Temporal Reference in Paraguayan Guarani, a Tenseless Language

Judith Tonhauser

Thuy Bui
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1 Introduction

1.1 Basic Phenomenon

- No overt grammaticalized expressions impose constraints on the temporal relation between the reference time (RT) and the utterance time (UT) in Guarani.
- Matrix clauses are in principle compatible with past, present, and future temporal reference.

1. ✓ PAST

   ▶ Context: *Maria talks about one of her childhood summers.*

   (1) Petei jey **ro-ho** la campana-re, che-abuela
   one time **A1pl.excl-go** the countryside-for B1sg-grandmother
   o-nase-ha-gue-pe, Kiindy-pe
   A3-be.born-NOM-NOM.TERM-in Kiindy-in
   'One day we **went** to the countryside where my grandmother was born, to Kiindy.'

2. ✓ PRESENT

   ▶ Context: *A duck offers friendship to a very sad looking frog. The frog exclaims:*

   (2) **A-guereko** petei angiru, petei angiru anete-te!
   A1sg-have one friend one friend true-very
   'I **have** a friend, a real friend!'

3. ✓ FUTURE

   ▶ Context: *It is morning and the speaker is talking about a goose walking past her and the addressee.*

   (3) Ja'u-ta-re ko ganso ko'ero, **a-juka** ko ka'aru-pe.
   A1pl.incl-eat-PROSP-for this goose tomorrow **A1sg-kill** this afternoon-at
   'Since we are going to eat this goose tomorrow, I **will kill** it this afternoon.'

- However, there are matrix clauses that exhibit temporal reference restrictions.

  1. ✓ PAST

     (4) Kuehe **a-jahu**
     yesterday **A1sg-bathe**
     'Yesterday I **bathed/was bathing**.'

  2. ✓ PRESENT

     (5) Ko'aga **a-jahu**
     now **A1sg-bathe**
     'I **am bathing** right now.'

  3. # FUTURE

     (6) #Ko'ero **a-jahu**
     tomorrow **A1sg-bathe**
     (Intended: 'Tomorrow I **am going to bathe**.')

- Similarly, a clause consisting of the verb *a-jahu* (A1sg-bathe) is felicitously uttered as an answer to the question about a past or present, but not future activity.

  1. ✓ PAST

     (7) A: Mba'e-pa re-japo kuehe ro-henoi-vove?
     what-QU A2sg-do yesterday 12sg-call-when
     'What were you doing yesterday when I called you?'

     B: **A-jahu**.
     A1sg-bathe
     'I **was bathing**.'

  2. ✓ PRESENT

     (8) A: Mba'e-pa re-japo ko'aga?
     what-QU A2sg-do now
     'What are you doing right now?'

     B: **A-jahu**.
     A1sg-bathe
     'I **am bathing**.'

  3. # FUTURE

     (9) A: Mba'e-pa re-japo-ta ko'ero die-pe?
     what-QU A2sg-do-PROSP tomorrow ten-at
     'What are you going to be doing tomorrow at 10?'

     B: #**A-jahu**.
     A1sg-bathe
     (Indetend: 'I **am going to bathe**.')

1.2 Main Goals

- To explore 2 hypotheses about temporal reference in Guarani, including the origin and distribution of the non-future meaning.
- To thereby discuss semantic variation among tenseless languages w.r.t. how the temporal relation between the RT and the UT is constrained.

1.3 Main Claims

- TENSED Analysis
  - The non-future meaning is contributed by a phonologically empty NONFUT tense morpheme, which requires RT $\leq$ UT.
    - (6) and (9) are correctly predicted to be unacceptable, since the adverb *tomorrow* in (6) and the context in (9) require RT $\geq$ UT.
    - However, examples with FUT reference like (3) are falsely predicted to be unacceptable.
- TENSELESS Analysis
  - Only context and temporal adverbials, but no phonologically tense morpheme, restrict temporal reference.
    - (6) and (9) are unacceptable because the contextually available RTs are non-future, and temporally unmarked verbs cannot convey prospective ASP.
    - (3) are correctly predicted to be acceptable, since the temporal adverbial can provide the future RT for the matrix clause.
- TENSELESS > TENSED

1.4 Structure of the Talk

- Section 2: Background on aspectual reference in Guarani and dynamic semantic framework
- Section 3: Tensed analysis
- Section 4: Tenseless analysis
- Section 5: Comparison of the 2 analyses
- Section 6: Concluding remarks on cross-linguistic variation in temporal reference

2 Linguistic and Formal Semantic Background

2.1 Aspectual Reference in Guarani

- All Guarani verbs are temporally unmarked.
- Verbs can additionally be marked for aspect, modality, and mood (AMM)

- The AMM markers are organized into 3 groups.

