# Temporal remoteness and relativity*

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## 1.     Tenses: deictic or relative?

A longstanding question in the literature is whether to treat the past tense in sentences like (1) as deictic or relative.

(1)     Rory talked to Lorelai.

Simplifying somewhat, a deictic theory states that the past tense relates a past topic time directly to the speech time in all its occurrences. On a relative theory, the past tense relates a past topic time to some evaluation time. In matrix clauses, the evaluation time is set by default to the speech time, so both theories can account for the occurrence of the past tense in (1). We need to look elsewhere for environments that distinguish the two theories.

    The theories say different things regarding embedded tenses, and what we will call complex tense, as schematized in (2).

(2)     a.     *Embedded tense (across clause boundaries)*
        Rory said Lorelai was sick.
        $[ \ldots T_1 \ldots [ \ldots T_2 \ldots ] ]$

      b.     *Complex tense (within clause boundaries)*
        Rory ha{s/d} left.
        $[ \ldots T_1 \ldots T_2 \ldots ]$

The relative theory elegantly accounts for the "back-shifted" reading of the embedded past tense in (2-a), assuming the evaluation time for the embedded tense can be set to the event time of the matrix clause. However, the relative theory needs a sequence of tense rule (e.g. Ogihara 1989) to obtain the "simultaneous" reading of (2-a), where the being sick time and

the saying time overlap. Meanwhile, the deictic theory states that the embedded past tense in (2-a) is interpreted deictically, and must rely on the Upper Limit Constraint (Abusch 1997, Heim 1994) to rule out a reading where Lorelai's leaving is in the past of the speech time but in the future of Rory's saying. In other words, both theories must rely on auxiliary assumptions to predict the available readings of (2-a), so it's still difficult to determine which theory should be preferred on the basis of this type of data.

Now considering (2-b), the deictic theory has no way of generating a past perfect from two past tenses within the same clause, since both will be interpreted relative to speech time. The relative theory, however, would be able to unify the simple past and the perfect by positing that the lower past tense is interpreted relative to the higher tense, yielding two backwards shifts within the same clause in the case of the past perfect. Certain authors have proposed exactly this for perfects in English (McCawley 1971, Arregi & Klecha 2015). The structures of the present and past perfects under this view are schematized as in (3).

(3)    a.    Rory has left. ⤳ [ PRES [ PAST VP ] ]

        b.    Rory had left. ⤳ [ PAST [ PAST VP ] ]

In this paper, we argue that Luganda (Bantu) is an excellent case study for work on embedded and complex tense because it features *temporal reference morphemes* (TRMs).[1] As Cable (2013) has shown in work on Gĩkũyũ (also Bantu), languages with TRMs allow for the careful study of interactions between temporal operators. Of particular interest is the fact that Luganda has an iterated TRM construction, whereby multiple TRMs can appear within the same clause to deliver a reading like the English past perfect. This construction is exemplified in (4). In this example, the main verb hosts an 'intermediate past' TRM, while a dummy copula verb hosts a 'distant past' TRM. The interaction between these TRMs produces a past perfect reading, as shown by the English translation.

(4)    Yali         ayogedde    naye.
       3SG.COP.**DIST** 3SG.talk.**INT** 3SG
       'He had talked to him recently.'

Our goal in this paper is to argue that the iterated TRM construction is a highly transparent case of complex tense, and provide an analysis. Our analysis provides support for the view that tenses are relative temporal operators, whose evaluation times can be set by temporal operators higher in the clause.

The outline of paper is as follows. After giving an overview of the behavior of single occurrences of TRMs in matrix clauses, we turn to discuss the iterated TRM construction in more detail. We then provide an analysis for TRMs as relative temporal operators that builds both on the relative tense analysis of perfects, as well as recent work by Arregi & Klecha (2015) and Bjorkman (2011) on auxiliary verb insertion as a host for stranded in-

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[1]We borrow this term from Cable (2013).

flectional features. We then point to an important remaining issue for future work regarding the behavior of TRMs in embedded clauses.

