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Nominal tense and temporal implicatures: evidence from Mbyá

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Abstract In this paper, I discuss the distribution and the interpretation of the temporal suffix *-kue* in Mbyá, a Guaraní language that is closely related to Paraguayan Guaraní. This suffix is attested both inside noun phrases and inside clauses. Interestingly, its nominal uses give rise to inferences that are unattested in its clausal uses. These inferences were first identified in Paraguayan Guaraní by Tonhauser (PhD thesis, 2006; *Language* 83:831–869, 2007), who called them the existence property and the change of state property. Tonhauser further argued that these properties are built into the lexical entry of the nominal temporal marker *-kue*. By contrast, I argue that *-kue* denotes a relative past tense both in its nominal and clausal uses, and that the existence and change of state properties are pragmatic inferences that arise from the interaction of the literal meaning of *-kue* with general constraints on the interpretation of noun phrases, notably constraints on the topicality of the time of evaluation of noun phrases. This allows me to maintain a uniform analysis of *-kue* across its nominal uses and its clausal uses. The analysis of *-kue* in Mbyá is relevant to a number of current debates on the expression of tense crosslinguistically. Firstly, the existence of relative tenses has sometimes been called into question. Klein (*Time in language*, 1994) notably argues that relative tenses are actually combinations of tense with the perfect aspect. Others have argued that there exist true relative tenses in certain languages (see e.g. Bohnemeyer, *NLLT* 1–38, 2013). I argue that facts of Mbyá support the latter view. Secondly, Klein (1994) famously defined tenses as relations between topic times and the time of utterance. I argue, on the other hand, that relative tenses only denote relations between times, and that the topicality or non-topicality of their temporal arguments depends on their context of use, including their syntactic environ-

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ment. Thirdly, this paper contributes to debates on the nature and reality of nominal tenses (see Nordlinger and Sadler, Language 80:776–806, 2004; Lecarme, In: Binnick (ed) *The Oxford handbook of tense and aspect*, 2012), by arguing that tense in Mbyá is a genuinely nominal category, in the sense that temporal functional projections are part of the extended projection of the noun phrase.

Keywords Nominal tense · Relative tense · Implicatures · Semantic fieldwork

1 Introduction

1.1 Nominal tense in Mbyá

Verbs in Guaraní languages[1] commonly occur without temporal inflection, as illustrated in (1). Matrix sentences with bare verbs are non-future and their viewpoint aspect is underspecified (it may be described as perfective or imperfective depending on the context of utterance).

(1) Juan o-mba'eapo vaipa.
Juan 3-work a.lot
'Juan is working/was working/worked a lot.'

There are nonetheless two morphemes that one may be tempted to describe as tenses: *-kue* and *-rã*. These suffixes are attested on nouns, on relative clauses, on nominalized propositional complements, and also in matrix clauses in the expressions *va'ekue* and *va'erã*. Inside underived noun phrases, *-kue* and *-rã* can be translated approximately as *ex-* and *future* in English:

(2) A-echa mburuvicha-kue.
1-see leader-PST
'I saw the ex-leader.'

(3) Kuee, a-jogua che-ro-rã.
Yesterday, 1-buy 1-house-FUT
'Yesterday, I bought my (future) house.'

[1] Mbyá is a Guaraní language (Tupí-Guaraní family, Tupí stock) spoken in Argentina, Brazil, and Paraguay. It is spoken by 4,000 to 15,000 speakers according to Ladeira (2003). All the data presented in this paper that are not referenced in the bibliography were elicited during field trips to Misiones, Argentina, in 2011 and 2012. For these data, I adopted the orthography in practice in Misiones. Sentences quoted from texts in Mbyá written in Brazil use the orthography in use in Brazil. Glosses: 1/2/3: 1st/2nd/3rd person agreement; ABL: ablative post-position; ANA: anaphoric expression; BDY: information structure boundary (see Dooley 2006); COORD: coordinator; COMPL: completive aspect; DAT: dative post-position; DES: desiderative modality; DIM: diminutive; DS: Different Subject (switch reference); EXCL: exclusive; FUT: future; HSY: hearsay evidential; IMP: imperative; INC: inclusive; ITER: iterative aspect; INT: intensifier; ITJ: interjection; LOC: locative post-position; NEG: negation; NLZ: marker of nominalization; DOM: differential object marking (human direct or indirect object); OBL: oblique; PL: plural; PROS: prospective aspect; PST: past; Q: interrogative marker; RECIP: reciprocial; REDUP: reduplication; REL: marker of relativization; RFL: reflexive/middle prefix; SS: Same Subject (switch reference).

This use of *-kue* and *-rã* has been studied extensively. In particular, Tonhauser (2006, 2007) argues that *-kue* and *-rã* in Paraguayan Guaraní are not nominal tenses, because they possess properties that are not characteristic of *bona fide* tenses crosslinguistically. Less attention has been paid to the clausal use of *-kue* (and its allomorph *-gue*) and *-rã*, i.e., their use on nominalized propositional complements, relative clauses, and even in matrix clauses on uninterpreted relativization morphology:

(4) Juan o-mba'eapo va'e-kue vaipa.
Juan 3-work REL-PST a.lot
'Juan worked/was working/had worked/had been working a lot.'

(5) Juan o-icha'ã Maria o-mba'eapo-a-gue vaipa.
Juan 3-think Maria 3-work-NLZ-PST a.lot
'Juan thinks/thought that Maria was working a lot.'

(6) Juan i-jayvu va'e-rã ava reve Maria o-jurupyte va'e-kue.
Juan 3-talk REL-FUT man with Maria 3-kiss REL-PST
'Juan will talk to the man that Maria kissed/was kissing/had kissed/had been kissing.'

In this paper, I focus on the past temporal marker *-kue*. A challenge for any analysis of its meaning is that its nominal uses trigger obligatory inferences that are unattested or optional in its clausal uses, as the contrast between (7) and (8) illustrates.

(7) Aỹ Juan mburuvicha-kue.
Now Juan leader-kue
'Juan is now an ex-leader.'

(8) Juan mburuvicha o-iko va'e-kue.
Juan leader 3-be REL-PST
'Juan was a leader.'

First, (7) triggers an obligatory inference that Juan is not a leader at the time of utterance, a phenomenon that I will call the *cessation inference*, borrowing the terminology of Altshuler and Schwarzschild (2012). Tonhauser (2007) argues that *-kue* in Paraguayan Guaraní licenses a weaker inference, which she calls the *change of state property*. In the Mbyá example (7), the change of state property would be an entailment that Juan stopped being a leader before the time of utterance, which is consistent with Juan being a leader again at the time of utterance.

Secondly, (7) entails that Juan was alive when he stopped being a leader, a phenomenon that Tonhauser (2006, 2007) calls the *existence property* and that I will relabel the *existence inference*.

Finally, Tonhauser (2006, 2007) shows that *-kue* cannot combine with nouns that denote permanent or final-stage properties.[2]

Importantly, clausal uses of *-kue* like (8) do not trigger the existence inference, and the cessation inference appears to be optional.

[2] "'Final-stage properties' (like 'survivor') and relations (like 'father') are, once true of an individual, true of it for the rest of its time of existence (i.e. the final-stage of the individual's existence)." (Tonhauser 2007)

Tonhauser (2006, 2007) argues that the change of state property and the existence property are part of the lexical meaning of *-kue*, and that *-kue* is best analyzed as a terminative aspect. An issue for this analysis, in Mbyá at least, is that the meaning that Tonhauser proposes for *-kue* is inappropriate for its clausal uses.

By contrast, I propose that *-kue* in Mbyá always denotes a relative past tense, i.e. an operator that existentially quantifies over the time of evaluation of a property of times, and locates it in the past of a temporal anchor that may be the time of utterance or some other time. Differences of interpretation between nominal and clausal uses of *-kue* are due to independent constraints on the temporal interpretation of nominalized clauses and underived noun phrases.

I argue that the cessation inference in (7) is an obligatory implicature that Juan is not a leader at the time of utterance, which is triggered by the use of *-kue*. Clausal uses of *-kue* trigger this implicature too, but in this case it can be blocked. The problem then is to explain why the implicature is obligatory in one environment, but not in the other.

The existence inference is due to the interaction of the temporal implicature of *-kue* with a presupposition triggered by the noun phrase in its scope.

Finally, restrictions on the class of nouns that *-kue* can combine with are shown to be lifetime effects that are due to the cessation inference. These inferences are similar to the lifetime effects that are observed with past tense individual level sentences in English (see Musan 1995, 1997; Magri 2009).

On the syntactic side of the analysis, I propose that *-kue* attaches to a nominal expression in all of its uses: *-kue* is a functional T head that c-selects a complement with nominal categorial features. In nominal uses of *-kue*, this constituent is an underived noun phrase. In clausal uses of *-kue*, I propose that the nominalizers *va'e* and *-a* select the extended projection (Grimshaw 2005) of a verb phrase and project a noun phrase that is in turn selected by *-kue*. In both cases, *-kue* projects a TP. In sum, I argue that tense is a genuinely nominal category in Mbyá, in the sense that TPs are part of the extended projection of noun phrases rather than of verb phrases.

1.2 Fieldwork practices

The Mbyá data for this paper were elicited in the Mbyá community of Kuña Piru in the province Misiones, Argentina, during three field trips (summer 2011, winter 2011, and winter 2012). I worked with three main consultants: Aureliano Duarte, Cirilo Duarte, and Germino Duarte. Before each elicitation session, the consultants read or were read a consent form written in Spanish, and gave their written consent for the elicitation session to be recorded and/or transcribed, as well as for the resulting data to be used in scientific conferences and publications. In addition, I obtained the verbal agreement from the political leader of the community (at the time, Aureliano Duarte) to conduct research there.

During each elicitation session (elicitation of judgments of acceptability and truth value from the consultants based on questionnaires, along with comments made by the consultants during the elicitation), notes were taken in plain text files. These files were sorted by date and consultant and are archived on personal hard-drives.

The orthography that was used for the data I elicited is the one that is *de facto* used in Misiones, in written publications in Mbyá. Guaraní examples taken from publications or scientific articles are reproduced with the original orthography.

1.3 Structure of the paper

The paper is structured as follows. In Sect. 2, I give an overview of clausal tense. I describe bare verb clauses (BVCs, clauses without temporal marking) and clauses with *-kue*. In Sect. 3, I propose an analysis of these data. I argue that *-kue* is best analyzed as a relative past tense. In Sect. 4, I describe nominal tense. I present Tonhauser's description and analysis of *-kue* in Paraguayan Guaraní (Tonhauser 2006, 2007) and I discuss how Mbyá compares to Paraguayan Guaraní in this respect. I show that the analysis of *-kue* as a relative past tense does not capture its change of state and existence properties in and of itself. In Sect. 5, I analyze the cessation inference as a temporal implicature. In Sect. 6, I derive the existence inference of *-kue* from the interaction of this temporal implicature with independently attested presuppositions of noun phrases, and I show how to derive the restriction on the set of nouns that *-kue* can combine with as a lifetime effect. In Sect. 7, I discuss nominal uses of *-kue* in the light of Tonhauser's (2008) criteria for the classification of temporal markers as tenses. Finally, in Sect. 8 I situate my analysis of *-kue* within the larger debate on the existence of nominal tense crosslinguistically.

2 Clausal tense

In this section, I describe some aspects of the temporal interpretation of clauses in Mbyá. I focus on two verb forms: verbs that do not have any temporal marking (so-called bare verbs) and verbs that are modified by *-kue* or its allomorph *-gue*. I investigate the temporal interpretation of these verb forms in matrix clauses, in relative clauses, and in propositional complements.

2.1 Bare verbs

Simple sentences Bare verb sentences describe events that are located before or at the time of utterance (TU). Out of the blue, such sentences are only compatible with past or present frame adverbials, as illustrated in (9) and (10).

(9) Juan i-ñembyayi agỹ'i/kuee/*ko'erã.
Juan 3-hungry now/yesterday/tomorrow
'Juan is/was hungry now/yesterday/*tomorrow.'

(10) Juan o-mba'eapo agỹ'i/kuee/*ko'erã.
Juan 3-work now/yesterday/*ko'erã
'Juan is/was working now/yesterday/*tomorrow.'

Secondly, bare verb sentences can only be used to answer questions about the past or about the present:

(11) Q: Mba'e pa re-japo kuee ka'aru? A: A-mba'eapo.
what Q 2-do yesterday afternoon 1-work
'What did you do yesterday afternoon?' 'I worked.'

(12) Q: Mba'e pa re-japo agỹ'i? A: A-mba'eapo.
what Q 1-do right.now 1-work
'What are you doing right now?' 'I am working.'

Questions about future times cannot be felicitously answered with bare verb sentences:

(13) Q: Mba'e pa re-japo-ta ko'erã?
what Q 2-do-PROS tomorrow
'What are you going to do tomorrow?'

A: *A-mba'eapo.
1-work-PROS
Intended: 'I am going to work.'

The reader will have noticed that the above sentences with bare verbs have been freely translated using perfective or imperfective aspect. There is no overt realization of perfective and imperfective aspects in Mbyá. Both aspectual interpretations of bare verbs are possible, as further illustrated by the following examples:

(14) Context: Maria visited the speaker on the previous day. When she arrived at the speaker's place, the speaker was in the process of carving the figure of an animal in a block of wood.

Maria o-vaẽ ramo kuee, a-japo peteĩ ta'anga.
Maria 3-arrive DS yesterday 1-make one sculpture
'When Maria arrived yesterday, I was making a sculpture.'

(15) Kuee, a-mỹi aje'ive. A-japo ta'anga …
yesterday 1-wake.up early 1-make sculpture
'Yesterday, I woke up early in the morning. I made a sculpture.'

Ha'e rire ka'aru, peteĩ jurua o-jogua ta'anga.
COORD after afternoon one jurua 3-buy sculpture
'Then in the afternoon, a jurua[3] bought the sculpture.'

In (14), the context (which was described verbally to the consultants) specifies that the event described by the matrix VP was ongoing at the time of the event that is described by the adverbial clause. In (15) the three sentences describe a sequence of events that occur during a single day. Each event is described as a complete event in a narrative progression.

Relative clauses Relative clauses in Mbyá are formed with the particle *va'e*, as illustrated in (16):

[3] A *jurua* is a non-indigenous person.

(16) E-me'ẽ kyche mesa py o-ĩ va'e.
IMP-give knife table on 3-be REL
'Give me the knife that's on the table.'

When the matrix verb is bare, a relative clause with a bare verb is non-future, i.e. describes an event that precedes or overlaps with the time of utterance. This is shown by the fact that past and present frame adverbs can be used felicitously, while the use of future frame adverbs is ungrammatical:

(17) A-ikuaa ava re Maria i-jayvu va'e agỹ'i.
1-know man about Maria 3-talk REL now
'I know/knew the man that Maria is talking about now.'

(18) A-ikuaa ava re Maria i-jayvu va'e kuee.
1-know man about Maria 3-talk REL yesterday
'I know/knew the man that Maria talked about yesterday.'

(19) *A-ikuaa ava re Maria i-jayvu va'e ko'erã.
1-know man about Maria 3-talk REL tomorrow
Intended: 'I know/knew the man that Maria will talk about tomorrow.'

If the matrix clause describes a future event, the event described by the relative clause can be simultaneous to the matrix event. This is illustrated in (20), where the matrix event is located in the future by the future-oriented modal operator *-rã* (Tonhauser 2006, 2007; Thomas 2012):

(20) Guaimi vy, Maria o-menda va'e-rã peteĩ ava o-guereko-pa va'e reve.
female.adult SS, Maria 3-marry REL-FUT one man 3-have-all REL with
'When she is an adult, Maria will marry a man who is rich.'

However, the event described by the relative clause cannot precede the matrix event and follow the time of utterance, as shown by the unacceptability of (21) when the future *-rã* is not used in the embedded relative clause:

(21) Ko'erã ka'aru pytũ, Juan i-jayvu va'e-rã ava reve Maria re o-menda
tomorrow afternoon late, Juan 3-talk REL-FUT man with Maria with 3-marry
va'e-*(rã) reve ko'erã pyareve.
REL-FUT with tomorrow morning
'Tomorrow evening, Juan will talk to the man who will get married to Maria tomorrow morning.'

Propositional complements In complements of verbs of attitude and verbs of report, the eventuality that is described by a bare verb must be ongoing at the time at which the attitude holder locates herself. Consider (22), which describes a present thought of Juan. This sentence is true only if at the time of utterance, Juan thinks "Maria is hungry." If Juan thinks that Maria was hungry but is no longer so, or if he thinks that she will be hungry although she is not yet so, then the sentence is false:

(22) Agỹ, Juan o-icha'ã Maria i-ñembyayi-a.
Now Juan 3-think Maria 3-hungry-NLZ
'Now, Juan thinks that Maria is hungry.'

Sentences whose matrix verb describes a past or a future eventuality have similar truth conditions. (23) is true only if there was a time yesterday when Juan said "I am working" and (24) is true only if there will be a time tomorrow when Juan will say "I am working."

(23) Kuee ka'aru Juan h-e'i chevy pe o-mba'eapo-a.
yesterday afternoon Juan 3-say me to 3-work-NLZ
'Yesterday afternoon Juan said to me that he was working.'

(24) Ko'erã ka'aru pytũ Juan h-e'i-ta chevy pe o-mba'eapo-a.
tomorrow afternoon dark Juan 3-say-PROS me to 3-work-NLZ
'Tomorrow evening, Juan will say to me that he is working.'

Future reference in coordinated constructions Tonhauser (2011) noted that bare verbs in Paraguayan Guaraní can describe future events in matrix sentences that are part of a sequence of conjoined clauses, the first of which bears future-oriented aspectual morphology. The same is true in Mbyá, as illustrated in (25):

(25) Che-ru o-u-ta, ha'e rire a-chẽ che-ro gui.
1-father 3-come-PROS, and after 1-leave 1-house from
'My father will come, and then I will leave the house.'

