

Encoding Time in Tenseless Languages: The View from Zapotec

Maziar Toosarvandani

1. Introduction

Many Western American indigenous languages are tenseless, lacking verbal inflection that relates the time of an event or state to the utterance time. Northern Paiute, to name one such language, can describe an eventuality that overlaps the speech time (1a) or precedes it (1b) with a single verb form.

(1) *Northern Paiute*

a. (Mino'o) *t̥i=kaadzi madabbui-winni.*

now REFL=car **fix-PROG**

'They **are fixing** their car (now).'

b. (Idzi'i) *t̥i=kaadzi madabbui-winni.*

yesterday REFL=car **fix-PROG**

'They **were fixing** their car (yesterday).'

(Toosarvandani 2017:567–569)

Under many contemporary accounts, the variation between tenseless languages and their tensed counterparts is mostly superficial. In both types of languages, finite clauses are thought to be anaphoric to a contextually salient time, which serves to temporally locate the eventuality. If this *topic time* is retrieved by tense, as in referential theories of tense (Partee 1973, 1984; Kratzer 1998), then so-called tenseless languages would also have tense, even if it was never pronounced.

In St'át'imcets, for instance, Matthewson (2006) proposes that a silent tense refers to a topic time located at or before the utterance time. This non-future tense is discernible from its alternation with an overt marker of futurity (see also Jóhannsdóttir and Matthewson 2007 on Gitksan). For other languages, a silent tense has been posited whose reference is not restricted in any way, e.g., in Yucatec Maya (Bohnemeyer 2009), Washo (Bochnak 2016), and Northern Paiute (Toosarvandani 2016, 2017). When tense is not pronounced, it seems reasonable that its referential potential should be less restricted in this way. Without explicit morphological cues, the language learner would likely not be able to posit anything richer than a binary tense distinction (e.g., overt future vs. covert non-future).

What could underlie this semantic uniformity? The topic time is often taken to play a privileged role in the dynamics of information exchange. Klein (1994:4) identifies it as the time "to which a speaker's claim on [an] occasion is confined." And Kratzer (2014) relates the topic time to an Austinian topic situation, or the state of affairs that an utterance is about. Whatever the ultimate source of this uniformity, it can be stated as a putative linguistic universal.

(2) *Topic Time Universal*

In all languages, finite sentences are interpreted relative to a topic time.

* University of California, Santa Cruz, mtoosarv@ucsc.edu. I am extremely grateful to Fe Silva Robles and two other speakers of Zapotec, as well as to Isidro Vázquez Jerónimo, Raul Díaz Robles, and Rosario Reyes Vázquez, for their generosity in teaching me about their language. I would also like to thank the audience at WCCFL 38 for their thoughtful questions and comments. This research was supported by a Faculty Research Grant awarded by the Committee on Research from the University of California, Santa Cruz.

This universal might seem too trivial to deserve special mention. Indeed, von Stechow and Matthewson (2008), who contemplate several semantic universals making reference to a topic time, never consider one that mandates its existence in the first place.

But it is easy to imagine ways that a language could do without a topic time. One particularly interesting way has been suggested recently by Pancheva and Zubizarreta (2020) for Paraguayan Guaraní, which they argue completely lacks tense.¹

(3) *Paraguayan Guaraní*

a. Ko'ãga a-**jahu**.

now A1SG-**bathe**

'I **am bathing** right now.'

b. Kuehe a-**jahu**.

yesterday A1SG-**bathe**

'Yesterday, I **bathed/was bathing**.'

(Tonhauser 2011b:260)

Pancheva and Zubizarreta propose that finite clauses in Guaraní locate an eventuality at a contextual time parameter, which by default is the time of utterance, as in (3a). To describe a past eventuality, as in (3b), this “now” is shifted by the same mechanism that enables the present tense, in languages that have it, to describe past eventualities (cf. Schlenker 2004; Eckardt 2015; Anand and Toosarvandani 2017, 2018).

How common are such topic-time-less temporal systems in the world's languages? And how can we tell whether a language even has a temporal system like this in the first place? I will explore these questions from the perspective of Sierra Zapotec, a closely related group of Zapotec varieties from the southeastern Sierra Norte of Oaxaca, Mexico.² Like Guaraní and the other languages mentioned, it is morphologically tenseless.

(4) *Sierra Zapotec*

a. Na'a⁴ **dzul**⁴ Pe²dro⁴.

now CONT.**sing** Pedro

'Pedro **is singing** now.'

(FA/RM, GZYZ028, 6:15)

b. (Bi¹ dzunh²³ Ma¹ria¹ ka²te'⁴ blhe'e¹⁴du'⁴ba'³ ne⁴je²? 'What was Maria doing when you saw her yesterday?')

Dzul⁴=ba'³.

CONT.**sing**=3.HU

'She **was singing**.'

(FA/RM, GZYZ067, 42:50)

There are some initial reasons to think Sierra Zapotec shares a temporal system with Guaraní. Pancheva and Zubizarreta identify an interpretive restriction on future marking, which they take to indicate the absence of a topic time. In Guaraní, while the future marker can locate eventualities in the future of the utterance time, it cannot do so readily relative to a past time. This restriction on a *future-in-the-past* reading is also found in Sierra Zapotec, which is natural if eventualities are directly related to the “now.”