  1. Verbs marked with a group I affix are compatible only with perfect ASP.
  2. Verbs marked with a group II affix are compatible only with prospective ASP.
  3. Verbs not marked with an AMM affix are compatible with (im)perfective ASP.

Group	Verbal Marker	Example (*a-karu* (A1sg-eat))	Aspectual Reference
I	*-ma* 'PERFECT'	*a-karu-ma* 'I already ate.'	ET $<$ RT
	-pa 'COMPLETE'	*a-karu-pa* 'I finished eating.'	
II	t(a)- 'HORT'	*t-a-karu* 'Let me eat.'	ET $\geq$ RT
	-ta 'PROSP'	*a-karu-ta* 'I am going to eat.'	
	-se 'DES'	*a-karu-se* 'I want to eat.'	
	-ne 'MIGHT'	*a-karu-ne* 'I might eat.'	
	-va'era 'MUST'	*a-karu-va'era* 'I must eat.'	
III	$\emptyset$	*a-karu* 'I was/am eating/ate/eat.'	ET $\bigcirc$ RT

2.2 Formal Framework

- The temporal overlap between the ET and the RT is captured by the AT relation.
  - For *a-jahu* (A1sg-bathe), the AT relation holds between the ET t and the RT t' at which the speaker sp bathes in word w

(10) $a\text{-}jahu \Longrightarrow \lambda w \lambda t' \lambda t[AT(t', bathe'(sp, w, t))]$

- The AT relation can be spelled out in various ways in which t' and t can overlap.

(11) a. t and t' overlap under a stative or habitual interpretation.
$AT(t', P(w, t)) = t \bigcirc t' \wedge P(w, t)$ if P is stative or habitual

b. t' is a non-final interval of t under a progressive interpretation.
$AT(t', P(w, t)) = t' \subset_{nf} t \wedge P(w, t)$ if P is progressive

c. t is included in t' under a perfective interpretation.
$AT(t', P(w, t)) = t \subseteq t' \wedge P(w, t)$ if P is perfective

d. t is t' when the verb is marked with an AMM marker.
$AT(t', P(w, t)) = P(w, t)$ if $t' = t$

- In the dynamic semantic framework, B's utterance in (12) is translated into formulas of a higher order predicate logic language given in (13).

(12) A: What were you doing when I called you yesterday?
B: I was dancing.

(13) $\exists t(dance'(sp, w_0, t) \wedge t_{rt} \subset_{nf} t \wedge \partial(t_{rt} < now))$

– t_{rt} represents the RT.

– *now* represents the UT.

– The past tense of B's utterance presupposes that t_{rt} precedes *now* ($\partial(t_{rt} < now)$).

– t represents the ET at which the speaker dances in the world w_0.

– The progressive ASP in B's utterance constrains t_{rt} to be a non-final interval of the ET t of the dancing ($t_{rt} \subset_{nf} t$).

3 Analyzing Guarani as a Tensed Language

3.1 Key Claim

- The non-future temporal reference observed in (4-9) is contributed by a phonologically empty NONFUT tense morpheme.

  – NONFUT presupposes that the RT *g(i)* in the context *c* is at or prior to the UT t_c. If the presupposition is satisfied, the utterance is interpreted at *g(i)*.

  (14) $[\![\text{NONFUT}_i]\!]^{g,c}$ is only defined if g(i) $\leq$ t_c
  If defined, $[\![\text{NONFUT}_i]\!]^{g,c}$ = g(i)

- If temporal reference in Guarani indeed involves a NONFUT tense morpheme, this morpheme is present in every finite clause.

