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The Paraguayan Guaraní future marker *-ta*: Formal semantics and cross-linguistic comparison

1. Introduction

Since the future, in contrast to the present and the past, is unknown, reference to future states of affairs is inherently non-factual.¹ For natural language semanticists, this raises the question of whether linguistic expressions used to refer to future states of affairs differ from those used to refer to past or present ones, for example in conveying both temporal and modal meanings. An empirical domain that holds answers to this question is the cross-linguistic set of future markers, i.e. expressions that can realize future time reference. Most, if not all, future markers that have been explored from a formal semantic perspective have been analyzed as conveying not just future temporal reference but also modal meaning(s): the English auxiliary *will*, for example, expresses future time reference with circumstantial or deontic modality (e.g. Sarkar 1998; Copley 2002; Kissine 2008), the Turkish suffix *-(y)Ecek* realizes future time reference with the modal attitude of prediction (Yavaş 1982), and Kalaallisut future markers evoke attitude states to *de se* prospects, starts of expected processes, or mark the speech act as a request or wish (Bittner 2005). This small collection of future markers already indicates what has also been pointed out in the typological literature (e.g. Bybee and Pagliuca 1987; Bybee, Perkins and Pagliuca 1994), namely that future markers have a wide variety of modal meanings. Another point of cross-linguistic variation regarding future markers is that some entail future time reference, such as St'át'imcets (Salish) *kelh* (Matthewson 2006), while future time reference arises only with particular modal meanings with others: English *will*, for example, can realize present time reference with epistemic modality. This relates to the question of whether a particular future marker entails the modal meaning it conveys or is merely compatible with it. The semantic literature on English *will* shows how difficult it is to answer this question: English *will* has been analyzed as a future marker that also encodes modality (e.g. Enç 1996), as a future tense that does not encode modality (e.g. Kissine 2008) and as a modal marker that does not entail future time reference (e.g. Kaufmann 2005; Werner 2006).

Answers to the question of whether reference to future states of affairs in natural language is inherently modal presuppose detailed formal semantic explorations of future markers across a typologically diverse set of languages and the cross-linguistic comparison of the temporal and modal meanings of the cross-linguistic set of future markers. This paper contributes to the cross-linguistic study of future markers by exploring the truth

¹ For helpful discussions, I thank Maria Bittner, Jürgen Bohnemeyer, Cleo Condoravdi, Anastasia Smirnova, Mary Swift, and especially Stefan Kaufmann, Lisa Matthewson and Craige Roberts, who gave extensive and insightful comments on earlier versions of this paper. I also benefited from feedback from the audience at the *Tense Across Languages* workshop at the 2008 DGfS meeting and the students in the course *Semantics of Tense Cross-linguistically* at the 2009 LSA Linguistic Institute. I am grateful to my Guaraní language consultants for working with me on their language.

conditional semantics of the Paraguayan Guaraní future marker *-ta*. This suffix is the marker most commonly used by consultants asked to translate Spanish sentences with future time reference. (1), for example, is the Paraguayan Guaraní (henceforth Guaraní) translation provided for the Spanish sentence *Cantaré* (sing.FUT.1sg) ‘I will sing’:²

(1) Context: What will you do at the party tomorrow?

A-purahéi-ta.

A1sg-sing-FUT

‘I will sing.’

[E]

The next section provides background on temporal and modal reference in Guaraní before the meaning of *-ta* is explored in section 3. I argue that *-ta* is a future marker that entails future time reference in present and past contexts and is compatible with the modal meanings of intention and prediction (which are formally analyzed in Kratzer’s (1981, 1991) framework). The formal semantic analysis is shown in section 4 to account for a counterfactual interpretation that arises when *-ta* co-occurs with certain past time adverbs. Section 5 concludes the paper by comparing *-ta* to other future markers that convey intentions and predictions, in particular English *will/would* and St’át’imcets *kelh*.

2. Background on temporal and modal reference in Guaraní

Guaraní is a tenseless language (Tonhauser 2006, 2009c). Verbal stems are obligatorily inflected for person/number and need not co-occur with a temporal, aspectual or modal

² Guaraní is a Tupí-Guaraní language spoken by about four million people in Paraguay and surrounding countries. The data presented here were collected by the author with speakers in the departments of Guairá and Asunción from 2004 to 2008. Examples are marked to identify their origin; elicited examples are marked with [E], examples from a corpus of naturally occurring texts with [C]. The Guaraní examples are given in the standardized orthography used in Paraguay (Ministerio de Educación y Cultura 2004, cf. also Velázquez-Castillo 2004:1421f.), except that all postpositions are attached to their host. Accents are not written for normally accented words (stress on the final syllable); stressed nasal syllables are marked with a tilde. The language has two sets of cross-reference markers: the set A prefixes (which mark subjects of transitive and one set of intransitive verbs) are *a(i)-* ‘A1sg’, *ja(i)-* ‘A1pl.incl’, *ro(i)-* ‘A1pl.excl’, *re(i)-* ‘A2sg’, *pe(i)-* ‘A2pl’, and *o(i)-* ‘A3’; the set B prefixes (which mark possessors and subjects of the other set of intransitive verbs) are *che(r)-* ‘B1sg’, *ñane(r)-* ‘B1pl.incl’, *ore(r)-* ‘B1pl.excl’, *nde(r)-* ‘B2sg’, *pende(r)-* ‘B2pl’, and *i(ñ)-/h-* ‘B3’. The two portmanteaux prefixes *ro(i)-* ‘12sg’ and *po(i)-* ‘12pl’ refer to a first person subject and a second person (singular/plural) object. The glosses used are: 3.pronS/O = 3rd person subject/object pronoun, ABL = ablative, AT = cotemporaneity, CAUS = causative, COMPLETE = completive aspect, DEM = demonstrative, DES = desiderative, DIM = diminutive, EMPH = emphatic, excl = exclusive, FUT = future marker, incl = inclusive, IMM.FUT = immediate future, IMP = imperative, JE = reflexive/passive, MIGHT = possibility modal, MUST = necessity modal, NEG = negation, NEG.IMP = negative imperative, NOM = nominalizer, NOM.FUT/PAST = future/past-oriented nominal marker (cf. Tonhauser 2007), PL = plural, PROG = progressive, PURP = purpose, QU = question, RC = relative clause, SAY = reportative evidential.

marker. In matrix clauses, these (temporally, aspectually and modally) *unmarked* verbs are compatible with present and past temporal reference, as illustrated in the examples in (2) and (3). The unmarked verb *a-purahei* (A1sg-sing) occurs with the present-time denoting adverb *ko'ágã* 'now' in (2a) and with the past-time denoting adverb *kuehe* 'yesterday' in (2b). The examples in (3a) and (3b) illustrate unmarked verbs in discourse contexts with present and past temporal reference, respectively.

- (2) a. Context: What are you doing?
 Ko'ágã **a-purahei**.
 now A1sg-sing
 'I am singing now.' [E]
- b. Kuehe **a-purahei**.
 yesterday A1sg-sing
 'Yesterday I sang/was singing.' [E]
- (3) a. Context: Maria returns from checking on her daughter, who is in her room.
 Rossáni **o-ke**.
 Rossani A3-sleep
 'Rossani is sleeping.' [overheard]
- b. Context: A woman had a child out of wedlock.
 I-memby **o-heja** ha **o-ho** mombyry.
 B3-child A3-leave and A3-go far
 'She left her child and went far away.' [C]

Unmarked verbs in matrix clauses are infelicitous in (most) future time contexts,³ cf. (4a), or with future-time denoting adverbs, such as *ko'ëro* 'tomorrow', as in (4b). Both utterances in (4) would be felicitous if the verb was marked with the future marker *-ta*.

- (4) a. Context: What will you do tomorrow?
 #**A-purahei**.
 A1sg-sing
 (Intended: I will sing.) [E]
- b. #Ko'ëro **a-purahei**.
 tomorrow A1sg-sing
 (Intended: Tomorrow I will sing.) [E]

In subordinate clauses, unmarked verbs are compatible with future time reference. This includes unmarked verbs in temporal adjunct clauses, as in (5a), in the antecedents of conditionals, as in (5b), and relative clauses of sentences whose main clause has future time reference, as in (5c), cf. Abusch (1998).