Despite this similarity, I argue that Sierra Zapotec's temporal system must make reference to a topic time. This diagnosis is informed by the temporal organization of narratives in the language. The temporal relations attested between sentences are more flexible than what would be allowed solely by shifting the

¹ There are other accounts of tenseless languages as truly lacking tense, including Ritter and Wiltschko's (2005) accounts of Blackfoot and Halkomelem (though see the response by Reis Silva and Matthewson (2007) for Blackfoot).

² The data presented here are based on the judgements of three Zapotec speakers from the towns of San Sebastián Guiloxi, Santiago Laxopa, and Santa María Yalina who now reside in California (Santa Cruz and Los Angeles). Their varieties are all highly mutually intelligible and are most closely related to the Zapotec spoken in San Bartolomé Zoogocho (Long 1993; Long and Cruz 2000; Sonnenschein 2004). I have worked with all three speakers almost continuously since 2016, meeting with them every week on average.

“now” of the context. Thus, finite sentences in the language must be interpreted relative to a topic time. Since this requires a different explanation for the interpretative restriction on future marking, I suggest that future-in-the-past readings are restricted, at least in Sierra Zapotec, for the same reason that certain epistemic modals have limited past temporal perspective (Abusch 1997; Hacquard 2011; Rullmann and Matthewson 2018, among others).

On the surface, the temporal system of Sierra Zapotec looks quite different even from other Western American indigenous languages. Verbs inflect for one of several “aspects” (their traditional name) with a lexically-conditioned combination of prefixes, stem suppletion, and tones. But underneath this morphology lies a temporal semantics that is organized along more familiar lines, conforming to the Topic Time Universal. This result, which is motivated by the temporal interpretation of narratives, shows the need for increased attention to narratives, in tensed languages and tenseless languages alike, to understand how time is encoded in human language.

2. Doing without a topic time

In standard theories of temporality, tense relates a *topic time* to a temporal perspective point, which canonically is the time of utterance (Klein 1994, cf. Reichenbach 1947). In referential theories of tense, it does this much like a pronoun, referring to a contextually salient topic time restricted by the appropriate presupposition (Partee 1973, 1984; Kratzer 1998).

- (5) *Tense (English, ...)*
- a. $\llbracket \text{PRES}_i \rrbracket^{c,g} = g(i)$; defined iff $g(i) \subseteq \text{TIME}(c)$
 - b. $\llbracket \text{PAST}_i \rrbracket^{c,g} = g(i)$; defined iff $g(i) < \text{TIME}(c)$

Aspect establishes a relation between the topic time and the eventuality described by the verb phrase. The common aspects, perfective and imperfective, have the following (simplified) lexical entries:

- (6) *Aspect (English, ...)*
- a. $\llbracket \text{PFV VP} \rrbracket^{c,g} = \lambda t \exists e . \llbracket \text{VP} \rrbracket^{c,g}(e) \wedge \tau(e) \subseteq t$
 - b. $\llbracket \text{IMPF VP} \rrbracket^{c,g} = \lambda t \exists e . \llbracket \text{VP} \rrbracket^{c,g}(e) \wedge \tau(e) \supset t$

Under the accounts described above, while tenseless languages might have the aspects in (6a–b), they would have silent tenses that refer to a topic time with few or no restrictions.

- (7) a. *Tense (St’át’imcets, Gitksan, ...)*
 $\llbracket \text{NFUT}_i \rrbracket^{c,g} = g(i)$; defined iff $g(i) \leq \text{TIME}(c)$
- b. *Tense (Yucatec Maya, Washo, Northern Paiute, ...)*
 $\llbracket \text{TNS}_i \rrbracket^{c,g} = g(i)$

The differences between tensed and tenseless languages would thus be almost entirely superficial: in both, finite clauses would be anaphoric to a topic time.

Pancheva and Zubizarreta (2020) argue that Guaraní lacks the tenses in (7) altogether, locating eventualities in the present or past without making reference to a topic time.³ Their account has three ingredients:

1. Aspect relates an eventuality directly to the time of a context via a deictic pronoun in the left periphery (cf. Kusumoto 1999).
2. This pronoun picks out the time of an *assessment context*, not the *utterance context*, in a bicontextual semantics (Schlenker 2004; Sharvit 2008; MacFarlane 2014).

³ This diverges from earlier work on Guaraní. Thomas (2014) posits a silent tense for the language, while Tonhauser (2011b) proposes that finite clauses in the language are anaphoric to a topic time, though this is not via tense.

3. The assessment time can be shifted into the past, subject to certain constraints (Schlenker 2004; Eckardt 2015; Anand and Toosarvandani 2017, 2018).

This account relies crucially on the interpretive freedom enabled by adding an assessment context. So we should start by motivating the first two ingredients above, before turning to the third ingredient.

2.1. A bicontextual semantics for tense

Not all tenses are as well behaved as their familiar semantics in (5) would suggest. The simple present in English, for instance, can describe eventualities located not just at the speech time, but also anterior to the speech time.