3.2 Predictions of This System

- NONFUT constrains the location of the RT w.r.t. the UT in matrix clauses, and w.r.t. to a time that is potentially different from the UT in subordinate clauses.

- The tense existentially binds the ET t and presupposes RT $t' \leq$ evaluation time t''.

  (15) $\text{NONFUT}(a\text{-}jahu) \Longrightarrow \lambda w \lambda t' \lambda t''[\exists t(AT(t', bathe'(sp, w, t)) \wedge \partial(t' \leq t''))]$

- In matrix clauses, the time t' is temporal anaphor t_{rt}, and t'' is the UT *now*.

  (16) $\text{NONFUT}(a\text{-}jahu) \Longrightarrow \exists t(AT(t_{rt}, bathe'(sp, w_0, t)) \wedge \partial(t_{rt} \leq now))$

- This can be extended to predict that a verb like *a-jahu* is compatible in matrix clauses with an adverb like *kuehe* 'yesterday', as in (17), and incompatible with ko'ero 'tomorrow', as in (18).

  – The 2 adverbs are analyzed as constraining the temporal location of t_{rt}.

  (17) a. Kuehe **a-jahu**
  yesterday **A1sg-bathe**
  'Yesterday I **bathed/was bathing**.'

b. NONFUT(*kuehe*(*a-jahu*))
$\Longrightarrow \exists t(\partial(t_{rt} \leq now) \wedge t_{rt} \subseteq yesterday' \wedge AT(t_{rt}, bathe'(sp, w_0, t)))$

– (17) is correctly predicted to be acceptable in a context where the RT is a past time included within or identical to the day prior to the current one.

∗ *yesterday'* denote the day-long time interval preceding the day that includes the UT.

∗ The constraints introduced by the adverb and NONFUT are not contradictory.

(18) a. #Ko'ero **a-jahu**
tomorrow **A1sg-bathe**
(Intended: 'Tomorrow I **am going to bathe**.')

b. NONFUT(*kuehe*(*a-jahu*))
$\Longrightarrow \exists t(\underline{\partial(t_{rt} \leq now)} \wedge \underline{t_{rt} \subseteq tomorrow'} \wedge AT(t_{rt}, bathe'(sp, w_0, t)))$

– (18) is correctly predicted to be unacceptable, regardless of the context in which the matrix clause is uttered.

∗ *tomorrow'* denote the day-long time interval following the day that includes the UT.

∗ The constraints introduced by the adverb and NONFUT are contradictory.

3.3 P1: Not all matrix clauses have non-future temporal reference

3.3.1 Problem

- There are 2 types of matrix clause constructions with future time reference.

1. The non-initial conjuncts headed by a temporally unmarked verb, while the verb of the initial conjunct is marked with the PROSP ASP *-ta*

► Context: *Friends are waiting for me in the next city over. I am running late and call them:*

(19) A-jahu-ta ha (upei) **a-jupi** kolektivo-pe.
A1sg-bathe-PROSP and then **A1sg-get.on** bus-at
'I am going to shower and then I **will get on** the bus.'

2. The clauses modified by a complex temporal/causal adverbial clause marked with *-re* 'for' on the verb.

► Context: *It is morning and the speaker is talking about a goose walking past her and the addressee.*

(20) Ja'u-ta-re ko ganso ko'ero, **a-juka** ko ka'aru-pe.
A1pl.incl-eat-PROSP-for this goose tomorrow **A1sg-kill** this afternoon-at
'Since we are going to eat this goose tomorrow, I **will kill** it this afternoon.'

- (19) and (20) are problematic, since NONFUT constrains RT $\leq$ UT in matrix clauses.