- (5) a. Re-karú-ta **re-jú-rire**.
 A2sg-eat-FUT A2sg-return-after
 'You will eat after you return.' [overheard]

³ Recent fieldwork has revealed contexts where unmarked verbs are compatible with future temporal reference in matrix clauses (cf. Tonhauser 2009b). The question of how unmarked verbs are temporally and modally interpreted is left to future research.

- b. **O-ký-rõ** ko'ẽro ja-pytá-ta óga-pe.
 A3-rain-if tomorrow A1pl.incl-stay-FUT house-at
 'If it rains tomorrow we'll stay home.' [E]
- c. Context: A child that just had an operation to restore its eye sight says:
 Ko pyharé-pe a-mombe'ú-ta che-sý-pe o-pa mba'e
 this night-at A1sg-tell-FUT B1sg-mother-to A3-complete thing
a-hechá-va ko ára-pe.
 A1sg-see-RC this day-at
 'Tonight I'll tell my mother about all the things I see today.' [E]

Guaraní has several modal verbal markers, some of which can convey future time reference. This includes the possibility modal suffix *-ne* '-MIGHT', the necessity modal *-va'erã* '-MUST', the desiderative suffix *-se* '-DES' and the counterfactual suffix *-mo'ã* (the semantics of the latter is discussed in detail in Tonhauser (2009a)). The examples in (6) show that *-ne* can express present time reference with epistemic modality, as in (6a), and future time reference with circumstantial modality, as in (6b). The necessity modal *-va'erã* realizes present time reference with epistemic modality in (7a) and future time reference (relative to a past time) with deontic modality in (7b). See Tonhauser (2006: ch.7) for more details on these modals.

- (6) a. Context: A family is discussing who might disrespect them. The father says to the daughter:
 Nde rei-kuáa-**ne**, che-memby!
 B2sg A2sg-know-MIGHT B1sg-child
 'YOU might know, my child!' [C]
- b. Context: A farmer is looking at the clouds.
 Ko'ẽro o-ký-**ne**.
 tomorrow A3-rain-MIGHT
 'It might rain tomorrow.' [E]
- (7) a. Context: The speaker has just heard that a man's daughter has gotten married.
 O-vy'á-iterei-**va'erã**.
 A3-happy-very-MUST
 'He must be very happy.' [C]
- b. Context: My grandmother milked the cows every morning.
 O-vende-pá-rire o-japo-**va'erã** rambosa
 A3-sell-COMPLETE-after A3-make-MUST breakfast
 i-personal-kuéra-pe-**gua-rã**.
 B3-personnel-PL-at-PURP-NOM.FUT
 'After she had sold all (the milk), she had to make breakfast for her personnel.' [C]

The desiderative suffix *-se* '-DES' realizes wishes and desires, and is often translated with the English verb *want*:

- (8) a. Context: Somebody complains that Rita hasn't come by for a long time. Rita says:
 A-ju-**se** reí-ko po-hecha-mí.
 A1sg-come-DES for.nothing-EMPH 12pl-see-DIM
 'I had wanted to come and see you.' [C]

- b. Context: Aniceto came here and...
 He'i ché-ve aipo re-ju-**se**-ha re-ñe'ẽ.
 A3.say B1sg-to DEM A2sg-come-DES-NOM A2sg-talk
 'He told me that you wanted to come talk (to us).' [C]

Guaraní also has several aspectual morphemes, including the perfect aspect *-ma*, the completive aspect *-pa*, and the progressive aspect *hina*. None of these convey future time reference; see Tonhauser (2006: ch.7) for details.

3. The temporal and modal meaning of the future marker *-ta*

Previous literature on the future marker *-ta* holds that it marks future time reference (e.g. Gregores and Suárez 1967; Liuzzi and Kirtchuk 1989; Dessaint 1996; Guasch 1996; Meliá et al. 1997; Zarratea 2002; Nordhoff 2004; Velázquez-Castillo 2004). This section explores the temporal and modal semantics of this suffix from a truth-conditional semantic perspective. The discussion of the temporal meaning is couched in a Reichenbachian framework (Reichenbach 1947) where the reference time, the time a particular stretch of discourse is about (Klein 1994), mediates between the eventuality time (the time at which an eventuality is temporally located) and the utterance time.

3.1. Future time reference in present time contexts

In contexts with a present reference time, i.e. where the reference time is the utterance time, the eventuality denoted by a matrix clause verb marked with *-ta* is true at a time in the future of the utterance time. The suffix *-ta* is compatible with future time reference of varying distance, as illustrated by the examples in (9), which contain future-time denoting temporal adverbs of increasing temporal remoteness.^{4,5}

- (9) a. A-hai-**ta** peteĩ kuatione'ẽ ága-ite.
 A1sg-write-FUT one card now-very
 'I will write a card right now.' [E]

⁴ These data show that *-ta* cannot be analyzed as a marker of near future or imminence, as has been proposed in Liuzzi and Kirtchuk (1989), Dessaint (1996), Guasch (1996) and Meliá et al. (1997).

⁵ Immediate future is also expressed with the suffix *-pota*, cf. (i). Whether this suffix could be analyzed as consisting of a suffix *-po* and the future suffix *-ta* is an open question.

- (i) Che-rendy-**pota**-ité-ko ai-kó-vo.
 B1sg-burn-IMM.FUT-very-EMPH A1sg-be-AT
 'I am about to explode (lit.: burn).' (adapted from Liuzzi and Kirtchuk 1989:34)

- b. Ko ára-pe a-jahú-**ta**.
 this day-at A1sg-bathe-FUT
 ‘I will bathe today.’ [E]
- c. Ko’ëro a-purahéi-**ta**.
 tomorrow A1sg-sing-FUT
 ‘I will sing tomorrow.’ [E]
- d. A-japo-pá-**ta** la eskuéla ótro ányo-pe.
 A1sg-do-COMplete-FUT the school other year-at
 ‘I will finish school next year.’ [E]
- e. Ko mundo o-pá-**ta** un mijon anyo-há-pe.
 this world A3-finish-FUT one million year-NOM-at
 ‘The world will end in a million years.’ [E]

Both unmarked verbs and verbs marked with *-ta* are compatible with the temporal adverbs *ko’ága* ‘now’ and *ko éste día* ‘today’, whose denotation includes the utterance time. With such adverbs, unmarked verbs have past or present temporal reference (depending in part on the Aktionsart of the proposition, cf. Tonhauser (2006: ch.7)), as in the naturally occurring example in (10a), while verbs marked with *-ta* have future time reference, as in (10b):

- (10) a. Libória ko éste día **o-menda**.
 Liboria this this day A3-marry
 ‘Liboria married today.’ [C]
- b. Libória ko éste día **o-menda-ta**.
 Liboria this this day A3-marry-FUT
 ‘Liboria will marry today.’ [E]

In out-of-the-blue contexts, where the reference time is the utterance time, the suffix *-ta* is incompatible with past-time denoting adverbs:

- (11) #Kuehe a-purahéi-**ta**.
 yesterday A1-sing-FUT [E]

The infelicity of (11) is a first piece of evidence that *-ta* entails future time reference. Further evidence is that all of the 77 naturally occurring instances of *-ta* in my corpus⁶ realize future time reference, and my reading of additional Guaraní texts has not revealed examples where *-ta* does not express future time reference. Furthermore, attempts to elicit examples with *-ta* that do not have future time reference failed (cf. section 5).

To formally account for the future time reference entailed by *-ta* in the Reichenbachian framework assumed in this paper means to identify whether *-ta* locates the eventuality time in the future of the reference time (prospective aspect, cf. Bohnemeyer 2002) or whether it locates the reference time in the future of the utterance time (future tense). Under the

⁶ The corpus is a collection of nine texts from different genres (fables, personal narratives, conversation). It consists of about 7,300 Guaraní words, which correspond to about 20,000 English words since Guaraní is mildly polysynthetic.

former analysis, the infelicity of (11) can be accounted for by assuming that the reference time is the utterance time in this out-of-the-blue context and that the temporal adverb *kuehe* ‘yesterday’ locates the eventuality time in the past of the reference time, thereby contradicting the requirement introduced by *-ta* that the eventuality time is in the future of the reference time. On the latter analysis, according to which *-ta* is a future tense, (11) could be accounted for by assuming that *kuehe* ‘yesterday’ locates the reference time in the past of the utterance time, thereby conflicting with the requirement introduced by *-ta* that the reference time be in the future of the utterance time. The data presented in sections 3.3. and 4. provide evidence for the former analysis.