- (8) Inez, the maid, **brings** in lunch on a tray, one rare hamburger, one cheeseburger and a glass of tomato juice. Jane **tastes** the tomato juice. “Oh,——!” she **says**. “It’s diet.”
(Tom Wolfe, “The Girl of the Year”)

The simple present’s *historical* (or *narrative*) use is easy to identify, since it does not exhibit the stativity restriction that characterizes more canonical uses. When the simple present describes an eventuality overlapping the utterance time, it is incompatible with eventive predicates (under an episodic interpretation).

- (9) a. Josie **owns** the farm. *stative*
 b. # Josie **reads** the newspaper.
 Intended: ‘Josie is reading the newspaper now.’ *accomplishment*
 c. # Josie **plays** the violin.
 Intended: ‘Josie is playing the violin now.’ *activity*

By contrast, the historical present is used for just this purpose, to describe events, as (8) illustrates. With the semantics in (5a), such uses should be impossible, because the present tense would not refer to a topic time located at the utterance time.

Recent work aims to unify these different uses by making tense sensitive to a time coordinate distinct from the time of the utterance context (Schlenker 2004; Eckardt 2015; Anand and Toosarvandani 2017). I will present Anand and Toosarvandani’s implementation of this idea here, since it accounts for the lack of a stativity restriction with the historical present and can straightforwardly be embedded in a theory of discourse structure. Like its alternatives, it appeals to two contexts, which we can call an *utterance context* (u) and an *assessment context* (a), following MacFarlane (2014).

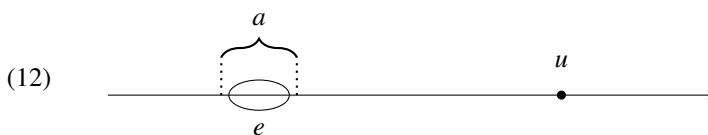
Linguistic expressions are interpreted relative to both contexts, though they vary in how they are sensitive to features of these contexts. Tense is sensitive to the time of the assessment context, while indexical pronouns are sensitive to coordinates of the utterance context (cf. Sharvit 2008).

- (10) *Tense in a bicontextual semantics (English,...)*
 a. $\llbracket \text{PRES}_i \rrbracket^{u,a,g} = g(i)$; defined iff $g(i) \subseteq \text{TIME}(a)$
 b. $\llbracket \text{PAST}_i \rrbracket^{u,a,g} = g(i)$; defined iff $g(i) < \text{TIME}(a)$
- (11) *Pronouns in a bicontextual semantics*
 a. $\llbracket \text{I} \rrbracket^{u,a,g} = \text{SPEAKER}(u)$
 b. $\llbracket \text{you} \rrbracket^{u,a,g} = \text{ADDRESSEE}(u)$

In principle, these contexts can be identical or diverge.⁴ As Schlenker (2004) proposes, the different tense uses arise based on the relation between the time coordinates of the two contexts. When the assessment

⁴ In Sharvit’s (2008) account of free indirect discourse, they diverge in the scope of an operator quantifying over assessment contexts.

and utterance times are identical, the canonical present arises; when the assessment time precedes the utterance time, the historical present results.



Thus, even the present tense describes a past eventuality when the assessment time is shifted in this way.

This account also provides a way of understanding the historical present's compatibility with eventives. The stativity restriction is often grounded in the idea that the utterance event is conceived of as instantaneous (Bennett and Partee 1978:10; Cowper 1998:6; among others). With the semantics for present tense in (10a) and perfective aspect in (6a), the simple present would have to locate an event inside the assessment time. But this is not possible with the canonical present, when the assessment time is identical to the utterance time, because the event is too wide. For the historical present, the assessment time is unmoored from the utterance time, and so can be wide enough to accommodate an event.

2.2. Present and past without a topic time

Under Pancheva and Zubizarreta's account, this flexibility in the assessment time's location is what enables Guaraní to describe not just present eventualities, but also past ones. Without tense, though, the assessment time must be accessed in some other fashion. This happens via an indexical pronoun in the left periphery that picks out the assessment time.⁵ In a tensed language, this pronoun would provide tense with an evaluation time (cf. Kusumoto 1999, among others). But in Guaraní, the pronoun instead feeds a time to aspect. Consider the following logical form for the sentences in (3a–b) above:⁶

$$(13) \quad \boxed{\text{TIME}(a)} \left[\text{[}_{(TP)} \quad \left[\text{AspP } \lambda t \exists e. \text{bathe}(\text{SPEAKER}(u))(e) \wedge \tau(e) \circ t \right] \right] \quad = (3a-b)$$

Aspect relates an eventuality directly to the assessment time. (A semantically-vacuous tense head may or may not be present.) Thus, (13) describes a present eventuality when the assessment and utterance times are identical; it describes a past one when the assessment time precedes the utterance time.

An argument for the topic-time-less account of Guaraní comes from certain interpretive restrictions on the future marker *-ta*. Tonhauser (2011a:212) observes that when the suffix appears in a root clause out of the blue, it can only describe an eventuality in the future of the utterance time (14a). It cannot have a *future-in-the-past* reading (14b).