## 2. Luganda TRMs

Luganda is a Northeast Bantu language (JE15), spoken by approximately 5 million people, mainly in Uganda, East Africa, as well as a diaspora population. The data reported on here come from elicitations with three male native speakers of Luganda, two of whom live in the United States, and one in the United Kingdom. All three are also fluent speakers of English, and elicitations took place in English.

Luganda has three remoteness categories for past time reference, which we refer to as RECENT, INTERMEDIATE, and DISTANT. These are illustrated in (5).

(5) a. **Nzinye** (ku makya).
1SG.dance.**REC** (LOC morning)
'I danced (this morning).' RECENT PAST

b. **Nazinye** (jjo).
1SG.dance.**INT** (yesterday)
'I danced (yesterday).' INTERMEDIATE PAST

c. **Nazina** (luli).
1SG.dance.**DIST** (another.time)
'I danced (the other day).' DISTANT PAST

The boundaries of the temporal delineations grammaticized by Luganda TRMs are often described in the literature as being quite precise. Ashton et al. (1954, 122-123) characterize the three TRMs in the following way: the recent past "expresses the completion of an action and/or state entered upon within the immediate past"; the intermediate past "expresses an action actually finished and accomplished as an action, but confined or limited ..., roughly speaking, to the past twelve hours"; and the distant past "denotes an action in the past, but is indefinite as to the exact time. ... It corresponds to a Past Aorist." Meanwhile, according to Sternefeld & Nickshere (2015, 49-52), the recent past "is used for events that happened approximately within the last hour"; the intermediate past " is used for events that happened today or yesterday"; and the distant past "is used for events that happened more than a day ago."

In general, our consultants' judgments converge for what might be considered the most prototypical uses for the TRMs, as described above. However, depending on the context, the applicability of the TRMs may diverge quite significantly from the descriptive generalizations. For further defense of the view that Luganda TRMs are vague and context sensitive, see Bochnak & Klecha (2015).

Additionally, there is evidence that the distant past is in fact underspecified for temporal distance. Cable (2013) argues that this is the case for the distant past[2] in Gĩkũyũ by showing

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[2]Cable labels this form in Gĩkũyũ the 'remote past'.

that in contexts of speaker ignorance, the distant past is used without any temporal distance inferences. Applying this test to Luganda, we find exactly this behavior for the distant past. As observed in (6), when a speaker has no idea how far in the past an event happened, the distant past is used without any presumption on the part of the speaker that the event happened at least two days ago.

(6)　a.　Context: You have known Kato for a long time, but have never been to his house. You are finally invited over and you see that he often buys very old things for fun. He tells you he bought an old Apple computer from 1985 just a few hours before you arrived. You see his TV, which is also quite old, but you can't tell if he just recently bought it, or if he's actually had it since the 80's.

　　b.　Eno TV wagiggula-di?
　　　　this TV 2SG.buy.**DIST**-when
　　　　'When did you buy this TV?'

(7)　a.　Same context as (6-a).

　　b.　#Eno TV wagigguzze-di?
　　　　this TV 2SG.buy.**INT**-when
　　　　'When did you buy this TV?'
　　　　Speaker comment: "Sounds like it happened maybe yesterday."

We follow Cable (2013) in assuming that the distant past form is underspecified for temporal distance, and that the distance implication arises due to a pragmatic competition with the more specific recent and intermediate forms.

## 3.　TRM iteration

The empirical pattern we aim to account for in this paper is the fact that TRMs in Luganda can iterate within a single clause to yield interpretations similar to the English past perfect, as shown in (4). We illustrate this pattern in more detail with variants of the following scenario. First consider (8):

(8)　Context: A and B are talking about a party they went to a few days ago.

　　A:　Nalabye　　Kato kabaga.
　　　　1SG.see.**INT** K　at.party
　　　　'I saw Kato at the party.'

　　B:　Wayogedde　naye?
　　　　2SG.talk.**INT** him
　　　　'Did you talk to him (at that time)?'

In (8), A uses the intermediate past to talk about the topical party time a few days prior to speech time. B then also uses the intermediate past to anaphorically refer back to that time. Now compare this with (9).