3.3.2 Rescue Attempt

- Alternative Analysis for (19): The verb in the 2nd conjunct occurs in the scope of the PROSP ASP of the 1st conjunct.
  - This would allow the ET of the 2nd conjunct to be in the future of the RT/UT.
- Reason for Failing: This is possible only if the finite clause in the 2nd conjunct does not realize a NONFUT morpheme.
  - NONFUT morpheme would also occur in the scope of the PROSP ASP of the 1st conjunct
    - This would an unattested interpretation where the 2nd conjunct is interpreted in the past of the 1st conjunct, or even in the past of the UT.
  - The 2nd conjunction not realizing a NONFUT morpheme would violate the claim that NONFUT occurs in every finite clause.
- Alternative Analysis for (20): The evaluation time of the matrix clauses is not the UT, but some future time.
  - NONFUT would then allow the matrix clause to have future time reference.
- Reason for Failing: This violates the cross-linguistic finding that the evaluation time of matrix clause tenses is the UT.
- Guarani matrix clauses can then be assumed to not have non-future temporal reference. However, a tensed analysis cannot easily capture this categoricity.

3.4 P2: NONFUT in complement clauses licenses unattested back-shifted interpretation

3.4.1 Problem

- Unlike matrix clauses, subordinate clauses are readily compatible with future time reference.

  ▶ Context: *To play a trick on Mario, we plan to call him to ask directions to his house.*

  (21) Mario oi-mo'a-ta **ja-ju**-ha.
  Mario A3-think-PROSP **A1pl.incl-come**-NOM
  'Mario is going to think that we **are coming**.'

  - The context shows that the ET/RT of the relevant clauses are located in the future of the UT.
- Since the matrix clause rule does not apply to complement clauses, the times t' and t'' are not identified with t_{rt} and *now*, respectively, but can be located by the matrix clause.

  (22) a. $\text{NONFUT}(ja\text{-}ju) \Longrightarrow \lambda w \lambda t' \lambda t'' [\exists t(AT(t', come'(gr, w, t)) \wedge \partial(t' \leq t''))]$

  b. oi-mo'a (A3-think)
  $\Longrightarrow \lambda R_{\langle \omega, \langle \iota, \langle \iota, \tau \rangle \rangle} \lambda w \lambda t^4 \lambda t^3 [AT(t^4, think'\ (m, \lambda w'' \exists t^5 \underline{(R(w'', t^5, t^3))}, w, t^3))]$

c. oi-mo'a(NONFUT(*ja-ju*))
$\Longrightarrow \lambda w \lambda t^4 \lambda t^3 [AT(t^4, think'(m, \lambda w'' \exists t^5 (AT(t^5, come'(gr, w'', t)) \wedge \partial(t^5 \leq t^3)), w, t^3))]$

– (22a): Embedded NONFUT requires that the (reference) time t', which is at the time t at which the group *gr* comes to Mario's house, is at or prior to the (evaluation) time t'' ($\partial(t' \leq t'')$).
– (22b): t' is existentially bound as the time t^5, and t'' is identified with the matrix ET time t^3.
– (22c): Embedded NONFUT requires t^5 at which the group comes to be at or prior to the matrix ET time t^3 ($\partial(t^5 \leq t^3)$).

- The matrix clause verb *oi-mo'a* (A3-think) is modified by the PROSP ASP *-ta*.
  – *ta-* introduces a precedence relation between the RT and the ET ($P(t' < t'')$).
  – *ta* presupposes a modal base with an ordering source that specifies the agent's intentions.

(23) *-ta*
$\Longrightarrow \lambda P_{\langle \omega, \langle \iota, \langle \iota, \tau \rangle \rangle} \lambda w \lambda t' \lambda t'' [\forall w' (w' \in best(MB, OS, \langle w, t' \rangle) \rightarrow t' < t'' \wedge P(w', t'', t''))]$

(24) (21) $\Longrightarrow$ NONFUT(*-ta*(*oi-mo'a*(NONFUT(*ja-ju*))))
$\Longrightarrow \partial(t_{rt} \leq now) \wedge \exists t^6 (\forall w' (w' \in best(MB, OS, \langle w_0, t_{rt} \rangle)$
$\rightarrow t_{rt} < t^6 \wedge think'(m, \lambda w'' \exists t^5 \exists t (t \subseteq t^5 \wedge come'(gr, w'', t) \wedge \partial(t5 \leq t^6)), w', t^6)))$

  – There is a time t^6 in the future of the RT at which Mario thinks that the group's coming is at a time t that includes the time t^5, which is presupposed to be $\leq t^6$.
    * Therefore, if $t^5 = t^6$, and t^6 is an absolute future time, (21) is correctly predicted to have an interpretation according to which t^5 is an absolute future time.
    * The group's coming to Mario's house is at Mario's thinking time in the future of the UT.