Tonhauser (2011) also remarks that in Paraguayan Guaraní, *after*- and *before*-adverbial clauses that are interpreted in the future do not license future interpretations of bare verbs in the matrix clause. The same is true in Mbyá, as illustrated in (26):

(26) Ko'erã, o-ky rire, Juan o-o-*(ta) ka'aguy re.
Tomorrow 3-rain after Juan 3-go-PROS forest to
'Tomorrow, after it rains, Juan will go to the forest.'

When-adverbials also fail to license future interpretations of bare verbs:

(27) Ko'erã, Juan o-vaẽ vy, o-echa-*(ta) Maria pe.
Tomorrow, Juan 3-arrive SS, 3-see-PROS Maria DOM
'Tomorrow, when Juan arrives, he will see Maria.'

In sum, future reference with bare verbs in matrix clauses appears to be restricted to a specific construction.

2.2 The past tense suffix *-kue*

Matrix clauses In matrix clauses, the suffix *-kue* is bound to the particle *va'e*, as illustrated in the following example:

(28) A-mba'eapo va'e-kue.
1-work REL-PST
'I worked/was working.'

As we saw in the previous subsection, *va'e* is used to form relative clauses. However, *va'ekue* does not function as a relativizer in matrix clauses. Rather, it appears that *va'e* is only used in this environment as a morphological support for the suffix *-kue*. This conclusion is supported by the fact that *va'e* cannot be applied to a matrix clause without a temporal suffix:

(29) *A-mba'eapo va'e.
1-work REL

Matrix sentences with *va'ekue* describe past events. A first piece of evidence is that they cannot be used to answer questions about present or future times:

(30) Q: Mba'e pa re-japo kuee ka'aru?
what Q 1-do yesterday afternoon
'What did you do yesterday afternoon?'

A: A-mba'eapo va'e-kue.
1-work REL-PST
'I worked.'

(31) Q: Mba'e pa re-japo agỹ'i?
what Q 2-do right.now
'What are you doing right now?'

A: *A-mba'eapo va'e-kue.
1-work REL-PST
Intended: 'I am working.'

(32) Q: Mba'e pa re-japo-ta ko'erã?
what Q 2-PROS tomorrow
'What are you going to do tomorrow?'

A: *A-mba'eapo va'e-kue.
1-work REL-PST
Intended: 'I am going to work.'

A second piece of evidence is that a matrix verb modified by *va'ekue* is incompatible with present of future frame adverbials:

(33) Juan o-mba'eapo va'e-kue kuee/*agỹ'i/*ko'erã.
Juan 3-work REL-PST yesterday/now/tomorrow
'Juan was working/worked yesterday/*now/*tomorrow.'

Let us now compare the use of *va'ekue* in matrix clauses in Mbyá to that of the English simple past and past perfect. In English, the simple past denotes a past interval that is related to the eventuality described by the verb by aspect. In episodic past tense sentences that describe events and that are not in the progressive aspect, the event is located in the interval denoted by the past tense. In this respect, past tense sentences contrast with past perfect sentences, in which the event is located before a salient past interval. This contrast is apparent in narrative progression, as the following examples illustrate:

(34) When I arrived at Mary's place, she prepared a nice dinner.

(35) When I arrived at Mary's place, she had prepared a nice dinner.

Is *va'ekue* interpreted like a simple past tense or like a past perfect? Evidence from naturally occurring discourse suggests that both interpretations are available.[4] Consider first the following excerpt from Florentino (1977a).[5] The speaker is relating a dream that he once had when he was a child. In that dream, the child goes to bed and is afraid that his mother will leave him. In that setting, the sequence of events related in (36) unfolds as follows: the child calls his mother, the mother gets a cup of water[6] and throws the water in the face of the child. Matrix *va'ekue* is used to locate the second event in the past of the time of utterance, but note that this event is part of a strict progressive narration. In this example then, *va'ekue* is interpreted as the English simple past would be.

(36) Ha'e rã tu xee a-jae'o reve rei a-japukai: "Xe-reja eme, mamãe," ha'e
ANA DS INT I 1-cry with INT 1-shout 1-leave NEG.IMP mother ANA
jevy.
again
'But then I called out crying: "Don't leave me, mother!" '

Ha'e rã tu mamãe yy ro'yxã karo-'i py o-jara va'e-kue o-nhoẽ xe-rova re.
ANA DS INT mother water cold cup-DIM in 3-serve REL-PST 3-pour 1-face in
'At that, my mother got a cup of cold water and poured it on my face.'

Example (37) is another illustration of the 'simple past' interpretation of matrix *va'ekue*. These are the opening sentences of Florentino (1977d), in which the author describes how he used to lie to his father as a child. There is no salient past time before which the events of lying and tricking could be located, so this use of *va'ekue* is obviously not comparable to a past perfect:

(37) Yma xe-kyrĩ jave ma xee xe-apu vai rei va'e-kue, Papai
a.long.time.ago 1-child when BDY I 1-lie a.lot ITER REL-PST dad
a-mbo-tavy-pa rei va'e-kue.
1-CAUS-wrong-COMPL ITER REL-PST
'When I was a child, I lied a lot, and I always tricked my father.'

[4] *Pace* Thomas (2012), who failed to identify the past perfect interpretations of *va'ekue*.

[5] Florentino (1977a,b,c,d) were glossed and translated by Robert Dooley. In this paper, I used Dooley's translation into English but I made some modifications to the glosses.

[6] Literally 'served a cup of cold water'. The original Portuguese version of this translation reads: 'Então, a minha mãe encheu um copo de água fria e a derramou no meu rosto'. In English: 'And then, my mother filled a cup with cold water'.

Next, consider the following excerpt from Florentino (1977c). In this story, an old man who is hard of hearing is walking in the forest. His grandson follows him and calls to him. Upon hearing his grandson, the old man makes a sudden move and bangs his head on a tree limb. The excerpt begins at this point. The old man, believing that he was assaulted, begs his imaginary assailant to stop the beating. The sentence that follows explains that the old man actually hit his head on a tree limb, but that being hard of hearing, he was surprised to hear someone call to him without notice (which presumably caused his confusion). What is important here is that the second sentence locates the event of the old man banging his head in the past of the event of the old man speaking to his imaginary assailant. This is a case of narrative regression, which in English would be expressed with the past perfect. Note that in this case, *va'ekue* is followed by the particle *ri*, which indicates anaphora to a situation mentioned in the previous discourse (Dooley 2006). I propose that the use of *ri* indicates that the temporal anchor of *va'ekue* is a past time made salient in the previous discourse, rather than the time of utterance:

(38) Ha'e vy je aipo-e'i: "H-a'eve ma xe-nupã, xe-juka ta ma" h-e'i
COORD SS HSY ITJ-3.say 3-good already 1-beat 1-kill PROS already 3-say
je.
HSY
'Then he said: "Enough, you're about to kill me!"'

Ha'e ae ma yvyra r-akã re o-nhe-akã-nga va'ekue ri
ANA exactly BDY tree R-branch ABL 3-RFL-head-hit.on REL-PST ANA
'He had hit his own head on the tree limb …'

nda-'ij-apyja-ve-i va'e-kue ri
NEG-3-hear-more-NEG REL-PST ANA
'…but being heard of hearing …'

o-endu xapy'a vy ha'e ae o-nhe-mo-ndyi o-endu xapya va'e gui.
3-hear briefly SS ANA exactly 3-RFL-CAUS-startle 3-hear briefly REL from
'…he was startled at hearing something all of a sudden.'

In Sect. 3, I develop an analysis of *-kue* as a relative past tense, from which I explain the two uses of matrix *va'ekue*.

Relative clauses The suffix *-kue* is also attested on the relativizer *va'e* in relative clauses. When the matrix verb is bare, relative clauses with *va'ekue* describe past events. Evidence comes again from modification with temporal frame adverbials:

(39) A-ikuaa ava re Maria i-jayvu va'e-kue kuee.
1-know man ABL Maria 3-talk REL-PST yesterday
'I know the man that Maria talked about yesterday.'

(40) *A-ikuaa ava re Maria i-jayvu va'e-kue agỹ'i.
1-know man ABL Maria 3-talk REL-PST now
Intended: 'I know the man that Maria is talking about now.'

(41) *A-ikuaa ava re Maria i-jayvu va'e-kue ko'erã.
1-know man ABL Maria 3-talk REL-PST tomorrow
Intended: 'I know the man that Maria will talk about tomorrow.'

Note that the event described by the relative clause may precede the time of utterance but follow the matrix event, as demonstrated by the following example:

(42) Kuee pyareve, Juan i-jayvu ava reve Maria o-ayvu va'e-kue pe ka'aru
Yesterday morning Juan 3-talk man with Maria 3-kiss REL-PST DOM afternoon
pytũ.
dark
'Yesterday morning, Juan talked to the man who kissed Maria in the evening.'

If the matrix verb describes a future event, the event described by the relative clause may precede the matrix event and follow the time of utterance. This is illustrated in the following sentence:

(43) Guaimi vy, Maria o-menda va'e-rã peteĩ ava ng-oo pe o-japo
female.adult SS, Maria 3-marry REL-FUT one man RFL-house DOM 3-make
va'e-kue reve.
REL-PST with
'When she is an adult, Maria will marry a man who built his own house.'

Consultants judge that (43) is felicitous in a context where Maria is a child and it is understood that whoever she will end up marrying is currently a child and hasn't built a house yet. In other words, (43) can be used to express that Maria will marry a man who will have built his own house before the time of the wedding, even though this building event follows the time of utterance.

Let us compare the use of *va'ekue* to that of the English simple past and past perfect again, but this time in relative clauses. At the beginning of the story from which the following sentences were extracted (Florentino 1977b), Toe-Stumper meets three black horses that promise to help him in the future, provided he gives them some collard leaves. The first one is a black horse and asks for one collard leaf. The second is a dotted horse and asks for two collard leaves. The last one is a red horse who asks for three collard leaves. Toe-Stumper gives food to each of them and the horses leave. Sentence (44) occurs later in the text. As Toe-Stumper is washing his face in the river, the black horse reappears:[7]

(44) Ha'e gui mae je o-nhe-mo-py-ambu-ambu ramo ve je
COORD from INT HSY 3-RFL-CAUS-foot-noise-RED DS VE HSY
'Then there was the sound of galloping …'

kavaju h-uũ va'ekue ma ou.
horse 3-black REL-PST BDY 3-come
'…and the black horse came.'

[7] Note that in this sentence and the following, *va'ekue* cannot be analyzed as past temporal marker on the matrix verb *ou*, since matrix *va'ekue* obligatorily follows the verb it modifies; see Sect. 3.3.1.

In (44), the state of being black still holds of the horse at the time of his coming to the river. In English, a simple past tense would be used.

Consider next the following sentence, which occurs later in the text. Toe-Stumper is standing on the river bank again, when the second horse reappears:

(45) Ha'e py je ha'e-kue rami jevy o-nhe-mo-py-ambu-ambu-'i
COORD from HSY ANA-PST same again 3-RFL-CAUS-foot-noise-RED-DIM
rã je
DS HSY
'And just like before, there was a sound of galloping …'

kavaju mokoĩ couve rogue-'i ho-'u va'e-kue jevy o-u.
horse two collards leaf-DIM 3-eat REL-PST again 3-come
'…and there came the horse that had eaten the two collard leaves.'

In (45), the event described by the relative clause (the eating) lies in the past of the matrix event (the coming). In English, a past perfect would be used in the relative clause.

Note that given the description of relative clauses with *va'e* provided in this section, we expect that both *va'e* and *va'ekue* may be used in a relative clause that describes a past event that is simultaneous to the matrix event. The following sentence from the same text suggests that this is correct.

(46) Ha'e gui je o-je-ova-ei-pa ma vy je.
COORD from HSY 3-face-wash-COMP already SS HSY
'After he finished washing his face …'

ha'e o-nhe-mo-py-ambu-ambu-'i jevy.
ANA 3-RFL-CAUS-foot-noise-RED-DIM again
'…he made a galloping noise again …'

ha'e ramo ve je kavaju pytã va'e jevu o-u.
COORD DS VE HSY horse red REL again 3-come
'…just then the red horse came.'

In (46), Toe-Stumper makes a galloping noise (presumably to call the last horse; the discourse referents are tracked by switch reference), after which the red horse reappears. As in (44), the state of the horse being red overlaps the time of the event of coming, yet here a simple *va'e* is used, rather than *va'ekue*. This shows that the distributions of *va'e* and *va'ekue* overlap in parts.

Propositional complements The morpheme *-kue* is not attested in propositional complements, but we do find occurrences of a past tense morpheme *-gue*, which has been analyzed as an allomorph of *-kue* in Mbyá (Dooley 2006) and in Paraguayan Guaraní (Tonhauser 2011). As the following example illustrates, *-gue* is suffixed to the nominalizer *-a*:

(47) Kuee, Juan he'i chevy pe Maria o-vy'a-a-gue.
yesterday, Juan 3.say me.OBL DAT Maria 3-happy-NLZ-gue
'Yesterday, Juan told me that Maria was happy.'

Complement clauses with *-gue* describe eventualities that precede the subjective 'now' of the attitude that is reported by the matrix verb. Thus, (47) entails that there is a time before the time of Juan's reported assertion (the time of the event of 'saying') at which Maria was happy. How do we know that this description of the meaning of *-gue* is correct? A first test consists in asking consultants what utterance of Juan could be truthfully reported by (47). Consultants feel that (47) can be used to report (48) but not (49), in contexts where Juan uttered these sentences on the day that precedes the utterance of (47). Crucially, (48) entails that there is a time before the utterance at which Maria was happy, while (49) does not entail this, but instead entails that Maria is happy at the time of utterance:

(48) Maria o-vy'a va'e-kue.
Maria 3-happy REL-PST
'Maria was happy.'

(49) Agỹ, Maria o-vy'a.
Now, Maria 3-happy
'Maria is happy now.'

Another piece of evidence is given in (50):

(50) Context: Yesterday, there was a soccer game on TV starting at 10 pm. At 10 pm sharp, I called Juan because I wanted to talk to him. He told me that he didn't want to talk to me because he was watching the soccer game.

Kuee a-henoi Juan jave, h-e'i chevy pe o-ma'ẽ-a(#-gue) partido.
yesterday 1-call Juan when, 3-say me.OBL DAT 3-watch(#-PST) game
'Yesterday when I called Juan, he told me that he was watching the game.'

The use of *-gue* in the complement clause is inappropriate in the context of utterance of (50). More exactly, the sentence would be false if the speaker used *-gue*. This is expected if *-gue* locates the time of evaluation of the embedded clause before the time of Juan's utterance. Indeed, since the conversation between Juan and the speaker was taking place right when the game started, there was no time before the conversation at which Juan could have been watching the game, and therefore no time before Juan's utterance that would overlap with an event of Juan watching the game.

Finally, note that the use of *-gue* does not entail that the eventuality that is described by the embedded verb ends before the matrix event time. The following example shows that this eventuality can go on without being interrupted:

(51) Juan o-icha'ã Maria o-mba'eapo-a-gue ha'e o-mba'eapo-a teri.
Juan 3-think Maria 3-work-NLZ-PST and 3-work-NLZ still
'Juan thinks that Maria was working and still is.'

Sentence (51) is true in a context where Juan believes that Maria was working at some time in the past, and is still working presently.

3 Analysis of bare verbs and clausal uses of *-kue*

3.1 Interpreting bare verb clauses

General considerations The preceding description suggests that there are two conflicting requirements on the temporal interpretation of bare verb clauses (BVCs). On

the one hand, in matrix clauses, the time of evaluation of BVCs is simultaneous to the time of utterance or precedes it. Call it a non-future interpretation. On the other hand, the time of evaluation of BVCs that are complements of a verb of attitude or report must be simultaneous to the subjective 'now' of the attitude holder/author of the report. Call that a simultaneous interpretation. In relative clauses, both interpretations are attested, insofar as the time of evaluation is either non-future with respect to the time of utterance or simultaneous to the runtime of the matrix event.

How should we account for the availability of both non-future and simultaneous interpretations, and how should we account for the distribution of these interpretations? Following Tonhauser (2011), I assume that BVCs are syntactically tenseless. However, in matrix BVCs, the time of evaluation of the verb phrase is obligatorily saturated by a covert temporal adverb that denotes a contextually salient non-future time. I will call this adverb RT, for 'reference time,' since the interval that it denotes would be analyzed as the reference time in a Reichenbachian analysis of tense, cf. Reichenbach (1947):[8]

(52) *Reference time adverb:*
$[\![\text{RT}]\!]^{c,w}$ is defined only if c makes available an interval t_{rt} such that $\neg(t_{rt} > t_c)$.
If defined, $[\![\text{RT}]\!]^c = t_{rt}$.

According to the definition in (52), RT is not a variable, inasmuch as it doesn't have an index that would allow it to be coindexed with a binding operator at LF. This is a lexical stipulation that prohibits RT from being used as a bound variable. In particular, it will prevent RT from being used in complements of verbs of attitude or report, since the analysis of these constructions that I adopt will require that their evaluation time is bound by the matrix verb. Likewise, I will argue that the simultaneous interpretation of relative clauses arises when their evaluation time is bound by a matrix operator (aspect or modal), which precludes the use of RT in the relative clause. Insofar as it cannot be bound, RT is similar to non-vacuous tenses in Kratzer's (1998) analysis. However, I assume that RT is not a functional tense head, but rather a temporal adverbial that is realized in the specifier of the highest phrase in the extended projection of the verb. Since RT is not a functional head, BVCs are syntactically tenseless.

The distribution of RT can be described as follows:

(53) Distribution of RT:
  a. RT is obligatory in matrix clauses.
  b. RT is optional in relative clauses.
  c. RT is banned from complement clauses.[9]

Clause (53c) follows from the lexical entry of RT together with the fact that the evaluation time of complement clauses must be bound by their selecting head (e.g.