3.2 Modal meanings: Intention and prediction

Future time reference with *-ta* is compatible with a limited set of modal meanings, namely intention and prediction. Utterances with the modal meaning of intention convey an agent’s mental state of intending to make a proposition be true at a time in the future; the intender is committed to do what she can to make the proposition true. No such commitment or implication of agency is necessarily associated with predictions. Rather, with predictions the speaker asserts that the proposition will be true at a time in the future: the speaker expresses that, given her epistemic state, she is committed to the truth of the proposition at a future time. Utterances with *-ta* are also compatible with the modal meaning of expectation, a weaker type of prediction in the sense that the speaker does not assert that the proposition will be true in the future but states a strong conviction that, given her epistemic state, the proposition is true at a future time. What the two modal meanings – intention and prediction/expectation – have in common is that they are intrinsically future-oriented: if something is already so, we cannot *intend* to make it so; and if something is true and we know it, we cannot *predict* its truth or *expect* it, but can only assert or believe it.

Of the 77 examples with *-ta* in the corpus, 39 convey intentions and 38 predictions or expectations. Representative examples of each are given in (12) and (13), respectively.

- (12) a. Context: A woman is scheming on how to catch the monkey that is playing tricks on her.
 A-japó-**ta** ta’anga araity kakuaa porã-va.
 A1sg-make-FUT figure wax big pretty-RC
 ‘I will make a pretty big wax figure.’ [C]
- b. Context: A monkey is stuck with hands and legs, and threatens to use its teeth to defend itself.
 Roi-su’ú-**ta**, roi-su’ú-**ta**.
 12sg-bite- FUT 12sg-bite- FUT
 ‘I will bite you, I will bite you.’ [C]
- c. Context: A woman has just arrived at the house of a friend.
 Che-are-mi-**ta** gueteri!
 B1sg-stay-DIM-FUT still
 ‘I’m still going to stay.’ [C]

- (13) a. Context: A father is happy that his daughter will come back home.
 Hasypevé-ko péina o-je-arreglá-**ta** ko asúnto hetá-ite
 finally-EMPH DEM A3-JE-resolve- FUT this matter much-very
 ñane-mo-’akā-rasý-va’e-kue.
 B1pl.incl-CAUS-head-hurt-RC-NOM.PAST
 ‘Finally this matter will get resolved that has been giving us much headache.’ [C]
- b. Context: The boy and his dog have left the frog. The frog says: “I will follow them and then...
 ...ai-kuáa-**ta** moð-pa oi-ko.”
 ...A1sg-know- FUT where-QU A3-live
 ‘...I will know where they live.’” [C]
- c. Context: A girl is told by her mother that the neighbors talk badly about her because of some past incident.
 Ha nde-ru i-tarová-**ta** voi i-mandu’á-ramo upéva-rehe.
 and B2sg-father B3-crazy-FUT surely B3-remember-if this-about
 ‘And your father will go crazy if he remembers it.’ [C]

Utterances with *-ta* do not entail that the eventualities will be realized. For example, the story in which (12b) appears makes clear that the speaker of (12b) did not end up biting the addressee, and the father does not end up going crazy in the story of (13c).

I formally analyze the modal meanings of intention and prediction/expectation in Kratzer’s (1981, 1991) framework, where modals are quantifiers over a contextually restricted set of possible worlds. I assume that worlds are world histories, i.e. a world is not a static entity where things are fixed once and for all, but rather one way in which things develop over time. The set of accessible worlds over which a particular modal expression quantifies is determined by two contextually given functions from world-time pairs to conversational backgrounds (sets of propositions) referred to as the modal base and the ordering source. The modal base of utterances with *-ta* that convey intention is circumstantial: applied to an index (a world-time pair), it returns the set of propositions denoting the circumstances that are relevant at the index. In (12a), for example, propositions denoting currently relevant circumstances include ‘There is a monkey’, ‘There is a woman’ and ‘The monkey is annoying the woman’; *-ta* quantifies over those worlds in which all of these propositions are true. The fact that (12a) is not entailed to be true at a future time is formally accounted for by requiring that the conversational background returned by the ordering source is not empty. If it was empty, (12a) would specify that the woman makes a wax figure at a time in the future of the evaluation time in all worlds in which the currently relevant circumstances are true, which is not necessarily the case. Rather, the conversational background returned by the ordering source for *-ta* with a circumstantial modal base is the set of propositions denoting the agent’s intentions; for (12a), this includes the woman’s intention to catch the monkey. Hence, (12a) is true at the time and world of evaluation if and only if, in all worlds where the circumstances relevant at the time and world of evaluation are true and that are best with respect to the woman’s intentions, i.e. where these intentions are realized, there is a time in the future of the time of evaluation at which the woman makes a wax figure.

The modal meaning of prediction involves an epistemic modal base, which when applied to an index returns the set of propositions denoting what the speaker knows at that

index. In (13c), for example, the speaker's epistemic state includes the propositions 'My daughter did something bad in the past' and 'Her father is still mad about what his daughter did'. The ordering source in utterances where *-ta* conveys a prediction is a stereotypical one: it consists of propositions that characterize the normal course of events. The modal meaning of *-ta* in these examples is to quantify over those worlds that are best with respect to the epistemic modal base and the stereotypical ordering source, i.e. worlds in which what the speaker knows is true and that develop as expected. According to this analysis, (13c) is true at the time and world of evaluation if and only if, in all worlds where what the mother knows about the past incident and how people currently feel about it is true and that develop as expected, there is a time in the future of the time of evaluation at which the father goes crazy.

When we consider how the world stereotypically develops, not everything is fixed up to the last detail; a development might be stereotypical regardless of whether some proposition is true or not. Intuitively, whether the speaker predicts or merely expects a state of affairs to occur depends on how sure the speaker is, given how the world stereotypically develops, that the state of affairs will occur. If the speaker asserts that the state of affairs will occur if the world develops one way or another, the speaker is surer of it than if she asserts that the state of affairs will occur if the world develops in one particular way. The (gradual) difference between prediction and expectation is therefore formally analyzed here as a difference in the size and nature of the set of propositions returned by the stereotypical ordering source. With expectations, the ordering source consists of a consistent set of propositions that characterize one way in which the world normally develops. (13c), for example, could be interpreted as an expectation if the stereotypical conversational background includes the propositions 'The world does not suddenly end', 'The father does not stop caring about what people think about the family', 'The father chats with the neighbors in the evening' and 'The neighbors tell the father what they think about his daughter's behavior'. If this is how the world develops, the speaker expects the father to go crazy, if he remembers the daughter's behavior. In order for (13c) to be interpreted as a prediction, on the other hand, the speaker asserts that the state of affairs will come about regardless of whether some proposition is true or not, e.g. if the stereotypical conversational background consists of the additional proposition 'The neighbors do not tell the father what they think about his daughter's behavior'. Thus, (13c) is a prediction if, regardless of whether the neighbors talk to the father or not, the father goes crazy, if he remembers the daughter's behavior. Since the former ordering source requires the highest-ranked worlds to be worlds in which the neighbors tell the father what they think, while the latter ordering source ranks highest both worlds in which they tell the father what they think and worlds in which they don't, the set of worlds quantified over with the latter ordering source is larger, thus leading to a stronger necessity claim. Since prediction and expectation involve the same modal base and stereotypical ordering sources, it is correctly predicted that the two are hard to distinguish for examples with little or no discourse context or information about the speaker.

The two types of modal meaning conveyed by *-ta* cannot be analyzed with the same modal base and ordering source. In (13c), for example, the speaker's, the father's, and the daughter's intentions are not relevant. Likewise, the examples in (12) cannot be analyzed as involving an epistemic modal base and a stereotypical ordering source: in (12b), the monkey's epistemic state is not relevant and worlds that develop stereotypically might be

ones where he stays tied up. What is relevant, rather, are the current circumstances and his intentions.

The use of *-ta* is not limited to assertions and it conveys the same modal meanings when it realizes future time reference in questions, as illustrated in the examples in (14): for example, (14a) inquires about the addressee's intentions, and the question in (14b) (rhetorically) inquires about the addressee's expectations about people's reactions.

