-conditions in (117b).

(117) **No Shifting of *Ũmũthĩ* 'Today' Under Future** [57]

a. Sentence: Mwangi akauga aĩ ñĩainire ũmũthĩ
Mwangi will.say$_{PHOD}$ that he.danced$_{HOD}$ today
Mwangi will say that he danced today

b. Predicted T-Conditions
[[(117a)]]$^{g, w, t, c, c*}$ is defined only if $t \subseteq g(3)$ If defined, then it is T *iff:*

$\exists t_4$. t_4 is on the interval [*t* , _) & $g(3) < t_4$ & $\exists c'$. $c'(T) = t_4$
& $\forall \langle w', t' \rangle \in$ Asrt(*Mwangi* , w , t_4) :
$g(1) < t'$ & $\exists t_2$. **t_2 is on the interval [TOD_{t4} , t_4]** & $g(1) \supset t_2$
& **t_2 is on the day surrounding c*(T)**
& $\exists e$. dance(e,w') & Agent(e) = Mwangi & $T(e) = t_2$]]

Thus, our system predicts that (111) will be T *iff* at some future time t_4 after the day (111) is asserted, Mwangi asserts that there is an earlier time t_2 on the same day as t_4 that contains an event of Mwangi dancing, *and also falls on the day surrounding the matrix utterance time*. Since such T-conditions don't hold of the scenario paired with (111), we predict that sentence (111) is

[57] These T-conditions assume an LF for (117a) where matrix T bears index 3 and the subordinate T bears index 1.

false in its associated context. Moreover, one can see that the T-conditions predicted in (117b) are *contradictory*; thus our theory captures the intuition voiced by speakers that (111) does not admit of a sensible interpretation.

We find then, that our semantics for TRMs in (99) is necessitated by their behavior in subordinate clauses. Furthermore, the surprising behavior of HEST and HOD_{PST} in the complements of future-tense verbs motivates a semantics for Kikuyu 'Future Aspect' whereby it is a context-shifter, and binds the 'intermediate' context of its vP complement. Finally, as the reader can confirm, our semantics correctly predicts that all the other TRMs (HOD_{FUT}, PHOD, IMM) in the complement of future-tense PA verbs will also shift. Their shifting, however, is due simply to the fact that their meaning is tied to the temporal index *t*, which is bound by the PA verb. Therefore, since it does not add substantially to our discussion, the data illustrating such shifting of those TRMs will be omitted from this paper for reasons of space.

6. Temporal Remoteness Morphemes and Event Time

As we noted earlier, our formal analysis of Kikuyu TRMs consists of three key hypotheses: (i) TRMs have a presuppositional semantics akin to tenses, (ii) the meanings of certain TRMs depend on the contextual parameter *c* rather than the temporal index *t*, and (iii) TRMs are modifiers of the Event Time pronoun 'ET', rather than the Tense node. Thus far, Section 4 has presented a defense of proposal (i), while Section 5 defended proposal (ii). In this section, we focus on the hypothesis in (iii).

As noted by others (Demirdache & Uribe-Etxebarria 2004), it is often difficult to determine whether a given element restricts the TT or the ET, particularly when the verb bears either IMP or PRV aspect. Given their entries in (16), both IMP and PRV assert that the ET and the TT coincide. Therefore, in such cases, a modifier will typically apply to the TT *iff* it applies to the ET. Fortunately, it is more readily possible to distinguish TT- and ET-modification in sentences being PERF or FUT. Crucially, those heads assert that TT and ET do *not* coincide, and so it becomes possible in principle to tell whether a modifier applies to the TT or the ET.

We will therefore examine the behavior of TRMs with Future and Perfect verbs. As we'll see in the sections below, the meanings of such sentences indicate that their TRMs apply to the ET and not to the TT, vindicating our core proposal in (48). We will begin our study with a brief discussion of future tense verbs, followed by a more in-depth look at the behavior of TRMs with PERF aspect. Following that, we will make some cursory supporting observations regarding the way TRMs are employed in 'characterizing sentences'. Finally, we will examine the behavior of TRMs in 'future-in-the-past' contexts, particularly those occurring in embedded clauses. There, we will see that certain constructions used to express 'future-in-the-past' provide further evidence that TRMs are modifiers of ET.

6.1 The Contribution of TRMs to Verbs bearing FUT

It is rather apparent that our syntactic and semantic assumptions regarding 'future-tense' sentences in Kikuyu require us to also assume that the TRMs in such sentences are modifiers of ET. The key issue is that Hodiernal Future sentences like the following assert that the *event* in question will occur within the day of speech.

(118) **Hodiernal Futures Require 'Present-Day' Event Time**

Mwangi nĩekũina.
Mwangi ASRT-3sgS-**HOD**-FUT-dance-FV
Mwangi will dance.
Judgment: If someone says this, and Mwangi does *not* dance by the end of the day, then the person has made a false prediction.

Our currently system, where HOD_{FUT} is a modifier of ET, correctly predicts these core judgments. After all, the T-conditions our system predicts are those in (119a) below. Note that if HOD_{FUT} were assumed to modify the T-node – and thus the TT – the T-conditions we'd obtain would be those in (119b).

(119) **T-Conditions of Hodiernal Future Sentences**

a. T-Conditions if TRM Modifies ET

$[[(118)]]^{g,w,t,c,c^*}$ is defined only if $t \subseteq g(1)$
If defined, is T *iff*

$\exists t''$. **t'' is on the interval [*t* , TOD_t]** & $g(1) < t''$ &
& $\exists e$ .dance(e,w) & Agent(e) = Mwangi & $T(e) = t''$

b. T-Conditions if TRM Modifies TT

$[[(118)]]^{g,w,t,c,c^*}$ is defined only if $t \subseteq g(1)$
and g(1) is on the interval [*t* , TOD_t]
If defined, is T *iff*

$\exists t''$. $g(1) < t''$ & $\exists e$ .dance(e,w) & Agent(e) = Mwangi & $T(e) = t''$

According to our predicted T-conditions in (119a), sentence (118) is T *iff* there is some future time t'' such that Mwangi dances on t'' and *t'' falls on the day surrounding the moment of speech*. Thus, we clearly obtain the key T-conditional judgment for (118). The T-conditions in (119b), however, do not make this prediction. Since the tense of (118) is presumed to be PRES, if the TRM were to modify the TT, it would only contribute the redundant information that the TT is located on the day of speech. Consequently, the T-conditions in (119b) would hold if Mwangi danced *after* the day of speech, contrary to the reported judgments for (118).

Thus, if we are correct to apply to Kikuyu 'future tense' the analysis commonly used for such verbs in English, then it must be that the TRMs in such sentences are modifiers of the pronoun 'ET', and not the T-node.

6.2 The Contribution of TRMs to Verbs bearing PERF

In section 2, I introduced the fact that TRMs can appear in verbs bearing perfect aspect. To recall, verbs bearing only perfect aspect (120a) will be referred to as 'simple perfects', while those bearing perfect aspect and a TRM will be referred to as 'complex perfects' (120b-d).

(120) **TRMs Occuring with Perfect Aspect**

a. Simple Perfect: Mwangi **nĩainĩte.**
Mwangi ASRT-3sgS-dance- **PERF**
Mwangi has/had danced.

b. Hodiernal Perfect: Mwangi **nĩekũinĩte.**
Mwangi ASRT-3sgS-**HOD**-dance- **PERF**
Mwangi has/had danced (earlier today).

c. Hesternal Perfect: Mwangi **nĩarainĩte.**
Mwangi ASRT-3sgS-**HEST**-dance- **PERF**
Mwangi has/had danced (yesterday).

d. Pre-Hesternal Perfect: Mwangi **nĩāinĩte.**
Mwangi ASRT-3sgS-**PHEST**-dance- **PERF**
Mwangi has/had danced (before yesterday).

As we will see below, the meanings of complex perfects demonstrate that the TRMs in such sentences modify the ET rather than the TT.

Let us begin by noting that, as past scholars have observed (Barlow 1951; Johnson 1977, 1980, 1981), the 'perfect' of Kikuyu is quite analogous to that of English. It seems to admit of the panoply of uses noted for the English perfect, including the so-called 'Resultative Perfect' and 'Continuative Perfect' (Portner 2003).

(121) **Resultative Perfect in Kikuyu**

Situation: Your friends trying to find someone who knows something about the local geography of Massachusetts. You know that Mwangi was once a resident of the state, and wish to communicate this fact.

Mwangi nĩaikarĩte Massachusetts.
Mwangi nĩ-a-ikar-ĩte Massachusetts
Mwangi ASRT-3sgS-live-PERF Massachusetts
Mwangi has lived in Massachusetts.

Judgment: True/appropriate in this context. (Offered as translation of English)

(122) **Continuative Perfect in Kikuyu**

Situation: Your friends trying to find someone who knows something about the local geography of Massachusetts. You know that Mwangi was once a resident of the state, and wish to communicate this fact.

Mwangi	nĩaikarĩte	Massachusetts	kuuma	mwaka	mũthiru
Mwangi	ASRT-3sgS-live-PERF	Massachusetts	from	year	last

Mwangi has lived in Massachusetts since last year.

Judgment: True/appropriate in this context. (Offered as translation of the English) Furthermore, entails that Mwangi *still* lives in Massachusetts.

In the sentences above, the present perfect of the English sentence is translated into Kikuyu as a 'simple perfect'. This is in line with the traditional grammatical descriptions whereby simple perfects are equivalent to present perfects while complex perfects equate to past perfects. The following sentence provides further illustration of this pattern.

(123) **Present Perfect in English Translated as Kikuyu Simple Perfect**

Situation: Mwangi went on a trip to Washington D.C. He is now back and telling everyone stories of his visit. He mentions that, on his trip, he got to meet Barack Obama. You all cry out in disbelief. In the next room, Kamau hears the commotion. He walks over and asks what is up. You answer:

Mwangi	nĩacemanĩtie	na	Barack Obama!
Mwangi	nĩ-a-cemani-**ĩte**	na	Barack Obama
Mwangi	ASRT-3sgS-meet-**PERF**	with	Barack Obama

Mwangi has met Barack Obama!