- (14) a. Kalo o-**purahéi-ta** (ko'ẽro).
 Kalo 3-**sing-FUT** tomorrow.
 Intended: 'Kalo **will sing** (tomorrow).' (Pancheva and Zubizarreta 2020:274)
- b. # Kuehe Kalo o-**purahéi-ta**.
 yesterday Kalo 3SG-**sing-FUT**
 Intended: 'Kalo **was going to sing** yesterday.' (Pancheva and Zubizarreta 2020:277)

Tonhauser (2011a:217) observes, however, that a future-in-the-past reading becomes available in non-initial clauses of a narrative. In (15a), the bringing event is located after the past telling event.

⁵ In fact, Pancheva and Zubizarreta assume the pronoun can pick out the time of either context. For consistency with preceding work, I have reframed this aspect of their account, so that the pronoun is always indexical to the assessment time.

⁶ The language does not obligatorily mark aspect. While a present event can only be understood as ongoing, past events can be either perfective or imperfective (Tonhauser 2011b:263–265).

- (15) a. *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.’ (Tonhauser 2011a:217)
- b. Kuehe, a-ha Elsa róga-pe ha nd-a-ikatú-i a-ñe’ẽ hendive.
 yesterday 1SG-go Elsa house-LOC and NEG-1SG-can-NEG 1SG-talk with-her
 O-**sẽ-ta**; o-japurái etereí.
 3SG-**go-PROSP** 3SG-hurry SUP
 ‘Yesterday, I went to Elsa’s house and I was not able to talk with her. She **was about to leave**; she was very much in a hurry.’ (Pancheva and Zubizarreta 2020:278)

A future-in-the-past reading also becomes available in the non-initial coordinate of a coordination (15b).

If Guaraní had tense, this restriction would be unexpected. Ignoring some details, the future suffix would locate an eventuality in the future of the topic time, as shown in the schematic lexical entry below.

$$(16) \quad \llbracket -ta \text{ VP} \rrbracket^{c,s} = \lambda t \exists e. \llbracket \text{VP} \rrbracket^{c,s}(e) \wedge t < \tau(e)$$

But this incorrectly predicts, then, that (14b) should be acceptable. If the topic time is retrieved anaphorically, the availability of a future-in-the-past reading should simply be a matter of finding a suitable time in the past. If this is possible for the bare verb in (3b), then it should also be possible in (14b).

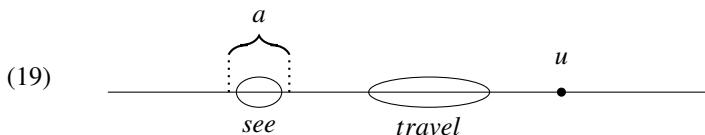
This interpretive restriction on future marking, which we can state as the generalization in (17), is a problem for any account of Guaraní that appeals to an anaphorically retrieved topic time.

- (17) *Future-in-the-Past Generalization (FPG)*
 A future-in-the-past reading is not available in a root clause outside of narratives.

If Guaraní did not make reference to a topic time, then the FPG could be derived from how the assessment time can be shifted. Under Pancheva and Zubizarreta’s assumptions, the future suffix locates an eventuality in the future of the assessment time, as in the following logical form for (15a):

$$(18) \quad \llbracket \text{TIME}(a) \llbracket_{(TP)} \llbracket_{\text{ASP}} \lambda t \exists t' \exists e. \mathbf{bring}(g(8))(g(3))(e) \wedge \tau(e) \circ t' \wedge t < t' \rrbracket \rrbracket \rrbracket = (15a)$$

If the assessment time is shifted into the past after the first sentence in a narrative, then a future-in-the-past reading will be available for all subsequent discourse segments in (15a). A similar analysis of (15b) is possible if the coordination constitutes a narrative. In both cases, the future suffix is able to locate an eventuality after the assessment time and before the utterance time.



The FPG could be derived, then, by restricting when assessment time shift can happen. Some constraints would be needed that restrict the assessment time for future-marked sentences outside of a narrative. Below I discuss what shape these constraints might take, but first we should take a look at Sierra Zapotec.

2.3. The view from Zapotec

Sierra Zapotec lacks overt tense morphology. For each verb, several lexically-conditioned combinations of prefixes, stem suppletion, and lexical tone mark what are called “aspects” in the traditional literature. This description is more or less correct for at least the “*completive*,” which conveys perfective aspect, and the “*continuative*,” which conveys imperfective aspect.

- (20) “*Completive*” (*perfective aspect*)
 Ne⁴je² **bil**⁴ Pe²dro⁴.
 yesterday **COMP.sing** Pedro
 ‘Pedro **sang** yesterday.’ (FA/RM, GZYZ028, 21:40)
- (21) “*Continuative*” (*imperfective aspect*)
 Na’a⁴ **dzul**⁴ Pe²dro⁴.
 now **CONT.sing** Pedro
 ‘Pedro **is singing** now.’ (FA/RM, GZYZ028, 6:15)

By default, the continuative describes an eventuality at the speech time, though it can also describe past eventualities, as in (4b). The completive only describes past events, regardless of the predicate’s aktionsart.⁷ This default interpretation is perhaps expected for the same reason that the simple present in English is restricted to statives in its canonical use. As discussed in §2.1, if the utterance event is conceived of as instantaneous, then it will be too narrow to contain an event (cf. Smith et al. 2007).