(9)     Context: A and B are talking about a party they went to a few days ago.

    A:  Nalabye     Kato kabaga.
         1SG.see.**INT** K    at.party
         'I saw Kato at the party.'

    B:  Wabadde     wayogera    naye?
         2SG.COP.**INT** 2SG.talk.**DIST** him
         'Had you talked to him (before that time)?'

    B′: #Wali         wayogedde   naye?
         2SG.COP.**DIST** 2SG.talk.**INT** him
         Intended: 'Had you talked to him (before that time)?'

In this case, A again uses the intermediate past to talk about the topical party time. B then responds by asking about the existence of an event of talking before the topical party time, and does so by using the iterated TRM construction. Notice that the intermediate past is used on the copula, while the distant past is used on the lexical verb. Notice also that the reverse order of TRMs is unacceptable in this context. This appears to be evidence that the TRM on the copula identifies the topic time, while the TRM on the lexical verb identifies the event time. However, since the distant past is used on the lexical verb in B's acceptable response, it is not yet clear whether this TRM is interpreted deictically or relative to the TRM on the copula. We now slightly modify the context scenario to test this question. First, consider the dialog in (10), parallel with (8).

(10)     Context: A and B are talking about a party they went to quite a while ago.

    A:  Nalaba      Kato kabaga.
         1SG.see.**DIST** K    at.party
         'I saw Kato at the party.'

    B:  Wayogera    naye?
         2SG.talk.**DIST** him
         'Did you talk to him (at that time)?'

Here, A uses the distant past to talk about the topical party time, now set more distantly prior to speech time. Likewise, B also uses the distant past to refer anaphorically to this topic time. Now compare again with (11).

(11)     Context: A and B are talking about a party they went to quite a while ago.

    A:  Nalaba      Kato kabaga.
         1SG.see.**DIST** K    at.party

'I saw Kato at the party.'

B:  Wali          wayogedde   naye?
    2SG.COP.**DIST** 2SG.talk.**INT** him
    'Had you talked to him (a few days before that time)?'

B′: #Wabadde      wayogera    naye?
    2SG.COP.**INT** 2SG.talk.**DIST** him
    Intended: 'Had you talked to him (a few days before that time)?'

In (11), A again uses the distant past to talk about the topical party time. B then uses the iterated TRM construction with the distant past on the copula, and the intermediate past on the lexical verb. Notice that the reverse order of TRMs is now unacceptable in this context. This pattern confirms the first hypothesis made on the basis of (9), namely that the TRM on the copula refers to the topic time. The topic time is in the intermediate past in (9), and in the distant past in (11), and these are the TRMs used on the copula in those examples, respectively. We can also now confirm based on B's response in (11) that the TRM on the lexical verb is interpreted relative to the TRM on the copula, and not deictically. That is, the event of talking being asked about is in the intermediate past of the distant topic time. If it were interpreted deictically, then the talking event would be located in the intermediate past of the speech time. This would locate the talking event time in the *future* of the topic time, since the topic time is in the distant past of the speech time. This, however, is not a possible interpretation for B's utterance in (11).

In sum, the empirical generalizations for the iterated TRM construction are as follows. The highest, or only, TRM in a clause describes the temporal depth between the speech time and the topic time. In iterated TRM constructions, this is the TRM marked on the copula. Meanwhile, the lower TRM on the lexical verb describes the temporal depth between the topic time and the event time of the clause. This is shown schematically in (12).[3]

(12)    *Schematic of iterated TRM construction*
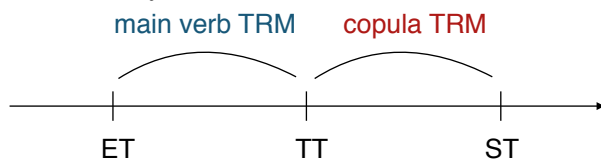


From (12), we can see how the iterated TRM construction delivers past-perfect-like meanings. The higher TRM, relating the speech time and topic time, serves the function of the past tense in languages like English, while the lower TRM, relating the topic time and the event time, serves the function of the perfect.