Judgment: True/appropriate in this context (Offered as translation of the English)

While it is common for English present perfects to be translated as Kikuyu simple perfects, this is not always the case. The sentences below illustrate. Note especially how the slight variations in the associated story affect the Kikuyu translation of the English present perfect.

(124) **Present Perfect in English Translated as Kikuyu Complex Perfect**

a. Situation: Mwangi went on a trip to Washington D.C. He is now back and telling everyone stories of his visit. He mentions that **yesterday** he got to meet Barack Obama. You all cry out in disbelief. In the next room, Kamau hears the commotion. He walks over and asks what is up. You answer:

Mwangi	nĩa**ra**cemanĩtie	na	Barack Obama!
Mwangi	nĩ-a-**ra**-cemani-**ĩte**	na	Barack Obama
Mwangi	ASRT-3sgS-**HEST**-meet-**PERF**	with	Barack Obama

Mwangi has met Barack Obama!

Judgment: True/appropriate in this context
(Offered as translation of the English)

b. Situation: Mwangi went on a trip to Washington D.C. He is now back and telling everyone stories of his visit. He mentions that **two days ago** he got to meet Barack Obama. You all cry out in disbelief. In the next room, Kamau hears the commotion. He walks over and asks what is up. You answer:

Mwangi	nĩ**ā**cemanĩtie	na	Barack Obama!
Mwangi	nĩ-a-**a**-cemani-**ĩte**	na	Barack Obama
Mwangi	ASRT-3sgS-**PHEST**-meet-**PERF**	with	Barack Obama

Mwangi has met Barack Obama!

Judgment: True/appropriate in this context
(Offered as translation of the English)

c. Situation: Mwangi went on a trip to Washington D.C. He is now back and telling everyone stories of his visit. He mentions that **this morning, before he returned,** he got to meet Barack Obama. You all cry out in disbelief. In the next room, Kamau hears the commotion. He walks over and asks what is up. You answer:

Mwangi	nĩe**gũ**cemanĩtie	na	Barack Obama!
Mwangi	nĩ-a-**kũ**-cemani-**ĩte**	na	Barack Obama
Mwangi	ASRT-3sgS-**HOD**-meet-**PERF**	with	Barack Obama

Mwangi has met Barack Obama!

Judgment: True/appropriate in this context
(Offered as translation of the English)

In each of the examples above, an English present perfect is translated as a complex perfect in Kikuyu.[58] More interestingly, the identity of the TRM in the translation appears to depend upon the time of Mwangi's meeting with Barack Obama. When the meeting occurs the day before the

[58] Note that although it was not offered as a translation, speakers did still accept the simple perfect *nĩacemanĩtie* 'he has met' in these contexts as well.

utterance, HEST is used; when it occurs two days before, PHEST is used; when it is on the day of the utterance, HOD_{PST} is used.

This pattern provides some initial support for the notion that TRMs modify the Event Time rather than the Topic Time of the clause. Given their associated contexts – as well as their translational equivalence to English present perfects – it is likely that the TTs of the sentences in (124) are (roughly) the time of speech. Similarly, given these contexts, it is unlikely that speakers would supply a translation where the TT has shifted to the day of the meeting. Thus, one would be warranted in concluding that the TRMs in (124) track the Event Time of the clause rather than the Topic Time.

Further support for this conclusion can be found in the behavior of TRMs in the translations of past perfects. Since one can explicitly indicate the Topic Time for past perfects, they provide a remarkable testing ground for the key hypothesis in (48). With this in mind, consider the Kikuyu translation of the story below.

(125) **The Use of Kikuyu Complex Perfects in Context**

Original Story: We planned to have a big party for Mwangi today. Yesterday, I bought decorations, and Kamau bought some food. This morning, though, we found out that Mwangi wasn't feeling well. Since Kamau had already bought the food, we decided to have a party for Wambui instead.

a. Tũrabangĩte gwikira Mwangi iruga inene ũmũthĩ
1plS-HEST-plan-PERF INF-do.for Mwangi party big today
We had planned to have a big party for Mwangi today.

b. Ira nĩndĩragũrire indũ cia kũgĩmia,
yesterday ASRT-1sgS-HEST-buy-PST.PRV things of decoration

na Kamau uragũra irio imwe. [59]
and Kamau 3sgS-HEST-guy-FV food some
Yesterday, I bought decorations, and Kamau bought some food.

c. Ũmũthĩ rũcinĩ ri, twakora Mwangi
Today morning though 1plS-IMM.PST.PRV-discover-FV Mwangi

ndaraigwa wega [60]
NEG-3sgS-HEST-feel-FV good
This morning, however, we learned that Mwangi was not feeling well.

[59] The verb *uragũra* 'he bought$_{HEST}$' is in the so-called 'consecutive form', and so does not bear the suffix *–ire* 'PST.PRV'. In brief, 'consecutive forms' are used when a given sentence is connected to prior sentences in a single discourse. I refer the reader to Barlow (1951) for more details on this phenomenon, which is common across Bantu.

[60] Note the use of HEST in the translation of 'didn't feel'. This indicates that Mwangi's illness has lasted yesterday and today.

d.	Tondo	Kamau	**nĩarakĩgurĩte**	irio,[61]
	Tondo	Kamau	nĩ-a-**ra**-kĩ-gur-ĩte	irio,
	because	Kamau	ASRT-3sgS-**HEST**-then-buy-PERF	food

twatua	gwikira	Wambui	iruga.
1plS-IMM.PST-PRV-decide-FV	INF-do.for	Wambui	party

Since Kamau had already bought the food, we decided to have a party for Wambui instead.

In the story above, the sentence of key interest is (125d). In both the English original and the Kikuyu translation, the sentence preceding (125d) conveys the proposition that 'This morning, we found out that Mwangi wasn't feeling well.' Given this context, the Topic Time for (125d) is roughly 'this morning'. Indeed, in the original English, the past perfect 'had bought' in (125d) would commonly be taken to indicate that this TT – our moment of discovery this morning – precedes the UT and *follows* the Event Time of Kamau's purchase. Note, then, that in the Kikuyu sentence in (125d), the translation of 'had bought' contains HEST. Since the intuitive TT in (125d) falls on the day of speaking, HEST cannot be understood as modifying the TT. Instead, since the ET of (125d) *does* fall on the preceding day, HEST in this sentence must be understood as applying to the ET.

It is possible to provide even more carefully controlled examples that support the same point. Consider the use of the TRMs in the sentence below.

(126) **The Use of TRMs in Kikuyu Past Perfects**

Situation: Mwangi has been telling us for a while that he intends to travel to New York. Today, we went to his house to say goodbye, but unbeknownst to us, he had already left yesterday.

Rĩĩria	tũkinyire	gwake,	Mwangi	**nĩarathiĩte.**
rĩĩria	tũ-∅-kiny-ire	gwake,	Mwangi	nĩ-a-**ra**-thi-**ĩte.**
when	1plS-HOD-arrive-PST.PRV	his	Mwangi	ASRT-3sgS-**HEST**-go-**PERF**

When we arrived at his (house), Mwangi had already left.

Judgment: True/appropriate in this context (Offered as translation of original English)

In the sentence above, the adjoined 'when'-clause would commonly be viewed as providing the TT of the main clause. Thus, in (126), the TT of the main clause is the moment of our arrival, which occurred earlier on the day of speaking. It is therefore again notable that the Kikuyu translation of the past perfect 'had left' contains HEST. Since the understood TT falls on the day of speaking, HEST in (126) cannot be viewed as applying to the TT. However, since the reported event of leaving occurs on the day *prior* to speaking, HEST in (126) would seem to instead apply to the Event Time of the main clause. Finally, it is worth noting that if the HEST in (126) is replaced with HOD, speakers report that the sentence is no longer true in the associated context.

[61] The semantics of the prefix *kĩ-* in the verb *nĩarakĩgurĩte* 'he had bought' is a difficult matter. From traditional descriptions, it appears to be essentially vacuous, though it is often translatable into English as 'then' (Barlow 1951).

(127) **The Use of TRMs in Kikuyu Past Perfects**

Rĩiria	tũkinyire	gwake,	Mwangi	**nĩegũthiĩte.**
rĩiria	tũ-∅-kiny-ire	gwake,	Mwangi	nĩ-a-**kũ**-thi-**ĩte.**
when	1plS-HOD-arrive-PST.PRV	his	Mwangi	ASRT-3sgS-**HOD**-go-**PERF**

When we arrived at his (house), *Mwangi had already left.*

Judgment: Not true in the situation under (126). Would only be true if Mwangi's departure were on the day of speech.

Up to this point, our discussion of the facts above has been rather informal. Let us now observe the way in which our formal account captures these patterns, focusing on the key contrast in (126)-(127). Assuming that the main clauses in (126)-(127) also bear PAST tense, our semantics predicts them to have the T-conditions below.[62]

(128) **Predicted T-Conditions for (126), (127)**

a. T-Conditions for Main Clause of (126)

$[[(126)]]^{g,w,t,c,c^*}$ is defined only if g(1) < t If defined, is T *iff*

∃t''. **t'' is on the interval [YEST$_{c(T)}$, c(T)]** & t'' < g(1) &
∃e . leave(e,w) & Agent(e) = Mwangi & *T*(e) = t''

b. T-Conditions for Main Clause of (127)

$[[(127)]]^{g,w,t,c,c^*}$ is defined only if g(1) < t If defined, is T *iff*

∃t''. **t'' is on the interval [TOD$_{c(T)}$, c(T)]** & t'' < g(1) &
∃e . leave(e,w) & Agent(e) = Mwangi & *T*(e) = t''

Thus, given our key hypothesis in (48), we predict that (126) will be T *iff* there is a time t'' falling on the day *prior* to speech when Mwangi left, while we predict that (127) will be T *iff* there is a time t'' falling on the day of speech when Mwangi left. Therefore, we correctly predict that (126) is true in its associated context, while (127) is not.