- However, this also licenses an unattested interpretation of (21) according to which $t^5 < t^6$.
  – The analysis falsely predicts the availability of an interpretation of (21) according to which the group comes prior to Mario's thinking time, or even prior to the UT.
    * (cf. *Mario is going to think that we came.*)

3.4.2 Rescue Attempt

- P2 can be avoided by assuming a Sequence-of-Tense rule, as follows:

(25) The NONFUT morpheme of a subordinate clause is not interpreted under identity with a NONFUT morpheme in the matrix clause.

  – Then, the NONFUT morpheme realized in complement clauses is not interpreted.
  – Therefore, the back-shifted interpretation is not licensed, addressing P2.

- The NONFUT morpheme of a complement clause does not need to be deleted to derive the temporal overlap.

- The Sequence-of-Tense rule is not motivated by the data, since it is assumed only to avoid problems of the tensed analysis.

3.5 P3: Neither the UT nor the matrix ET can serve as the evaluation time for NONFUT

3.5.1 Problem

- It is not possible to assume that the UT or the matrix ET is the evaluation time of NONFUT in antecedents of conditionals.

  ▶ Context: *Paloma has a terrible voice but still wants to sing at tonight's event. Maria says:*

  (26) **Re-purahei**-ramo, a-se-ta.
  A2sg-sing-if A1sg-leave-PROSP
  'If you **sing**, I am going to leave.'

  – The PROSP ASP *-ta* of the matrix clause introduces the future ET.

  – For this ET to be the evaluation time of the NONFUT morpheme of the antecedent of the conditional, both *-ta* and NONFUT would need to scope over the entire conditional, as in (27).

  (27) NONFUT(*ta*-(*-ramo*(NONFUT(*re-purahei*, *a-se*)))

- However, (28) shows that (27) makes an incorrect prediction.

  ▶ Context: *Juan and Malena have been fighting a lot lately since Juan wants to move to Buenos Aires. We have plans to visit them tomorrow to counsel them. I say:*

  (28) Juan **o-ho**-ramo Buenos Aires-pe ambue ary-pe, Malena i-pochy-ta ko'ero.
  Juan **A3-go**-if Buenos Aires-to other year-at Malena B3-angry-PROSP tomorrow
  'If Juan **goes** to Buenos Aires next year, Maleno is going to be angry tomorrow.'

  – The ET of the antecedent $>$ the ET of the matrix clause consequent.

- The fact that antecedents of conditionals are not generally interpreted in the non-future of the matrix clauses shows that NONFUT is neither an absolute tense nor a relative one.

- For a NONFUT tense to maintain a role in constraining temporal reference, an absolute future evaluation time distinct from both the UT and the matrix ET needs to be stipulated.

  – This absolute future evaluation time is introduced by the sentence construction regardless of the temporal reference of the matrix clause.

    ∗ This correctly predicts that the subordinate clause in (28) is compatible with absolute future time reference, since their temporal reference can be at the absolute future time reference introduced by the construction.

  – Since the temporal reference of the subordinate clauses can also be a time prior to this absolute future evaluation time, the analysis also correctly predicts that the antecedent of conditional in (29) can also have present or past time reference.

► Context: *Juan and Malena have been fighting about whether Juan should move to Buenos Aires for work: Juan wants to go, Malena wants him to stay. We are on our way to visit them since we have not seen them in a couple of days. On our way, we ponder about Malena's mood.*

(29) Juan **o-ho**-ramo Bueno Aires-pe ko'ero, upevare Malena i-pochy ko'aga.
Juan **A3-go**-if Buenos Aires-to tomorrow for.that Malena B3-angry now
'If Juan **goes** to Buenos Aires tomorrow, Malena is angry now.'