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[3]Due to space constraints, we suppress the full range of combinations of TRMs in the iterated TRM construction. All combinations are in principle grammatical, though their acceptability depends on the context of utterance (i.e., whether the temporal depths lexicalized in the TRMs, and their arrangement on the copula and main verbs as in (12) are appropriate for the context).

## 4.     Formal Semantics

We analyze TRMs in Luganda as relative tenses. Simple denotations and standard compositional principles are sufficient to implement the essential schematic for temporal interpretation given in (13). Below let *EvalT* be evaluation time, *TT* be topic time, *ST* be speech time, and *ET* be event time (the evaluation time of the verb).

(13)     *Schema for Interpretation of Temporal Operators*

      a.    Each temporal operator (TO) relates an *EvalT* and a *TT*.

      b.    Given a chain of TOs, $[_{CP} \ ... \ TO_1 \ ... \ TO_n \ V \ ... \ ]$

          (i)    $TT_{TO_k} = EvalT_{TO_{k+1}}$

          (ii)   $ET = TT_{TO_n}$

          (iii)  $EvalT_{TO_1} = ST$

First, we will assume that the extended verbal projection for any typical verb will be of type $\langle i, st \rangle$. We posit the inventory of TRMs in (14).

(14)     *Luganda Inventory of Temporal Remoteness Morphemes*

      a.    $[\![\textbf{REC.P}]\!] = \lambda t \lambda u \lambda w [t < u \ \& \ \textbf{close}(t, u) \succ \textbf{s}(\textbf{close})]$

      b.    $[\![\textbf{INT.P}]\!] = \lambda t \lambda u \lambda w [t < u \ \& \ \textbf{far}(t, u) \prec \textbf{s}(\textbf{far})]$

      c.    $[\![\textbf{DIST.P}]\!] = \lambda t \lambda u \lambda w [t < u]$

First observe the denotation for the distant past in (14-c). It is a simple temporal relation, placing its first time argument (its TT) prior to its second time argument (EvalT). The recent (14-a) and intermediate (14-b) past TRMs differ only in that they relate the two time arguments in an additional way, conveying information about their proximity on the timeline. We follow Bochnak & Klecha (2015) in modeling these remoteness inferences using the measure functions **close** and **far**, respectively, and the positive standard function **s** from Kennedy (2007).

The measure function **close** takes two time arguments and returns the degree of their proximity. The measure function **far** takes two time arguments and returns the degree of their distance. As in Kennedy, **s** takes a measure function and returns the degree on the scale associated with that function that 'stands out' relative to the salient comparison class.[4]

Thus the recent past (14-a) takes two times and returns true iff the first is both prior to the second, and close enough to it so that its proximity stands out relative to the comparison class. The intermediate past (14-b) takes two times and returns true iff the first is both prior to the second, and *not far enough* from it so that its distance stands out relative to the comparison class. Thus both operators are true of pairs of times which are in close proximity. The intermediate past is also true of times which are not in close proximity, but are not distant either. Scalar implicature will typically strengthen the intermediate past so that its usage excludes times in close proximity. Likewise, scalar implicature will typically strengthen the distant past (which has no remoteness inference) so that its usage excludes

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[4]The role of context in determining the comparison class is suppressed in the formalism.
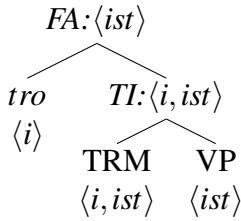
times which are not distant. The use of degree semantics and the **s** function, which underly the semantics of positive gradable adjectives (Kennedy 2007), captures the vague and context dependent nature of these morphemes (Bochnak & Klecha 2015).

   We assume that temporal pronouns (*tro*s) combine with each TRM, and provide their TT. We also assume that at the top of every clause is a special speech time pronoun, $tro_0$, which provides the default valuation of EvalT for the highest temporal operator. We also assume a generalized conjunction rule allows TRMs to combine with their complements. We give only the specific instance of the generalized rule needed for this case.