- (14) a. Context: A visitor is asked by his host:
 Nde-aré-**ta** gueteri-pa árupi?
 B2sg-stay-FUT still-QU here
 'Will you stay here a bit longer?' [C]
- b. Context: A daughter is indignant about what people will say about her behavior.
 She asks:
 Mba'é-piko he'í-**ta**?!
 what-EMPH A3.say-FUT
 'What will they say?!' [C]

The suffix *-ta* is not used in imperatives⁷ but it can be used with imperative illocutionary force in situations where a person in authority has expectations about another person's behavior; this is illustrated by the examples in (15).

- (15) a. Context: A teacher advises a student who has just hurt her hand very badly.
 Re-pytá-**ta**-nte ko do tre semana.
 A2sg-stay-FUT-just this two three week
 'You will stay (home) for two or three weeks.' [C]
- b. Context: A doctor instructs a mother on how to make a therapeutic device out of a glove:
 Kóva-pe re-hó-**ta** re-moñ arína.
 this-in A2sg-go-FUT A2-put flour
 'You will go and put flour into this.' [C]

These examples convey a strong expectation on part of the speaker for a particular future action of the addressee. Formally, the interpretation of such examples involves an epistemic modal base: in (15a), what the teacher knows includes the propositions that the student won't be able to write for a while, that it takes the student 40 minutes to walk to school, that the student needs to make sure her hand heals and that she considers the teacher a

⁷ Positive imperatives are expressed with a special second person cross-reference marker, negative ones with the marker *ani*:

- (i) a. **E**-ju ápe, **e**-guapy che-yké-rehe, che-memby!.
 A2sg.IMP-come here A2sg.IMP-sit B1sg-side-at B1sg-child
 'Come here and sit next to me, my child!' [C]
- b. **Ani** e-mombo yty tapé-pe.
 NEG.IMP A2sg.IMP-throw garbage path-in
 'Do not litter.' [sign in bus]

person of authority. The ordering source is stereotypical. Thus, by using (15a), the teacher conveys that, in all worlds in which what the teacher knows is true and that develop stereotypically, the student stays home. Likewise, in (15b), the doctor knows that the mother trusts the doctor, considers him a person of authority (as evidenced by their previous interaction), wants her daughter's hand to heal and knows that the device is an accepted means for healing the hand. In all worlds in which all the propositions in the modal base are true and that develop stereotypically, the mother prepares the device as instructed.

3.3. Future time reference in past time contexts

The examples so far have been limited to ones uttered in contexts with a present reference time. In these contexts, the situation time of the eventuality is located in the future of the utterance/reference time. The examples in this section show that *-ta* can also express future time reference in contexts with a past reference time, i.e. that *-ta* is not limited to deictic future time reference.

The examples in (16) are both taken from a story in which a mother recounts how her daughter severely injured her hand and had to be treated for a long time afterwards. In both examples, the reference time is a contextually given past time and *-ta* conveys that the eventuality time is temporally located in the (relative) future of the contextually given past time. Such examples are therefore translated into English with *would*, not *will*.

- (16) a. Context: The mother tells how she started taking care of her daughter's wound, which she has not yet seen at the past time of the story (but she has at the utterance time).
 Che la a-japo-há-pe chupe la kurasion priméra ves a-hechá-**ta** hĩna.
 B1sg the A1sg-do-NOM-at pron.3O the cure first time A1sg-see-FUT PROG
 'And I, when I was cleaning her wound, I would see it for the first time.' [C]
- b. Context: The mother received a call from the school that her daughter had had an accident at school and was now at the hospital. The teacher told her to come to a particular road crossing.
 Upépeve o-guerú-**ta** chupe la i-profesor.
 there A3-bring-FUT pron.3O the B3-teacher
 'Her teacher would/was going to bring her there.' [C]

At the past reference time of (16a), the mother has never seen the wound (the daughter was treated in a hospital) and (16a) expresses that at that past time she had the expectation that she would, at a time in the future of the past time, see the wound. (16b) reports that, at the contextually given past time, the teacher had the intention of bringing the daughter to the road crossing.

The suffix *-ta* can also occur in embedded clauses that are interpreted with respect to a past time, as in (17), which expresses the teachers' expectation that the speaker's daughter would arrive later than the other school children due to her injury:

- (17) Context: “They called me to tell me not to worry about my daughter...”
 ...porque o-ġuahé-**ta** tarde-ve i-compañéra-kuéra-gui.
 ...because A3-arrive- FUT late-more B3-school.friend-PL-ABL
 ‘...because she would arrive later than her school friends.’ [C]

This example also shows that utterances with *-ta* do not entail the realization of the eventuality even when then eventuality is temporally located in the future of a (past) reference time: the context of the story in which (17) occurs makes clear that the daughter never arrived at home but instead had to be picked up by the mother at a road crossing.

In the examples in (18) and (19), *-ta* is realized on verbs in relative clauses (marked with *-va* ‘-RC’) and complement clauses (marked with *-ha* ‘-NOM’), respectively. In (18a), the situation time of the eventuality denoted by the relative clause is in the future of a contextually given past time; in (18b), it is in the future of the utterance time.

- (18) a. Context: “And he hissed and sputtered at me.”
 Pytā-mba ko gringo, ñemo’a ku o-soró-**ta**-va
 red-COMplete this gringo like DEM A3-explode-FUT-RC
 ‘He was completely red, this gringo who looked like he would explode.’ [C]
- b. E-kiriri ha e-hendu ko ha’**é**-**ta**-va ndé-ve!
 A2sg.IMP-quiet and A2sg.IMP-listen this A1sg.say-FUT-RC B2sg-to
 ‘Shut up and listen to what I will tell you.’ [C]
- c. O-nasē kuri petē mitā réy-**ta**-va.
 A3-born back.then one child king-FUT-RC
 ‘A child was born who will/would be king.’ [E]

(18c) is felicitous in two kinds of discourse contexts, which result in interpretations of (18c) that correspond to the interpretations of the English translations with *will* and *would*, respectively. The first discourse context is one in which the child was born in the past of the utterance time and has not yet become king at the utterance time but is expected to (i.e. the relative clause is interpreted with respect to the utterance time); the second context is one in which the child was born in the past of the utterance time and already became king (i.e. the relative clause is interpreted with respect to the past reference time). These two interpretations are expected, given that verbs marked with *-ta* can be interpreted relative to both a present and a past reference time.

When *-ta* occurs on a verb in a complement clause marked with *-ha* ‘-NOM’,⁸ the situation time of the eventuality is (typically) located in the future of the situation time of the matrix eventuality, which is at the utterance time in (19a) and at a past time in (19b,c).

- (19) a. Context: A monkey advises a fox on how to win a woman’s hand.
 Áġa o-já-vo nde-yké-pe ere chupe re-mendá-**ta**-ha.
 now A3-join-AT B2sg-side-at A2.say pron.3O A2sg-marry-FUT-NOM
 ‘Now, when she comes to your side, tell her that you will marry.’ [C]

⁸ Complement clauses can additionally be marked with the nominal temporal marker *-kue*, analyzed as a terminative aspect in Tonhauser (2006, 2007), which affects the temporal interpretation of the complement clause (cf. Tonhauser 2006).

- b. Context: A girl has badly injured her hand.
 Nd-o-krée-i la i-kuã ha'e o-rekuperá-jeý-**ta**-ha
 NEG-A3-believe-NEG the B3-finger pron.3S A3-recuperate-again-FUT-NOM
 'She didn't believe that her fingers would recuperate.' [C]
- c. Context: A man calls over his dog to inspect somethings.
 Pe jagua o-ñeypyrũ tuicha o-ñarõ, oi-mo'ã-re o-ñe-me'ẽ-**ta**-ha
 that dog A3-start big A3-bark A3-think-about A3-JE-give- FUT-NOM
 ichupe tembi'u.
 pron.3O food
 'That dog started to bark loudly thinking that it would be given food.' [C]

In these examples, too, the future time reference conveyed by *-ta* comes with either of the modal meanings of intention or prediction/expectation. (19a), for instance, expresses that the fox should voice his intention of marrying the woman; (19b) conveys the girl's beliefs at the contextually given past time about her expectations for the recovery of her fingers; these expectations are based on what she knows about her situation (her fingers are badly hurt, the doctor gave her a bad diagnosis) and how the world stereotypically develops.