Furthermore, as the reader can confirm, if we were to allow TRMs to modify the T-node like tense features, we would predict (126)-(127) to have the T-conditions below.

(129) **T-Conditions Predicted if TRMs Modify the Topic Time**

a. T-Conditions for Main Clause of (126)

$[[(126)]]^{g,w,t,c,c^*}$ is defined only if g(1) < t &
g(1) is on the interval [YEST$_{c(T)}$, c(T)] If defined, is T *iff*

∃t'' . t'' < g(1) & ∃e . leave(e,w) & Agent(e) = Mwangi & *T*(e) = t''

[62] Note that our analysis of Kikuyu perfects assumes that tense in such structures is unexpressed. Thus, a complex perfect can function either as a present perfect (124) or as a past perfect (125)-(126), with no change in its surface appearance.

b. T-Conditions for Main Clause of (127)
[[(127)]]^{g,w,t,c,c*} is defined only if g(1) < t
g(1) is on the interval [$TOD_{c(T)}$, c(T)] If defined, is T *iff*

∃t''. t'' < g(1) & ∃e . leave(e,w) & Agent(e) = Mwangi & *T*(e) = t''

Thus, if TRMs were modifiers of the T-node, (126) would only be defined if the TT fell on the day *prior* to the day of speech. Since the TT in (126) falls on the day of speech, this semantics would wrongly predict (126) to be anomalous in its associated context. Furthermore, it would predict that sentence (127) is defined and true so long as the Topic Time falls on the day of speech and follows an event of Mwangi leaving. Since those conditions do hold in the specified scenario, we would wrongly predict that (127) is judged as true.

In summary, the facts in (126)-(127) demonstrate that TRMs in past perfects track the location of the Event Time rather than the Topic Time, and so provide crucial support for our formal analysis. This conclusion is further corroborated by the parallel data below.

(130) **TRMs in Kikuyu Past Perfects Track Event Time**

Situation: Mwangi has been telling us for a while that he intends to travel to New York. Today, we went to his house to say good bye, but unbeknownst to us, he had already left two days ago.

a. Rĩĩria tũkinyire gwake,
when 1plS-HOD-arrive-PST.PRV his

Mwangi **nĩāthiĩte.**
Mwangi nĩ-a-**a-**thi-**ĩte.**
Mwangi ASRT-3sgS-**PHEST**-go-**PERF**
When we arrived at his (house), *Mwangi had already left.*

Judgment: True/appropriate in this context
(Offered as translation of original English)

b. Rĩĩria tũkinyire gwake,
when 1plS-HOD-arrive-PST.PRV his

Mwangi **nĩegũthiĩte**
Mwangi nĩ-a-**kũ-**thi-**ĩte.**
Mwangi ASRT-3sgS-**HOD**-go-**PERF**
When we arrived at his (house), *Mwangi had already left.*

Judgment: Not true in the situation described. Would only be true if Mwangi's departure were on the day of speech.

(131) **TRMs in Kikuyu Past Perfects Track Event Time**

Situation: Mwangi has been telling us for a while that he intends to travel to New York. Yesterday, we went to his house to say good bye, but unbeknownst to us, he had already left one day earlier.

a.	Rĩĩria	tũrakinyire	gwake,
	Rĩĩria	tũ-ra-kiny-ire	gwake,
	when	1plS-HHEST-arrive-PST.PRV	his
	Mwangi	**nĩãthĩite.**	
	Mwangi	nĩ-a-**a**-thi-**ĩte.**	
	Mwangi	ASRT-3sgS-**PHEST**-go-**PERF**	
	When we arrived at his (house), *Mwangi had already left.*		
	Judgment:	True/appropriate in this context (Offered as translation of original English)	

b.	Rĩĩria	tũrakinyire	gwake,
	when	1plS-HEST-arrive-PST.PRV	his
	Mwangi	**nĩarathĩite**	
	Mwangi	nĩ-a-**ra**-thi-**ĩte.**	
	Mwangi	ASRT-3sgS-**HEST**-go-**PERF**	
	When we arrived at his (house), *Mwangi had already left.*		
	Judgment:	Not true in the situation described. Would only be true if Mwangi's departure were on the day prior to the moment of speech.	

In sentences (130a) and (131a), the TRM in the main clause again coincides with the Event Time (Mwangi's departure) and not the Topic Time (our arrival at his house). Similarly, in (130b) and (131b), the main clause TRM coincides with the Topic Time and not the Event Time. Given that (130a)/(131a) are judged as 'correct' while (130b)/(131b) are not, we find further confirmation for our key proposal in (48).

Taken as a whole, the patterns observed in this section provide compelling support for the claim that TRMs are not 'tenses', in that they are not modifiers of the T-node. Rather, in a certain sense, they are the equivalents of 'tenses' for the Event Time pronoun 'ET'.

6.3 The Use of TRMs in Characterizing Sentences

A key assumption of the present work is that tenses such as PAST constrain the relation between Topic Time and Utterance Time, and do not serve to directly locate the Event/State Time itself. One of the most compelling pieces of evidence for this view concerns the behavior of tense in sentences that describe 'characteristic properties' of some entity, henceforth referred to as 'characterizing sentences'. Consider the data below.

(132) **The Use of Tense in English Characterizing Sentences**

Situation: Yesterday, I met a really interesting guy named Mwangi. Here are some things I remember about him.

a. He **was** tall.
b. He **was** from Kenya.
c. He **had** met Barack Obama.

As noted by Klein (1994), the use of past tense in (132) in no way implies that the states in question no longer hold. Consequently, PAST in English should not be analyzed as stating that the Event/State Time itself (completely) precedes the UT. Rather, these data are perfectly in line with the assumption that PAST only indicates that the TT precedes the UT. Since the understood TT in (132) is 'yesterday' (or the moment of meeting Mwangi), the TT does indeed precede the UT in (132a-c). Thus, the semantic assumptions from Chapter 3 correctly predict the existence of PAST in these sentences.

With this in mind, consider the Kikuyu translations of (132a-c), below.

(133) **The Use of TRMs in Kikuyu Characterizing Sentences**

Situation: Yesterday, I met a really interesting guy named Mwangi. Here are some things I remember about him.

a. Nĩ mũraihu
be tall
He was tall.
Judgment: True/appropriate in this context (Offered as translation of English) [63]

b. Nĩ wa Kenya
be of Kenya
He was from Kenya.
Judgment: True/appropriate in this context (Offered as translation of English)

c. Nĩacemanĩtie na Barack Obama
nĩ-a-cemani-ĩte na Barack Obama
ASRT-3sgS-meet-PERF with Barack Obama
He had met Barack Obama.
Judgment: True/appropriate in this context (Offered as translation of English)

[63] Note that we cannot say with certainty what tense is born by the verbs in (133a-c). As stated in Footnote 62, we assume that tense is not expressed in perfects like (133c). Moreover, other than TRMs, there is no separate way of marking the copula *nĩ* as 'non-present'. Consequently, I will assume that the verbs in (133) bear unexpressed PAST tense, which is in line with the fact that their understood TT precedes the UT. Note that if all this is accepted, then sentence (133c) demonstrates that 'simple perfects' in Kikuyu can indeed function as past perfects, as predicted by our analysis (and as contrary to their traditional description as present perfects).

Notably, none of the sentences in (133) contain a TRM. Furthermore, if HEST is added to the sentences above, the result strikes speakers as anomalous.

(134) **The Use of TRMs in Kikuyu Characterizing Sentences** [64]

Situation: Yesterday, I met a really interesting guy named Mwangi. Here are some things I remember about him.

a. A**ra**rĩ mũraihu
a-**ra**-rĩ mũraihu
3sgS-**HEST**-be tall
He was tall (yesterday).
Judgment: Not true/appropriate in this context.
Strangely suggests that Mwangi's height had changed.

b. A**ra**rĩ wa Kenya
a-**ra**-rĩ wa Kenya
3sgS-**HEST**-be of Kenya
He was from Kenya (yesterday).
Judgment: Not true/appropriate in this context.
Strangely suggests that Mwangi was not previously from Kenya.

c. Nĩa**ra**cemanĩtie na Barack Obama
nĩ-a-**ra**-cemani-ĩte na Barack Obama
ASRT-3sgS-**HEST**-meet-PERF with Barack Obama
He had met Barack Obama (yesterday).
Judgment: Not equivalent to (133c) in this context.
Adds the new information that the meeting took place 'recently'.

Note that in each of the sentences above, the Topic Time is again yesterday (the time of meeting Mwangi). Thus, if TRMs could track Topic Time like tenses, we would predict that each of the sentences above was licit in the associated context. However, speakers typically report that, unlike (133), the sentences in (134) are somewhat anomalous. For example (134a,b) are reported to strongly suggest that Mwangi's tallness/nationality are subject to change, and perhaps changed prior to yesterday. Moreover, although (134c) is reported to be acceptable within that context, it is also said to differ in meaning from (133c): while (133c) states only that a meeting with Obama took place, (134c) states that the meeting took place 'recently' (*i.e.,* yesterday or today).

Thus, the contrast between (133) and (134) indicates that TRMs in Kikuyu cannot be used as modifiers of the TT. Furthermore, the judgments in (134) are in line with our proposal that TRMs only modify the Event/State Time. Under our analysis, the TRMs in (134a,b) would limit the Event/State time to a span within the preceding day. Thus, the T-conditions of the

[64] Note that, as I will discuss later in Section 7, speakers sometimes vary in their judgment of (134a,b). The data reported here represent the predominant pattern that emerged from my interviews.

sentence would entail that the state does not extend beyond that time, and so is subject to relatively rapid change. Given that the states in question, tallness and nationality, typically do not change (or change only slowly), we can account for the reported anomaly of (134a,b). Moreover, as we saw in the preceding section, our analysis predicts that the TRM in (134c) can only be understood to locate the Event Time of the sentence, and thus adds the information that the meeting with Obama took place on the day prior to speech.