[8] The similarities end here; the notion of reference time in Neo-Reichenbachian's analyses is more general, since it is used to describe the interpretation of complement clauses and of sentences with a future tense. Furthermore, Reichenbach's notion of reference time is embedded in a theory of temporal interpretations that differs from the one that is adopted in this paper.

[9] This includes complements of verbs of attitude and report, but also presumably adverbial clauses, which are complements of adverbial subordinating operators that bind the RT argument of their complement. Cf. Tonhauser's (2011) analysis of adverbial BVCs in Paraguayan Guaraní.

an embedding verb of attitude). There is nothing to be said about (53b), since in this case the distribution of RT is free. We are left with (53a) then, which we may just stipulate. Alternatively, we may see the obligatory use of RT adverbs in matrix clauses as a reflection of the act of assertion.

This analysis, of course, does not derive the future interpretation of bare verb clauses discussed in (25). However, since this interpretation is only attested in coordinated constructions with a prospective aspect in the first conjunct, I assume that a particular analysis must be developed for these constructions, which overrides the general principles that govern the temporal interpretation of bare verb clauses (cf. the analysis of BVCs in Paraguayan Guaraní in Tonhauser 2011). Since this paper is not concerned with the temporal interpretation of BVCs in and of itself, I will not address this issue.

Compositional analysis Let us see how to implement this proposal in Mbyá. First of all, let us put viewpoint aspect out of the way. Since there is no overt viewpoint aspect in Mbyá, and both viewpoints are available depending on the context, I assume that viewpoint aspect is built into the lexical entries of verbs but is underspecified. Eventive verbs denote properties of times that are related to an existentially quantified event variable by a relation ρ. The statement $\rho(e)(t)$ may express a perfective viewpoint ($e \subseteq t$) or an imperfective viewpoint ($t \subseteq e$), but the specification of ρ is not handled in the semantics. This is a coarse analysis, but since this paper is not about viewpoint aspect, it will do for now. Following Katz (1995), stative verbs denote properties of times:

(54) $[\![\text{-mba'eapo}]\!]^{c,w} = \lambda x.\lambda t.\exists e[\mathbf{work}(w)(e)(x) \wedge \rho(e)(t)]$

(55) $[\![\text{-vy'a}]\!]^{c,w} = \lambda x.\lambda t.\mathbf{happy}(w)(t)(x)$

Following Tonhauser (2011), I make the hypothesis that BVCs are syntactically tenseless, inasmuch as they do not contain a functional temporal projection. The covert adverb RT is not a functional head but a specifier. The LF of (56) is given in (57):

(56) A-mba'eapo.
1-work
'I am/was working.'

(57) [$_{VP}$ RT a-mba'eapo]

$[\![(57)]\!]^{c,w}$ is defined only if the context provides a salient interval t_{rt} that does not follow the time of utterance t_c; if defined, it is true in w iff there is an event of the speaker working at t_{rt} in w, where this 'at' relation may be interpreted perfectively or imperfectively depending on the context.

(58) a. $[\![\text{a-mba'eapo}]\!]^{c,w} = \lambda t.\exists e[\mathbf{work}(w)(e)(\mathbf{speaker}(c)) \wedge \rho(e)(t)]$

b. $[\![\text{VP}]\!]^{c,w} = \exists e[\mathbf{work}(w)(e)(\mathbf{speaker}(c)) \wedge \rho(e)(t_{rt})]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

Let us now examine BVCs that are complements of verbs of report or attitude. I assume that propositional complements are derived nominals: the nominalizer

-a selects the extended verb phrase as its complement and projects an NP. It is also assumed that *-a* is semantically vacuous.

(59) $[_{VP}$ RT Juan oicha'ã $[_{NP}$ $[_{N}$ -a] $[_{VP}$ Maria iñembyayi]]]

I assume an analysis of verbs of propositional attitudes and verbs of report in the line of Lewis (1979) and von Stechow (1984, 2009), which is illustrated in (60) for the verb *oicha'ã* ('think' or 'believe'). (60) is expressed more succinctly in (61). *Oicha'ã* takes as arguments an intensional property of times P of type $\langle s, \langle i, t\rangle\rangle$, an individual x, and a time t, and returns the truth value 1 if and only if P is true at every pair of world and time in a certain set. This set characterizes what the attitude holder x believes in the evaluation world w at the evaluation time t. The worlds in this set are those in which every proposition that is believed by the attitude holder in w at t is true. The times in this set are those at which the attitude holder believes that she may be located while entertaining her propositional attitude in w at t.

(60) $[\![\text{oicha'ã}]\!]^{c,w} = \lambda P.\lambda x.\lambda t.\forall w'\forall t'$ [(w', t') is compatible with everything x believes in w at t] $\rightarrow$ [$P(w')(t')$ is true]

(61) $[\![\text{oicha'ã}]\!]^{c,w} = \lambda P.\lambda x.\lambda t.\forall w'\forall t'[(w', t') \in Dox(w)(t)(x) \rightarrow P(w')(t')]$

Because of the type of *oicha'ã*, its complement must be interpreted as an intensional property of times. Consequently, a numerical index n is systematically inserted in the specifier of this complement. As a consequence, the reference time of the propositional complement is interpreted as a variable bound by the embedding predicate. To illustrate, (59) is interpreted as follows:[10]

(62) $[\![\text{NP}]\!]^{c,w} = \lambda t.\textbf{hungry}(w)(t)(\textbf{Maria})$
$[\![\text{oicha'ã}]\!]^{c,w}(\lambda w.\ [\![\text{NP}]\!]^{c,w}) =$
$\lambda x.\lambda t.\forall w'\forall t'[(w', t') \in Dox(w)(t)(x) \rightarrow \textbf{hungry}(w')(t')(\textbf{Maria})]$
$[\![(59)]\!]^{c,w} = \forall w'\forall t'[(w', t') \in Dox(w)(t_{rt})(\textbf{Juan}) \rightarrow \textbf{hungry}(w')(t')(\textbf{Maria})]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

According to this derivation, (59) is defined only if the context makes available a non-future time t_{rt}, and if defined it is true iff for every pair of world and time (w', t') that is compatible with Juan's beliefs in w at t_{rt}, Maria is hungry at t' in w'. This is the attested 'simultaneous' interpretation.

Finally, let us discuss relative clauses. Again, I assume that these are derived nominals (see Dooley 2006): *va'e* is a head of category N that c-selects a verbal complement and projects a noun phrase. Its complement may be a verb phrase or the extended projection of a verb phrase. A consequence of this analysis is that the relative 'clause' is not a complementizer phrase but rather a noun phrase whose head is *va'e*.

We have seen that the use of RT is obligatory in matrix clauses, while it is impossible in complement clauses because of the type of the embedding verb. In relative clauses, both strategies are available. In the first case, the evaluation time of the relative clause

[10] It is assumed that the denotation of the verb is combined with that of its nominalized complement by a rule of intensional functional application, (Heim and Kratzer 1998).

(i.e. the evaluation time of the verb phrase extended with whatever aspect or modal operator might be present) is a salient interval that does not follow the time of utterance, as illustrated in (63). In the second, the evaluation time of the relative clause is simultaneous to the matrix event time, as illustrated in (64):

(63) Maria o-menda va'e-rã peteĩ ava ng-oo pe o-japo va'e reve.
Maria 3-marry REL-FUT one man RFL-house DOM 3-make REL with
'Maria will marry a man who built his own house.'

(64) Maria o-menda va'e-rã peteĩ ava o-guereko-pa va'e reve.
Maria 3-marry REL-FUT one man 3-have-COMPL REL with
'Maria will marry a man who is rich.'

The relevant LFs for (63) and (64) are as follows. In both sentences, the DP that contains the relative clause QRs from its object position. In (65), the future-oriented modal *va'erã* binds the evaluation time of the matrix verb, and the evaluation time of the relative clause is saturated by a covert RT adverb. Note that each RT adverb may denote a different time. In (66), *va'erã* binds both the evaluation time of the relative clause and that of the matrix verb phrase:

(65) [$_{ModP}$RT va'erã 1 [$_{DP}$ peteĩ ava [$_{NP}$ RT ng-oo pe o-japo va'e reve]] 2 [$_{VP}$ t_1 Maria omenda t_2]]

(66) [$_{ModP}$RT va'erã 1 [$_{DP}$ peteĩ ava [$_{NP}$ t_1 o-guereko-pa va'e reve]] 2 [$_{VP}$ t_1 Maria omenda t_2]]

The derivation of the truth conditions of each sentence is left to the reader.[11]

3.2 The relative past tense *-kue*

In Sect. 2, it was shown that *va'ekue* in matrix sentences is ambivalent between a simple past-like and a past perfect-like interpretation. In complement clauses, the use of *-gue* entails that the evaluation time of the embedded clause precedes the subjective 'now' of the attitude holder. Finally, it was shown that relative clauses with *va'ekue* are three-ways ambiguous: they may describe an eventuality that lies in the past of the time of utterance, they may describe an eventuality that lies in the past of a salient past time, and they may describe an eventuality that lies in the past of the matrix eventuality. In view of these facts, I propose that *-kue* denotes a relative past tense, i.e. a function that takes a property of time P and a time t (its temporal anchor) and returns the truth value 1 iff P is true at a time that precedes t:

(67) $[\![\text{-kue}]\!]^{c,w} = \lambda P.\lambda t.\exists t'[t' < t \wedge P(t')]$

[11] An anonymous reviewer points out that the derivation of the bound tense interpretation of (66) depends on the object DP not QR-ing above the modal operator *va'erã*: if the DP QR-ed above *va'erã*, the time of evaluation of the NP could not be bound by *va'erã*. I have not had the opportunity to test this prediction with my consultants.

I will now show how this analysis allows us to account for the different uses of *-kue* that were described in Sect. 2. In matrix clauses, the temporal anchor of *-kue* is saturated by a covert RT adverb, which may denote (a super-interval of) the time of utterance or an interval that precedes the time of utterance. In the first case, *va'ekue* will be interpreted as an English simple past tense, i.e. the sentence will be true iff the VP eventuality includes or is included in a time that precedes the time of utterance. In the second case, *va'ekue* will be interpreted as an English past perfect, i.e. the matrix sentence will be true iff the VP eventuality includes or is included in a time that precedes a contextually salient past time. This is illustrated in the following examples:

(68) A-mba'eapo va'e-kue.
1-work REL-PST
'I worked/was working/had worked/had been working.'

(69) $[_{TP}$ RT $[_{T}$-kue] $[_{NP}$ $[_{N}$ va'e] $[_{VP}$ amba'eapo]]]

(70) $[\![(69)]\!]^{c,w} = \exists t'[t' < t_{rt} \wedge \exists e[\mathbf{work}(w)(e)(\mathbf{speaker}(c)) \wedge \rho(e)(t')]]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

In relative clauses that are arguments of a bare matrix verb, the temporal anchor of *-kue* will again be saturated by a covert RT adverb, since there is no binder available. If this occurrence of RT denotes the time of utterance or a super-interval thereof, *va'ekue* will locate the evaluation time of the relative (extended) verb phrase at some past time. If the matrix event is itself located in the past, the evaluation time of the relative verb phrase may in principle precede that event, follow it, or be simultaneous to it. In principle, all of these situations can be expressed in English with a simple past tense.[12] If the occurrence of RT in the relative clause denotes a contextually salient past interval, *va'ekue* will locate the evaluation time of the relative verb phrase in the past of that interval, which in English would be expressed with a past perfect. These different possibilities correspond to a single parse, as is illustrated in (71)–(73):

(71) Kuee, a-echa ava pe Maria reve i-jayvu va'e-kue.
Yesterday, 1-see man DOM Maria with 3-talk REL-PST
'Yesterday, I met the man who talked/was talking/had talked/had been talking to Maria.'

(72) $[_{TP}$ RT $[_{T}$ -kue] $[_{NP}$ $[_{N}$ va'e] $[_{VP}$ Maria re ijayvu ~~ava~~$_1$]]]

(73) $[\![\text{TP}]\!]^{c,w} = \lambda x.\exists t'[t' < t_{rt} \wedge \exists e[\rho(e)(t') \wedge \mathbf{talk}(w)(e)(x)(\mathbf{Maria})]]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

[12] The following sentences illustrate each interpretation:

(i) I tripped on a stone that was lying in the middle of the path.
(relative event time simultaneous to matrix event time)

(ii) She married a man who became president.
(relative event time > matrix event time)

(iii) I finally met the reviewer who rejected my paper.
(relative event times < matrix event time)

In relative clauses that are arguments of a verb that is modified by a future-oriented aspect or modal, the temporal anchor of *-kue* may either be bound by the future-oriented aspect/modal or be saturated by a covert RT adverb. There is nothing new to be said about the second case, but in the first case the evaluation time of the relative verb phrase precedes the event time of the matrix verb, which is itself shifted to the future by the matrix aspect/modal. These two possibilities are illustrated below:

(74) Guaimi vy, Maria o-menda va'e-rã peteĩ ava ng-oo pe o-japo
female.adult SS, Maria 3-marry REL-FUT one man RFL-house DOM 3-make
va'e-kue reve.
REL-PST with
'When she is an adult, Maria will marry a man who built his own house.'

(75) Bound temporal anchor:

a. $[_{ModP}$RT va'erã 1 $[_{DP}$ peteĩ ava $[_{TP}\ t_1\ [_T$ -kue] $[_{NP}\ [_N$ va'e] $[_{VP}$ ng-oo pe o-japo]]]] 2 $[_{VP}\ t_1$ Maria omenda t_2 reve]]

b. $[\![\text{TP}]\!]^{c,w} = \lambda x.\exists t[t < g_c(t_1) \wedge \exists e[\textbf{talk}(w)(e)(x)(\textbf{Maria}) \wedge \rho(e)(t)]]$

(76) Temporal anchor saturated by RT:

a. $[_{ModP}$RT va'erã 1 $[_{DP}$ peteĩ ava $[_{TP}$ RT $[_T$ -kue] $[_{NP}\ [_N$ va'e] $[_{VP}$ ng-oo pe o-japo]]]] 2 $[_{VP}\ t_1$ Maria omenda t_2 reve]]

b. $[\![\text{TP}]\!]^{c,w} = \lambda x.\exists t'[t' < t_{rt} \wedge \exists e[\textbf{talk}(w)(e)(x)(\textbf{Maria}) \wedge \rho(e)(t')]]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

Finally, in complements of verbs of attitude or report, the temporal anchor of *-kue* must be bound by the matrix verb for type-theoretic reasons. The evaluation time of the complement verb phrase lies in the past of the subjective 'now' of the attitude holder/author of the report:

(77) Juan o-icha'ã Maria o-vy'a-a-gue.
Juan 3-think Maria 3-happy-NLZ-PST
'Juan thinks/thought that Maria was happy.'

(78) $[_{VP}$ RT Juan oicha'ã $[_{TP}\ [_T$-gue] $[_{NP}\ [_N$-a] $[_{VP}$ Maria ovya'a]]]]

(79) $[\![\text{TP}]\!]^{c,w} = \lambda t.\exists t'[t' < t \wedge \textbf{happy}(w)(t')(\textbf{Maria})]$

In sum, the full range of interpretation of clausal uses of *-kue* is explained by its analysis as a relative past tense. In the next subsection, I consider alternative analyses of *-kue*, and I argue that the relative tense analysis is preferable to them.

3.3 Alternative analyses of *-kue*

3.3.1 Va'ekue is not an adverb

Tonhauser (2006) argues that *va'ekue* in matrix clauses in Paraguayan Guaraní is a temporal adverb rather than a tense, because it is only used to refer to the remote past. This is illustrated in the contrast between her examples (80a) and (80b) below.

A consultant judges (80b) infelicitous because it conveys that the trip back home was taken a long time ago, contradicting the information available in the context:[13]

(80) Context: Coming home from a quick shopping trip that turned out to be longer than planned.

a. Che-rape puku kuri.
B1sg-path long KURI
'My path was long.'

b. # Che-rape puku va'ekue.
B1sg-path long VAEKUE
'My path was long.' (Paraguayan Guaraní; Tonhauser 2006, p. 266)

There are some differences between Paraguayan Guaraní and Mbyá concerning the use of *kuri* and *va'ekue* in matrix clauses. In Paraguayan Guaraní, *kuri* is an adverb of the immediate past, while in Mbyá it means *a short while*, either in the past or in the future. Reference to the immediate past in Mbyá is made with the adverb *kue'i*, which is composed of the particle *kue* and the diminutive suffix *'i*. According to Tonhauser's (2006) consultants, *va'ekue* in Paraguayan Guaraní locates the topic time of a sentence in a more distant past than *kuri*. In Mbyá, *va'ekue* in matrix clauses is not limited to the *remote* past, as shown by its compatibility with adverbials such as *kuee* ('yesterday'). However, it is not felicitous to describe the immediate past ('just happened' sentences), where *kue'i* is used instead, although *kuri* is also acceptable. Note that *va'ekue* is in complementary distribution with both *kue'i* and *kuri*:

(81) Juan o-o va'e-kue kuee.
Juan 3-go REL-PST yesterday
'Juan left yesterday.'

(82) Juan o-o kue-'i/kuri.
Juan 3-go recently/a.short.while
'Juan just left.'

(83) Juan o-o va'ekue (*kue'i/*kuri).
Juan 3-go REL-PST recently/a.short.while
'Juan left.'

Tonhauser's analysis of matrix *va'ekue* as a remote past adverb explains both the impossibility to express the immediate past with *va'ekue* and its complementary distribution with *kue'i* and *kuri*. However, there are a number of arguments against this analysis in Mbyá. First of all, *va'ekue* does not have the same distribution as other adverbs, and in particular it doesn't have the same distribution as *kue'i* and *kuri*.