3.4. Formal semantic analysis

The previous sections illustrated that Guaraní utterances with the future marker *-ta* are felicitous in contexts where the reference time is the utterance time but also in contexts where the reference time is a past time. Under the assumption that tenses impose a constraint on the relation between the reference time and the utterance time (e.g. Klein 1994; Bittner 2005), this conclusively shows that *-ta* is not a future tense but rather a prospective aspect, which locates the eventuality time in the future of the reference time. This section develops a formal semantic analysis according to which *-ta* entails such a future temporal meaning; this is motivated by the finding that all naturally occurring examples of *-ta* convey future time reference and that it was not possible to elicit examples to the contrary (cf. section 5).

The syntax and semantics of the fragment is expressed in a Combinatoric Categorical Grammar framework (cf. Steedman 1996). The lexicon consists of triples of the form

$$(20) \textit{phon} : \textit{CAT} : [[\textit{sem}]]^{M,g,i,j,w}$$

where *phon* is a phonological string, *CAT* the syntactic category of the lexical item and $[[\textit{sem}]]^{M,g,i,j,w}$ the denotation of the (logical translation of the) expression in a model *M*, under an assignment function *g*, at times *i* and *j*, and a world *w*. (The nature of the times *i* and *j* is clarified below.) The rules in (21) compositionally determine the syntactic category and meaning of a complex expression *ab* from the syntactic categories and meanings of the expressions *a* and *b* that make up the complex expression: the string *ab* is derived by concatenating the string *a* and the string *b*, the syntactic category of *ab* is A (since, e.g. in Forward Function Application, the syntactic category of *a* is A/B ("A looking for B to its right") and *b* is an expression of syntactic category B to its right), and the denotation of *ab* is derived by applying the denotation of (the translation of) *a* to that of *b*.

(21) a. Forward Function Application (FA)

$$\frac{a : A/B : [[a \]]^{M,g,i,j,w} \quad b : B : [[b \]]^{M,g,i,j,w}}{ab : A : [[a'(b \)]]^{M,g,i,j,w}}$$

b. Backward Function Application (BA)

$$\frac{b : B : [[b \]]^{M,g,i,j,w} \quad a : A \setminus B : [[a \]]^{M,g,i,j,w}}{ba : A : [[a'(b \)]]^{M,g,i,j,w}}$$

The denotations of Guaraní expressions are given as the denotations of expressions in a typed lambda calculus with basic types ε (for individuals), ι (for intervals, also referred to as times below), ω (for worlds), and τ (for truth values). The denotations are specified in an intensional model $M = \langle U, F, T, W \rangle$, where U is the universe of entities, F an interpretation function, T a (non-empty) set of times and W a (non-empty) set of worlds. The denotations of constants are given by F and depend on the world w and the time i , those of variables are given by the variable assignment function g as follows:

- (22) a. If α is a constant, $[[\alpha]]^{M,g,i,j,w} = F(\alpha, w, i)$.
 b. If α is a variable, $[[\alpha]]^{M,g,i,j,w} = g(\alpha)$.

Following Dowty (1982), I assume that the time i that the interpretation function $[[\cdot]]$ makes reference to corresponds to Reichenbach's (1947) reference time, and that this time is contextually given in narrative discourse but can also be constrained by temporal adverbs (cf. Partee 1984; Dowty 1986; Hinrichs 1986; Kamp and Reyle 1993; Klein 1994). The time j is the utterance time; this time is used to specify the meanings of temporal expressions (see below). I assume three designated variables, rt and now of type ι and w^* of type ω , which denote the reference time i , the utterance time j and the world of evaluation w , respectively:

- (23) a. $[[rt]]^{M,g,i,j,w} = i$
 b. $[[now]]^{M,g,i,j,w} = j$
 c. $[[w^*]]^{M,g,i,j,w} = w$

Verbs denote functions from individuals to sets of world-time pairs. In (24), the intransitive verb *o-ke* 'A3-sleep' (type $\langle \varepsilon, \langle \omega, \langle \iota, \tau \rangle \rangle \rangle$) combines with its argument *Rossáni* (the constant r in (24) is of type ε).⁹ The resulting expression of semantic type $\langle \omega, \langle \iota, \tau \rangle \rangle$ and syntactic category S_{rad} is referred to as a *sentence radical*.

⁹ The arguments of a verb in Guaraní need not be realized by an independent pronoun or a full noun phrase; *o-ke* 'A3-sleep', for example is a well-formed sentence with the meaning 'S/he/it sleeps/slept'. Such examples are not treated here.

(24) Derivation of the sentence radical *Rossáni o-ke* ‘Rossani A3-sleep’:

$$\frac{\text{Rossáni} : \text{NP} : [[r]]^{M.g,i,j,w} \quad \text{o-ke} : S_{rad} \backslash \text{NP} : [[\lambda x \lambda w' \lambda t [sleep'(x)(t, w')]]]^{M.g,i,j,w}}{\text{Rossáni o-ke} : S_{rad} : [[\lambda w' \lambda t [sleep'(r)(t, w')]]]^{M.g,i,j,w}} \quad \text{BA}$$

After beta-reduction, the denotation of the sentence radical denoted by *Rossáni o-ke* (Rossani A3-sleep) is $[[\lambda w' \lambda t [sleep'(r)(t, w')]]]^{M.g,i,j,w}$, the set of world-time pairs at which Rossani sleeps.

I use the NON-FUT operator defined in (25) to account for the non-future temporal interpretation of unmarked verbs and verbs marked with –ta.¹⁰ This (phonologically zero) operator instantiates its argument at the world of evaluation w^* and the reference time rt , and requires the reference time to be a non-future time ($rt \leq now$), i.e. the reference time interval can strictly precede the utterance time interval or be identical to it.

(25) Lexical entry of the NON-FUT operator:

$$\emptyset : S/S_{rad} : [[\lambda P_{\langle \omega, \langle t, \tau \rangle \rangle} [P(w^*)(rt) \ \& \ rt \leq now]]]^{M.g,i,j,w}$$

Applying the NON-FUT operator to the output of (24) yields the truth-conditions in (26b) for example (3a), repeated as (26a) below:

- (26) a. Context: Maria returns from checking on her daughter, who is in her room.
 Rossáni o-ke. (= (3a))
 Rossani A3-sleep
 ‘Rossani is sleeping.’ [overheard]
- b. $[[(26a)]]^{M.g,i,j,w} = [[\text{NON-FUT} (Rossáni \ o-ke)]]^{M.g,i,j,w}$
 $= [[\text{NON-FUT} (\lambda w' \lambda t [sleep'(r)(t, w')]]]]^{M.g,i,j,w}$
 $= [[\lambda P_{\langle \omega, \langle t, \tau \rangle \rangle} [P(w^*)(rt) \ \& \ rt \leq now] (\lambda w' \lambda t [sleep'(r)(t, w')]]]]^{M.g,i,j,w}$
 $= [[sleep'(r)(rt, w^*) \ \& \ rt \leq now]]^{M.g,i,j,w}$

In the context given for (26a), the reference time i is the utterance time j . Hence, according to (26b), (26a) is true if and only if Rossani sleeps at the utterance time. (The relation between the reference time and the time of the eventuality of Rossani sleeping is determined by Aktionsart, which is not considered here.)

Temporal adverbs such as *kuehe* ‘yesterday’ and *ko’ëro* ‘tomorrow’ are modifiers of sentence radicals (type $\langle \langle \omega, \langle t, \tau \rangle \rangle, \langle \omega, \langle t, \tau \rangle \rangle \rangle$); they restrict the time at which the sentence radical is located to the day before or after the one containing the utterance time now , respectively:

- (27) a. *kuehe* ‘yesterday’ : $S_{rad}/S_{rad} : [[\lambda P \lambda w' \lambda t [P(w')(t) \ \& \ t \subseteq yesterday'_{now}]]]^{M.g,i,j,w}$
 b. *ko’ëro* ‘tomorrow’ : $S_{rad}/S_{rad} : [[\lambda P \lambda w' \lambda t [P(w')(t) \ \& \ t \subseteq tomorrow'_{now}]]]^{M.g,i,j,w}$

¹⁰ As mentioned in footnote 3, there are discourse contexts in which unmarked verbs can receive a future time interpretation. I leave for future research the question of whether a NON-FUT operator is empirically motivated in the temporal analysis of Guaraní and, if yes, the identification of the conditions under which the operator is applied.