Interestingly, despite the facts in (133)-(134), there are some circumstances where TRMs can be used in such characterizing sentences. When observing the anomaly of (134), both speakers I worked with observed that "past tense" is possible when describing persons that are deceased. The following scenario was volunteered by one consultant.

(135) **The Use of TRMs in Kikuyu Characterizing Sentences**

Situation: My paternal grandfather died many years ago. Let me tell you about him.

a. **A**rĩ mũraihu
a-**a**-rĩ mũraihu
3sgS-**PHEST**-be tall
He was tall.
Judgment: True/appropriate in this context (Offered as translation of English)

b. **A**rĩ wa Kenya
a-**a**-rĩ wa Kenya
3sgS-**PHEST**-be of Kenya
He was from Kenya.
Judgment: True/appropriate in this context (Offered as translation of English)

c. Nĩācemanĩtie na Barack Obama
nĩ-a-**a**-cemani-ĩte na Barack Obama
ASRT-3sgS-**PHEST**-meet-PERF with Barack Obama
He had met Barack Obama.
Judgment: True/appropriate in this context (Offered as translation of English)

The contrast between (134) and (135) again supports the view that TRMs are understood to modify Event/State Time rather than Topic Time. Since the subject of predication in (135) has been deceased for some time, the states in question are indeed limited to a time span preceding the Utterance Time by several days. Thus, our semantics correctly predicts that (135a,b) should be true/appropriate in their associated context. Moreover, since the meeting with Barack Obama would have to have taken place some time ago, our analysis also predicts the truth and appropriateness of (135c) in this context.

We find, then, that the interactions between TRMs and characterizing sentences lends further support to our claim in (48) that TRMs are necessarily modifiers of the pronoun 'ET' rather than the tense head T.

6.4 The Use of TRMs in 'Future-in-the-Past' Sentences

This subsection develops a final, extended argument in support of our key hypothesis in (48). Here, we will see that certain 'future-in-the-past' constructions provide further support for the view that TRMs in Kikuyu function as modifiers of Event Time, rather than Topic Time. We begin in the following subsection with a tour of the key grammatical patterns.

6.4.1 The Expression of 'Future-in-the-Past' in Kikuyu

A 'future-in-the-past' (FIP) sentence expresses the past existence of some future disposition. The common means for expressing such propositions in English is the following construction.

(136) **Expression of FIP in English**
Last week, Bill **was going to** leave yesterday

In this section, we will be more interested in embedded FIP sentences like the following.[65]

(137) **Embedded FIP Sentence in English**
Last week, Bill said that he **would leave** yesterday.

Intuitively, such sentences report that at some earlier time *t'*, Bill asserted the existence of an event of his leaving at some time after *t'*. The form of such sentences in English is relatively straight-forward. The embedded clause contains the auxiliary 'would', which is commonly analyed the future auxiliary 'will' exhibiting an irregular past tense form.[66]

We've already encountered some FIP sentences of Kikuyu in Section 5. Two examples are repeated below.

(138) **Illustrative Embedded FIP Sentences of Kikuyu**

a. Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I will dance today."

Mwangi araugire ati nĩe**kũ**ina.
Mwangi 3sgS-HEST-say-PST.PRV that ASRT-3sgS-**HOD**-FUT-dance-FV
Mwangi said that he would dance.
Judgment: True in this context. (Offered as translation of the English)

[65] The reason for focusing on embedded FIP sentences is that the construction of main interest to us – 'scheduled future' readings of past imperfectives – were most readily elicited in subordinate clauses. For some reason, I had some difficulty eliciting them as main clauses, which may or may not be grammatically signficiant.

[66] Note that the use of *would* (will-PAST) to express main clause FIP proposiations is rather marked in present-day speken English. The sentence below is not a natural way of expressing the proposition in (136).
(i) ?? Last week, Bill **would** leave yesterday.

b. Situation: Our friend Mwangi speaks only English. Yesterday, he said literally the following: "I will dance tomorrow."

Mwangi araugire atĩ nĩa**ka**ina.
Mwangi 3sgS-HEST-say-PST.PRV that ASRT-3sgS-**PHOD**-FUT-dance-FV
Mwangi said that he would dance.
Judgment: True in this context. (Offered as translation of the English)

These sentences have a form much like the English (137); in both, the embedded clause exhibits typical future-tense morphology. The key difference is that the future-modal in (137) bears overt past tense, while the Kikuyu verbs in (138) are presumed to be present tense.

We noted in Section 6.1 that our morphosyntactic assumptions regarding 'FUT' in Kikuyu entail that TRMs must be modifiers of Event Time. The same can be seen for the embedded FIP sentences in (138). Recall that our semantics predicts for (138a) the T-conditions below.[67]

(139) **T-Conditions Predicted for FIP Sentences**

$[\![\text{(138a)}]\!]^{g, w, t, c, c^*}$ = is defined only if $g(3) < t$
if defined, then it is T *iff:*

$\exists t_4$. t_4 is on the interval $[\text{YEST}_{c(T)}, c(T)]$ & $g(3) \supset t_4$ &
$\forall \langle w', t' \rangle \in \text{Asrt}(\textit{Mwangi}, w, t_4)$:
$t' \subseteq g(1)$ & $\exists t_2$. **t_2 is on the interval $[t', \text{TOD}_{t'}]$** & $g(1) < t_2$
& $\exists e$. dance(e,w') & Agent(e) = Mwangi & $T(e) = t_2$]]

Thus, we correctly predict that (138a) is T *iff* at some time t_4 on the preceding day, Mwangi asserted that is some time t_2 after t_4 *but on the same day as* t_4 where Mwangi dances. These T-conditions crucially rest on the TRM being a modifier of the pronoun 'ET'. If the embedded TRM were a modifier of the T-node, we would predict the following, incorrect T-conditions.

(140) **Incorrect T-Conditions, Predicted by TRM Being a Modifier of T**

$[\![\text{(138a)}]\!]^{g, w, t, c, c^*}$ = is defined only if $g(3) < t$
if defined, then it is T *iff:*

$\exists t_4$. t_4 is on the interval $[\text{YEST}_{c(T)}, c(T)]$ & $g(3) \supset t_4$ &
$\forall \langle w', t' \rangle \in \text{Asrt}(\textit{Mwangi}, w, t_4)$:
$t' \subseteq g(1)$ & **$g(1)$ is on the interval $[t', \text{TOD}_{t'}]$** & $\exists t_2$ & $g(1) < t_2$
& $\exists e$. dance(e,w') & Agent(e) = Mwangi & $T(e) = t_2$]]

Under these T-conditions, the TRM would only contribute the redundant information that the embedded Topic Time g(1) falls on the day surrounding the 'asserted alternative'. Consequently,

[67] Since it will not matter for our current discussion, I will ignore the 'context-shifting' behavior of FUT in Kikuyu. Thus, I will henceforth revert to the earlier, simpler semantics for FUT in (23).

we would wrongly predict that (138a) could be true in a scenario where Mwangi asserts at t_4 that there is a future time t_2 falling on the day *after* t_4 where he dances.

In addition to the structures in (138), there are other means in Kikuyu for expressing 'future-in-the-past', which also providing striking support for our key hypothesis in (48). The first builds upon a special, 'futurate' interpretation of imperfective aspect. As in many languages, IMP in Kikuyu allows for a kind of 'scheduled future' reading. The following illustrates.

(141) **'Scheduled Future' Reading of Kikuyu Imperfectives**

Situation: We are all in a dance competition. The competition schedule states that Mwangi is scheduled for later tonight.

Mwangi	nĩa**raina**	hwainĩ
Mwangi	ASRT-3sgS-**PRES.IMP**-dance-**FV**	evening

Mwangi is dancing this evening.
Judgment: True/appropriate in this context (Offered as translation of original English)

Thus, as shown above, Kikuyu speakers can use a present imperfective to describe events that are not presently occurring but are 'destined' to occur within the near future. As in the comparable English construction, the event described must be one that can be brought about by human influence. For example, no matter how certain we happen to be, future weather conditions cannot be described using present imperfectives.

(142) **'Scheduled Future' Reading Requires Possible Human Agency**

Situation: We are wondering about the weather this evening. Looking up at the sky, there are large rain clouds forming.

Nĩkũ**raura**	hwainĩ
Nĩ-kũ-**ra**-ur-**a**	hwainĩ
ASRT-8sgS-**PRES.IMP**-rain-**FV**	evening

It is raining this evening.
Judgment: *Not* true or appropriate in this context.

Scheduled future readings are also possible for past imperfectives, and such constructions provide another means for expressing FIP propositions. The following sentences illustrate.

(143) **Scheduled Future Readings Providing Embedded FIP Propositions**

a. Mwangi **ā**ugire aĩ nĩ**āina**ga**.**
Mwangi 3sgS-**PHEST**-say-PST.PRV that ASRT-3sgS-**PHEST**-dance-**PST.IMP**
Mwangi said (two days ago) that he was dancing.

Verifying Situation:
Two days ago, Mwangi literally said "I will dance later today."

b. Mwangi **ā**ugire afi ñia**rai**n**aga.**
Mwangi 3sgS-**PHEST**-say-PST.PRV that ASRT-3sgS-**HEST**-dance-**PST.IMP**
Mwangi said (two days ago) that he was dancing.

Verifying Situation:
Two days ago, Mwangi literally said "I will dance tomorrow."

c. Mwangi **ā**ugire afi ñie**kũi**n**aga.**
Mwangi 3sgS-**PHEST**-say-PST.PRV that ASRT-3sgS-**HOD**-dance-**PST.IMP**
Mwangi said (two days ago) that he was dancing.

Verifying Situation:
Two days ago, Mwangi literally said "I will dance two days from now."

In each of the sentences above, the embedded clause contains a past imperfective. However, speakers report that these sentences can receive FIP readings, whereby the matrix subject Mwangi asserts at past time t_4 the existence of a time *after* t_4 where he dances.