The completive and continuative alternate with a third category, traditionally called the “*potential*,” which is used to describe future eventualities.

- (22) “*Potential*”
 Wxe² **gul**¹ Pe²dro⁴.
 tomorrow **POT.sing** Pedro
 ‘Pedro **will sing** tomorrow.’ (FA, GZYZ028, 7:40)

These three “aspects” are most relevant here, though there are a couple others that have a more restricted distribution. Some verbs also have a “dubitative” form, which describes future events about which the speaker is not certain, a “stative” form, or an “infinitive” form, which appears in embedded clauses (Long and Cruz 2000:425–430, 449–451).

The potential in Sierra Zapotec appears to obey the FPG. In an out-of-the-blue context, the potential can only describe an eventuality in the future of the utterance event (23a). But a future-in-the-past reading becomes available in non-initial clauses of narratives (23b) and coordinations (23c).

- (23) a. # Ne⁴je² **gul**¹ Pe²dro⁴.
 yesterday **POT.sing** Pedro
 Intended: ‘Pedro **was going to sing** yesterday.’ (FA/RM, GZYZ028, 7:57)
- b. Nlle’e²³ bzu²law⁴ gok⁴ yejw⁴. E¹lhua¹ Pe²dro⁴ yelh⁴, perw⁴
 at.night COMP.begin COMP.be rain **POT.clean** Pedro milpa but
 bi⁴tu⁴ blhua¹=ba³=nh.
 NEG COMP.clean=3.HU
 ‘Last night, it started to rain. Pedro **was going to clean** the *milpa*, but he didn’t.’
 (FA/RM, GZYZ080, 39:50)

⁷ Verbs that describe states in the continuative generally have a punctual interpretation in the completive.

- c. Ba² tsda²³ Pe²dro⁴ ts-ja¹-lua¹=ba³ lu² yelh⁴ nha⁴
 already CONT.walk Pedro CONT-AND-clean=3.HU in milpa and
 e¹le¹ed¹⁴=ba³ beh¹⁴.
 POT.see=3.HU snake
 ‘Pedro went to clean the *milpa*, and he **would see** a snake.’ (FA/RM, GZYZ085, 21:34)

This parallel notwithstanding, Sierra Zapotec makes reference to a topic time. The main argument will come from the temporal organization of narratives, which exhibit a flexibility that cannot be accounted for simply by shifting the assessment time. This will depend crucially on constraints on assessment time shift, which are also needed to derive the FPG in Guaraní under a topic-time-less account.

3. Going forwards and backwards

In principle, the location of the assessment time could be entirely free, restricted solely by pragmatic considerations. But there is some evidence, from the temporal interpretation of historical present narratives, that it is tightly constrained. Consider first a sequence of sentences in the simple past in English. These can participate in *narrative progression*, describing a forward-moving sequence of events, as in (24a), or they can be *backshifted* relative to a preceding sentence. In (24b), the meeting can be interpreted as preceding the firing.

- (24) a. *Narrative progression*
 The administration **fired** Mike. He **lost** his house.
 b. *Backshifting*
 The administration **fired** Mike. He **met** with the ambassador.

This interpretive freedom is only available with specific tense forms. Anand and Toosarvandani (2018) observe that, while the historical present permits narrative progression, it forbids backshifting. In (25b), the meeting can only be understood as following the firing.

- (25) a. The administration **fires** Mike. He **loses** his house.
 b. The administration **fires** Mike. He **meets** with the ambassador.

This contrast correlates with the semantics of tense: the past tense permits backshifting and encodes temporal anteriority, while present tense forbids backshifting and encodes temporal simultaneity. This generalization can be derived from the bicontextual semantics of tense in (10), as long as there are some constraints on how the assessment time can be updated across sentences.

3.1. Constraints on assessment time shift

To account for the absence of backshifting with the historical present, Anand and Toosarvandani propose the *Constraints on Assessment Time Shift* (CATS) below.

- (26) *Constraints on Assessment Time Shift* (cf. Anand and Toosarvandani 2018:80)
 A sentence S can be evaluated with respect to contexts u and a such that:
 a. $\text{TIME}(a) := \text{TIME}(u)$, or
 b. $\text{TIME}(a) := t$ such that, for the most recent eventuality e_0 , $\forall t'(t' < t \rightarrow t' < \tau(e_0)) \wedge \forall t'(t' < \tau(e_0) \rightarrow t' < t)$

According to CATS, the only way the assessment time can be unmoored from the utterance time is by aligning its left boundary with the left boundary of the most recent eventuality in the discourse.

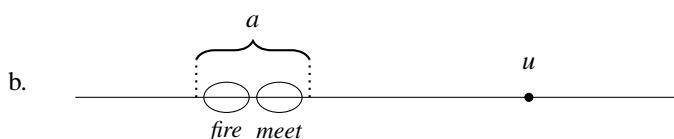
As stated, CATS also prohibits the assessment time from being shifted for any sentence in discourse initial position, when there are no previously described eventualities. Broadly speaking, this is the right

prediction for the historical present, which is infelicitous as the first sentence in a narrative (27a) or in an information-seeking exchange (27b).⁸

- (27) a. # Fifty eight years ago to this day, on January 22, 1944, the Americans **are** preparing to invade Europe.
 b. (*What happened on January 22, 1944?*)
 # On January 22, 1944, the Americans **are** preparing to invade Europe.