Since these temporal adverbs apply to sentence radicals, they are interpreted in the scope of the NON-FUT operator. In the semantic analysis of examples like (2b) and (4b), repeated in (28a) and (29a) below, the temporal adverbs therefore constrain the location of the reference time. The semantics correctly predicts the (un)acceptability of the two deictic temporal adverbs with unmarked verbs (the variable *sp* refers to the speaker):

- (28) a. Kuehe a-purahei. (= (2b))
 yesterday A1sg-sing
 ‘Yesterday I sang/was singing.’ [E]
 b. $[[[(28a)]]^{M,g,i,j,w} = [[\text{NON-FUT}(\text{kuehe}(\text{a-purahei}))]]^{M,g,i,j,w}$
 $= [[\text{NON-FUT}(\text{kuehe}(\lambda w' \lambda t [\text{sing}'(\text{sp})(t, w')]])]]^{M,g,i,j,w}$
 $= [[\text{NON-FUT}(\lambda w' \lambda t [\text{sing}'(\text{sp})(t, w') \ \& \ t \subseteq \text{yesterday}'_{\text{now}}]])]]^{M,g,i,j,w}$
 $= [[\text{sing}'(\text{sp})(rt, w^*) \ \& \ rt \subseteq \text{yesterday}'_{\text{now}} \ \& \ rt \leq \text{now}]]^{M,g,i,j,w}$
- (29) a. #Ko'ëro a-purahei. (= (4b))
 tomorrow A1sg-sing
 (Intended: Tomorrow I will sing.) [E]
 b. $[[[(29a)]]^{M,g,i,j,w} = [[\text{NON-FUT}(\text{ko'ëro}(\text{a-purahei}))]]^{M,g,i,j,w}$
 $= [[\text{sing}'(\text{sp})(rt, w^*) \ \& \ \underline{rt \subseteq \text{tomorrow}'_{\text{now}}} \ \& \ \underline{rt \leq \text{now}}]]^{M,g,i,j,w}$

(28a) is true if and only if the speaker sings at the contextually given reference time *rt*, which is constrained to lie before or at the utterance time and within the time denoted by *kuehe* ‘yesterday’. By contrast, in (29a), the non-future reference time *rt* is required to be located within the time denoted by *ko'ëro* ‘tomorrow’ (cf. the underlined parts of the formula in (29b)). This contradiction renders such utterances infelicitous.

The formal semantic analysis of *-ta* is given in (30). According to this lexical entry, *-ta* presupposes an epistemic modal base (and a stereotypical ordering source) or a circumstantial modal base (and an ordering source that specifies the agent’s intentions). I borrow from Portner (1998) the three-place functor ‘best’ which, I assume, applies to the modal base MB, the ordering source OS and the pair $\langle w^*, rt \rangle$ consisting of the world of evaluation *w** and the reference time *rt*, and which returns the set of worlds *w'* in the modal base that are best with respect to the ordering source at $\langle w^*, rt \rangle$.¹¹ If the modal presupposition is fulfilled, *-ta* introduces a time *t'* in the future of the reference time *rt* (the temporal meaning of *-ta*) at which the eventuality is temporally located in all worlds *w'*.

- (30) Lexical entry of the Guaraní future marker *-ta*:

-ta presupposes an epistemic modal base with stereotypical ordering source or a circumstantial modal base with an ordering source that specifies the agent’s intentions. If defined:

$$-ta : S \setminus S_{rad} : [[\lambda P_{\langle \omega, \langle t, \tau \rangle \rangle} [\forall w'(w' \in \text{best}(\text{MB}, \text{OS}, \langle w^*, rt \rangle)) \rightarrow \exists t'(rt < t' \ \& \ P(w')(t'))]]]^{M,g,i,j,w}$$

¹¹ Portner’s (1998) ‘best’ comes with the Limit Assumption, the assumption that there always is a unique best set of worlds (p.771).

In utterances made out of the blue, such as (9c), repeated as (31a) below, the reference time is the utterance time. Here, *-ta* behaves like a deictic future marker. Since the temporal adverb *ko'ëro* 'tomorrow' is a modifier of sentence radicals (S_{rad}), it is outscoped by *-ta* (which applies to sentence radicals to return a sentence S). As a consequence, the temporal adverb here constrain the location of the eventuality time, not the reference time.

- (31) a. *Ko'ëro a-purahéi-ta.* (= (9c))
tomorrow A1sg-sing-FUT
'I will sing tomorrow.' [E]
- b. $[[(31a)]]^{M.g,i,j,w}$ is defined for an epistemic modal base with stereotypical ordering source or a circumstantial modal base with an ordering source that specifies the agent's intentions. If defined,
 $[[(31a)]]^{M.g,i,j,w} = [[-ta(ko'ëro(a-purahei))]]^{M.g,i,j,w}$
 $= [[-ta(\lambda w' \lambda t [sing'(sp)(t, w') \ \& \ t \subseteq tomorrow'_{now}])]]^{M.g,i,j,w}$
 $= [[\forall w' (w' \in best(MB, OS, \langle w^*, rt \rangle))$
 $\rightarrow \exists t'(rt < t' \ \& \ sing'(sp)(t', w') \ \& \ t' \subseteq tomorrow'_{now})]]^{M.g,i,j,w}$

According to this semantics, (31a) is correctly predicted to be true if and only if, in all worlds w' that are best with respect to the modal base MB and the ordering source OS at the world of evaluation w^* and the reference/utterance time rt , there is a time t' that is in the future of the reference time and included in the denotation of *ko'ëro* 'tomorrow' at which the speaker sings.

The analysis correctly predicts that examples like (32a) are infelicitous when uttered out of the blue, i.e. in a context where the reference is the utterance time: the eventuality time of the speaker's singing is located at a time t' in the future of the utterance/reference time by *-ta* and within the denotation of *kuehe* 'yesterday' (cf. the underlined material in (32b)).

- (32) a. *#Kuehe a-purahéi-ta.* (= (11))
yesterday A1sg-sing-FUT [E]
- b. $[[\forall w' (w' \in best(MB, OS, \langle w^*, rt \rangle))$
 $\rightarrow \exists t'(\underline{rt} < t' \ \& \ sing'(sp)(t', w') \ \& \ t' \subseteq \underline{yesterday'_{now}})]]^{M.g,i,j,w}$

The analysis of *-ta* also correctly predicts that examples like (32) where *-ta* co-occurs with a past-time denoting temporal adverb are not infelicitous in *all* contexts. Since the semantics given for *-ta* in (30) does not constrain the location of the reference time with respect to the utterance time, it correctly predicts that *-ta* can express future time reference with respect to contextually given past times. When it does, as in the examples given in the preceding section, the semantics of *-ta* can be reconciled with that of a past time adverb. (33) is an example with a (non-deictic) past time adverb:

- (33) Context: A Paraguayan friend complains that I returned to Paraguay later than I said I would the last time we saw each other.

Ere ambue arý-pe ché-ve e-jú-**ta**-ha-gue octúbre
 A2sg.say other year-at B1sg-to A2sg-return-FUT-NOM-NOM.PAST October
 ñepyrû-há-pe.
 beginning-NOM-at

‘You told me last year that you would return (last) October.’

[E]

In this example, the co-occurrence of *-ta* with a past time denoting adverb is felicitous since the eventuality denoted by the embedded clause can be temporally located in the future of the (past) reference time while simultaneously satisfying the requirement that it be located at the past time denoted by *octúbre ñepyrû-há-pe* ‘beginning of (last) October’.

4. Implicated counterfactuality

The analysis of *-ta* developed in the previous section correctly predicts a counterfactual interpretation that arises when *-ta* co-occurs with the past time adverbs *kuri* or *va’ekue*. While *-ta* is incompatible with past-time denoting adverbs such as *kuehe* ‘yesterday’ in contexts with a present reference time (cf. (11)), it may co-occur with the past-time adverbs *kuri* and *va’ekue*. The discussion here is limited to *kuri*, which is illustrated in (34).

- (34) Context: José extended a picnic blanket over the cricket’s cave.

Ha kirikiri ho’u **kuri** hña peteĩ togue kyrÿi, i-karú-pyhare.
 and cricket A3.eat back.then PROG one leaf tender B3-food-night

‘And the cricket was eating a tender leaf, its dinner.’