[13] Glosses from Tonhauser (2006) used in this paper: A1/2sg: 1st/2nd person singular set A crossreference marker; A3: 3rd person set A crossreference marker; B1/2sg: 1st/2nd person singular set B crossreference marker; -COND: conditional marker *-ramo*; -GUI: causative marker/ablative case *-gui*; JE-: reflexive and middle prefix *je-*; -NOM: (location) nominalizer *-ha* (also complement clause marker); -PE: marker of non-A arguments and spatiotemporal locations *-pe*; -PURP: purposive/benefactive marker -guã; -RC: relative clause marker *-va'e*; -TA: irrealis modal marker *-ta*; VAEKUE: past-time locating adverb *va'ekue*.

These adverbs can occur in a variety of positions, including sentence initially as in (84). Matrix *va'ekue* is only acceptable postverbally.

(84) Kue'i o-o.
recently 3-go
'He just left.'

(85) *Va'e-kue o-o.
REL-PST 3-go
Intended: 'He left.'

Secondly, the complementary distribution of *va'ekue* and *kue'i* or *kuri* is only observed in matrix clauses. *Va'ekue* as a tensed relativizer can co-occur with *kue'i*, as illustrated in the following example. Therefore, the analysis of *va'ekue* as a remote past-tense adverb would apply at most to matrix uses of *va'ekue*. Of course, if matrix *va'ekue* is analyzed as a relative past tense, the incompatibility with *kue'i* remains to be explained:

(86) Kue'i o-u va'e-kue ma che-ryvy.
recently 3-come REL-PST BDY 1-younger.brother
'The person who just arrived is my younger. brother.'

Thirdly, *va'ekue* can combine with *va'erã* to express deontic modality with a past perspective time or what appears to be a future in the past with an added counterfactual meaning. *Kue'i* is ungrammatical in this construction, and *kuri* takes on a different meaning:

(87) O-o va'e-rã va'e-kue.
3-go REL-RA REL-PST
'He had to go' or 'He should have gone.'

(88) *O-o va'e-rã kue'i.
3-go REL-RA recently
Intended: 'He had to go' or 'He should have gone.'

(89) O-o va'e-rã kuri.
3-go REL-RA a.short.while
'He will go soon' or 'He must go soon.'

The first and the third sets of facts can be explained if we assume that *va'ekue* is a tense morpheme. Its difference in distribution from adverbs is explained by the assumption that the position of the T head is fixed in the clausal spine and that this is reflected in the order of suffixes and post-clitics of the verb: the order of functional projections in the clause is mirrored by the order of postverbal morphemes (affixes and clitics), cf. Baker (1985). This view of verbal morphology is not only common crosslinguistically, it also explains the relative positions of *va'ekue* and *va'erã*. Under the assumption that *va'erã* is a modal operator and that root modals sit below tense (e.g. Brennan 1993), we expect that *va'erã* will occur to the left of *va'ekue* in the chain

of postverbal morphemes, as illustrated in (87). The analysis of matrix *va'ekue* as a relative past tense also explains why it can combine with *va'erã*, while past adverbs cannot: matrix *va'erã* without *-kue* locates the event time in the future of the time of utterance. From this, it follows that past tense adverbs are incompatible with matrix *va'erã*, since there is no interval that they can locate in the past (neither the time of utterance nor the event time). Because *va'ekue* is interpreted as a relative past tense, it may shift the time of evaluation of *va'erã* to the past of the time of utterance. Last but not least, this analysis provides a unified account of the interpretation of *va'ekue* in matrix clauses and in relative clauses, and of *-gue* in propositional complements: in all cases, the morpheme *-kue* (and its allomorph *-gue*) marks the presence of a past tense operator.

Concerning the second set of facts, analyzing matrix *va'ekue* as a relative past tense results in a trade-off. On the one hand, we gain a unified analysis of the temporal interpretation of matrix and relative uses of *va'ekue*. On the other hand, we have to explain why matrix *va'ekue* is incompatible with adverbs of recent time. Maybe the use of *va'ekue* in matrix sentence is marked (because BVCs may have past reference and because the use of *va'e* without semantic relativization is inherently marked) and this co-occurrence restriction can be made to follow from the markedness of matrix *va'ekue*. But an actual explanation along these lines is still to be developed.

In sum, there are more arguments against the analysis of matrix *va'ekue* as a past adverb in Mbyá than in its favor.

3.3.2 -kue/-gue is not a terminative aspect

Tonhauser (2006) proposes that nominal *-kue* is a terminative aspect. In the framework of this paper, a terminative aspect maps a property of event P to a property of times that are included in the post-state of some P-event, where the post-state of an event e starts when e ends. We may distinguish different types of post-states by their endpoint (does the post-state of a P-event e end at a time that meets certain conditions, or does it last indefinitely?) or by further conditions on the state (should the post-state of a P-event e stand in a causal or intentional relation to e?). See notably Parsons's (1990) discussion of resultant states versus target states. Since these refinements do not matter for the discussion that follows, I will not commit myself to a more precise definition of post-state.

What interests us here is whether *-kue* is best analyzed as a relative past tense or as a terminative aspect. Bohnemeyer (2003, 2013) discusses the differences between these two types of temporal operators and proposes linguistic tests that allow us to tell one from the other. In this subsection, I will compare clausal uses of *-kue* in Mbyá with the terminative aspect marker *ts'o'k* of Yukatek Maya analyzed in Bohnemeyer (2003, 2013). Note that Bohnemeyer (2003, 2013) calls *ts'o'k* a 'pure perfect,' and glosses it as a terminative aspect.

Bohnemeyer argues that temporal adverbs may not be used to locate the event time of a verb with a terminative aspect, while this is possible with relative past tenses (which he calls anterior tenses). Bohnemeyer illustrates this point with the Yukatek Maya particle *ts'o'k*. (90) shows that a temporal adverbial (in this case, a *when*-clause)

can be used to locate a time in the post-state of the event described by the verb that is modified by *ts'o'k*.[14]

(90) Káa=h-máan-en t-uy=iknal Pedro
CON=PRV-pass-B.1.SG LOC-A.3=at Pedro
'(When) I went by Pedro's at seven …

ts'o'k u=hàan-al leti'; chen ba'l=e'
TERM A.3=eat-INC it only thing=TOP
'he had (already) eaten; only …'

mix inw=ohel ba'x òora hàan-ak-i.
EMPH.NEG A.1=know(B.3.SG) what hour eat-SUBJ(B.3.SG)-D4
'I have no idea at what time he had eaten.'(Bohnemeyer 2013 (32))

By contrast, (91) shows that adverbs cannot locate the event itself in time. Bohnemeyer argues that (91) can only mean *Were you yesterday in the state of having met my brother?* and that the question is infelicitous because asking such a question is pragmatically odd. The question *Did you meet my brother yesterday?*, where the adverb modifies the event time, must be formulated as (92), without *ts'o'k*:

(91) # Ts'o'k aw=il–ik in=suku'n ho'lheak?
TERM A.2=see–CMP(B.3.SG) A.1.SG=elder.brother yesterday
Intended; 'Have you met my brother yesterday?' (Bohnemeyer 2013 (29b))

(92) T–aw=il–ah in=suku'n ho'lheak, he'bix
PRV–A.2=see–CMP(B.3.SG) A.1.SG=elder.brother yesterday like
t–a=tukul–ah–e'?
PRV–A.2=think–CMP(B.3.SG)–D3
'Did you meet my brother yesterday, as you had planned?' (Bohnemeyer 2013 (29a))

Coming back to Mbyá, we saw in Sect. 2 that adverbial clauses may be used to locate the runtime of an event that is described by a verb modified by *va'ekue*:

(93) Ha'e rã tu mamãe yy ro'yxã karo-'i py o-jara va'e-kue
ANA DS INT mother water cold cup-DIM in 3-serve REL-PST
'At that, my mother got a cup of cold water…'

o-nhoẽ xe-rova re.
3-pour 1-face in
'…and poured it on my face.'

[14] Glosses from Bohnemeyer (2013): 1/2/3: 1st/2nd/3rd person; A: set-A (ergative/possessor) bound pronominal clitic; B: set-B (absolutive) bound pronominal suffix; CMP: completive; CON: connective particle; D2: anaphoric/distal clause-final particle; D3: text-deictic clause-final particle; D4: locative/negative clause-final particle; EMPH: emphatic (negation); INC: incompletive status; LOC: locative; NEG: negation; PRV: perfective; SG: singular; SUBJ: subjunctive status; TERM: terminative (perfect) aspect; TOP: topic marker.

(94) Yma xe-kyrĩ jave ma xee xe-apu vai rei va'e-kue, Papai
a.long.time.ago 1-child when BDY I 1-lie a.lot ITER REL-PST dad
a-mbo-tavy-pa rei va'e-kue.
1-CAUS-wrong-COMPL ITER REL-PST
'When I was a child, I lied a lot, and I always tricked my father.'

Finally, *va'ekue* is not interpreted as a terminative aspect in narrative progression. In the following dialogue, the event of going to Buenos Aires follows the decision-taking:

(95) Che-ramoĩ i-karia'ỹ jave, jurua ruvicha kuery joguero-ayvu-che Mbyá kuery
1-grandfather 3-young when jurua leader PL RECIP-talk-DES Mbyá PL
reve.
with
'When my grandfather was young, the government (lit. leaders of the jurua, the non-indigenous people) wanted to have talks with the Mbyá people.'

Ha'e ramo ore-ruvicha o-mondouka che-ramoĩ pe i-jayvu
COORD DS 1.PL.EXCL-leaders 1-send 1-grandfather DOM 3-talk
agũa.
PURP
'Our leaders decided to send my grandfather to talk [to the government].'

Ha'e ramo che-ramoĩ Buenos Aires py o-o va'e-kue o-echa vy
COORD DS 1-grandfather Buenos Aires LOC 3-go REL-PST 3-meet SS
jurua ruvicha kuery pe.
jurua leader PL DOM
'So, my grandfather went to Buenos Aires to meet the government.'

If *va'ekue* were interpreted as a terminative aspect, the last sentence should convey that the decision-taking is followed by a state that follows the speaker's grandfather going to Buenos Aires, which would be consistent with that event overlapping or preceding the decision-taking. It is not clear that the discourse would be coherent then. Indeed, the ordering of event that would be incurred by a terminative aspect would not fit the progressive narration of this discourse, in which the event of going is a consequence of the decision taking and therefore follows it.

4 Nominal tense

4.1 Tonhauser on nominal *-kue*

NPs such as *opygua* ('priest' of the traditional religion of the Mbyá) or *kyrĩngue* ('children') denote properties of individuals. As a consequence, the interpretation of

such an NP is sensitive to time in at least two respects. Firstly, we may inquire about the time of existence of its individual argument. Secondly, one may ask at what time the predication is true of that individual. Musan (1995) called these two times the *time of existence* of the NP and its *predication time*, respectively. It has been known since at least Enç (1981) that the predication time of NPs is to some extent independent from the tense of the verb. Enç (1981) points out, for instance, that the default interpretation of (96) is that the individuals who were fugitives at a previous time are now (back) in jail.

(96) The fugitives are now in jail.

Similar facts are observed in Mbyá, where the predication time of the subject NP *chera'ychy* ('my wife') in (97) is the time of utterance, even though the verb is interpreted in the past tense:

(97) Context: the speaker is currently married and is talking about his wife.

Che-ra'ychy pytã'i va'e-kue 1984 py.
1-wife born REL-PST 1984 in
'My wife was born in 1984.'

Tonhauser (2006, 2007) uses three different notions to describe the temporal interpretation of NPs modified by *-kue* and *-rã* in Paraguayan Guaraní.[15] The *nominal time* of an NP is the time at which the property that it describes is asserted to hold of its argument. It corresponds to Musan's predication time. The *possessive time* is the time at which the argument of a possessive NP is asserted to be possessed. Finally, the *NP-time* is the time of evaluation of the NP and is determined contextually. It is assumed that the NP-time is identical to the time of evaluation of the clause unless the context provides clues to the contrary. In NPs without *-kue* (or *-rã*), Tonhauser posits that the NP-time and nominal/possessive time coincide. In (97) for instance (my example, not Tonhauser's), the NP-time is contextually located at the time of utterance. It can't be located at the time of evaluation, since that would mean that the speaker was married to his wife at the time of her birth; since the speaker is currently married, it is safe to assume that the NP-time is TU. Furthermore, the NP-time is identical to the possessive time.

The most fundamental function of *-kue* is to indicate that the nominal/possessive time precedes the NP-time. Tonhauser (2006, 2007) calls this the *precedence* property of *-kue*. Let us illustrate this idea with data from Mbyá. Consider (98) and (99). The present frame adverbial fixes the time of evaluation of these clauses at TU, and by default the NP-time is TU as well. Whereas (98) is true iff Juan knows an individual

[15] Sentences that are quoted from Tonhauser (2006, 2007) are from Paraguayan Guaraní. Other sentences were elicited in Mbyá.

who is a priest[16] at TU, (99) is true only if the individual that Juan knows was a priest at a time that precedes TU:[17]

(98) Agỹ, Juan o-ikuaa peteĩ opygua.
now Juan 3-know one priest
'Now, Juan knows one priest.'

(99) Agỹ, Juan o-ikuaa peteĩ opygua-kue.
now Juan 3-know one priest-PST
'Now, Juan knows one ex-priest.'

Just as with unmodified DPs, the NP-time of a DP with *-kue* need not coincide with the time of evaluation of the extended VP of the clause. Consider for instance (100), uttered in a context where the speaker was only married once and is divorced at TU. In this context, the sentence is judged true if and only if the woman to whom the speaker was married and from whom he is now separated was born in 1975. The most plausible analysis of (100) is that it entails that there is a time before TU and included in 1975 when the unique *x* who was the speaker's wife before TU was born. In other words, the NP-time is fixed at TU and the function of *-kue* in the DP is to shift the time at which that *x* is the speaker's wife to a time that precedes the NP-time. The time of evaluation of the extended VP, on the other hand, is some time in 1975.

(100) Che-ra'ychy-kue pytã'i va'e-kue 1975 py.
1-wife-PST born REL-PST 1975 LOC
'My ex-wife was born in 1975.'

As we will see in more detail in the next subsection, the precedence property is captured by the assumption that *-kue* conveys that the nominal or possessive time of the NP it modifies precedes the NP-time, and that *-rã* conveys that it follows the NP-time.

Tonhauser (2006, 2007) identifies three additional properties of *-kue* and *-rã*. Since the focus of this paper is on *-kue*, I will not illustrate these properties with *-rã*. Modification of an NP by *-kue* indicates not only that the nominal/possessive time precedes the NP-time, but also that the individual argument of the NP ceased to have the property (or be in the possessive relation) described by the NP before the NP-time. This

[16] The *opy* is the house where religious ceremonies are performed. The *opygua* is the person who is in charge of the *opy*, hence a priest of sorts.

[17] Mbyá consultants judge that (98) is true in contexts (iii) and (iv) but false in contexts (i) and (ii), and they judge that (99) is true in context (ii) but false in contexts (i), (iii), and (iv).

(i) Juan doesn't know anyone who ever was *opygua*.

(ii) Juan knows a man called Pedro. Pedro was *opygua* several years ago, but now he is no longer an opygua. Juan doesn't know anyone else who ever was *opygua*.

(iii) Juan knows a man called Pedro. Pedro was *opygua* many years ago. Then Pedro stopped being *opygua* for several years. Recently Pedro became *opygua* again, and he is still *opygua* now. Juan doesn't know anyone else who ever was *opygua*.

(iv) Juan knows a man called Pedro. Pedro became *opygua* for the first time a few years ago, and he is still *opygua* now. Juan doesn't know anyone else who ever was *opygua*.

point is illustrated in the following example in Mbyá (adapted from a Paraguayan Guaraní example from Tonhauser 2007, p. 838). The first sentence of (101) entails that Juan was a leader at a time that precedes the NP-time, which Tonhauser takes to be the time of utterance. The fact that the use of *teri* ('still') renders the second sentence unacceptable shows that the first sentence entails that this person stopped being a leader before the NP-time. On the other hand, according to Tonhauser's reasoning, the fact that it is possible to use *ju* ('again') shows that there is no entailment that this person is not a leader at the NP-time. Tonhauser (2006, 2007) calls this the *change of state property*:

(101) Juan mburuvicha-kue, ha'e agỹ mburuvicha ju/#teri.
Juan leader-PST, COORD now leader again/#still
'Juan is an ex-leader, and now he is a leader again/#and now he is still a leader.'

I think that in Mbyá, the inference under discussion is stronger than this example suggests, and for this reason I call it a *cessation inference*, rather than *change of state property*. Note that the following minimal variation on (101) is completely unacceptable in Mbyá:[18]

(102) # Agỹ, Juan mburuvicha-kue ha'e mburuvicha ju.
Now, Juan leader-PAST COORD leader again
#'Now, Juan is an ex-leader and he is a leader again.'

I propose that (102) is unacceptable because preposing the adverbial *agỹ* forces it to modify the first predicate (and possibly the second too), which must then be evaluated at (a super-interval of) the time of utterance. Consequently, the sentence is interpreted as an assertion that Juan is an ex-leader at TU, and that he is a leader again at TU. This interpretation is predicted to be contradictory, provided the use of *-kue* on *mburuvicha* triggers the obligatory inference that the individual argument of the NP is not a leader at the time of evaluation of the NP *mburuvichakue* – in this case, TU. That this unacceptability of the sentence is not due to syntactic confounds (e.g. the position of the adverb *agỹ*) is supported by the fact that using two different predicates turns the sentence acceptable again:

[18] Judith Tonhauser (p.c.) points out that while the English translation of this sentence is odd, it contrasts with the following example

(i) Peter Hoyle is a former and present Ukiah policeman. (Tonhauser 2006 (37))

Tonhauser argues that the fact that (i) is acceptable casts doubt on the argument surrounding (102). If we take the English translation to reflect the fact that (102) has the cessation inference, why is (i) acceptable? This is actually not an issue for the analysis that I propose in this paper: the cessation inference will be analyzed in Sect. 5 as an embedded implicature, and we will see then that if we applied the analysis to *former*, we would predict that the implicature would be computed in the English translation of (102) but not in (i). Therefore, the acceptability of (i) does not challenge the use of (102) as a piece of evidence for the cessation inference. Note that since *-kue* is not conjoinable with other nominal temporal markers and since there is no present nominal temporal marker, (i) is not reproducible in Mbyá. See footnote 28 in Sect. 5.