In the following subsection, I will attempt a formal analysis of sentences like those in (143). The motivation for focusing upon these structures is that, at first glance, they seem to provide striking support for our key hypothesis in (48) that TRMs modify Event Time rather than Topic Time. Note that in each sentence, the promised event of dancing occurs within the span of time indicated by the embedded TRM. Thus, in each of these sentences, the embedded TRM can truthfully apply to the embedded Event Time. On the other hand, it is less clear that the embedded TRM applies to the embedded Topic Time. Given the 'verifying situation' associated with each, it would seem that the embedded Topic Time coincides with the moment of reported speech. Consequently, in sentences (143b,c), the embedded TRM cannot truthfully aply to the embedded TT. Thus, these facts suggest that TRMs in Kikuyu can only ever function as modifiers of the pronoun 'ET", and never as modifiers of the T-node.

These 'scheduled future' readings appear to be more frequently used in Kikuyu than they are in English. Whereas the comparable English construction is not always salient to some speakers, Kikuyu speakers readily volunteer the observation that imperfectives can describe 'future situations', and such use of the imperfective is highlighted in the standard reference materials on the language (Barlow 1951; Johnson 1977, 1980, 1981). Indeed, for some speakers, embedded imperfectives seem to be the preferred method of expressing FIP propositions. One consultant in particular made frequent use of these constructions; for example, the sentence below was once offered spontaneously.

(144) **Unelicited Instance of Forward-Shifted Past Imperfective**

Iyo,	Wambui	āugire	afi	Mwangi
day.before.yesterday	Wambui	3sgS-PHEST-say-PST.PRV	that	Mwangi

a**ra**thi**aga**	ira.
3sgS-**HEST**-go-**PST.IMP**	yesterday

The day before yesterday, Wambui predicted that Mwangi would leave yesterday.

It is worth noting that the sentence above again demonstrates that the embedded TRMs in such sentences appear to track the embedded Event Time.

Our description of the FIP constructions in (143)-(144) states that they are based upon a 'scheduled future' reading of the embedded imperfective. Thus, we correctly predict that such structures are only possible if the embedded proposition is one that can be brought about by human influence. As illustrated below, one cannot use this construction to express a FIP proposition about weather conditions. Instead, a third 'future-in-the-past' construction must be used, one that employs so-called 'conditonal' morphology.

(145) **Conditional Forms Used to Express Future-in-the-Past**

Iyo,	Wambui	ēcĩragiria	atĩ
iyo	Wambui	a-a-ĩcĩria-aga	atĩ
day.before.yesterday	Wambui	3sgS-PHEST-think-PST.IMP	

ira	nĩkūngiraurire.
ira	nĩ-kū-**ngi**-**ra**-ur-**ire**
yesterday	ASRT-8sgS-**COND-HEST**-rain-**PST.PRV**

The day before yesterday, Wambui thought that it would rain yesterday.

Although these 'conditional' forms will lie beyond the scope of this paper, it is again worth noting the identity of TRM in the embedded clause above.[68] Given that the understood Event Time of the embedded clause is one day prior to speech, the appearance of HEST in that clause supports the key notion that such TRMs modify the Event Time.

We've seen that at an informal level of analysis, the FIP constructions in (143)-(144) seem to support our view that TRM features are adjuncts to 'ET'. In the sections below, I will seek to corroborate this within a formal analysis of those structures.

6.4.2 A Formal Analysis of Embedded 'Scheduled Future' Imperfectives

Under their 'scheduled future' readings, imperfective sentences like (141) can be used to describe future eventualities. Although this glosses over all the most interesting aspects of such readings, my analysis of the FIP sentences in (143)-(144) will simply assume that IMP can receive the interpretation below.

(146) **Alternate Lexical Entry for IMP**

$$[\![\text{IMP}]\!]^{g, w, t, c, c^*} = [\, \lambda P_{<it>} : [\, \lambda t'' : [\, \lambda t' : t' < t'' \,\&\, P(t'') \,]\,]\,]$$

That is, since the proper analysis of 'scheduled future' readings is not of main interest here, I will simply stipulate that IMP can receive an interpretation whereby it is equivalent to FUT.

[68] Iatridou (2000) notes that the comparable 'conditional mood' of Romance languages is simply the realization of both the features PAST and FUT. It would attractive, but not trivial, to develop a similar analysis of the 'conditional' forms in Kikuyu.

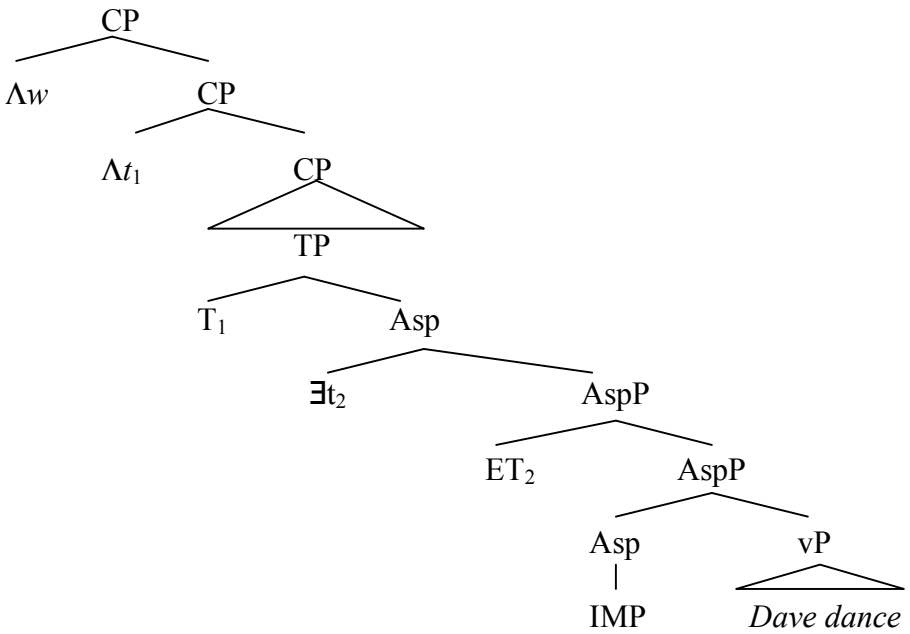
The second ingredient to my analysis of (143)-(144) will be a slight amendment to our semantics for complement clauses. Thus far, I have assumed that complement clauses are dominated by the lambda operator 'Λi', which binds the temporal index of the embedded CP. In addition, let us assume the existence of a third lambda-operator 'Λt_i', which is in complementary distribution with 'Λi'. Crucially, the operator 'Λt_i' bears an index *i* and receives the interpretation below.

(147) **The Semantics of 'Λt_i'**

$$[[\ \Lambda t_i\ \text{XP}\ ]]^{g,\,w,\,t,\,c,\,c^*} \quad = \quad [\ \lambda t' : [[\ \text{XP}\ ]]^{g(i \rightarrow t'),\,w,\,t,\,c,\,c^*} = \text{T}\ ]$$

As stated above, the operator 'Λt_i' does not bind the temporal index *t* of the embedded clause. Instead, it binds some temporal *pronoun* within the embedded clause. Given our background assumptions, there are only two temporal pronouns within the subordinate clause: the tense-node 'T' and the pronoun 'ET'. Since the pronoun 'ET' is obligatorily existentially bound within AspP, the only element open to binding by 'Λt_i' is T. Thus, a subodinate clause containing 'Λt_i' must have the structure below.

(148) **A Subordinate Clause Containing 'Λt_i'**



Note that in the structure above, the T-node does not bear a tense feature. This is by design, and introduces the third key component to the analysis, stated below.

(149) **No Tense Features on Bound T-Nodes (Kratzer 1998, Schlenker 2004)**

If the T-node is bound by Λt_i, then no tense features appear on T at LF. Thus, any tense features appearing on the subordinate clause are the result of an 'agreement' process with the matrix T.

Following previous authors (Kratzer 1998; Schlenker 2004), I will assume that bound T-nodes are subject to a process of 'T-agreement', whereby the tense features of the matrix clause are passed down to them at PF. The formal details of this agreement process are not crucial to our study, but their result is that bound T-nodes have no real tense features at LF. Thus, although embedded clauses bearing 'Λt_i' might appear to exhibit tense features, those features are ignored when computing their meaning.

One of the primary motivations for (149) in languages like English is the existence of 'simultaneous readings' of embedded past imperfectives. That is, sentences like (150) allow for either of the interpretations in (150a,b).

(150) **The Ambiguity of Embedded Imperfectives in English**

Dave said that he was dancing.

a. Back-Shifted Reading: Dave said literally "I was dancing."
b. Simultaneous-Reading: Dave said literally "I am dancing."

As the reader can confirm, our semantics from Section 5 predicts only the 'back-shifted' reading in (150b), whereby the sentence is T *iff* the matrix subject asserted at some past time t_4 that there was some time t_2 preceding t_4 where he was dancing. However, if we assume that the subordinate clause in (150) has the structure in (148), then our semantics would predict the following T-conditions.[69]

(151) **Logical Form (148) Allows for Simultaneous Readings**

$[\![(150)]\!]^{g,w,t,c,c^*}$ is defined only if $g(3) < t$ If defined, then it is T *iff*:

$\exists t_4 . g(3) \supset t_4 \ \& \ \forall \langle w', t' \rangle \in \text{Asrt}(\textit{Dave} , w , t_4) :$
$\exists t_2 . t' \subseteq t_2 \ \& \ \exists e . \text{dance}(e,w') \ \& \ \text{Agent}(e) = \text{Dave} \ \& \ T(e) = t_2$

Since the T-node in (148) is bound by 'Λt_i', the embedded TT is ultimately bound by the matrix PA verb. Since the embedded aspect is IMP, the resulting proposition is T *iff* at some past time t_4, Dave asserted that t_4 was contained in some event of him dancing. Thus, we predict that (150) is T *iff* Dave asserted at t_4 that he was dancing at that time, which amounts to the 'simultaneous reading' in (150b).[70]

With this in mind, observe that embedded imperfectives in Kikuyu also allow for both the 'back-shifted' and 'simultaneous' readings described above. The following data illustrate.