(15)   *Temporal Identification*
       If $[\![\alpha]\!] \in D_{\langle ist \rangle}$ and $[\![\beta]\!] \in D_{\langle i,ist \rangle}$, and $\gamma$ is the mother of $\alpha$ and $\beta$, then
       $[\![\gamma]\!] = \lambda t \lambda u \lambda w[[\![\alpha]\!](t)(w) \mathrel{\&} [\![\beta]\!](t)(u)(w)]$

(16)   *Schema for TRM Composition*

$$
\begin{array}{c}
FA{:}\langle ist \rangle \\
\diagup\phantom{xxxx} \\
tro \qquad TI{:}\langle i, ist \rangle \\
\langle i \rangle \qquad\quad \diagup\phantom{xx}\diagdown \\
\phantom{xxxx}TRM \quad VP \\
\phantom{xxx}\langle i, ist \rangle \quad \langle ist \rangle
\end{array}
$$

   The only crucial detail here is that the type of the VP and the type of the phrase headed by the TRM is the same; thus TRMs may iterate freely, as in the crucial datum in (11), repeated in (17).

(17)   Wali           wayogedde   naye?
       2SG.COP.**DIST** 2SG.talk.**INT** him
       'Had you talked to him (a few days before that time)?'

We assume the following LF for the declarative counterpart of (17), and provide its derivation in (18).

(18)   *LF for Declarative Version of (17)*
       [$_S$ $tro_0$ [$_{TP_1}$ $tro_5$ [ DIST.P [$_{TP_2}$ $tro_7$ [ INT.P [$_{VP}$ 2SG$_2$ –*yoger*– *naye*$_3$ ]]]]]]

(19)   a.   $[\![\textbf{2SG } \text{–}\textbf{yoger}\text{–}\textbf{ naye}]\!]^g = \lambda t \lambda w[\exists e[\textbf{talk}(e, g(2), g(3), w) \mathrel{\&} \tau(e, w) = t]]$
       b.   $[\![tro_7 \textbf{ INT.P VP}]\!]^g = \lambda u \lambda w[[\![\textbf{VP}]\!](g(7))(w) \mathrel{\&} g(7) < u \mathrel{\&} \textbf{far}(g(7), u) \prec \textbf{s}(\textbf{far})]$
       c.   $[\![tro_0 \: tro_5 \textbf{ DIST.P } tro_7 \textbf{ INT.P VP}]\!]^g =$
            $\lambda w[[\![\textbf{VP}]\!](g(7))(w) \mathrel{\&} g(7) < g(5) \mathrel{\&} \textbf{far}(g(7), g(5)) \prec \textbf{s}(\textbf{far}) \mathrel{\&} g(5) < g(0)]$

Together with a standard theory of scalar implicature,[5] this captures the data described above. The event time of the verb, $g(7)$, is placed at an intermediate distance (not far)
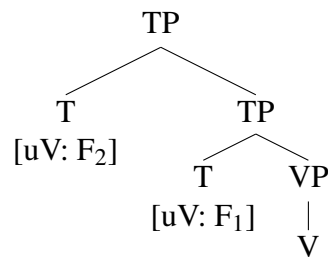
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[5] Or see Cable 2013 for for a version couched in Maximize Presupposition.

from the topic time, $g(5)$, which is turn in the past with respect to speech time, $g(0)$; by implicature, $g(5)$ is also distant from $g(0)$.
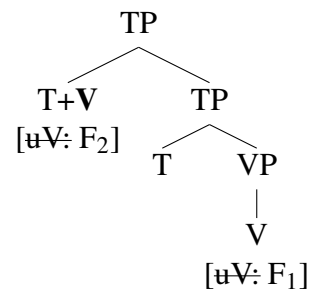
## 4.1    Syntax

Briefly, we address how the LF given in (18) corresponds to the surface form seen in (17). Following Bjorkman (2011) and Arregi & Klecha (2015), we assume that copulas like those seen in (17) are dummy verbs inserted to support verbal features which outnumber the lexical verbs that they can associate with. Thus while the lower TRM can send[6] its features to the lexical verb, the higher TRM is blocked by the presence of the lower one. A dummy verb must be inserted to support its features, as seen in (21).