[C]

Not: ‘And the cricket is eating a tender leaf, its dinner.’

(34) occurs in a discourse context with a past reference time. The adverb *kuri* locates the (progressive) eventuality of the cricket eating its leaf relative to this past reference time. Consultants reject examples with *kuri* in contexts with a present reference time.

As expected, sentences in which *-ta* co-occurs with *kuri* receive an interpretation where the eventuality denoted by the verb (and its dependents) is located in the future of the past reference time. Additionally, a counterfactual implicature can arise. In the discourse context given in (35), for example, the speaker conveys that at a past time there was an expectation that it would rain in the relative future. The example also implicates that, although there was an expectation that it would rain, it did not rain. Evidence for this counterfactual implicature is that consultants will often offer a spontaneous continuation of examples where *-ta* and *kuri* co-occur that states the non-occurrence of the eventuality. After uttering (35), for example, several of my consultants offered the continuation in (35a) when asked to consider whether (35) was felicitous in the discourse context given. That this counterfactual implication is merely an implicature is shown by the fact that consultants will also accept continuations such as (35b), which asserts that it did, in fact, rain.

- (35) Context: I am in Paraguay and wondering whether it will rain later today. A friend tells me that according to the weather report two days ago...
- Kuehe o-ký-**ta** **kuri**.
yesterday A3-rain-FUT back.then
‘It was going to rain yesterday.’ [E]
- a. ...ha nd-o-ky-i.
...and NEG-A3-rain-NEG
‘...but it didn’t rain.’ [spontaneously volunteered]
- b. ...ha o-ky.
...and A3-rain
‘...and it rained.’ [E]

(36) is a naturally occurring example where *-ta* and *kuri* co-occur. What is implicated here is that the girl lost her hand, but the remainder of the story shows that she did not lose it.

- (36) Context: “When I cleaned her wound I tried not to show her how badly it looked.”
- O-ñe-hundí-**ta** chu-gui la i-po **kuri**
3-je-lose-FUT 3-ABL the B3-hand back.then
‘She was going to lose her hand.’ [C]

Both *kuri* and *va’ekue* are analyzed in Tonhauser (2006) as temporal adverbs that are anaphoric to a past reference time, similar to the English adverb *back then*. I assume here that the two adverbs shift the reference time to a past time. This analysis accounts for why *kuri* but not *kuehe* ‘yesterday’ can co-occur with *-ta* in out-of-the-blue contexts: in such contexts, *kuri* locates the reference time in the past of the utterance time but it does not affect the temporal relation between the eventuality time and the reference time, which is constrained by *-ta*. The adverb *kuehe* ‘yesterday’, on the other hand, locates the eventuality time at a time in the past of the reference time when it co-occurs with *-ta*; this conflicts with the constraint introduced by *-ta* that the eventuality time is in the future of the reference time. The co-occurrence of *kuehe* ‘yesterday’ and *-ta* is only possible (without *kuri*) in contexts like (33) where the reference time is in the past of the utterance time.

Previous researchers have called *kuri* a past tense (e.g. Nordhoff 2004) or a (recent) past marker (e.g. Gregores and Suárez 1967; Liuzzi and Kirtchuk 1989) since it requires a past time interpretation of the utterance it occurs with, cf. (34). Tonhauser (2006) argues that *kuri* and *va’ekue* are not past tenses even though they locate the reference time in the past of the utterance time since they are not part of the verbal paradigm but rather temporal adverbs (cf. also Tonhauser 2009c). Both *kuri* and *va’ekue* occur very infrequently in naturally occurring discourse and only in those contexts where past time reference is not sufficiently established contextually. This is the case at the beginning of stories where no past time has yet been introduced, as in (37a), and in contexts where the discourse context has shifted the reference time into the present or a more recent past; in such examples, *kuri* locates an eventuality at a previously mentioned (more distant) past time, cf. (37b).

- (37) a. O-ĩ-je **kuri** upe kyju kapi’ipé-pe peteĩ ka’are-gúy-pe.
A3-be-SAY back.then that cricket grass-in one medicinal.plant-under-at
‘It is said that there once was a cricket in grass under a medicinal plant.’ [C]

- b. Context: The boy and his dog gave up on catching the frog and went home. Once at home, they are taking a bath, and the boy sees the frog sitting in the door. The little boy says:
 Mba'é-piko pea heta ña-ñe-ha'ã **kuri** ja-guerú-haguã
 what-EMPH that much B1pl.incl-JE-try back.then A1pl.incl-bring-PURP
 ñané-ndive.
 B1pl.incl-with
 'How much did we try to bring him with us (and now he comes voluntarily).' [C]

I analyze *kuri* as constraining the location of the reference time to a past time. In contexts like (37a) where no past time is contextually available, the existence of such a past reference time is accommodated.

(38) Lexical entry of *kuri*: $kuri : S \setminus S : [[\lambda p_{\tau} [rt < now \ \& \ p]]]^{M,g,i,j,w}$

According to this semantics, (39a) is correctly interpreted as locating the reference time, relative to which the speaker's singing is located according to the Aktionsart of the proposition, at a time in the past of the utterance time, as illustrated in (39b).¹²

- (39) a. A-purahei **kuri**.
 A1sg-sing back.then
 'I sang/was singing.' [E]
- b. $[[[(39a)]]]^{M,g,i,j,w} = [[kuri(\text{NON-FUT}(a\text{-purahei}))]]^{M,g,i,j,w}$
 $= [[kuri(\text{sing}'(sp)(rt, w^*) \ \& \ rt \leq now)]]^{M,g,i,j,w}$
 $= [[rt < now \ \& \ \text{sing}'(sp)(rt, w^*)]]^{M,g,i,j,w}$

In examples where *-ta* and *kuri* co-occur, *kuri* outscopes *-ta* since *kuri* applies to expressions of category S. Consider the interpretation of the example in (35) in (40), where *kuri* also outscopes the temporal adverb *kuehe* 'yesterday' and thus correctly requires the raining eventuality to have been predicted to occur at a time within yesterday:

- (40) $[[[(35)]]]^{M,g,i,j,w}$ is defined for a circumstantial modal base (with an ordering source that specifies the agent's intentions) or an epistemic modal base (with stereotypical ordering source). If defined,
 $[[[(35)]]]^{M,g,i,j,w} = [[kuri(-ta(kuehe(o-ky)))]]^{M,g,i,j,w}$
 $= [[kuri(\forall w' (w' \in \text{best}(MB, OS, \langle w^*, rt \rangle))$
 $\quad \rightarrow \exists t'(rt < t' \ \& \ \text{rain}'(t', w') \ \& \ t' \subseteq \text{yesterday}'_{now}))]]^{M,g,i,j,w}$
 $= [[rt < now \ \& \ \forall w' (w' \in \text{best}(MB, OS, \langle w^*, rt \rangle)$
 $\quad \rightarrow \exists t'(rt < t' \ \& \ \text{rain}'(t', w') \ \& \ t' \subseteq \text{yesterday}'_{now}))]]^{M,g,i,j,w}$

According to this analysis, (35) is true at the utterance time in the speech world if and only if the reference time is in the past of the utterance time and, in all worlds w' that are best

¹² Since *kuri* is acceptable in sentences with unmarked verbs and in sentences with verbs marked with *-ta*, I assume that *kuri* co-occurs (redundantly) with the NON-FUT operator in the interpretation of sentences like (39b) to be able to give a uniform analysis to *kuri*.

with respect to the modal base and the ordering source in the speech world and at the reference time, there is a time *t'* in the future of the reference time and included in the denotation of *kuéhe* ‘yesterday’ at which it rains. Since the actual world is not necessarily among the worlds quantified over (e.g. if the actual world is not one that develops stereotypically), (35) does not entail that it rained yesterday in the actual world but is not false in such a situation either. I argue that the counterfactual implicature arises from Grice’s Maxim of Quantity 1 (“Make your contribution as informative as is required for the current purposes of the exchange”) in this context where the (non)occurrence of rain is relevant. Here’s how the hearer calculates the implicature: The (competent) hearer assumes that the speaker knows whether or not it rained yesterday (since (35) is uttered by a farmer) and knows that (35) asserts that there was an expectation that it would rain yesterday. The hearer also knows that the factual “It rained yesterday” would have been a more informative assertion in a more succinct form, and that the (competent) speaker knows this. The hearer can assume that the speaker knows that he infringed on the Manner Maxim (specifically “Be brief”) by not uttering “It rained yesterday”, and that he did this to avoid infringing on the Maxim of Quality 1 (“Say only what you believe to be true”); hence, if the (non-)occurrence of rain was relevant, the speaker presumably couldn’t make the stronger assertion, i.e. the speaker must know that “It rained yesterday” is not true. The cooperative speaker can be assumed to know that the hearer can come to the conclusion that the speaker meant to convey that “It rained yesterday” was not true. Hence, the hearer also assumes that it did not rain yesterday.