(103) Context: Juan was *opygua* several years ago, then he stopped being *opygua* and he became a political leader. Recently he stopped being a leader and became *opygua* again.

Agỹ, Juan mburuvicha-kue ha'e opygua ju.
Now, Juan leader-PST COORD priest again
'Now, Juan is an ex-leader and he is a priest again.'

On the contrary, no frame adverbial constrains the interpretation of the first predicate in (101), and given that bare predicates can be interpreted either as past or as present, a past interpretation of the first conjunct is available, which does not contradict the second conjunct. A better translation of (101) is therefore 'Juan was an ex-leader, and now he is a leader again'. In order to test the hypothesis that the acceptability of (101) is due to the fact that the evaluation times of the predicates are different in each conjunct, we can use the prospective aspect to locate the evaluation time of the nominal predicates in the future, and we can build contrastive pairs of conjoined sentences that differ with respect to the identity of the evaluation time of each conjunct. The contrast between the unacceptable (105) and the perfectly acceptable (106) confirms the hypothesis:

(104) Context: Juan was a professor from 2005 to 2010. Then he stopped being a professor. Now, in January 2012, he doesn't have a job. But next year, in 2013, he plans to be a professor again. He plans to start on January 1, 2013, and he plans to remain a professor until he is old enough to retire, in 2025.

(105) # Año 2013 py, Juan o-iko-ta ñombo'ea-kue, ha'e o-iko-ta
Year 2013 LOC, Juan 3-be-PROS professor-PST COORD 3-be-PROS
ñombo'ea ju.
professor again
#'In 2013, Juan will be an ex-professor and he will be a professor again.'

(106) Agỹ, Juan ñombo'ea-kue, ha'e rã año 2013 py, Juan o-iko-ta
Now, Juan professor-PST COORD DS year 2013 LOC, Juan 3-be-PROS
ñombo'ea ju.
professor again
'Now, Juan is an ex-professor, but in 2013, he will be a professor again.'

I also elicited judgments of acceptability of simple sentences with *-kue* in contexts that are consistent with the cessation inference hypothesis but not with the change of state property hypothesis. To illustrate, (107) is judged true in context (b) and false in contexts (a), (c), and (d):

(107) Agỹ, Juan o-ikuaa peteĩ opygua-kue.
now Juan 3-know one priest-PST
'Juan knows one ex-priest.'

a. Juan doesn't know anyone who ever was *opygua*.
b. Juan knows a man called Pedro. Pedro was *opygua* several years ago, but now he is no longer opygua. Juan doesn't know anyone else who ever was *opygua*.

c. Juan knows a man called Pedro. Pedro was *opygua* many years ago. Then Pedro stopped being *opygua* for several years. Recently Pedro became *opygua* again, and he is still *opygua* now. Juan doesn't know anyone else who ever was *opygua*.

d. Juan knows a man called Pedro. Pedro became *opygua* for the first time a few years ago, and he is still *opygua* now. Juan doesn't know anyone else who ever was *opygua*.

The second property of nominal *-kue* is that it conveys that the lifetime of the individual argument of the NP was not over at the NP-time. In (108), it is understood that the individual who died yesterday was no longer a priest at the time of his death: the transition from being a priest to not being one must have occurred during the lifetime of the individual. Tonhauser (2006, 2007) calls this the *existence property* of *-kue*.[19] In Sect. 6, I will argue that this inference is not lexically encoded in *-kue* but results from an interaction of the cessation inference with presuppositions triggered by nouns. As a consequence, I refer to it as the *existence inference* rather than as the *existence property*.

(108) Opygua-kue o-mano kuee.
opygua-PST 3-die kuee
'The ex-priest died yesterday.'

Finally, *-kue* only occurs with a limited range of noun classes. In particular, *-kue* is not attested with nouns that denote food artifacts (e.g. *chipa* 'corn bread'), natural kinds (e.g. *oky* 'rain'), or permanent/final-stage relations (e.g. *ava* 'man' or *ru* 'father').

Tonhauser (2006, 2007) proposes that the precedence property, the change of state property, and the existence property are all directly encoded in the denotation of *-kue*. (110) is a reformulation of the proposed denotation in the framework adopted in this paper.[20] It is assumed that NPs have a state argument. State variables are represented with the letter s:

(109) $[\![\text{mburuvicha}]\!]^{c,w} = \lambda x.\lambda t.\lambda s.\mathbf{leader}(w)(s)(t)(x)$

(110) $[\![\text{-kue}]\!]^{c,w} = \lambda P_{\langle e,\langle i,vt\rangle\rangle}.\lambda x.\lambda t.\lambda s.\exists t'[t' < t \wedge P(x)(t')(s) \wedge \tau(s) = t' \wedge t \subseteq \tau(x) \wedge \neg\exists s'\exists t''[P(x)(t'')(s') \wedge t' \subset t'']]$

$[\![\text{-kue}]\!]^{c,w}$ maps an NP meaning P of type $\langle e, \langle i, vt\rangle\rangle$ to a relation of the same type which holds of an individual x in a state s at a time t if and only if there is a time t' such

[19] With some possessive nouns, this property may be satisfied if the transition occurred during the lifetime of the possessor instead.

[20] Here is her original formulation (Tonhauser 2007, p. 848). The denotation of the NP *mburuvicha* ('leader') is given in (109).

(i) The meaning of *-kue* for properties P:
$\forall P \forall x(\text{KUE}(P)(x) = 1$ iff $\exists t_{nom}(t_{nom} < t_{np} \wedge \tau(P(x)) = t_{nom}$ *in* $w \wedge t_{np} \subseteq \tau(x)))$
(For all properties P and entities x, the property KUE(P) is true of x at the noun-phrase time t_{np} in a world w if and only if there is a time t that precedes t_{np} and t is the situation time of $P(x)$ in world w and t_{np} is included in the lifetime of x.)

that (i) t' is before t, (ii) s is a state of x being P at t', (iii) the temporal extension of s (noted $\tau(s)$) is included in t', (iv) t is included in the lifetime of x (noted $\tau(x)$), and (v) s is a maximal state of x being P at t, i.e. there is no state s' and time t'' such that s' is a state of x being P at t'', and t'' properly includes t'. Note that the variable t is the time of evaluation of the NP. Therefore, the change of state property should guarantee that there is a maximal state of x being P that ends before t. This is guaranteed by the conjunction of conditions (i), (ii), (iii), and (iv). The existence property is guaranteed by condition (iv), that the time of evaluation of the NP be included in the lifetime of its individual argument.

4.2 Tense inside DPs

In Tonhauser's proposal, *-kue* encodes not only the precedence property but also the change of state property and the existence property. This possibility is not available to me, since I have described *-kue* as a relative past tense, which only encodes a precedence relation between its temporal arguments. In this subsection, I propose a first analysis of the syntax and semantics of DPs modified by *-kue*. I show that my analysis captures the precedence property directly. More work is needed to capture the additional properties of *-kue*, which will be the topic of Sects. 5 and 6. For lack of space, I will only discuss non-possessive DPs, although the analysis that I propose can be extended to possessive DPs.

Bare Noun Phrases I assume that bare NPs (without *-kue* or *-rã*) are interpreted at a time that is denoted by a covert nominal time adverb NT_i. Contrary to the RT adverb of clauses, NT_i is indexed, and therefore can be bound:

(111) $[\![\text{NT}_i]\!]^{c,w} = g_c(i)$

It was shown in the preceding subsection that the time of evaluation of noun phrases in argument position is context dependent. In such a case, NT_i will be free and its denotation will depend on the contextually salient assignment function g_c:[21]

(112) A-ikuaa peteĩ opygua.
1-know one priest
'I know/knew a priest.'

(113) $[_{VP}$ RT $[_{VP}$ $[_{DP}$ peteĩ [1 $[_{NP}$ NT_2 $x_1$opygua]]]] [3 $[_{VP}$ aikuaa x_3]]]

(114) $[\![(113)]\!]^{c,w} = \exists x[\textbf{priest}(w)(g_c(2))(x) \wedge \textbf{know}(w)(t_{rt})(x)(\textbf{speaker}(c))]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

[21] See Heim and Kratzer (1998, p. 243): "Let us think of assignments as representing the contribution of the utterance situation. The physical and psychological circumstances that prevail when an LF is processed will (if the utterance is felicitous) determine an assignment to all the free variables occurring in this LF (…). A context c is appropriate for an LF φ only if c determines a variable assignment g_c whose domain includes every index which has a free occurrence in φ."

When a bare noun phrase is used as predicate, its evaluation time is that of the clause. In such a case, the nominal time is bound by RT or by a lower tense (*va'ekue*), aspect, or modal operator.[22]

(115) Juan ma opygua o-iko.
Juan BDY priest 3-be
'Juan is/was a priest.'

(116) $[_{PredP}$ Juan [1 [RT [2 [$[_{Pred}$ oiko] $[_{NP}$ NT_2 x_1 opygua]]]]]]

(117) Juan ma opygua o-iko va'e-kue.
Juan BDY priest 3-be REL-PST
'Juan was a priest.'

(118) $[_{TP}$ Juan [1 [RT [2 [$[_{T}$ -kue] $[_{NP}$ va'e $[_{PredP}$ $[_{Pred}$ oiko] $[_{NP}$ NT_2 [x_1 [opygua]]]]]]]]]

Nominal tense The syntax of nominal uses of *-kue* is similar to that of its clausal uses; *-kue* combines with the NP and has its internal argument slot saturated by the covert adverb NT_i. As in bare noun phrases, NT_i will be free inside NPs in argument position:

(119) A-ikuaa peteĩ opygua-kue.
1-know one priest-PST
'I know/knew an ex-priest.'

(120) $[_{VP}$ RT $[_{VP}$ $[_{DP}$ peteĩ [1 $[_{TP}$ NT_2 [$[_{T}$ -kue] $[_{NP}$ x_1 opygua]]]]] [3 $[_{VP}$ aikuaa x_3]]]]

(121) $[\![(120)]\!]^{c,w} = \exists x \exists t'[t' < g_c(2) \wedge \textbf{priest}(w)(t')(x) \wedge \textbf{know}(w)(t_{rt})(x)(\textbf{speaker}(c))]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

Inside predicative NPs, NT_i is bound by a higher operator:

(122) Juan ma opygua-kue o-iko.
Juan BDY priest 3-be
'Juan is/was an ex-opygua.'

(123) $[_{PredP}$ Juan [1 [RT [2 [$[_{Pred}$ oiko] $[_{TP}$ NT_2 $[_{T}$ *-kue*] $[_{NP}$ x_1 opygua]]]]]]

(124) $[\![(122)]\!]^{c,w} = \exists t'[t' < t_{rt} \wedge \textbf{opygua}(w)(t')(\textbf{Juan})]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

This analysis captures the precedence inference licensed by nominal uses of *-kue*, but it fails to capture other inferences it licenses, notably the cessation and existence inferences.

[22] In these examples and elsewhere, it is assumed that the copula *oiko* is semantically vacuous, so that RT binds the time of evaluation of the predicative NP in (118).

5 Deriving the cessation inference

5.1 Reformulating the problem

Both nominal and clausal uses of *-kue* trigger an inference that the property described by the predicate does not hold of its subject at the evaluation time:

(125) Juan mburuvicha o-iko va'e-kue.
Juan leader 3-be REL-PST
'Juan was a leader.'

(126) Agỹ, Juan mburuvicha-kue.
Now Juan leader-PST
'Now, Juan is an ex-leader.'

In (125), *-kue* modifies the copula *oiko*. Overt copulas are generally avoided in Mbyá, and are used mostly to support verbal morphology, such as *va'ekue* in (125); see Dooley (2006). By contrast, there is no overt copula in (126), and *-kue* modifies the predicative NP directly. When uttered out of the blue, both (125) and (126) trigger the inference that Juan is no longer a leader at the time of utterance. However, while this inference can be blocked in (125), it appears to be mandatory in (126). This is shown by the contrast between (127) and (128):

(127) Juan mburuvicha o-iko va'e-kue, ha'e agỹ mburuvicha teri.
Juan 3-be leader REL-PST COORD now leader still
'Juan was a leader, and he is still a leader now.'

(128) #Agỹ, Juan mburuvicha-kue ha'e mburuvicha (teri/ju).
Now Juan leader-PST COORD leader still/again
'Now, Juan is an ex-leader and he is a leader/still a leader/a leader again.'

The inference that is observed in (125) is also attested in English, and it may also be blocked in English, as the translations of (127) and (128) indicate. More generally, it seems that in Mbyá as in English, the use of a past tense sentence licenses an inference that its present tense alternative is false. Such inferences have not gone unnoticed in the literature on tense: Musan (1995, 1997), Magri (2009), and Altshuler and Schwarzschild (2012) analyze them as implicatures that are triggered by the use of tense.

These observations suggest that we may be able to analyze the cessation inference as an implicature. From this perspective, the question that we must address is the following. Is it possible to analyze the temporal implicature triggered by *-kue* in such a way that it is obligatory in its nominal uses but can be blocked in its clausal uses? In order to answer this question, we must of course adopt a theory of implicatures in which the notion of obligatory implicatures is defined. To this end, I will adopt the theory of grammatical implicatures proposed by Magri (2009), together with the theory of structurally defined alternatives of Katzir (2007, 2008). I give an overview of these theories in the next subsection.

5.2 Quantity implicatures and tense

A theory of quantity implicatures For lack of space, I will give a rather cursory presentation of Magri's and Katzir's theories, to the extent that such a presentation is necessary to discuss the phenomenon of temporal implicatures in Mbyá. The reader who is interested in the formal aspects of these theories and in their empirical motivation is referred to Magri (2009) and Katzir (2007, 2008).

I assume with Magri (2009) that some inferences that have been described as Gricean implicatures are entailments that are generated by adjoining a silent exhaustivity operator (represented as EXH) to the syntactic representations of sentences[23] (see also Groenendijk and Stokhof 1984; Chierchia 2004; Chierchia et al. 2009; Fox 2007; Spector 2005). More precisely, the constituent that is obtained by adjoining EXH to a sentence ϕ denotes the conjunction of the proposition denoted by ϕ with the negation of the proposition denoted by each sentence in the set of excludable alternatives to ϕ, as defined in (129):

(129) $$[\![\text{EXH } \phi]\!]^{c,w} = [\![\phi]\!]^{c,w} \bigwedge_{[\![\psi]\!]^{c,w} \in \mathcal{E}xcl([\![\phi]\!]c,w)} \neg\, [\![\psi]\!]^{c,w}$$

The meaning of EXH ϕ is therefore dependent on the definition of the set of excludable alternatives to ϕ, $\mathcal{E}xcl([\![\phi]\!]^{c,w})$. In order to define $\mathcal{E}xcl([\![\phi]\!]^{c,w})$, we must first define the set of alternatives to ϕ, of which $\mathcal{E}xcl([\![\phi]\!]^{c,w})$ is a subset. Following Katzir (2007, 2008), I assume that a sentence ψ is an alternative to a sentence ϕ iff the syntactic structure of ϕ is at most as complex as the syntactic structure of ψ. This condition holds if and only if ψ can be generated by applying a finite number of operations to ϕ, such that none of these operations increases the complexity of the structural description they are applied to. The operations that are licensed are deletion (removing edges and nodes), contraction (removing an edge and identifying its end nodes), and substitution. The elements that are introduced in an alternative by substitution must be taken from a certain substitution source, which I will assume is the lexicon of the language (see Katzir 2007 for discussion). This structural definition of the alternatives to a sentence ϕ is captured more precisely in the following definitions:

(130) SUBSTITUTION SOURCE:
Let φ be a parse tree. The substitution source for φ, written as $\mathrm{L}(\varphi)$, is the union of the lexicon of the language with the set of all sub-trees of φ.

(131) STRUCTURAL COMPLEXITY:
Let φ, ψ be parse trees. If we can transform φ into ψ by a finite series of deletions, contractions, and replacements of constituents in φ with constituents of the same category taken from $\mathrm{L}(\varphi)$, we will write $\varphi \lesssim \psi$. If $\varphi \lesssim \psi$ and $\psi \lesssim \varphi$, we will write $\varphi \sim \psi$. If $\varphi \lesssim \psi$ and not $\psi \lesssim \varphi$, we will write $\varphi < \psi$.

[23] This theory is not actually intended to replace the Gricean analysis of scalar implicatures, and it is consistent with the view that there are also scalar implicatures obtained by Gricean reasoning, in addition to grammatical scalar implicatures.

(132) STRUCTURAL ALTERNATIVES:
Let φ be a parse tree. The set of structural alternatives for φ, written as $A_{str}(\varphi)$, is defined as $A_{str}(\varphi) := \{\varphi' : \varphi' \lesssim \varphi\}$.

Given the set $A_{str}(\varphi)$ of structurally defined alternatives to a sentence ϕ, we may define $\mathcal{E}xcl(\phi)$ as the set of sentences in $A_{str}(\varphi)$ that are not entailed by ϕ (see Fox 2007 for refinements).