[69] These T-conditions assume that in the LF of (150), the matrix T-node bears index 3.

[70] Note that the overlap between the embedded Event Time and the time of reported speech follows only from the assumption that the subordinate T-node is bound. The motivation for the additional assumption in (149) is that if the subordinate PAST tense were present at LF, the resulting reading would be stronger than the one observed. See Heim (1994) and Schlenker (2004) for details.

(152) **'Back-Shifted' and 'Simultaneous' Readings of Embedded Past Imperfectives**

a. Mwangi augire afi **nĩekũina**ga
Mwangi 3sgS-**HOD**-say-PST.PRV that ASRT-3sgS-**HOD**-dance-**PST.IMP**
Mwangi said (today) that he was dancing.

(i) Verifying Situation:
Today, Mwangi literally said "I was dancing earlier today."

(ii) Verifying Situation
Today, Mwangi literally said "I am dancing now."

b. Mwangi a**ra**ugire afi **nĩarain**a**ga.**
Mwangi 3sgS-**HEST**-say-PST.PRV that ASRT-3sgS-**HEST**-dance-**PST.IMP**
Mwangi said (yesterday) that he was dancing.

(i) Verifying Situation:
Yesterday, Mwangi literally said "I was dancing earlier today."

(ii) Verifying Situation:
Yesterday, Mwangi literally said "I am dancing now."

(iii) Not a Verifying Situation:
Yesterday, Mwangi literally said "I was dancing yesterday."

c. Mwangi **ā**ugire afi **nĩāina**ga
Mwangi 3sgS-**PHEST**-say-PST.PRV that ASRT-3sgS-**PHEST**-dance-**PST.IMP**
Mwangi said (two days ago) that he was dancing.

(i) Verifying Situation:
Two days ago, Mwangi literally said "I was dancing earlier today."

(ii) Verifying Situation:
Two days ago, Mwangi literally said "I am dancing now."

As the reader can again confirm, our semantics from Section 5 predicts only the 'back-shifted' readings observed in (152ai, bi, ci). It is also worth noting that, under these back-shifted readings, the embedded TRM can only be interpreted relative to matrix utterance time, and not the time of reported speech, as shown by the fact that (152b) is not true in situation (152biii).

Although our account from Section 5 captures the data in (152ai, bi, biii, and ci), it cannot alone account for 'simultanoues readings' observed in (152aii, bii, and cii). On the other hand, if we were to assume that the embedded clauses in (152) had the structure in (148), we

could easily derive these simulatenous readings.[71] Thus, the facts in (152) provide some independent support for the key assumptions in (148) and (149).

On the other hand, we should also note a key problem for extending the hypothesis in (149) to Kikuyu. Another crucial argument in support of (149) in English is the possibility of embedded PAST in sentences like the following (Ogihara 1989, Abusch 1997).

(153) **'Ogihara Sentence', Establishing Uninterpreted PAST in English**

Yesterday, Mwangi **said** that **at the party next week**, he **would** only dance with girls who **were** dancing.

In this sentence, the alleged event of the girls dancing is not prior to the Utterance Time, nor any of the other events described in the sentence. Thus, the presence of PAST tense on the verb 'were dancing' does not seem to be semantically motivated. However, it could be profitably analyzed as a kind of 'T-agreement' with the past-tense modal 'would dance' in the higher clause. Thus, the possibility of sentences like (153) provide rather definitive evidence that certain instances of embedded PAST in English are not truly present at LF. With this in mind, note that such sentences are not possible in Kikuyu, as illustrated below.

(154) **'Ogihara Sentences' are Not Possible in Kikuyu**

Situation: Yesterday, you and Mwangi were talking about a party next week. Mwangi mentioned that he doesn't like to ask girls to dance, and so only ever dances with girls who are already dancing. He literally said (in English): "I will only dance with girls who are dancing." Again, all this happened yesterday. You are today reporting to Wambui what Mwangi said yesterday.

a.	Ira,	Mwangi	araugire			atĩ	a**rar**ĩ
	yesterday	Mwangi	3sgS-HEST-say-PST.pRV			that	3sg-**HEST**-be
	aine	na	airĩtu	aria	ma**rain**a		
	a-in-e	na	airĩtu	aria	ma-**ra**-in-**a**		
	3sgS-dance-SUBJ	with	girls	who	3plS-**PRS.IMP**-dance-**FV**		

Yesterday, Mwangi said that he would only dance with girls who are dancing.

Judgment: True in this context (Offered as translation of English)

b.	Ira,	Mwangi	araugire	atĩ	a**rar**ĩ
	yesterday	Mwangi	3sgS-HEST-say-PST.pRV	that	3sg-**HEST**-be

[71] Note, however, that we may need to also assume some mechanism whereby the embedded TRM is absent at LF. Since the analysis of simultaneous readings are not central to our interests, I will leave this important problem to future study.

aine	na	airĩtu	aria	ma**ra**in**aga**
a-in-e	na	airĩtu	aria	ma-**ra**-in-**aga**
3sgS-dance-SUBJ	with	girls	who	3plS-**HEST**-dance-**PST.IMP**

Yesterday, Mwangi said that he would only dance with girls who are dancing.

Judgment: *Not* true in this context.
Would only be true if Mwangi said he would dance with girls who were dancing *one day prior to the assertion of* (154b).

In sentence (154b), the embedded verb ***marainaga*** 'were dancing' shares the PAST tense and the Hesternal TRM of the modal ***ararĩ aine*** 'would dance' in the higher clause.[72] Nevertheless, a simultaneous reading of ***marainaga*** 'were dancing', whereby the dancing of the girls coincides with Mwangi's, is not possible for (154b). Instead, the desired proposition can only be expressed by an embedded present imperfective ***maraina*** 'is dancing', as in (154a).[73] These facts demonstrate that the general process of 'T-agreement' observed for English in (153) does not extend to Tense and TRMs in Kikuyu. Consequently, attributing the simultaneous readings in (152) to such a 'T-agreement' process is a bit uncertain. However, given that there are no other known means for obtaining such readings, I will retain the assumption in (149).

With this background in place, let us now consider the analysis of FIP sentences like the following.

(155) **Embedded FIP Sentences Containing Past Imperfectives**

Mwangi **ā**ugire aĩ nĩa**ra**in**aga.**
Mwangi 3sgS-**PHEST**-say-PST.PRV that ASRT-3sgS-**HEST**-dance-**PST.IMP**
Mwangi said (two days ago) that he was dancing.

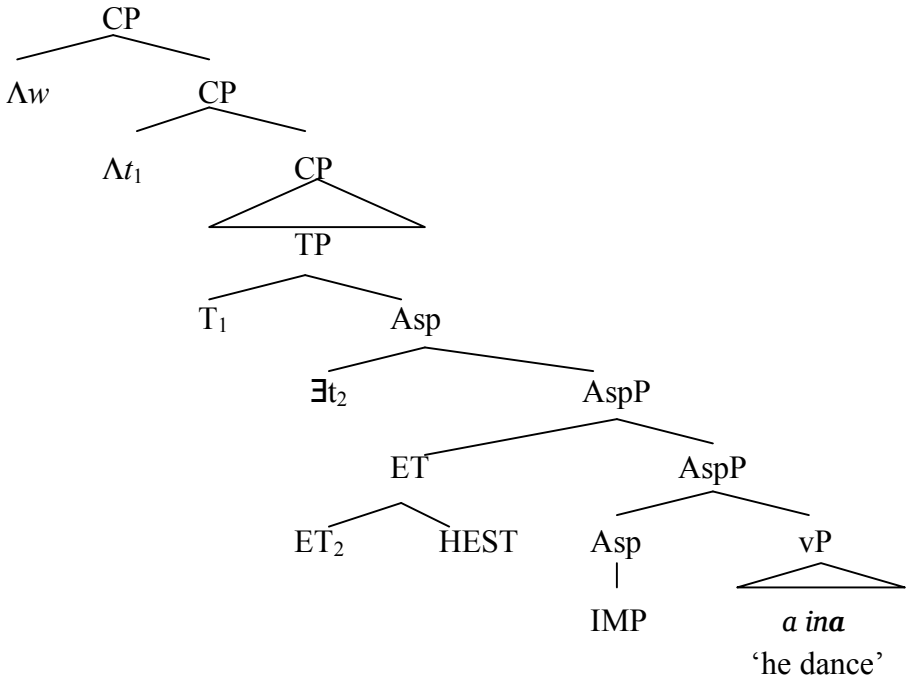
Verifying Situation:
Two days ago, Mwangi literally said "I will dance tomorrow."

The reader may verify that the account below will extend to the similar sentences in (143)-(144). The key assumption I will make is that the embedded clause in (155) has the structure below.

[72] The auxiliary construction ***ararĩ aine*** 'would dance' combines the copula ***nĩ/rĩ*** with the verb ***kũina*** 'dance' in the subjunctive mood. It is another one of the ways Kikuyu speakers can express 'future-in-the-past'. Interestingly, in this construction, the TRM of the auxiliary does not modify the future event time, but rather the time that the disposition in question holds. I believe this can be linked to the bi-verbal nature of the construction, but it remains an important outstanding challenge to the semantic theory developed here.

[73] Recall that in Section 5, embedded present imperfectives were shown to allow for simultaneous readings (107).

(156) **Structure of Embedded Clause in (155)**



Thus, I assume that the embedded CP in (155) has essentially the structure in (148), the one key difference being the presence of HEST on the embedded ET. Importantly, if we also assume that IMP in (156) is interpreted via the rule in (146), we predict the following T-conditions for (155).