In sum, Guaraní utterances in which the future marker *–ta* co-occurs with an adverb that locates the reference time in the past of the utterance time may give rise to a counterfactual implication. This is similar to English utterances like (*If Charlie had kept his king, he might have won the game*, analyzed by Condoravdi (2002) as implicating a counterfactual interpretation on the basis of the past-shifting meaning of the perfect and the metaphysical (possibility) modal meaning of *might*. The counterfactual implicatures of these English and Guaraní utterances thus do not depend on the semantics of particular morphosyntactic expressions but can emerge cross-linguistically from the combination of related but slightly different meanings of language-particular expressions: the backward shift is expressed by an aspect marker in English and by a temporal adverb in Guaraní, and the forward shift by a (possibility) modal in English and a prospective aspect with a necessity modal meaning in Guaraní.

The next section concludes the paper by comparing Guaraní *–ta* to other future markers that express the modal meanings of intention and prediction.

5. The Guaraní future marker *–ta* in cross-linguistic perspective

One of the key differences between Guaraní and European languages such as English is that Guaraní does not have tenses, i.e. paradigmatic expressions that locate the reference time with respect to the utterance time. One way in which this difference manifests itself is that the Guaraní future marker *–ta* can express future time reference from the perspective of both past and present reference times, while e.g. English has the future auxiliaries *will* and

would, which are generally analyzed as differing in their tense contribution (e.g. Abusch 1997, 1998; Kaufmann 2005). Another difference between Guaraní *-ta* and the English auxiliary *will* is that although both can convey the modal meanings of intention and prediction, *-ta* is more limited than *will*. As illustrated in section 3.1, *-ta* does not realize future time reference with deontic modality, and the elicited examples in (41) to (43) show that *-ta* also does not realize present time reference with epistemic or dispositional modality. (Such meanings were also not attested in naturally occurring data.) Take (41): English *will*, just like German *wird* and the Spanish synthetic future, can be used in the context of (41) to express that the child is at the friend's house at the utterance time in the worlds epistemically accessible from the perspective of the speaker. Guaraní *-ta* is judged unacceptable in this context, cf. (41d); instead, the modal markers *-ne* 'MIGHT' or *-va'erã* 'MUST' are used, as illustrated in (41e).

- (41) Context: I try to soothe my friend whose child hasn't come home from school yet.
- a. He'll be with his friend.
 - b. **Estará** con su amigo. (Spanish)
be.3.FUT with his friend
'He'll be with his friend.'
 - c. Er **wird** bei seinem Freund sein. (German)
he will at his friend be
'He'll be with his friend.'
 - d. #**Oi-mé-ta** iñ-angirû-ndive. (Guarani)
A3-be-FUT B3-friend-with
(Intended: He'll be with his friend.) [E]
 - e. **Oi-mé-ne/Oi-me-va'erã** iñ-angirû-ndive. (Guarani)
A3-be-MIGHT/A3-be-MUST B3-friend-with
'He might/must be with his friend.' [E]

(42) presents another example of this kind:

- (42) Context: We know that Paula, the neighbor, has a gun. From time to time she shoots into the sky to scare off people and animals. A consultant and I are sitting in front of the house working when we hear a gun shot. My consultant says:
- a. **Páula-ne** hĩna.
Paula-might PROG
'That might be Paula.' [E]
 - b. #**Páula-ta** hĩna
Paula-FUT PROG
(Intended: That'll be Paula.) [E]

English *will* and its past tense version *would* are also compatible with a dispositional conversational background, such as the English translation in (43a) (cf. Palmer 1987, Sarkar 1998, Copley 2002). In Guaraní, this meaning is conveyed with an unmarked verb (43a) and my consultants reject the version in (43b) where the verb is marked with *-ta*.

- (43) Context: When my sister was small she had a strange habit.
- a. Oi-ke mesa-guý-pe ha o-herei mesa-guy.
 A3-enter table-under-at and A3-lick table-under
 ‘She sat/would sit under the table and lick its underside.’ [E]
- b. #Oi-ké-ta mesa-guý-pe ha o-herei mesa-guy.
 A3-enter-FUT table-under-at and A3-lick table-under
 (Intended: She would sit under the table and lick its underside.) [E]

Guaraní *-ta* shares the inability to express present time reference with the St’át’incets future marker *kelh*, a second position clitic analyzed in Matthewson (2006) and Matthewson et al. (2006). Guaraní *-ta* and St’át’incets *kelh* also share the property of realizing future time reference in both present and past contexts, as illustrated for St’át’incets in (44a,b) and (44c), respectively.¹³

- (44) St’át’incets
- a. matq kelh [kw s-Mary]
 walk WOLL [DET NOM-Mary]
 ‘Mary will walk.’ (Matthewson 2006:691)
- b. sáy’séz’-lkhán kelh
 play-1SG.SUBJ *kelh*
 ‘*I played/*I am playing/I will play.’ (Matthewson 2006:678)
- c. Context: Dad and Uncle Jack were talking to Uncle Ben. They all decided that the men and John would go out to the fish rock in the morning and catch some salmon.
 nilh *kelh* aylh s-wa7-s ts’zús-wit k’úl’-em ku
 FOC WOLL then NOM-IMPF-3POSS busy-3PL make-MID DET
 cwík’-em-althw i sqáycqyecw-a
 butcher.fish-MID-place DET.PL man(PL)-DET
 ‘After that, they would get busy building the new drying rack.’
 (Narcisse 1994:4, as given in Matthewson 2006:692)

Matthewson (2006) analyzes *kelh* as a future-oriented modal since it patterns with other modals in the language in being compatible with both existential and universal quantificational force, and lexically specifying the conversational background. In Matthewson et al. (2006), *kelh* is analyzed as presupposing a circumstantial conversational background:

- (45) $[[kelh \varphi]]^{w,t,c}$ is only defined if $B(c)$ is circumstantial.
 If defined, $[[kelh \varphi]]^{w,t,c} = 1$ iff for all/some worlds $w' \in B(c)(w, t)$, there is a time $t' > t$ such that $[[\varphi]]^{w',t',c} = 1$.

A difference between this analysis of *kelh* and that of Guaraní *-ta* is that the former is only felicitous in contexts with a circumstantial conversational background and that, according

¹³ Matthewson (2006) explains the following glosses for the St’át’incets examples: DET = determiner, IMPF = imperfective, MID = middle, NOM = nominalizer, PL = plural, POSS = possessive, SG = singular, SUBJ = indicative subject.

to Matthewson (2006:701), “*kelh* does not convey mental states such as expectation, desire or intent”. But examples like those in (44a) and (44b) suggest that St’át’imcets *kelh* is at least compatible with the modal meanings of prediction/expectation and intention, respectively. Whether this is the case, or *kelh* perhaps even entails these meanings like Guaraní *-ta*, is a question for future research.

To conclude, future markers differ cross-linguistically in (i) which modal meanings they are compatible with (or entail), and (ii) whether future time reference is entailed or not. Comparing the temporal and modal meanings of English *will/would*, St’át’imcets *kelh* and Guaraní *-ta* shows that the meaning of *-ta* is the most restrictive of these future markers since *-ta*, unlike *will/would*, entails future time reference and is only compatible with the modal meanings of intention and prediction/expectation, and, unlike *kelh*, only has universal quantificational force. Thus, exploring the semantics of Guaraní *-ta* has revealed yet another way in which future time reference and modal meaning can be bundled together in a natural language future marker. This result from Guaraní contributes to our (growing) picture of what is (im)possible in (future) temporal and modal reference in natural languages. Many more detailed formal semantic studies of future markers in a typologically diverse set of languages are needed, however, to develop truly cross-linguistic theories of (temporal) semantics and assess the cross-linguistic applicability of existing theories.

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