(133) $\mathcal{E}xcl(\phi) = \{\psi : \psi \in A_{str}(\varphi) \wedge \phi \not\models \psi\}$

Temporal implicatures Let us illustrate how this system works by deriving the temporal implicature of past tense sentences. Out of the blue, one infers from (134a) that there is no book on the table at the time of utterance. Assume for the sake of the argument that the syntactic structure of (134a) is (134b), while the syntactic structure of the present tense sentence (135a) is (135b):

(134) a. There was a book on the table.
b. [$_{TP}$ PST [$_{VP}$ there be a book on the table]]

(135) a. There is a book on the table.
b. [$_{TP}$ PRES [$_{VP}$ there be a book on the table]]

(135b) qualifies as an alternative to (134b) since it can be obtained from the latter by substituting the present tense PRES for the past tense PST. It remains to be seen whether (135b) is an excludable alternative to (134b). For the sake of simplicity, assume that PST and PRES in English are interpreted as in (136). Given these assumptions, (134b) does not entail (135b), hence (135b) belongs to the set of excludable alternatives to (134b). We predict that the exhaustification of (134b) is interpreted as in (139): it is true iff there is a time before t_c at which there was a book on the table, and there is no book on the table at t_c. This is the temporal implicature that we want to derive.

(136) a. $[\![\text{PST}]\!]^{c,w} = \lambda P.\exists t[t < t_c \wedge P(t)]$
b. $[\![\text{PRES}]\!]^{c,w} = t_c$

(137) $[\![(134\text{b})]\!]^{c,w} = \exists t[t < t_c \wedge \exists x[\textbf{book}(w)(x) \wedge \textbf{on}(w)(t)(\textbf{the table})(x)]]$

(138) $[\![(135\text{b})]\!]^{c,w} = \exists x[\textbf{book}(w)(x) \wedge \textbf{on}(w)(t_c)(\textbf{the table})(x)]$

(139) $[\![\text{EXH } (134\text{b})]\!]^{c,w} = \exists t[t < t_c \wedge \exists x[\textbf{book}(w)(x) \wedge \textbf{on}(w)(t)(\textbf{the table})(x)]] \wedge$
$\neg\exists x[\textbf{book}(w)(x) \wedge \textbf{on}(w)(t_c)(\textbf{the table})(x)]$

In this theory, implicatures will be derived whenever the exhaustivity operator EXH is adjoined to a sentence or to an embedded constituent that denotes a proposition. Following Magri (2009), exhaustivity operators are obligatorily adjoined at certain points of LFs, which I assume to be TPs. If we don't restrict the theory, this assumption would entail that implicatures (in Magri's sense, i.e., exhaustification entailments) are obligatory. This is obviously undesirable, since implicatures can often be blocked. Going back to our example, we observe that the discourse in (140) is consistent, which would not be the case if the first sentence entailed that there is no book on the table at the time of utterance.

(140) When I entered the room, there was a book on the table. As a matter of fact, this book is still there.

In order to account for these facts, Magri (2009) assumes that EXH only negates excludable alternatives that are contextually relevant. That is to say, the domain of EXH consists of the intersection of the set of excludable alternatives to its prejacent (the proposition that EXH applies to) with a set $\mathcal{R}$ of contextually relevant propositions. Let us call the latter the *relevance set* of EXH. We may redefine EXH as follows:

(141) $[\![\text{EXH } \phi]\!]^{c,w} = [\![\phi]\!]^{c,w} \bigwedge_{[\![\psi]\!]^{c,w} \in \mathcal{E}xcl([\![\phi]\!]^{c,w})) \cap \mathcal{R}} \neg\, [\![\psi]\!]^{c,w}$

If we accept this analysis, we must assume that the proposition that there is a book on the table is not relevant at the point where the first sentence of (140) is uttered. At the time of utterance of the second sentence, this proposition becomes relevant (the second sentence may actually be used to indicate the relevance of the current location of the book). The analysis of question–answer pairs provides empirical support for this analysis. Once a question has been asked and accepted as valid, only assertions that provide an answer to this question are deemed relevant (see Groenendijk and Stokhof 1984; Roberts 1996). In other words, we may assume that at the point of a discourse that follows a question, the relevance set of a matrix exhaustivity operator is identical to the set of possible answers to that question. If this assumption is correct, we expect that the temporal implicature of a past tense sentence will be blocked if its present alternative is not relevant given the question under discussion. The following example from Klein (1994) suggests that this is correct:

(142) Judge: What did you notice when you looked into the room?
Witness: There was a book on the table.

As Klein points out, one does not infer from (142) that there is no book on the table at the time of utterance. In Klein's terms, this is due to the fact that the claim made in the answer is confined to the topic time that is set by the question: the past time at which the speaker looked into the room. In Magri's terms, we may say that the proposition that there is a book on the table at the time of utterance is not relevant given the question under discussion, so that the corresponding alternative is kept out of the domain of the exhaustivity operator.

Let us dwell on Klein's conceptualization of these facts. According to Klein, any declarative utterance is associated with a topic time and what Klein calls a lexical content. The lexical content is essentially a property of times that is asserted to hold at the topic time. In traditional terms (Reinhart 1981), the lexical content is a *comment* on the topic time that the sentence is about.

Klein proposes that a speaker who makes an assertion is only committed to the claim that the lexical content holds at the topic time of the utterance. It may be the case that the lexical content holds at other times as well, but the speaker is not committed to such a claim. Likewise, the speaker is also not committed to the claim that the lexical content does *not* hold at times other than the topic time. In example (142), for instance, the answer asserts that the lexical content *a book be on the table* (the property of times at which there is a book on the table) holds at a past topic time, which is defined in the

question. Since the time of utterance is not topical, the speaker is committed neither to the claim that the book is on the table at the time of utterance nor to the negation of this claim. In Magri's terms, we would say that since the time of utterance is not topical, the proposition that results from applying the time of utterance to the lexical content of the sentence is not relevant. And since relevance is closed under negation (see Katzir 2007, 2008; Magri 2009), the negation of this proposition is not relevant either.

Klein's analysis is subject to an important caveat: it is not obvious that every sentence has a topic time. Consider for instance the following dialogue:

(143) Q: When did you first meet the suspect?
A: I met him on May 12, 2010.

Does the answer in (143) have a topic time? Here it seems that the question does not set a topic time, but rather poses a topic event and asks when that event happened. Likewise, the answer is not making a comment about the past interval *May 12, 2010*. Rather, the comment that is made about the topic event is that it happened on that date.

Let us then qualify Klein's proposal, and conclude that whenever a topic time is defined in the context of utterance, a sentence that is interpreted as making a claim about a time that is not topical is irrelevant in this context, everything else being equal. If there is a topical time in the context of utterance, being about this time is a necessary condition of relevance. It is not, however, a sufficient condition. In the following dialogue, for instance, the answer may very well be interpreted as making a claim about the topic time, but it is very likely irrelevant in the context of utterance:

(144) Judge: What did you notice when you looked into the room?
Witness: #It was my mother's birthday.

The problem with (144) is that the lexical content of the answer (the comment on the topic) is not at issue in the dialogue between the judge and the witness: the judge is only interested in learning whether certain properties of times hold at the topic time. Which properties? Those that characterize the witness's perception of the room at the topic time. Invoking Roberts's (1996) model of information structure, we may say that lexical contents that are at issue are those that, when combined with the topic time, yield a proposition that is congruent with the question under discussion. With this notions at hand, we can now propose a sufficient condition of relevance in a context:

(145) *Sentence relevance:*
If a sentence ϕ makes a claim about a time that is topical in a context c, and its lexical content is at issue in c, then ϕ is relevant in c.

Given the theory of temporal implicatures that I have adopted, it is expected that a past tense sentence will only trigger a temporal implicature if its present alternative is relevant. According to condition (145), this will be the case only if the lexical content of the sentence is at issue (which hopefully is the case, otherwise the prejacent wouldn't be relevant) and the time of utterance is topical. However, since the prejacent itself must be relevant, some past time must also be topical. That is to say, the 'topic time' in the context of utterance must be an interval that includes the time of utterance as well

as times that precede it. In order to distinguish this interval from the topic times that serve as time of evaluation of lexical contents of sentences, we may call the former the 'topic time projection range,' following Klein (1994).

A typical context where the conditions described in the previous paragraph are satisfied is the opening of biographical sketches, where the topic time is the lifetime of the individual under discussion. Provided the topic time individual is still alive, the topic time includes the time of utterance. (146) is a straightforward illustration of this fact. This is a single sentence biographical sketch of the author of a text that was posted on the Internet. Clearly, one infers from this sentence that Amanda Rippon is no longer a faculty member at the time of 'utterance,' i.e. the time of publication of the text:

(146) Amanda Rippon was a Faculty Member and is a barrister at New Park Court Chambers.[24]

Before I close this subsection, I would like to propose a format to represent topic times and comments on topic times. Following Reinhart (1981), I propose that the topic/comment articulation can be represented as a structure on a set of propositions, so that every proposition ϕ in this set is split into a topic $\mathcal{T}(\phi)$ and a comment $\mathcal{C}(\phi)$, with $\phi = \mathcal{T}(\phi)(\mathcal{C}(\phi))$. However, contrary to Reinhart, I suggest that this structure is not defined on the common ground, but on the set of relevant propositions that restrict the matrix exhaustivity operator. Since this set has been identified with the extension of the question under discussion, this assumption captures the fact that it is this question that sets the topic/comment articulation of its possible answers. Finally, following Krifka (2008), topics may be sets of entities (e.g. sets of intervals) as well as entities (intervals). This allows us to capture the topic/comment articulation of quantified sentences. To wit, if a tense is interpreted as an existential quantifier over intervals, then the sentence is about topic times just in case the domain of the temporal quantifier is a subset of the set of topic times in the context of utterance.

5.3 Temporal implicatures in Mbyá: clausal uses of *-kue*

Clausal uses of *-kue* trigger temporal implicatures, in much the same way as the simple past in English. Consider for instance the following discourse. After reading this discourse, consultants were asked whether they think that the man A is asking about is still the leader of the village:

(147) Context: A is visiting B's community. A notices a man who is addressing a small group of villagers; he asks:

A: Mava'e pa kova'e ava?
who Q this man
'Who is this man?'

[24] http://www.southeastcircuit.org.uk/education/keble-2012-a-faculty-members-perspective, last accessed on May 24, 2013.

B: Ha'e ma ore-ruvicha o-iko va'e-kue. Aỹ, porombo'ea o-iko.
ANA BDY 1.PL.EXCL-leader 3-be REL-PST now teacher 3-be
'He was our leader. Now, he is a teacher.'

All consultants judged that this man is no longer the leader (despite the fact that one may combine the functions of political leader and of teacher in a Mbyá community).

This inference can be analyzed as a temporal implicature triggered by *-kue*. The first sentence in B's answer, repeated in (148), is parsed as in (149). It has a tenseless alternative in (150), which can be obtained from (149) by a series of deletions and contractions, and hence is structurally simpler than (149).[25]

(148) Ha'e ma ore-ruvicha o-iko va'e-kue.
ANA BDY 1.PL.EXCL-leader 3-be REL-PST
'He was our leader.'

(149) $[_{TP}$ RT $[_{T}$ -kue] $[_{NP}$ $[_{N}$ va'e] $[_{VP}$ ha'e$_1$ ma oreruvicha]]]

(150) $[_{VP}$ RT ha'e ma oreruvicha]]

Sentence (150) is not only structurally simpler than (149), it is also excludable, since the two LFs denote logically independent propositions. While the prejacent asserts that the man was a leader at some time before $[\![\text{RT}]\!]^{c,w}$, (150) asserts that he is a leader at $[\![\text{RT}]\!]^{c,w}$. Therefore, (148) will be strengthened to (153), provided (150) is relevant.

(151) $[\![(149)]\!]^{c,w} = \exists t'[t' < t_{rt} \wedge \textbf{our-leader}(w)(t')(g_c(1))]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

(152) $[\![(150)]\!]^{c,w} = \textbf{leader}(w)(t_{rt})(g_c(1))$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

(153) $\exists t'[t' < t_{rt} \wedge \textbf{our-leader}(w)(t')(g_c(1))] \wedge \neg\textbf{our-leader}(w)(t_{rt})(g_c(1))$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

Under what conditions is the tenseless alternative relevant? Just as in the biographical sketch in the previous subsection, the question sets the topic time projection range to the part of the topical individual's lifetime that includes the time of utterance and extends into the past. (148) can therefore be interpreted as a claim about some past time that is included in this topical interval. To obtain this interpretation, we must assume that RT denotes the time of utterance. The time that the sentence makes a claim about is located before TU by *va'ekue*. Since RT denotes the time of utterance, the syntactically tenseless alternative (149) is interpreted as a claim about the time of utterance, which is also part of the topic time projection range. The 'lexical content' of the sentence, i.e. the property of times at which the man is the leader of the community, is of course at issue in this context. Therefore, the alternative is relevant, and we expect a temporal implicature to arise.

[25] Note that in (149), RT occupies the specifier of TP, while in (150) it occupies the specifier of VP. As a consequence, there is a sense in which mapping (149)–(150) involves relabeling non-terminals in the tree. However, if we assume, following Chomsky (1995), that category labels are not part of the actual structure of syntactic representations, the procedure that evaluates whether (150) is structurally simpler than (149) is blind to this relabeling.

As expected, the temporal implicatures triggered by *va'ekue* will be blocked whenever its alternative obtained by deleting the past tense is not relevant. This is illustrated in the following dialogue.

(154) A: Mba'e o-japo raka'e Juan años 90 py?
what 3-do remote.past.adv. Juan years 90 in
'What did Juan do in the '90s?'

B: Ha'e porombo'ea o-iko va'e-kue. Ha'e porombo'ea teri.
ANA teacher 3-be REL-PST ANA teacher still
'He was a teacher. He still is.'

In (154), the question sets the topic time projection range to the '90s. Therefore, the time of utterance is not topical. Consequently, the syntactically tenseless alternative to B's answer, which is interpreted as a claim about the time of utterance, is not relevant. No implicature is triggered.

This discussion shows that the computation of temporal implicatures with *va'ekue* is not significantly different from the computation of temporal implicatures with the past tense in English. In the next subsection, I discuss the computation of temporal implicatures in DPs, and then propose an explanation of their obligatory nature.

5.4 Temporal implicatures in Mbyá: nominal uses of *-kue*

The cessation inference of *-kue* is an embedded implicature. Consider the example in (155). This sentence is interpreted as in (156), where $g_c(1)$ is the value that is assigned to the nominal time adverb NT_1 in the context of utterance c:

(155) RT a-ikuaa peteĩ NT_1 opygua-kue.
Ø A1SG-know one Ø priest-PST
'I know/knew an ex-priest.'

(156) $\exists x \exists t'[\textbf{priest}(w)(t')(x) \wedge t' < g_c(1) \wedge \neg \textbf{priest}(w)(g_c(1))(x) \wedge \textbf{know}(w)(t_{rt})(x)(\textbf{speaker}(c))]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

By default, the NP-time is identical to the salient evaluation time of the sentence t_{rt}, i.e. $g_c(1) = t_{rt}$. We may also assume that out of the blue, the most salient interval that could value RT is the time of utterance t_c, so that $g_c(1) = t_{rt} = t_c$. In this case, the sentence is true in a world w at a context c iff there is an x who was a priest at some time before t_c and who is not a priest at t_c, and the speaker knows x at t_c. The implicature, namely that x is not a priest at $g_c(1) = t_c$, is embedded inside the object DP. If the temporal implicature of nominal *-kue* were global, the sentence would be interpreted as (157), contrary to facts. Under this reading (and making the same assumptions about $[\![\text{NT}_1]\!]^{c,w}$ and $[\![\text{RT}]\!]^{c,w}$), the sentence is true iff there is an x who was a priest at some time before t_c and such that the speaker knows x at t_c, and it is not the case that there is an x who is a priest at t_c and such that the speaker knows x at t_c. This interpretation is too strong: (157) entails (156), but it also entails that the speaker

doesn't know any individual who is a priest at the evaluation time. This is not correct, since (155) does not preclude that the speaker knows both a priest and an ex-priest.

(157) $\exists x \exists t'[priest'(w)(t')(x) \wedge t' < g_c(1) \wedge know'(w)(t_{rt})(x)(speaker(c))] \wedge \neg\exists x[priest'(w)(g_c(1))(x) \wedge know'(w)(t_{rt})(x)(\textbf{speaker}(c))]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

In order to generate embedded temporal implicatures as in (156), I assume that exhaustivity operators can be embedded inside DPs. Of course, this already follows from my earlier adoption of Magri's (2009) theory, according to which exhaustivity operators are adjoined at every scope site (i.e., at every node of type t in an LF). I will now discuss the computation of temporal implicatures, first in non-possessive DPs and then in possessive DPs.

Let us first look at DPs in argument position, as in the preceding example, repeated in (158). Assuming that exhaustivity operators are inserted at every scope site, this sentence may be parsed as in (159):[26]

(158) A-ikuaa peteĩ opygua-kue.
1-know one priest-PST
'I know/knew an ex-priest.'

(159) EXH [VP_3 RT [VP_2 [DP peteĩ 2 [EXH [TP_1 NT_3 [T -kue] [NP x_2 opygua]]]] 1 [VP_1 aikuaa x_1]]]

What matters to us is the lower EXH, inside the DP. Its complement is a TP that is interpreted as in (160). From the LF of this TP, we can generate the alternative in (161) by a series of deletions and contractions.

(160) $[\![\text{TP}_1]\!]^{c,w} = \exists t[t < g_c(3) \wedge \textbf{priest}(w)(t)(g_c(2))]$

(161) [NP NT_3 [e_2 opygua]]

(162) $[\![(161)]\!]^{c,w} = \textbf{priest}(w)(g_c(3))(g_c(2))$

The denotation of the alternative in (162) is logically independent from the denotation of the prejacent, and so we can assume that it is excludable. Its exclusion by EXH results in the following strengthened meaning:

(163) $[\![\text{EXH TP}_1]\!]^{c,w} = \exists t[t < g_c(3) \wedge \textbf{priest}(w)(t)(g_c(2))] \wedge \neg\textbf{priest}(w)(g_c(3))(g_c(2))]$

Since there is no alternative in the domain of the upper EXH, we predict the correct truth conditions. (158) is true iff there is an x who was a priest at some time before the DP evaluation time $g_c(3)$ and who is not a priest at $g_c(3)$, and the speaker knows x at $[\![\text{RT}]\!]^{c,w}$:

(164) $[\![(159)]\!]^{c,w} = \exists x[\exists t'[t' < g_c(3) \wedge \textbf{priest}(w)(t')(x)] \wedge \neg\textbf{priest}(w)(g_c(3))(x) \wedge \textbf{know}(w)(t_{rt})(x)(\textbf{speaker}(c))]$
Defined only if c provides a t_{rt} such that $\neg(t_{rt} > t_c)$

[26] One additional exhaustivity operator should actually have been adjoined to VP_1, which is a node of type t. Since there is nothing to exhaustifiy at that node, we can safely ignore it.