(157) **T-Conditions Predicted for (155)** [74]

[[(155)]] $^{g, w, t, c}$ = is defined only if g(3) < *t* If defined, then it is T *iff:*

∃t_4 . **t_4 is on the interval (_ , c(T))** & *g*(3) ⊃ t_4 &
∀<w',t'> ∈ Asrt(*Mwangi* , w , t_4) :
∃t_2 . t' < t_2 & **t_2 is on the interval [$YEST_{c(T)}$, c(T)]** &
& ∃e . dance(e,w') & Agent(e) = Mwangi & *T*(e) = t_2]]

Given that the T-node in (156) is bound by 'Λt_1', the embedded TT of (155) is ultimately bound by the PA verb ***ā**ugire* 'said'. Thus, under the interpretation in (146), the embedded IMP serves to directly locate the 'asserted alternatives' of Mwangi prior to a future event of him dancing. Finally, the embedded HEST provides the information that this event of dancing occurs one day prior to the utterance of (155). Putting all these pieces together, we predict that (155) is T *iff* at a time t_4 two days prior to the utterance of (155), Mwangi asserted that there was a time t_2 following t_4 *and falling one day prior to the utterance of (155)*, where he danced. Given that these conditions do hold in the 'verifying situation' paired with (155), we correctly predict that (155) can be read as T in that situation.

[74] As before, these T-conditions assume an LF wherein the matrix T bears index 3.

Finally, we should again note that th success of this analysis relies upon the TRM being a modifier of the embedded ET. As the reader can confirm, an LF where the embedded HEST is a modifier of the embedded T would lead to the T-conditions below.

(157) **T-Conditions Predicted for (155) if HEST Modifies the Embedded T-Node**

[[(155)]] $^{g, w, t, c}$ = is defined only if $g(3) < t$ If defined, then it is T *iff:*

$\exists t_4$. **t_4 is on the interval (_ , c(T))** & $g(3) \supset t_4$ &
$\forall$<w',t'> $\in$ Asrt(*Mwangi* , w , t_4) :
$\exists t_2$. t' < t_2 & **t' is on the interval [$YEST_{c(T)}$, c(T)]** &
& $\exists$e . dance(e,w') & Agent(e) = Mwangi & *T*(e) = t_2]]

As shown above, if HEST were a modifier of T, then our semantics would predict that in (155), HEST supplies the information that the asserted alternatives of Mwangi at t_4 all fall *one* day prior to the utterance of (155). Since those conditions do not obtain in the situation paired with (155), we would wrongly predict (155) to be false in that scenario.

Thus, we find that in seeking to deveop a formal understanding of the patterns in (143)-(144), we are independently lead to an analysis where it is again crucial that 'temporal remoteness morphemes' operate as modifiers of the Event Time, rather than the Topic Time. Taken together with the facts from Sections 6.1-6.3, we find compelling support for our key hypothesis in (48): TRMs are for Event Times what tenses are for Topic Times.

7. Some Outstanding Issues and Potential Problems

Although the system developed above may elucidate certain key patterns in the tense-aspect system of Kikuyu, it is not without its problems and challenges. Some of those were noted in the footnotes above. Others will receive more focused attention below.

7.1 The Analysis of 'Indefinite Future'

Section 2 introduced the 15 different tense-aspect forms of the Kikuyu verb. In the preceding sections, we provided formal analyses of 14 of those forms. However, we have not yet discussed the 'Indefinite Future' forms in (9), repeated below.

(158) **Indefinite Future Tense Forms**

Mwangi nĩa**rĩ**in**a.**
Mwangi nĩ-a-**rĩ-**Ø-in-**a**
Mwangi ASRT-3sgS-**INDEF-FUT**-dance-**FV**
Mwangi will dance / will be dancing (some time).

According to traditional descriptions, such forms place no constraints on when the future event will occur. For this reason, Johnson (1977, 1980, 1981) analyses them as simply unrestricted future forms, akin to the future forms of IE languages like English.

As noted earlier, these Indefinite Future forms do not appear to be an active feature of the speakers I have worked with. Moreover, the use conditions usually described for such forms – *i.e.*, an ignorance of whether the event occurred today or later – seem to overlap with those of the PHOD future. Nevertheless, one might righly wonder how forms like (158) would fit in to the system proposed here.

Interestingly, Johnson's (1977, 1980, 1981) analysis of Indefinite Future as simply being a 'general future' akin to that in English would seem to work rather nicely within our own account. Note that, under its traditional descriptions, a key feature of the 'Indefinite Future' is that it does not undergo the pragmatic strengthening observed for Post-Hodiernal Future. That is, we saw in Section 4 that Post-Hodiernal Futures also were akin to 'unrestricted futures' in English, in that they simply assert the future existence of some event. However, we also saw that Maximize Presuppositions typically leads to a strengthened interpretation of Post-Hodiernal forms, where they are taken to indicate that the speaker knows the event will occur after the day of speech. Since this kind of strengthened interpretation is not reported for Indefinite Futures like (158), an analysis of those forms must explain why.

Let us then suppose that, as suggested by Johnson, Indefinite Futures in Kikuyu have a syntax-semantics akin to futures in English. That is, let us suppose that the prefix *rĩ-* in (158) is not a TRM but is rather a realization of the otherwise null FUT head. Thus, the proper glossing of (158) would be as follows.

(159) **Indefinite Future Tense Forms**

Mwangi	nĩa**rĩ**in**a.**
Mwangi	nĩ-a-**rĩ**-in-**a**
Mwangi	ASRT-3sgS-**FUT**-dance-**FV**

Mwangi will dance / will be dancing (some time).

Thus, like future forms in English, Indefinite Futures in Kikuyu do not contain any TRM feature adjoined to ET. It therefore follows that Maximize Presuppositions (MP) will not lead to a strengthened interpretation of (159). Under our statement of MP in (57), repeated below, MP will only compare two LFs that are identical up to the lexical items α and β.

(160) **Maximize Presuppositions (MP)**

Suppose that the following holds:

a. LF_1 and LF_2 are identical, except that LF_1 contains lexical item α where LF_2 contains lexical item β
b. The domain of $[[\alpha]]$ is a strict subset of the domain of $[[\beta]]$
c. A speech act using either LF_1 and LF_2 would be licit in context.

If all these conditions hold, then the speech act must be made with LF_1 , not LF_2

Recall that this condition in (160a) does hold between a Hodiernal and a Post-Hodiernal Future, since they both contain TRMs adjoined to ET. However, since an Indefinite Future lacks a TRM on ET, condition (160a) would *not* hold between it and a Hodiernal Future. Thus, MP would not entail that an Indefinite Future is illicit when a Hodiernal Future may be used. Consequently, we

find that Johnson's original analysis of Indefinite Future forms could easily be incorporated into the system proposed here, and would righly predict that such forms would not exhibit the strengthened interpretations of Post-Hodiernal Futures.

The reasoning laid out above might also help elucidate the contrast between simple perfects in Kikuyu and complex perfects bearing PHEST. Note that under our analysis, the forms in (161a,b) have logically equivalent T-conditions.

(161) **The T-Conditional Similarity Between Simple Perfects and Pre-Hesternal Perfects**

a. Simple Perfect

Mwangi **nĩainĩte.**
Mwangi ASRT-3sgS-dance- **PERF**
Mwangi has/had danced.

Predicted T-conditions:
∃t''. t'' < TT & ∃e . dance(e,w) & Agent(e) = Mwangi & *T*(e) = t''

b. Pre-Hesternal Complex Perfect

Mwangi **nĩāainĩte.**
Mwangi ASRT-3sgS-**PHEST**-dance- **PERF**
Mwangi has/had danced (before yesterday).

Predicted T-conditions:
∃t''. **t'' is on the interval (_ , c(T))** & t'' < TT &
∃e . dance(e,w) & Agent(e) = Mwangi & *T*(e) = t''

As shown above, our semantics predicts that a simple perfect like (161a) asserts that there is some time t'' preceding the TT where the ET holds. A Pre-Hesternal perfect like (161b), however, asserts essentially the same thing: there exists some time t'' preceding the TT *and falling on the interval between the TT and the beginning of time* where the ET holds. Despite their T-conditions being so similar, the PHEST form in (161b) is subject to a strengthening process whereby it is typically understood to mean that the ET falls two days prior to the utterance. One might naturally wonder, then, why such a strengthened meaning is not observed for (161a).

Again, we can appeal to the exact statement of MP in (160). Recall that the strengthened interpretation of (161b) arises because (160a) holds between it and the Hesternal Perfect form in (6c). Happily, though, (160a) does *not* hold between (161a) and (6c); the Hesternal Perfect contains a TRM modifying its ET pronoun, while the simple perfect in (161a) does not. Consequently, MP does not ban the use of (161a) in context where (6c) would be licit, and so (161a) is not predicted to exhibit the strengthened interpretation of (161b).

We find, then, that the exact statement of MP in (57)/(160) helps to clarify the semantic contrast between Indefinite and Post-Hodiernal Futures, as well as that between simple and Pre-Hesternal Perfects. Although these forms have nearly identical T-conditions, the presence of a TRM in one leads it to exhibit a strengthened interpretation that the other does not.

7.2 Cases Where TRMs Seem to Track Topic Times Rather than Event Times

Section 6 put forth four arguments that TRMs function as modifiers of ET, and not TT. Although the facts in Section 6.1, 6.2, and 6.4 are rather clear, we should note here some vagaries concerning the use of TRMs in characterizing sentences.

First, it was noted in (133)-(134) that HEST does not appear in characterizing sentences, even when the understood topic time falls on the preceding day. Crucially, the sentences in (133)-(134) concern an individual, Mwangi. When the subject of prediction is a movie, intuitions change dramatically.

(162) **TRMs in Sentences Characterizing Movies**

a. Original Sentence: Last week, we saw "The King's Speech." It was very good.

Kikuyu Translation:

Nĩtwaonire	thenema	ya	"The King's Speech"
Nĩ-tũ-a-on-ire	thenema	ya	"The King's Speech"
ASRT-1plS-PHEST-see-PST.PRV	movie	of	"The King's Speech"

njuma	thiru,	na	**yarĩ**	njega	mũno
njuma	thiru	na	i-**a**-rĩ	njega	mũno
week	last	and	4sgS-**PHEST**-be	good	very

We saw the movie "The Kings Sppech" last week, and it was very good.