(20)

```
            TP
          /    \
        T        TP
     [uV: F₂]  /    \
             T       VP
          [uV: F₁]    |
                      V
```

(21)

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             TP
           /    \
        T+V       TP
     [u̶V̶: F₂]  /    \
             T       VP
                      |
                      V
                  [u̶V̶: F₁]
```

## 5.    Comparison to English

This analysis offers striking support for Arregi & Klecha's view of the English perfect (22).

(22)    Rory ha{s/d} left.

According to them, the perfect is simply an instance of past tense which has been embedded within its clause. The dummy-verb is *have* rather than *be* (see Bjorkman (2011) for discussion of auxiliary selection), and the morphology of the lexical verb is in some cases different than what is typical for the past tense (e.g., *fallen* vs. *fell*). Arregi & Klecha argue, following McCawley (1971), that this is a finiteness contrast; thus only the highest verb in a clause in English receives finiteness features, and the insertion of the dummy verb prevents the finiteness features from reaching the main verb.

   One critical difference between Luganda and English is that dummy verbs do not prevent the main verb from getting finiteness features. This can be seen in the rich agreement features which appear on both the main verb and dummy verb in cases like (17). Thus there are no morphological differences between clause-initial and non-clause-initial TRMs.

   A sticking point for the analysis of English is that, while the English past perfect is, as far as we can tell, semantically not discernible from Luganda iterated pasts, the English present perfect does have a number of semantic peculiarities, which have earned the name

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[6]For Bjorkman, this process is simply agreement. For Arregi & Klecha, it is a special feature movement process called *Feature Transmission*.

*Present Perfect Puzzle.* This puzzle is in part about the contrast between the English present perfect on the one hand, and other perfects in English on the other. But it has also been used (e.g., McCoard 1978) to argue against embedded-past analyses of the perfect.

In Luganda, however, there is no obvious analogue of the present perfect. Our consultants have sometimes offered sentences like (23)-(24) as translations of English sentences involving the present perfect.

(23)  Wabadde       oyogedde naye?      (24)  Wali      obadde      mu Afrika?
      2SG.COP.**INT** 2SG.talk.**IE** 3SG          2SG.**DST** 2SG.cop.**IE** in  Africa
      'Have you talked to him recently?'       'Have you been to Africa?'


Note that the marking on the lexical verb is syncretic with that of the recent past. We believe that this is a case of homophony, since, especially in (24), there is no discernible recency inference. Moreover, it is the initial TRM, the one on the copula, which constrains event time. Additionally, there is no discernible contextual topic time in any of these cases, which is typically necessary to license the cases of iteration we have been observing.

To the extent that this could be called a present perfect, it certainly does not exhibit the unique behavior of the English present perfect. Two of the central facets of the Present Perfect Puzzle are lifetime effects (25-a) (where the subject must be alive for the present perfect to be acceptable) and incompatibility with past time adverbs (25-b); both are special to the Present Perfect and not seen in other perfects (see e.g., Portner 2003); this construction exhibits neither.

(25)  a.  {Trump/#Bin Laden} has visited Africa.
      b.  Trump has visited Africa {this year/#last year}.

(26)  a.  Bin Laden yali        abadde       mu  Afrika.
          B.L.      3SG.COP.**DIST** 3SG.COP.IE LOC Africa
          Consultant judgment: Acceptable.
      b.  Trump yali        abadde       mu  Afrika 2003
          Trump 3SG.COP.**DIST** 3SG.COP.IE LOC Africa 2003
          Consultant judgment: Acceptable.

In recent analyses of the Present Perfect Puzzle, it is the present tense itself which is responsible for the puzzle (Portner 2003, Klecha 2016). Since there is no obvious present tense in these cases, there is no reason to think that the puzzle should arise with these cases. Moreover, it would be irresponsible to label these cases, or any of the Luganda iterated tense examples as 'perfects'. The perfect in English has a particular distribution and displays a constellation of semantic features, some of which overlap with Luganda iterated tenses; the closest pair being the English past perfect and Luganda iterated past, which both straightforwardly behave as a relative theory tense says iterated tenses should behave. But labeling this, or any other construction in Luganda a 'perfect' only muddies the descriptive waters and falsely minimizes the semantic differences between these languages.