The analysis of temporal implicatures of predicative DPs is essentially the same. Consider (165), parsed as (166). The prejacent of the embedded EXH is just as in (159), except for the fact that the internal argument of the nominal tense is bound by the clausal tense.[27]

(165) Juan opygua-kue.
Juan priest-PST
'Juan is an ex-priest.'

(166) EXH $[_{VP_2}$ RT 2 $[_{VP_1}$ Juan 1 BE $[_{DP}$ EXH $[_{TP_1}$ $[_T$ NT$_2$ -kue] $[_{NP}$ x_1 opygua]]]]]

From the prejacent TP$_1$ of the embedded EXH operator, we generate the following alternative, by a series of deletion and contractions:

(167) $[_{NP}$ NT$_2$ [x_1 opygua]]

(168) $[\![(167)]\!]^{c,w}$ = **priest**$(w)(g_c(2))(g_c(1))$

The predicative NP is then exhaustified as in (169), and the sentence is interpreted as in (170): true iff Juan was a priest before the evaluation time $g_c(3)$ and is not a priest at $g_c(3)$:

(169) $[\![\text{EXH TP}_1]\!]^{c,w} = \exists t[t < g_c(2) \wedge \textbf{priest}(w)(t)(g_c(1))] \wedge \neg\textbf{priest}(w)(g_c(2))(g_c(1))$

(170) $[\![(169)]\!]^{c,w} = \exists t'[t' < t_{rt} \wedge \textbf{priest}(w)(t')(\textbf{Juan})] \wedge \neg\textbf{priest}(w)(t_{rt})(\textbf{Juan})$

5.5 How to keep temporal implicatures in place?

In the preceding subsection, it was shown that the cessation inference of *-kue* can be analyzed as an embedded temporal implicature. However, temporal implicatures can generally be blocked, as in the following example:

(171) Q: Mba'e pa Juan o-japo 1996 py?
What Q Juan 3-do 1996 LOC
'What was Juan doing in 1996?'

[27] It should now be clearer why the observation mentioned in footnote 19, namely that *Peter Hoyle is a former and present Ukiah policeman* is acceptable, does not challenge the proposed analysis of cessation inferences of *-kue*. See footnote 19 for a reminder of the objection. If one applied the proposed analysis of cessation implicatures to *former* in English, one would not predict that *Peter Hoyle is a former and present Ukiah policeman* should be ungrammatical, since the structurally simpler alternative *Peter Hoyle is a present Ukiah policeman* would not be excludable. Alternatives are computed in a local domain in the analysis, and here we can assume that *former* and *present* are in the scope of the local EXH operator. An alternative of the prejacent *former and present Ukiah policeman* is *present Ukiah policeman*, and this alternative is not excludable since is its entailed by the prejacent. Indeed, one should interpret *former and present Ukiah policeman* as $\lambda t.\exists t'[t' < t \wedge UP(t')] \wedge \exists t''[t'' = t \wedge UP(t'')]$, while I take it that *former Ukiah policeman* denotes $\lambda t.\exists t'[t' < t \wedge UP(t')]$. If *present Ukiah policeman* or simply *Ukiah policeman* denotes $\lambda t.\exists t'[t' = t \wedge UP(t')]$ or equivalently $\lambda t.UP(t)$, then it is not an excludable alternative since it is entailed by the prejacent (meaning that any time that satisfies the prejacent satisfies this alternative), and therefore no cessation implicature would arise.

A: Opygua o-iko va'e-kue.
priest 3-be REL-PST
'He was a priest.'

In this dialogue, the answer does not convey that Juan is no longer a priest. Following Magri (2009), we have assumed that an implicature that $\neg\phi$ is blocked whenever ϕ is not relevant. In (171), assuming that the relevance set of EXH is identical to the extension of the question under discussion, it is expected that the proposition that Juan is a priest at the time of utterance is not relevant, and therefore that the corresponding implicature will be blocked.

That temporal implicatures of clausal uses of *-kue* can be blocked is also shown by the felicity of sentences such as (172):

(172) A-vy'a va'e-kue kuee, ha'e a-vy'a teri agỹ.
1-happy REL-PST yesterday and A1.SG-happy still now
'I was happy yesterday and I am still happy today.'

By the same device, we can show that temporal implicatures of nominal uses of *-kue* cannot be blocked:

(173) * Agỹ Juan opygua-kue, ha'e opygua teri.
Now Juan priest-PST and priest still
*'Now, Juan is an ex-priest, and he is still a priest.'

Given what we have said about implicatures so far, this is surprising. (174) is parsed as in (175), and the implicature that Juan is not a priest at the time of utterance is generated by negating the alternative in (176) to the prejacent of EXH_i.

(174) Juan opygua-kue.
Juan priest-PST
'Juan is an ex-priest.'

(175) EXH_{ii} [$_{VP_2}$ RT 2 [$_{VP_1}$ Juan BE 1 EXH_i [$_{TP}$ NT_2 [$_T$-kue] [x_1 opyguakue]]]]]]]

(176) [NT_2 [x_1 opygua]]

This implicature should be blocked whenever the proposition denoted by (176) is not in the relevance set of EXH_i. Let us call (176) the 'bare' alternative of the prejacent of EXH_i, which is the alternative that is obtained by deleting nominal tense from the prejacent. If we accept Magri's theory of implicatures, the fact that the implicatures that are triggered by nominal uses of *-kue* are obligatory indicates that the bare alternative to the prejacent is always a member of the relevance set of the local exhaustivity operator.

How can we account for this fact? First of all, let us convince ourselves that the relevance set of an exhaustivity operator that is embedded inside a DP need not be identical to that of the matrix exhaustivity operator. The latter, it was argued, can be identified with the denotation of the question under discussion. Given this fact, we can show that two exhaustivity operators that occur in the same sentence may have different relevance sets. In the following dialogue, for instance, the relevance

set of the matrix exhaustivity operator in the answer must be disjoint from that of the exhaustivity operator embedded in the DP:

(177) Q: Mava pa nde-recha? A: A-echa peteĩ opygua.
Who Q 2-see 1-see one priest
'Who did you see?' 'I saw a priest.'

The question under discussion requests answers of the form *I saw x*, while the prejacent of the embedded exhaustivity operator denotes propositions of the form *x is a priest*. Under the assumption that the prejacent of an exhaustivity operator is always a member of its relevance set, this demonstrates that the set of relevant propositions that restricts the embedded operator includes propositions that are not globally relevant. I conclude that the relevance set of an exhaustivity operator that is embedded inside a DP is not identical to the question under discussion, which is addressed by the whole sentence.[28] As a consequence, whether the temporal implicature of nominal *-kue* will be blocked or not is independent of the content of the question under discussion.

Since the relevance set of the exhaustivity operator that is embedded in a DP may be different from the global question under discussion, the topic time of that DP may also be different from the topic time of the sentence. Indeed, I propose that the topic time of a DP is constrained by the following syntactic principle:

(178) Let NP be an underived noun phrase, and let $\mathcal{R}$ be the relevance set of the exhaustivity operator that immediately dominates NP. Then for every proposition $\phi \in \mathcal{R}$, the nominal time $[\![\text{NT}_i]\!]^{c,w}$ of NP is the topic time $\mathcal{T}(\phi)$ of ϕ.

Principle (178) is a claim about the information structure of the NP. It states that any underived NP (i.e. any NP not derived by nominalization) is 'about' its nominal time $[\![\text{NT}_i]\!]^c$. Given what was said about relevance in Sect. 5.2, if the lexical content of the NP is at issue (which we can take for granted), the proposition that is obtained by applying the lexical content of the NP to its nominal time must be locally relevant.

How do we determine the lexical content of underived NPs? As with clauses, the lexical content is obtained by deleting from the syntactic representation of the NP the nodes that contain temporal information, i.e. the temporal projection (if any) and the nominal time adverb NT_i. As a consequence, the tenseless alternative to an NP modified by *-kue* will always be a member of the local relevance set.

In sum, the relevant difference between underived NPs and nominalized clauses, insofar as the computation of temporal implicatures is concerned, boils down to the following observations. In nominalized clauses, the domain of the relative past tense denoted by *-kue* may be topical, and the time denoted by RT may be non-topical. In underived NPs, however, the time denoted by NT_i is necessarily topical.

The reader may think that this proposal reduces to analyzing the clausal uses of *-kue* as relative past tenses and its nominal uses as perfect aspects. And this is correct,

[28] As Judith Tonhauser observed (p.c.), the idea that alternative sensitive operators may be interpreted with respect to an embedded set of alternatives akin to a local question under discussion was explored in the work of Liz Coppock and David Beaver on exclusives; see Coppock and Beaver (2011, 2012). Note that I am not committed to the claim that the relevance set of an embedded exhaustivity operator is expressible as a question.

if one defines a tense (relative or deictic) as an operator that relates a topic time to a temporal anchor (the time of utterance or some other time), and a perfect aspect as an operator that locates a situation time in the past of a topic time. However, it is not clear to me what one gains with this definition.

In any case, my point is that we don't need to build the cessation inference into the lexical entry of nominal *-kue*. It is possible to define *-kue* uniformly as an operator that shifts the evaluation time of a predicate in the past of a temporal anchor. The cessation inference is then explained as an effect of independent constraints on the identification of topical times in underived noun phrases. A central feature of this proposal is that topicality is not a lexical property of particular expressions like tenses. It is a feature that is assigned to lexical items or constituents depending on their syntactic environment (see e.g. (177)) and on pragmatic factors (such as the content of the question under discussion).

In the next section, I show that it is possible to factor the two remaining properties of nominal uses of *-kue* out of its lexical entry.

6 Additional inferences licensed by nominal tense

6.1 Existence presuppositions with NPs

The existence inference of *-kue* is the fact that the evaluation time of the modified DP is a subset of the lifetime of its individual argument. In (179), for instance, it is understood that the ex-priest was still alive when he stopped being a priest. Note that this individual need not be alive at the time of the remembering, which shows that the existence inference is not due to a constraint that the verb would impose on the lifetime of its arguments.

(179) Che-ma'endu'a petei opygua-kue.
1-remember one priest-PST
'I remember one ex-priest.'

The existence inference is reminiscent of the lifetime presupposition discussed by Musan (1997). Musan noted that (180) presupposes that Gregory is alive at TU. The sentence is infelicitous if Gregory is dead. (181) and (182) show that the same point can be made with predicative NPs: given the knowledge that Jacques Cousteau is dead, both sentences are infelicitous.

(180) Gregory is happy.

(181) #Jacques Cousteau is a naval officer.

(182) #I doubt that Jacques Cousteau is a naval officer.

Additional evidence that we are really dealing with a presupposition is given in (183), which shows that this presupposition can be filtered in the usual way:

(183) Either Jacques Cousteau is dead or he is happy/a naval officer.

Musan argued that this presupposition of existence is part of the meaning of predicates like *happy* or *naval officer*. A predicate like *naval officer* denotes a function from individuals to times to truth values that is defined only for individuals who are alive at the evaluation time. From now on I will represent presuppositions in the semantic metalanguage as subscripts on predicates, as in (184). The function τ in the presupposition maps individuals to their lifetime. The presupposition states that the lifetime of the individual argument x overlaps the evaluation time t. The sentence *Jacques is a naval officer* must then be interpreted as in (185).

(184) $[\![\text{naval officer}]\!]^{c,w} = \lambda x.\lambda t.\textbf{naval-officer}(w)(t)(x)_{\tau(x)\circ t}$

(185) $[\![\text{Jacques is a naval officer}]\!]^{c,w} = \textbf{naval-officer}(w)(t_c)(\textbf{Jacques})_{\tau(\textbf{Jacques})\circ t_c}$

6.2 The existence inference of nominal *-kue*

Consider (186), with *-kue* in a predicative DP. In Sect. 4, this sentence was interpreted as in (187). (188) adds the lifetime presupposition of *opygua* ('priest') to the representation of its truth conditions. What is important is not the presupposition of the first conjunct but that of the second: that the lifetime of Juan overlaps the evaluation time of the clause, $g_c(1)$. Since presuppositions project over negation, the sentence as a whole inherits this presupposition. Therefore, (188) asserts that Juan was a priest at some time t before $g_c(1)$ and is no longer a priest at $g_c(1)$, and it presupposes that his lifetime overlaps both t and $g_c(1)$.

(186) Juan opygua-kue.
Juan priest-PST
'Juan is an ex-priest.'

(187) $[\![(186)]\!]^{c,w} = \exists t[t < g_c(1) \wedge \textbf{priest}(w)(t)(\textbf{Juan})] \wedge \neg\textbf{priest}(w)(g_c(1)(\textbf{Juan})]$

(188) $[\![(186)]\!]^{c,w} = \exists t[t < g_c(1) \wedge \textbf{priest}(w)(t)(\textbf{Juan})_{\tau(\textbf{Juan})\circ t}] \wedge \neg\textbf{priest}(w)(g_c(1))(\textbf{Juan})_{\tau(\textbf{Juan})\circ g_c(1)}]$

The existence inference of *-kue* in (186) is thus derived as a projection of the lifetime presupposition of *opygua* from inside the temporal implicature triggered by nominal tense. How is that possible? In the grammatical analysis of implicatures that we have adopted, implicatures are entailments. Indeed, given an LF [EXH ϕ], if ψ is an excludable alternative to ϕ that is relevant with respect to EXH, then [EXH ϕ] denotes the proposition that $[\![\phi]\!] \wedge \neg[\![\psi]\!]$. In particular, $\neg[\![\psi]\!]$ is entailed by $[\![\text{EXH } \phi]\!]$. So, if ψ triggers a presupposition p, it is predicted that p will project from below the negation in $\neg[\![\psi]\!]$, just as it would if $\neg[\![\psi]\!]$ was directly asserted rather than implicated.

6.3 Restrictions on lexical classes of nouns

Tonhauser (2007) noted that *-kue* cannot occur with certain classes of nouns, such as most natural kinds (e.g. *ita* 'stone') or permanent and final stage properties (e.g.

ra'y 'son'). In Thomas (2012), I show that similar facts are attested in Mbyá. The compatibility of *-kue* with common nouns was tested for several lexical semantic classes of nouns, following closely the categories proposed in Tonhauser (2007). The following table summarizes the judgments of the consultants. Unless indicated by **kue*, consultants judged that a noun was compatible with *-kue*.[29] For instance, *opygua* ('priest'/'ex-priest') indicates that the noun *opygua*, which translates as 'priest (of the traditional religion)' is compatible with the past tense *-kue*. *Mbojape* ('bread,' *kue) indicates that the noun *mbojape*, which translates as 'bread,' is incompatible with the past tense *-kue*.

1. Professions: *poropoanoa* ('physician'/'ex-physician'), *opygua* ('priest'/'ex-priest'), *nõmboea* ('professor'/'ex-professor').
2. Non-food artifacts: *guapya* ('bow'/'broken bow'), *ka'ygua* ('mate gourd'/'broken mate gourd'), *mbo'y* ('collar'/'broken collar'), *mbaepu* ('musical instrument'/'broken musical instrument').
3. Food artifacts: *tembi'u* ('food'/*kue), *mbojape* ('bread,' *kue)
4. Natural kinds: *kamby* ('milk'/'cheese'), *uru* ('chicken'/*kue), *jagua* ('dog'/*kue), *kochi* ('wild boar'/*kue), *ei* ('bee'/*kue), *mitã* ('child'/*kue), *ava* ('man,' *kue), *kuña* ('woman,' *kue), *ka'yguy* ('forest'/'deforested area'), *tata* ('fire,' *kue), *yakã* ('river'/'dried river bed'), *a* ('hair'/*kue), *yvyra* ('tree'/*kue), *y* ('water'/*kue), *yvytu* ('wind'/*kue), *yvy* ('earth'/*kue).
5. Temporal periods: *ka'aru* ('afternoon'/*kue), *pyareve* ('morning'/*kue), *araroy* ('winter'/*kue)
6. Event nouns: *jeguata* ('walk'/*kue), *juru pyte* ('kiss'/*kue), *ñemboaty* ('meeting'/*kue), *mba'e achy* ('illness'/*kue)
7. Stage-level relations: *jara* ('owner'/'ex-owner'), *cheirũ* ('my friend'/'my ex-friend'), *ra'ychy* ('wife'/'ex-wife').
   h. Individual-level and final-stage relations: *cheru* ('father,' *kue), *chejaryi* ('grandmother', *kue), *ra'y* ('son,' *kue)

[29] The method of elicitation was as follows. For each noun, I elicited a pair of sentences of the following form. The consultants were asked if the sentences were acceptable, and if so they were asked to provide a translation in Spanish. In some cases, this was followed by further questions about the meaning of the modified noun (notably, questions about scenarios in which the modified noun could be used).

(i) Kova'e ma opygua.
this BDY priest
'This is a priest.'

(ii) Kova'e ma opygua-kue.
this BDY priest-PST
'This is an ex-priest.'

Note that in some cases, the second type of sentence was acceptable but only if *-kue* ∼ *-gue* was interpreted as a plural marker, as in the following example. Naturally, such examples are identified as **kue* in the preceding list.

(iii) Kova'e kuery ma kuã-gue.
this PL BDY woman-PL
'These are women.'