3.5.2 Rescue Attempt

- P3 can also be avoided by assuming the Sequence-of-Tense rule.
  - If NONFUT is not interpreted in antecedents of conditionals, an absolute future evaluation time need not be stipulated, addressing P3.
- This solution is just to remove the negative effects of assuming a NONFUT tense in the first place.
- P1 remains unresolved.

4 A Tenseless Analysis of Temporal Reference in Guarani

4.1 Key Claim

- Guarani temporal reference is not constrained by tense, but by context and temporal adverbials.

4.2 Predictions of This System

- A matrix clause is in principal compatible with past, present, and future time reference.
  - Matrix clauses are not categorically required to have absolute non-future temporal reference.
  - Problem P1 of the tensed analysis does not arise.
- The subordinating construction constrains the temporal reference of the subordinate clause.
  - The temporal reference of subordinate clauses is not constrained by NONFUT.
  - They can instead depend entirely on the temporal constraints introduced by subordinating constructions.
  - Problems P2 and P3 do not arise.

4.3 Temporal Reference of Guarani Matrix Clauses

- Under the tenseless analysis, the matrix clause rule applies directly to the translation of verbs
  - The 2 times are identified as the temporal anaphor t_{rt} and the existentially bound ET t.

(30) $a\text{-}jahu \Longrightarrow \exists t(AT(t_{rt}, bathe'(sp, w_0, t)))$

- Temporal adverbials may impose constraints on the RT.

(31) a. Kuehe **a-jahu**
yesterday **A1sg-bathe**
'Yesterday I **bathed/was bathing**.'

b. $kuehe(a\text{-}jahu) \Longrightarrow \exists t(t_{rt} \subseteq yesterday' \wedge t \subseteq t_{rt} \wedge bathe'(sp, w_0, t))$

– (31) is correctly predicted to be compatible only with past time reference.

∗ *kuehe* 'yesterday' constrains the time t', which is t_{rt}, to be temporally included within or identified with the denotation of $yesterday'$.

(32) a. #Ko'ero **a-jahu**
tomorrow **A1sg-bathe**
(Intended: 'Tomorow I **bathe**.')

b. $ko'ero(a\text{-}jahu) \Longrightarrow \exists t(t \subseteq tomorrow' \wedge AT(t_{rt}, bathe'(sp, w_0, t)))$

– (32) is correctly predicted to be acceptable only in contexts that make available a future RT.

∗ Since (32) does not occur in one of the two matrix clause constructions that make available an absolute future reference time, which are (19) and (20), (31) is unacceptable.

4.4 Temporal Reference of Guarani Subordinate Clauses

- Different constructions differ in their effect on the temporal reference of the subordinate clauses.

– The temporal reference of complement clauses is the matrix ET.

– That of antecedents of conditionals may be a past, present, or future time.

4.4.1 Complement Clauses

- Since a complement clause does not contain a NONFUT tense, the matrix ET and the time at which the complement clause is interpreted overlap.

– Therefore, no back-shifted interpretation is licensed.

► Context: *To play a trick on Mario, we plan to call him to ask directions to his house.*

(33) Mario oi-mo'a-ta **ja-ju**-ha.
Mario A3-think-PROSP **A1pl.incl-come**-NOM
'Mario is going to think that we **are coming**.'

- The verb *oi-mo'a* (A3-think) existentially binds the ET t of its complement R, and specifies its ET t^3 as the RT of its complement.

(34) a. *oi-mo'a* (A3-think)
$\Longrightarrow \lambda R_{\langle \omega, \langle \iota, \langle \iota, \tau \rangle \rangle}} \lambda w \lambda t^4 \lambda t^3 [AT(t^4, think'\ (m, \lambda w'' \exists t(\underline{R(w'', t^3, t)}), w, t^3))]$

b. (33) $\Longrightarrow$ *-ta*(*oi-mo'a*(*mario*)(*ja-ju*))
$\Longrightarrow \exists t''\forall w'(w' \in best(MB, OS, \langle w_0, t_{rt}\rangle)$
$\rightarrow t_{rt} < t'' \wedge think'(m, \lambda w''\exists t(t'' \subseteq t \wedge come'(gr, w'', t)), w', t''))$

– There is a time t'' s.t. in all best worlds w' at t'' that the group comes at a time t that temporally includes t''.