All this being said, the differences between the Luganda examples in (23) and (24) on the one hand and the other cases of Luganda TRM iteration on the other lead us to suspect that the morpheme glossed as IE in these cases is not a TRM at all. Further investigation is required to determine its exact function, and the precise distribution of the sentences containing it, but there is some precedent for this. The Luganda inventory of temporal operators also includes an imperfective operator, which also induces dummy-verb insertion.

> a. Context: Peet says that he saw Kato at the party. Ryan says:
> b. Wabadde      oyogera      naye?
>    2SG.COP.**INT** 2SG.talk.**IMPF** him
>    'Were you talking to him (at that time)?'

This correctly predicts that the topic time (the time of Peet's seeing Kato) is in the intermediate past relative to speech time, while the time of talking contains the topic time.

## 6.      Embedding Across Clauses

The proposal for treating Luganda TRMs as relative is in part motivated by a treatment of tenses in other languages as relative so as to account for their behavior when embedded *across* clause boundaries rather than within clause boundaries. This leads to a natural expectation that Luganda TRMs should also behave as relative when embedded across clauses. However, this is not the case; as in Gĩkũyũ (Cable 2015), TRMs appear to behave deictically when embedded across a clause boundary, e.g., under an attitude verb.

(27)   a.   Context: A while ago, Peet had the following thought: "Kisuule just danced."
       b.   Peet yalowoza      Kisuule azinye.
            P    3SG.think.DIST K      3SG.dance.REC
            Consultant judgment: Sounds weird; like he's thinking about the future.

Cable accounts for the Gĩkũyũ facts by positing TRMs in that language as inherently deictic. This strategy presents an immediate problem for Luganda, however; within-clause embedding of TRMs shows that they are clearly relative. What's more, the split seen in Luganda is actually the opposite of what might be expected given recent work on indexical shifting. Expressions like *I*, *you*, and *here*, in English are known to be not just anaphoric but rigidly so: Embedding them under attitude verbs (or anything else) does not cause their reference to shift; only the context of utterance controls their semantic exponence.

(28)   John said I left.
       *Cannot mean:* John said John left.

Typically it has been said that indexicals exhibit a kind of context dependence which is – unlike simple anaphora – inherently resistant to binding by logical operators; thus Kaplan's (1989) conjecture that an operator would have to be monstrous to bind indexicals. Follow-

ing observations by Partee (1989), however, Schlenker (2003) noted that some expressions in Amharic seem to be monsters.

(29)    ǰon ǰegna nə-**ññ**    yɨl-all
        John hero be.PF-**1SO** 3M.say-AUX.3M
        "John$_i$ says that he$_i$ is a hero."         (Amharic; Schlenker 2003)

Crucially, though, it is only in the context of attitude verbs that such monstrous shifting can occur; in (30) the first person pronoun cannot be bound by the third person subject.

(30)    wəndɨm-e    yəmm-ɨ-wəd-at-ɨn    lɨǰǰ agəññə
        brother-POSS.1S REL-1-love.IMP-3FO-ACC girl find.PF.3M
        'My brother found a girl I like/love.'         (Amharic; Schlenker 2003)

So Amharic and other similar languages establish a pattern which, though monstrous, can be sensibly explained: Certain expressions are indexical, being context dependent in a way distinct from simple anaphors, and therefore unable to be bound within clause boundaries, but with the help of attitude verbs, which introduce a perspectival center distinct from the default (that of the speaker) they can be, at least in some languages.

Moreover, Schlenker argues that Russian, whose present tense displays a clearly relative semantics when embedded under past-tensed attitude verbs, is actually deictic as well, but simply subject to monstrous binding. And Amharic might lead us to expect to find a language which is like Russian but goes further in that tenses can be iterated within a single clause and are all still interpreted relative to the same evaluation time, but which can have that evaluation time bound by a monstrous attitude verb.