As in Paraguayan Guaraní, it appears that nouns of food artifacts, natural kinds, temporal periods, event nouns, individual-level relations, and final-stage relations tend to be incompatible with *-kue*.

As Tonhauser remarks, such co-occurrence restrictions fall out from the interaction of the change of state and existence properties (or the cessation and existence inferences in my view), together with constraints on the use of nouns that denote persistent properties. Consider for instance (189), interpreted as in (191). This sentence asserts that Juan was a man at some t' before t_{rt} and implicates that he is not a man at t_{rt}, but it presupposes that he is alive at both times. Since the sentence contradicts the common knowledge that being a man is a persistent property, it is infelicitous:

(189) *Juan peteĩ ava-kue.
Juan one man-PAST
*'Juan is/was an ex-man.'

(190) $[_{VP}$ RT 1 Juan $[_{DP}$ petei 2 $[_{TP}$ NT_1 $[_{T}$ -kue] $[_{NP}$ x_1 ava]]]]

(191) $[\![(190)]\!]^{c,w} = \exists t'[t' < t_{rt} \wedge \mathbf{man}(w)(t')(\mathbf{Juan})_{\tau(\mathbf{Juan})\circ t'}] \wedge \neg(\mathbf{man}(w)(t_{rt})(\mathbf{Juan})_{\tau(\mathbf{Juan})\circ t_{rt}})$

Note that the incompatibility of *-kue* with nouns that describe persistent properties is similar to lifetime effects of the past tense in the clausal domain (Kratzer 1995; Musan 1995, 1997; Magri 2009). Consider for instance (192). Out of the blue, native speakers infer from (192) that Juan is dead. The sentence is infelicitous if it is known that Juan is alive, barring implausible scenarios where the color of his eyes changed:

(192) Juan recha hovy va'e-kue.
Juan eyes blue REL-PAST
'Juan had blue eyes.'

Let us see how we can explain these inferences, following Magri's (2009) analysis of lifetime effects. First, let us assume that alternatives that are contextually equivalent to their prejacent are necessarily relevant.[30] Then, note that if (192) is interpreted as a past tense sentence (rather than as a 'past perfect' sentence), its covert RT adverb must denote the time of utterance. Finally, let us assume that having blue eyes is a permanent property, and that this is common knowledge. In that case, if it is known that Juan is alive at the time of utterance and that he was alive some time before, the proposition that Juan had blue eyes before the time of utterance is contextually equivalent to the proposition that Juan has blue eyes at the time of utterance. Therefore, the tenseless alternative to (192) is relevant, and the temporal implicature that negates it cannot be blocked. The strengthened meaning of (192) entails that Juan had blue eyes at some past

[30] Closure of the set of relevant propositions under contextual equivalence also follows from a formalization of relevance along the lines of Groenendijk and Stokhof (1984). Let p and q be two propositions that are contextually equivalent in a context set CS. Assume that a proposition is relevant iff it addresses the Question Under Discussion $\mathcal{Q}$, and that $\mathcal{Q}$ is a partition of CS. More precisely, p is relevant with respect to the partition of CS by $\mathcal{Q}$ iff for any two worlds w and w' that belong to the same cell of the partition, $p(w) = p(w')$. But if p and q are contextually equivalent in CS, then for any world w in CS, $p(w) = q(w)$. Therefore, if p is relevant, so is q.

time but no longer has blue eyes at the time of utterance, which contradicts the common knowledge that the color of one's eyes is a permanent property. Magri proposes that it is this contradiction which explains the infelicity of past tense individual-level sentences in such contexts.

When it is common ground that Juan is dead at the time of utterance, the tenseless alternative to (192) is a presupposition failure. Consequently, this alternative is not contextually equivalent to the prejacent, and it is also not relevant. The temporal implicature of *-kue* is blocked. Finally, if the addressee ignores whether Juan is dead or alive at the time of utterance, but the time of utterance is topical, she will accommodate that Juan is dead.

In sum, the difference between lifetime effects in the clausal domain and lifetime effects in the nominal domain is just that the implicatures of the past tense can be blocked in the former but not in the latter. Therefore, lifetime effects in underived NPs surface as restrictions on the class of predicates with which the past tense can combine. Incidentally, the parallel between lifetime effects and lexical restrictions on nominal uses of *-kue* brings support to the analysis of the cessation inference as an obligatory implicature.

7 Is *-kue* a nominal tense?

In this section, I would like to discuss Tonhauser's (2008) definition of nominal tense. Tonhauser proposes six necessary properties of nominal tenses:

(193) Necessary properties of nominal tense markers (see definition (4), Tonhauser 2008):

a. "The marker occurs on nominal expressions, and its meaning affects the noun phrase it occurs with."

b. "The set of nominal tense markers of the language form a grammatical paradigm. This means that the grammar of the language requires that in certain grammatically specified environments the noun be marked by one and only one member of the nominal tense paradigm, parallel to verbal tense paradigms."

c. "In those environments where nominal tense markers are required, the markers are realized with nominal expressions without regard to the semantics of the head noun."

d. "The marker encodes a temporal relation between the noun-phrase time t_{np} and the utterance time (deictic tense), or between the noun-phrase time t_{np} and another contextually given perspective time (relative nominal tense)."

e. "A pure nominal tense does not encode a state change. If the marker under consideration encodes a state change, it cannot be a pure nominal tense."

f. "The noun-phrase time may be anaphorically resolved in discourse (parallel to the reference time of verbal tenses)."

Tonhauser (2008) argues that *-kue* in Paraguayan Guaraní violates all conditions in (193) except (a). I would like to argue that according to the analysis proposed in this

paper, *-kue* in Mbyá satisfies conditions (a)–(e), or at least does not differ from the English past tense in this respect.

-Kue and *-rã* in Paraguayan Guaraní are said to violate condition (b) since they co-occur in expressions such as *va'erã va'ekue*, as they do in Mbyá. But note that *-kue* and *-rã* do not differ from the past tense and *will* in English in this respect, which co-occur in *would*. One may of course conclude from this that *will* and *-rã* are not tenses, but then one is free to maintain that *-kue* is a tense, just like the English past tense.

-Kue is said to violate (c) because of its co-occurrence restrictions: it does not occur on nouns that denote permanent or final stage properties. But I have argued that in Mbyá these restrictions are lifetime effects of the same sort that are attested with the English past tense and individual-level predicates. That these lifetime effects manifest themselves as ungrammaticality with nominal uses of *-kue*, rather than as the inferences that are associated with the lifetime effects of the English past tense (see Kratzer 1995; Musan 1995, 1997; Magri 2009), is due to the fact that cessation implicatures of nominal tense in Mbyá are obligatory. I conclude that *-kue* satisfies condition (c) as much as the English past tense does, modulo the difference in the obligatory nature of cessation implicatures of nominal tense, which is a confounding factor.

-Kue violates condition (e) in Tonhauser's analysis since the change of state property is lexically encoded in the denotation of *-kue*. By contrast, I have analyzed the cessation inference of *-kue* in Mbyá as a temporal implicature, of the sort that is triggered by the past tense in English. Therefore, *-kue* does not encode a state change, and furthermore it does not differ from the English past tense with respect to this condition.

This leaves us with conditions (d) and (f). Remember that in Tonhauser's terminology, the noun phrase time is the time of evaluation of the noun phrase, and the nominal time is the time at which the property described by the noun is asserted to hold. In Paraguayan Guaraní as in Mbyá, *-kue* locates the nominal time in the past of the noun phrase time, which means that it violates condition (d) by definition. But I do not understand the rationale behind this condition. How does condition (d) help us understand the differences between the category of nominal tense and the category of verbal tense? It seems that (d) builds on the assumption that nominal times should be to noun phrase times what event times are to reference times. In a Neo-Reichenbachian analysis of tense (Klein 1994), tense relates the time of utterance (or some other salient time) to the reference time, and aspect relates the event time to the reference time. Therefore, given the parallels just suggested, one may expect that nominal tense would relate the noun phrase time to the time of utterance or to some other salient time. But one should not forget that the very notion of reference time was invented by Reichenbach (1947) to account for complex tenses, which in Neo-Reichenbachian analyses are analyzed as combinations of tense and aspect. As a consequence, without an equivalent of complex tenses or tense/aspect combinations in the nominal domain, there is no motivation to draw an analogy between the intervals at which nouns and noun phrases are evaluated and the three parameters used for the analysis of verbal tense in (Neo-)Reichenbachian theories. As it happens, if we analyze *-kue* as a nominal tense, there appears to be nothing like nominal aspect in Mbyá. So why not draw a first parallel between the noun phrase time and the time of utterance (or the pivot

time of a relative tense), and a second parallel between the nominal time and the event time, in which case there would just be no room for a notion like that of reference time in the temporal interpretation of noun phrases? To put it another way: as far as precedence relations between temporal intervals are concerned, the temporal interpretation of noun phrases in Mbyá is just like the temporal interpretation of clauses in English, if one restricts one's attention to simple tenses (where the reference time is identical to the event time, in (Neo)-Reichenbachian analyses). In view of these considerations, I question the adoption of (d) as a necessary condition on nominal tenses.

Finally, let us discuss condition (f). There seems to be a typo in its formulation, as it should be a condition about the anaphoricity of nominal times rather than noun phrase times. Tonhauser (2006, 2007) argues that it is the nominal time of nouns modified by *-kue* that cannot be located anaphorically, and Tonhauser (2008) observes that "the reference time, which is located relative to the utterance time by tense, can be anaphorically determined in narrative discourse […]. In contrast, the nominal/possessive time, which is located relative to the noun-phrase time by the Guaraní markers, is not anaphorically determined in discourse."

Let us then substitute "nominal time" for "noun phrase time" in condition (f). Tonhauser (2006, 2007) advances two arguments against the anaphoricity of *-kue*. The first one is based on the observation that the use of *-kue* in the following discourse is infelicitous. Consider the following example:

(194) Context: I want to buy my sister a bike.

Kuehe a-ha bisikleta-ñe-vende-há-pe ha enterove bisikleta
yesterday A1sg-go bike-JE-sell-NOM-PE and all bike
o-ĩ-va-gui ai-poravo peteĩ che-hermana-pe-gua-rã.
A3-exist-RC-GUI A1sg-choose one B1sg-sister-PE-GUA-RA

'Yesterday I went to a bike shop and of all the bikes they had there I chose one for my sister.'

#Ko'ẽ-ramo a-ha-jevy-ta a-jogua-ha-guã pe bisikleta-kue.
dawn-COND A1sg-go-return-TA A1sg-buy-NOM-PURP that bike-KUE

Intended: Tomorrow I'll go back to buy that bike.

Consultant's comments: "Sounds like you're going to buy a bike that doesn't work anymore, an ex-bike." (Tonhauser 2006, p. 284)

The consultant's comments suggest that the noun phrase time of the NP *bisikletakue* is located at the time of the buying, while the nominal time (the time at which the property of being a bike holds of its object) is located at a previous time, the infelicity arising from the inference that the object that the speaker bought was no longer a bike at the time of the buying. Tonhauser (2006) herself concludes that examples such as these do not allow us to rule out that the nominal time is anaphorically resolved to a salient time (in this case the time of going to a bike shop on the day before the utterance time):

(195) "We can conclude that this type of constructed discourse does not allow one to determine whether *-kue* receives an anaphoric interpretation or not." (Tonhauser 2006, p. 285)

Tonhauser (2006) then suggests that this example may however allow us to rule out a different form of anaphoricity:

(196) "Regardless, this type of example provides evidence of a different kind for the non-anaphoricity of the nominal temporality markers. What we learn from discourses like [(194)] is that the kinds of contexts in which the nominal temporality markers could be interpreted anaphorically are extremely restricted, namely to those contexts in which the nominal description is true of the individual denoted by the noun phrase at a contextually salient time in the past or future of the perspective time and false at the perspective time (because of the CHANGE meaning property). If *-kue* and *-rã* were nominal tenses, their distribution would be very much unlike that of verbal tenses, which are felicitous and anaphorically interpreted in all contexts that provide a (past or future) antecedent." (Tonhauser 2006, p. 285)

I don't understand that argument. Clearly, the infelicity of (194) is attributed to the change of state property (cessation inference in my analysis of Mbyá), therefore the limited restriction of *-kue* as illustrated in this example has nothing to do with the anaphoricity of tense, in my view.

The second argument shows that the nominal time of nouns modified by *-kue* cannot be located by adverbs. Consider the following example:

(197) Ambue ary-pe peteĩ doytor-kue o-mo-nguera iñ-angiru-pe i-mba'asy.
other year-PE one doctor-KUE A3-CAUS1-healthy 3-friend-PE 3-sickness
'Last year, an ex-doctor healed his friend's sickness.' (Tonhauser 2006, p. 285)

Consultants infer from this sentence that the person who cured the sickness of the friend was no longer a doctor at the time of the curing, which shows that the adverb *ambue arype* does not locate the nominal time but does locate the noun phrase time, although world knowledge would favor the former.

Similar facts are observed in Mbyá, as illustrated in (198), which reproduces Tonhauser's example in Mbyá. Consultants infer from this sentence that the person who cured the speaker's friend was no longer a doctor at the time of the curing.

(198) Amboae jaxy py, peteĩ poropoanoa-gue o-mo-nguera che-irũ.
other moon in one doctor-PST 3-CAUS-healthy 1-friend
'Last month, an ex-doctor cured my friend.'

Now, this second argument does not show directly that the nominal time of noun phrases modified by *-kue* cannot be resolved anaphorically. It only does so if one assumes that temporal modification by adverbs is anaphoric,[31] and even if we accept this assumption, the argument only shows that adverbs cannot provide antecedents

[31] See Altshuler (2014) for a particularly clear exposition and defense of this view.

for nominal times in noun phrases modified by *-kue*. Another option is to interpret temporal adverbs as properties of times, which are intersected with other properties of times denoted by constituents such as VPs or TPs.[32] In both cases, there may be independent syntactic factors that explain the impossibility for temporal adverbs to provide antecedents for nominal times or to serve as modifiers of the relevant properties of times. In the analysis provided in the present paper for instance, nominal times are arguments of properties denoted by NPs, while noun phrases times are arguments of properties denoted by constituents of category T (namely, non-maximal temporal projections). If we assume that adverbs can only modify constituents of category T, V, or A in Mbyá, it is not surprising that they cannot restrict the nominal time of noun phrases modified by *-kue*. While an analysis of the distribution of temporal adverbs in Mbyá will have to wait for another paper, I conclude that the inclusion of condition (f) in the set of necessary properties of nominal tense in (193) lacks motivation.

In sum, I conclude that nominal uses of *-kue* in Mbyá meet four of the six criteria of nominal tenses proposed by Tonhauser (2008). The two remaining criteria appear to me to be insufficiently motivated.

8 *-Kue* in a crosslinguistic perspective

I have argued that *-kue* is a relative past tense that only occurs on lexical noun phrases and nominalized clauses. To capture its distribution, I propose that *-kue* c-selects a complement of category N. This selectional requirement is of course satisfied when *-kue* modifies a lexical noun phrase. When *-kue* modifies an extended verb phrase (i.e. a verb phrase or a functional projection that extends a verb phrase, such as an aspect or a modal projection), the extended VP must be nominalized in order to combine with *-kue*. As for *-kue* itself, I propose that it is a functional head of category T. Accordingly, I propose that the functional category of tense is nominal in Mbyá.

Mbyá is not the first language for which it has been argued that tense is a functional categories of noun phrases. In a series of papers, Lecarme showed that this is the case in Somali (see *inter alia* Lecarme 1996, 2012), where temporal affixes are attached to definite determiners. Lecarme's analysis of nominal tense in Somali also shares two important features with my analysis of nominal tense in Mbyá. Firstly, nominal tense is not semantically different from clausal tense. Tenses have the same denotations in the verbal and nominal domains. The only difference between nominal tense and verbal tense is that the former is realized in the extended projection of a noun phrase while the latter is realized in the extended projection of a verb phrase. Secondly, nominal tense in Somali determines the temporal interpretation of the noun phrase itself, rather than that of the clause. In this respect, it is similar to tense on underived nominals in Mbyá, but it contrasts with nominal tense in Halkomelem as analyzed by Wiltschko (2003). According to Wiltschko, Halkomelem DPs contain a TP, but the tense on DPs contributes to the temporal interpretation of the verb phrase rather than to that of the NP in its scope (see also Matthewson 2005, who argues that there is no TP in DPs in Salish

[32] See e.g. the treatment of adverbs in von Stechow (2002).

languages, including Halkomelem). Whether nominal temporal morphology inflection affects the temporal interpretation of nouns or of the verbs that they are arguments of is a parameter in Nordlinger and Sadler's (2004) typology of nominal tense.

A more unusual property of the relative past tense in Mbyá is that it is exclusively a nominal category: *-kue* can be used to locate the time of evaluation of an extended verb phrase, but only if the latter has been nominalized. This might seem dubious to the reader. However, Mbyá is actually not the first language where this state of affairs has been observed. Chang (2012) comes to the same conclusion in his discussion of the past tense morpheme *nia* in Tsou. *Nia* can be used in a DP to specify the temporal interpretation of the NP. It can also be used to specify the temporal interpretation of a verb, but in that case the verb phrase must be nominalized with the morpheme *hia*.

9 Conclusion

In this paper, I have argued that the nominal temporal marker *-kue* in Mbyá is a relative tense, which is attested in nominalized clauses and in underived clauses. A challenge for this analysis was to account for its additional properties in underived noun phrases, as identified by Tonhauser (2006, 2007). I argued that the cessation inference is a temporal implicature that is also attested with clausal uses of *-kue*. This implicature cannot be blocked with nominal uses of *-kue* because of independent constraints on the information structure of noun phrases. The existence inference of *-kue* is due to the interaction of the cessation inference with existence presuppositions of noun phrases generally. Finally, the restrictions on lexical classes of nouns that can be combined with *-kue* were shown to be lifetime effects in the nominal domain.

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