Judgment: True/appropriate in this context.
(Offered as traslation of original English).

b. Original Sentence: Yesterday, we saw "The King's Speech. It was very good.

Kikuyu Translation:

Nĩtũraonire	thenema	ya	"The King's Speech"
Nĩ-tũ-ra-on-ire	thenema	ya	"The King's Speech"
ASRT-1plS-HEST-see-PST.PRV	movie	of	"The King's Speech"

njuma	thiru,	na	**irarĩ**	njega	mũno
njuma	thiru	na	i-**ra**-rĩ	njega	mũno
week	last	and	4sgS-**HEST**-be	good	very

We saw the movie "The Kings Sppech" last week, and it was very good.

Judgment: True/appropriate in this context.
(Offered as traslation of original English).

In the Kikuyu translations above, the characterizing sentence concerning "The King's Speech" contains a TRM, the identity of which seems to depend upon the TT of the utterance.

The contrast between (133)-(134) and (162) is striking and puzzling. One possible explanation, consistent with our overall approach, is that the sentences in (162) do not characterize the movie "The King's Speech", but rather (in some sense) the event of seeing it. If this can be maintained, then the TRMs in (162) might be expected. For example, in (162b), the event of watching the movie was confined to the day preceding the utterance, and so any states of that event would similarly be so confined. It should be noted, however, that the agreement prefixes in (162) clearly indicate that the understood subject of *nĩ njega* 'be good' is *thenema* 'movie'.

Furthermore, although the judgments concerning (133) and (162) were clear, speakers were sometimes uncertain in their judgments of (134a,b). Although the predominant pattern was to reject (134a,b) in the associated context, speakers sometimes found those sentences to be plausible. Even more puzzling, (134a,b) were not always accepted together; on several occasions only (134a) or (134b) would be accepted.

Taking these facts together, we find that the empirical picture concering TRMs in characterizing sentences is still rather hazy. The present work is based upon what currently seem to be the predominant patterns. Properly clarifying those patterns, however, remains an important goal for future research.

Finally, in this context, I should perhaps mention a seemingly failed prediction of our account. Our analysis of 'complex perfects' holds that such verbs can bear present tense, as allegedly occurs in (124). Consequently, we might expect that such verbs could co-occur with temporal adverbs indicative of present tense. To date, however, attempts to elicit such structures have not been successful. The following facts are representative.

(163) **Temporal Adverbs and TRMs Cannot 'Conflict'**

Situation: In Mwangi's math class, they need to hand in their homework one day before class. They do this by sending their homework to the professor over e-mail. Sometimes, Mwangi doesn't manage to do this in time. Today, however, he has.

a. Umũthĩ, Mwangi nĩa**ra**heanite homework yake kahindainĩ
Umũthĩ, Mwangi nĩ-a-**ra**-hean-ĩte homework yake kahindaini
Today Mwangi ASRT-3sgS-**HEST**-give-PERF homework his on.time
Today, Mwangi has handed in his homework on time.
Judgment: **Ill-formed.**

b. Umũthĩ, Mwangi nĩaheanite homework yake kahindainĩ
Umũthĩ, Mwangi nĩ-a-hean-ĩte homework yake kahindaini
Today Mwangi ASRT-3sgS-give-PERF homework his on.time
Today, Mwangi has handed in his homework on time.
Judgment: Well formed, and true in this scenario.

c. Mwangi nĩa**ra**heanite homework yake kahindainĩ
Mwangi nĩ-a-**ra**-hean-ĩte homework yake kahindaini
Mwangi ASRT-3sgS-**HEST**-give-PERF homework his on.time
Mwangi has handed in his homework on time.
Judgment: Well formed, and true in this scenario.

Sentence (163a) contains both the adverb *ũmũthĩ* 'today' and a verb bearing HEST and PERF. Speakers judge this sentence to be ill-formed; specifically, it is reported that *ũmũthĩ* "conflicts" with HEST, and the entire sentence seems "inconsistent". Interestingly, as long as one of those two conflicting elements is removed, the sentence is judged to be well-formed and true (163b,c).

The contrast between (163a) and (163b,c) is certainly not predicted by our formal analysis. However, it might be predicted by an account where TRMs are modifiers of Topic Time. Note that if HEST were a modifier of T in (163a,c), then both the TT and the ET would necessarily fall before the day of speech, and so *ũmũthĩ* 'today' in (163a) could be a modifier of neither, resulting in the observed anamoly of that sentence.

We find, then, that the facts in (162) and (163) raise important questions for our key hypothesis in (48). On the other hand, it should also be noted that any account allowing TRMs to be modifiers of Topic Time must itself contend with the countervailing data in Section 6.

7.3 The Dependency Between TRM, Tense and Aspect

A notable feature of the Kikuyu tense-aspect system is that, as described in Section 2, particular TRMs are limited to particular combinations of tense and aspect. Thus, HEST can never occur in 'future' forms, and PHOD can never occur in past imperfectives.

At first glance, these cooccurrence restrictions might seem to have clear semantic explanations. Indeed, within main clauses, they do. Once we broaden our gaze to subordinate clauses, however, it is no longer obvious why certain combinations are impossible. For example, recall the possibility of 'future-in-the-past' sentences like the following.

(164) **HEST Possible With 'Scheduled Future' Imperfectives**

Mwangi **ā**ugire ati nĩa**ra**in**aga.**
Mwangi 3sgS-**PHEST**-say-PST.PRV that ASRT-3sgS-**HEST**-dance-**PST.IMP**
Mwangi said (two days ago) that he was dancing.

Verifying Situation:
Two days ago, Mwangi literally said "I will dance tomorrow."

Under our analysis of such sentences, the embedded IMP receives (essentially) the same interpretation as FUT. Consequently, it becomes an interesting puzzle why a sentence like (165) is not possible.

(165) **HEST Not Possible with Embedded Future Forms**

Mwangi **ā**ugire aĩ nĩa**ra**in**a.**
Mwangi **ā**ugire aĩ nĩ-a-**ra-∅**-in-**a.**
Mwangi 3sgS-**PHEST**-say-PST.PRV that ASRT-3sgS-**HEST-FUT**-dance-**PST.IMP**
Mwangi said (two days ago) that he would dance.

Not a Verifying Situation:
Two days ago, Mwangi literally said "I will dance tomorrow."

That is, if HEST could appear in a clause bearing FUT, then the embedded verb *nĩaraina* in (165) would allow a parse where this were so. The resulting sentence, would then be true in the scenario paired with (165). That this is not so provides further indication that HEST is simply disallowed from appearing in clauses where AspP is headed by FUT.[75]

Interestingly, under the traditional conception of TRMs as tenses, these various co-occurrence restrictions might be explainable. For example, it would be said that *ra-* is one of a number of past tenses, whereas future tense is directly contributed by the prefixes *kũ-, ka,* or *rĩ.* Consequently, it would simply not be possible for a future tense verb to ever contain *ra-*, and so there would be no analytic problem raised by the facts in (165). Under the analysis advocated here, however, the TRM prefixes are expected to be entirely independent of the choice of tense and aspect. Consequently, the observed dependencies can only be captured by stipulating some complex licensing mechanism, the nature of which remains unclear.

Finally, we might also note here an intimately related problem. A key feature of our analysis is, of course, the claim that TRMs are semantically akin to tense features like PAST. Both are hypothesized to be restricted identity functions on times. This, then, raises the following obvious question: why are TRMs *not* permitted as modifiers of T? Modulo the questions raised in Section 7.2, it seems to just be an empirical fact of Kikuyu that TRMs do not track TT, but rather can only be understood to modify the ET. Given that TRMs and tense features are of the same semantic type, there is no clear explanation of this restriction. Instead, we can again only appeal to some kind of 'selection' relation holding between TRMs and ET, as well as between tense features and T.

8. Conclusion

The preceding sections provide a relatively in-depth examination of the tense-aspect system of Kikuyu, a language alleged to distinguish different 'grades' of past and future tense. We have seen, however, that the morphemes traditionally labeled 'tenses' by Bantu grammarians are, at least for Kikuyu, nothing of the sort. That is, rather than being modifiers of the Topic Time, these 'temporal remoteness morphemes' are actually modifiers of the Event Time. On the other hand, we have seen that these morphemes have a strong semantic similarity to tenses, in that they

[75] Of course, the embedded verb in (165) can be parsed as a present imperfective, which would allow for a 'scheduled future' interpretation. However, 'scheduled future' readings of present imperfectives typically require the event in question to occur on the day of speaking. Thus, (165) remains anomalous under that parse as well.

denote restricted identity functions that introduce presuppositions regarding the location of a temporal argument.

We find, then, that Kikuyu does not truly exhibit multiple past and future tenses. This, of course, raises the question of whether *any* language can be shown to have such a multiplicity of tenses. At first glance, the claim that languages can exhibit more tenses than English sounds very plausible, and perhaps theoretically uninteresting. After all, there is nothing theoretically challenging about the notion that T can be modified by features other than PAST and PRESENT. In Kikuyu, however, this just does not seem to be allowable. Although the additional features at play in Kikuyu's tense-aspect system are of the same semantic type as tense features, they are for unknown reasons not permitted in T. Rather, they can only function as modifiers of the Event Time.

This suggests a rather interesting characterization of the variation between English and Kikuyu, one that could be explored through study of other languages alleged to exhibit 'grades' of tense. From what we've seen, the key difference between Kikuyu and English lies not in the categories of tense. Rather, it is that only Kikuyu allows the ET pronoun to be modified by 'tense-like' features, ones that introduce presuppositions regarding the Event Time. Thus, the picture that emerges is one where the categories of tense remain constant, and what varies is the presence or absence of similar such features associated with ET.

Whether this picture can be corroborated by studies of similar such languages remains to be seen.

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