At the same time, CATS derives the impossibility of backshifting with the historical present. If the assessment time can be shifted no farther back in time than the most recent eventuality, then the present tense will never be able to describe an event preceding this eventuality. The bicontextual semantics of present tense in (10a) requires temporal inclusion of the topic time in the assessment time, and so only narrative progression (or temporal overlap) will be possible.

- (28) a. The administration **fires** Mike. He **meets** with the ambassador. *no backshifting*



By contrast, the bicontextual semantics for past tense in (10b) locates the topic time *before* the assessment time. Thus, when the assessment time has been shifted to align with the most recent eventuality, the past tense will locate an event even farther in the past.

- (29) a. The administration **fired** Mike. He **met** with the ambassador. *backshifting allowed*



With CATS, it is possible then to derive whether a given tense permits backshifting or not directly from its semantics.

Ideally, CATS would have a source in some deeper principle. In one way of thinking, this is nothing more than salience. The utterance time is always a natural resolution for the assessment time because of the utterance event's inherent prominence. Other than that, the only anchor for the assessment time is the most recent eventuality introduced in the discourse. Simple salience runs into problems, however, with narratives longer than two sentences. In these more complex discourses, a sentence can be related temporally to a discourse segment located farther back in the discourse than the most recent sentence. A long line of research has taken this to show that natural language discourse has a hierarchical structure (Hobbs 1979; Grosz and Sidner 1986; Mann and Thompson 1988, among others). It may be possible to identify a source for CATS in how the assessment time is resolved anaphorically within Segmented Discourse Representation Theory (SDRT; Asher and Lascarides 2003), though a recency constraint is still needed, even if it is defined over hierarchical discourse structures.

Even as an empirical generalization, CATS makes testable predictions about the temporal organization of narratives. It prohibits backshifting with the historical present by ruling out assessment time shift

⁸ This is not literally true. Many novels and short stories simply start with the historical present. Just to name one example, the first sentence of *How Much of These Hills is Gold* (by C. Pam Zhang) is: *Ba dies in the night, prompting them to seek two silver dollars*. So either some explicit material is needed to license the historical present, or a particular start-up context is required. Anand and Toosarvandani (2020) observe that clause-initial adverbials describing narrative events seem to be particularly useful for licensing historical present in initial position: e.g., *In the story, the Americans are preparing to invade Europe*.

While the possibility of backshifting is entirely unexpected under a topic-time-less account, both sequencing possibilities are predicted if finite sentences contain a silent tense. Consider the schematic logical form below, which uses the completely unrestricted tense in (7b).

$$(33) \quad [\text{TIME}(a) [\text{TP } g(i) [\text{AspP } \lambda t \exists e . \llbracket \text{VP} \rrbracket (e) \wedge \tau(e) \subseteq t]]]$$

With no constraints on the topic time, it can be resolved to a time before the assessment time, giving rise to backshifting.¹⁰

3.3. An alternative set of constraints

This argument relies crucially on assessment time shift being tightly constrained, so that the assessment time can only be updated, as CATS states, to the time of the most recently described eventuality. But could the assessment time plausibly be anchored in a different way to allow backshifting without a topic time?

Pancheva and Zubizarreta adopt the constraints in (34), which also do not allow the assessment time to shift just anywhere in the past. Clause (ii) prohibits the assessment time from preceding the time of the most recent eventuality, just like CATS. But clause (i) further restricts when assessment time shift can happen for the first time, *regardless of position in the discourse* (whether in an information seeking exchange (σ_0) or in the initial (σ_1) or subsequent (σ_2, \dots) sentences of a narrative). (Note: t_n is equivalent to $\text{TIME}(a)$, and t_s to $\text{TIME}(u)$.)

- (34) *Evaluation time shift ($t_n \neq t_s$) in free-standing clauses σ_0 and narratives $\sigma_1 \sigma_2$*
- (i) Initial evaluation time shift in σ (whether σ_0 , σ_1 , or σ_2 when the evaluation time in σ_1 is t_s) may not precede the time of σ 's event: $t_n \not\prec \tau(e)$.
 - (ii) Evaluation time shift in σ_2 may not precede the time of σ_1 's event: $t_{n2} \not\prec \tau(e_1)$.
- (Pancheva and Zubizarreta 2020:276)

Part of clause (i) is universal. In all languages, “initial” assessment time shift for the first time in a discourse is only permitted if a sentence describes an eventuality that overlaps or precedes the assessment time. Thus, future-marked sentences can only be interpreted relative to a shifted assessment time if it was shifted earlier in the discourse.¹¹

Non-future-marked sentences can, by contrast, be interpreted relative to a newly shifted assessment time, though when this can happen is subject to crosslinguistic variation. In English, the assessment time can only be shifted in narratives, since the historical present is infelicitous in an information-seeking exchange, as shown in (27) above. But in Guaraní, where bare sentences freely receive a past interpretation, as illustrated in (3), the assessment time must be able to shift for the first time even outside of narratives.