∗ This correctly predicts that the group comes to the house at Mario's future thinking time.

4.4.2 Antecedents of Conditionals

- The translation of the antecedent Q is interpreted at worlds w' that are best w.r.t. an epistemic modal base and an ordering source and at an existentially quantified time t''.

► Context: *Paloma has a terrible voice but still wants to sing at tonight's event. Maria says:*

(35) **Re-purahei**-ramo, a-se-ta.
A2sg-sing-if A1sg-leave-PROSP
'If you **sing**, I am going to leave.'

(36) a. *-ramo* 'if' $\Longrightarrow \lambda Q_{\langle\omega,\langle\iota,\langle\iota,\tau\rangle\rangle\rangle} R_{\langle\omega,\langle\iota,\langle\iota,\tau\rangle\rangle\rangle} \lambda w \lambda t \lambda t'[\forall w'(w' \in (MB, OS, \langle w, t\rangle)$
$\wedge \exists t''(Q(w', t'', t')) \rightarrow \exists t^4(R(w, t, t^4)))]$

b. (35) $\Longrightarrow$ *-ramo*(*re-purahei*)(*-ta*(*a-se*))
$\Longrightarrow \exists t'\forall w'(w' \in best(MB, OS, \langle w_0, t_{rt}\rangle) \wedge \exists t''(t' \subseteq t'' \wedge sing'(addr, w', t'))$
$\rightarrow \exists t^4\forall w''(w'' \in best(MB, OS, \langle w_0, t_{rt}\rangle) \rightarrow t_{rt} < t^4 \wedge leave'(sp, w'', t^4)))$

– There is a time t' s.t. in all epistemically accessible best worlds w' where the addressee sings in w' at the time t' that is included by a time t'', there is a time t^4 s.t. in all best worlds w'', t^4 is in the future of the RT, and the speaker leaves in w'' at t^4.

5 Comparison of the 2 Analyses of Temporal Reference in Guarani

- Both are based on the observation that, cross-linguistically, temporal reference is restricted by context, tenses, and adverbials.
- Both assume that subordinating constructions contribute in different ways to the temporal reference of subordinate clauses.
- W.r.t. conceptual complexity, the tenseless analysis is simpler, since it does not evoke a phonologically empty NONFUT tense morpheme.
- Assessing the theoretical adequacy of the 2 analyses depends on one's willingness to accept the proposal that absolute future RT is not contextually available in languages that primarily use the ET to realize future discourse.
- In assessing the empirical adequacy, tenseless analysis is taken to make better predictions.

6 Remarks on Cross-Linguistic Variation in Temporal Reference

- Tenseless languages can receive tensed analyses as well as tenseless analyses.
  1. TENSED: Lin 2005 on Chinese, and Matthewson 2006 on Lillooet,...
  2. TENSELESS: Bohnemeyer 2002 on Yukatek Maya, and Bittner 2005 on Kalaallisut,...
- There may be semantic variation among tenseless languages w.r.t. how the relation between the RT and the UT is constrained.
  1. By context and temporal adverbials alone.
  2. Additionally by a covert tense.
- 2 implications for cross-linguistic variation in temporal reference.
  1. The morphological differences between tensed and tenseless languages do not have consequences or temporal reference.
     - Temporal reference in Guarani is anaphoric to a contextually given RT, just as in tensed languages like English.
     - Temporal reference in tenseless languages is not un- or under-determined because of the lack of tense morphemes once the contribution of the context is taken into account.
  2. There is a cross-linguistic variation in the extent to which future discourse is realized by the RT option.
     - Yucatec Maya shows the most extensive use of the RT time option.
       * Future discourse is realized with both the ET and RT options with statives, but only the ET option is available for perfective eventives.
     - Guarani and English in the middle.
       * In English, future discourse is realized by the RT option only with scheduled events and the auxiliary *will*, if it is analyzed as a future tense.
       * In Guarani, future discourse is realized predominantly by the ET option, with the RT option in use in only two kinds of matrix clause constructions.
     - Kalaallisut is at the other extreme.
       * Future discourse is only realized by the ET option.