Such languages might exist, but Luganda is the opposite. If TRMs in Luganda are indeed deictic, then their relative interpretation in tense-iteration contexts is mysterious. We may posit monstrous shifting, but without any of the conceptual attractiveness witnessed by Amharic. We would have to instill a monstrous shifter into the semantics of the TRMs themselves, without any obvious motivation – TRMs do not otherwise give use any reason to believe that they introduce their own perspectival centers.

Despite the surprising nature of this data, the proposal outlined above, as stated, does actually correctly predict the deictic behavior of TRMs when clause-initial but not sentence-initial. If the speech time pronoun $tro_0$ exists at the left edge of every clause, the relative semantics of TRMs predicts that they are interpreted as deictic when clause-initial but relative when non-clause-initial. But an immediate concern about this is that it seems to predict the impossibility of *de se* interpretation. Consider (31), an acceptable case of past-under-past in Luganda. Here, despite the fact that Kisuule's dancing is possibly[7] in the recent past of Peet's saying, the intermediate past is used because the dancing is in the intermediate past of speech time. The theory as sketched so far predicts the LF in (32).[8]

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[7]It is difficult to create contexts in which events happen precisely in certain 'time zones' and not in others because of the aforementioned vague and context-dependent nature of the temporal remoteness distinctions.

[8]Temporal remoteness inferences are abbreviated.

(31)     Peet agambye          Kisuule yazinye
         Peet 3SG.dance.REC Kisuule 3SG.dance.INT
         "Peet just said Kisuule just danced."

(32)     $\lambda w[g(7) <_{close} g(0) \, \& \, \forall v \in \text{SAY-MB}(g(7),w)[g(5) <_{not.far} g(0) \, \& \, \textbf{dance}(g(5),v)]]$

(32) says that what Peet said entails that Kisuule danced at $g(5)$, and *in fact* $g(5)$ is in the not-distant past of speech time. This may all be well and good in cases where the speaker and the subject of the reported attitude are in agreement about the temporal perspective, but not in other cases. Consider this example.

(33)     a.     Context: Kato woke up from a coma last week. (Elicited in 2016.)
         b.     K. yali          alowoza          nti  twali          mu mwaka gwe 2020.
                K. 3SG.COP.DST 3SG.think.IMPF that 3PL.COP.DST in   year      GEN 2020
                "Kato thought we were in the year 2020."

This raises the question: what role exactly is the embedded TRM playing in this case? It cannot be relating the topic time of the embedded clause to speech time, since the topic time (2020) is in the future of speech time (2016). Nor can it be relating the topic time to the time of the reported attitude (also in 2016), nor can it be relating the topic time to the temporal perspective; they are, though both in 2020, simultaneous.

This mystery is left to future research, but for present purposes we will simply point out that a full treatment of the cross-clause embedding cases is as mysterious for deictic accounts as it is for relative ones.


## 7.     Conclusion

In this paper we present an analysis of Luganda TRMs as relative tenses. This analysis is well supported by data from original fieldwork which show that Luganda TRMs can (in a morphologically transparent way) iterate. The remoteness inferences that these morphemes give rise to make them especially useful for testing hypotheses about the interaction of multiple TRMs in embedding contexts, both within and across clauses. We note a difficulty for the theory in across-clause embedding, namely *de se* interpretations in which the TRM is not providing information about the relationship between the embedded topic time and speech time (as the speech time pronoun theory would predict) nor about the relationship between the embedded topic time and perspective time (as a speech-time-pronoun-less version of the theory would predict).

In addition to raising important questions about the differences and similarities between within- and across-clause embedding of temporal operators, this work advances the important point that cross-linguistic work in formal semantics enriches our understanding of temporal semantics in ways that would be impossible without it. This work contributes to what we hope will be a long line of fruitful work on the temporal semantics of tenses and temporal remoteness morphemes across languages.

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