In a language that allowed for this more liberal assessment time update, a temporal interpretation akin to backshifting thus might be expected, even without a topic time. A non-future-marked sentence could be located temporally anterior to a preceding sentence when the assessment time was updated as

¹⁰ In principle, the topic time could also follow the assessment time. This may be prohibited by a generalized version of the Upper Limit Constraint (Abusch 1997), which rules out reference to times in the future of the local evaluation time in an attitude context. If it holds also of the assessment time, then the topic time will never follow the assessment time without the introduction of quantification.

¹¹ This does not seem to be correct for the English future, which is unproblematic as the “initial” shifted segment in a discourse, as when it follows a simple past sentence.

- (i) Oedipus left the camp with gleaming eyes. He **will slay** his father in just a few minutes.

This is perhaps not surprising if *will* in English is a combination of present tense and the modal *woll* (Abusch 1997). The example in (i) would thus be an instance of the historical present, which alternates frequently in narratives with the simple past (Schiffrin 1981).

if the sentence were free standing or the start of a new discourse. Then, it would not be subject to clause (ii) of the constraints in (34). Pancheva and Zubizarreta take this to be possible in Guaraní, pointing to discourses like (35), which 5 out of the 10 speakers that they consulted approved. (This improved if an indirect evidential was added to the second sentence; then, 8 out of 10 approved.)

(35) *Context: Juan likes to bother his sister Maria at school. The teacher explains why she had to punish him.*

Kuehe, Maria ho-’a kyhágui. Juan o-myaña chupe.
 yesterday Maria 3-fall from-hammock Juan 3-push 3SG
 ‘Yesterday Maria fell from the hammock. Juan pushed her.’

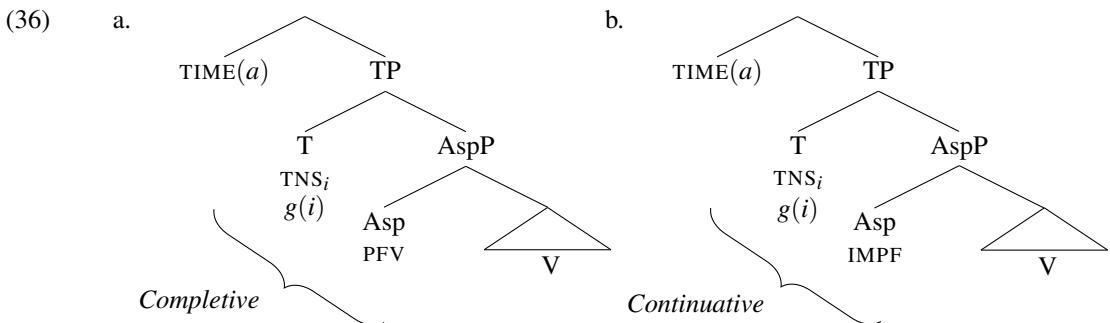
(Pancheva and Zubizarreta 2020:275)

Crucially, however, this is not a true backshifted interpretation, which involves a temporal inference relating the two sentences. Under the analysis of this discourse dictated by the constraints in (34), an inverse interpretation, when it is possible at all, is in some sense accidental. The discourse comprises, by hypothesis, two disconnected utterances, which can but need not be understood as temporally related. And insofar as they are, the relation between them would be guided solely by world knowledge and general pragmatic principles, not a calculation based on the semantics of tense and the perspective introduced by the assessment time. This may, in fact, be the source of the variability in the acceptability of (35), if speakers differ in how willing they are to do this.

But such an analysis is not possible for Sierra Zapotec, which appears to have true backshifting. The examples of temporal inversion in (32) are naturally occurring, and when checked with three native speakers, all three unhesitatingly accepted them. Moreover, the backshifted sentences are not isolated utterances, evaluated independently of what comes before or after them. They form a coherent part of an overall narrative, describing an event in the past of the event described by the preceding sentence. To account for this inference, it does not seem possible to do without a topic time.

3.4. Taking stock

I have argued that Sierra Zapotec has a silent tense that is anaphoric to a contextually salient topic time. Completive and continuative morphology realize this tense, along with aspect (either perfective or imperfective).



I will assume that the silent tense is completely unconstrained in Sierra Zapotec, though there is nothing that rules out the possibility that it is a non-future tense, as Matthewson (2006) proposes for St’át’imcet.

4. Back to the Future-in-the-Past Generalization

While the flexibility of a topic time is necessary for backshifting in Sierra Zapotec, the FPG now poses a problem. This interpretive restriction on future marking in Guaraní can be derived, as we saw earlier, by eliminating tense altogether. But if the potential encodes an anaphoric tense like the completive

and continuative, a future-in-the-past reading should arise whenever the discourse context is sufficiently rich to provide it with an antecedent.

A future-in-the-past reading might not be expected in an out-of-the-blue context for this reason (cf. Matthewson (2006:692) on St'át'imcet). But the potential cannot even be shifted into the past in an information-seeking exchange like (37a).

- (37) (E^1 $benh^{24}$ $Pe^2 dro^4$ $lhe'ej^4$ $ne^4 je^2?$ 'Did Pedro build the corral yesterday?')
- a. # **Gonh**²³=ba'³=nh, perw⁴ btahs⁴²=ba'³.
POT.do=3.HU=3.IN but **COMP.sleep**=3.HU
 Intended: 'He **was going to build** it, but he fell asleep.' (FA/RM, GZYZ080, 1:50)
- b. **Dzonh**²³=ba'³=nh, perw⁴ bi⁴tu⁴ be⁴yoll⁴ $benh^4=ba'^3=nh$.
CONT.do=3.HU=3.IN but **NEG COMP.finish COMP.do**=3.HU=3.IN
 'He **was building** it, but he didn't finish.' (FA/RM, GZYZ074, 10:25)

By contrast, a question suffices to establish an antecedent for the continuative (37b). This contrast is particularly significant since the continuative exhibits a shifted interpretation in all the other environments that the potential does. It can receive a past interpretation in both a narrative (38a) and a coordination (38b).

- (38) a. ...perw ja-ya=to' pur xis lhas, xis ya'a. Kanha' **chhak**-chhgwa
 but **AND-carry**=1PL.EXCL only stick thin stick green at.that.time **CONT.be**=INT
 to yejw zag.
 one rain cold
 '... but we went and brought back just thin, green sticks. That time it **was raining** a cold rain.' (Long 1993:217–218)
- b. Perw na' g-os-onh=e' we'e do yelh, gawe bi bishgal do yelh, nha'
 but then **COMP-PLdo**=3.EL drinking all night **NEG** any sleep all night and
chhe-se-zoll=de' kate' uyeni' lla lni nha'.
CONT-PL-be.drunk=3.EL when **COMP.dawn** day fiesta that
 'But they drank all night, getting no sleep all night, and they **were drunk** when dawn came on the day of the festival.' (Long 1993:239)

Simply put, the potential does not obey the same conditions on anaphora resolution as the continuative. A source for the FPG should thus probably be sought in the particular semantics of the potential.

4.1. The modal semantics of the potential

The potential has both temporal and modal meaning components. Roughly speaking, it has an *intention* sense, conveying how the world should be according to an agent's intentions or desires (39a), and a *prediction* sense, expressing how the world will turn out, given either the speaker's epistemic state or the current state of affairs in the actual world (39b).

- (39) a. "Nha'⁴ **gunh**²³=dzu⁴=ba'³ **pre²gunt**⁴ chi² u¹kaw⁴da³=ba'³ u¹ka'a⁴=ba'³
 so **POT.do**=1PL.INCL=3.HU **question** if **DUB.accept**=3.HU **DUB.marry**=3.HU
 bi'i²³ tse⁴=lhe²."
 child of=2PL
 "We **will ask** her if she wants to marry your son.'" (IVJ, SLZ2028-t1, 5)

- b. Context: A child breaks their new toy. Her mother says:

E¹lhok² xa²=u²=nh ka²te⁴ e²nezd⁴=e² bla²=u² ju²get²
POT.get.angry father=2SG=DEF when POT.know=3.EL COMP.break=2SG toy
 tsi⁴=u⁴=nh.
 of=2SG=DEF

‘Your father **will be angry** when he finds out you broke your toy.’

(FA/RM, GZYZ079, 59:00)

In this respect, the potential parallels the auxiliary *will* in English (Copley 2002:80), as well as the future suffix in Guaraní (Tonhauser 2011a).¹²

For *will*, the modal meaning component is often associated with an abstract modal *woll* that combines with tense and aspect (Abusch 1997). In English, this modal’s domain can be restricted overtly by an *if*-clause, as well as covertly in modal subordination (Roberts 1989). The modality expressed by the potential can be restricted in both these ways as well.

- (40) a. ... **she bi yolle nis wchinh=to’ nachh shej=to’**
if NEG STAT.contain water POT.use=1PL.EXCL then POT.go=1PL.EXCL
 chope ni’a bej che=to’.
 two time well of=1PL.EXCL

‘... **if there is no water on hand to use**, we [**will**] **make** two trips to our well (to get water).’ (Long 1993:67–68)

- b. Chi² ga²la⁴lle⁴=ba³ we¹=ba³ da² gaw²³ ka²bayw⁴ tse⁴=ba³, bi⁴tu⁴
 if POT.forget=3.HU POT.give=3.HU ? POT.eat horse of=3.HU NEG
 so¹=ba³ wenh² nha⁴ e¹lla⁴’a⁴yitsj⁴=ba³. Nha⁴ **gat¹** ka²bayw⁴
 POT.be=3.HU good and POT.feel.sad=3.HU then **POT.die** horse
 tse⁴=ba³=nh le² bdel⁴ tonh²³=ba³.
 of=3.HU=DEF because ? POT.be.hungry=3AN

‘If Pedro forgets to feed his horse, he will feel bad and be sad. Then his horse **will die** because it will be hungry.’ (RM, GZYZ086, 18:20)

For these reasons, I take potential morphology in Sierra Zapotec to realize an abstract modal like *woll*. Following Condoravdi (2003), this expresses universal quantification over worlds accessible from the world of evaluation in a branching worlds model.

- (41) $[[\text{POT}]^{u,a,g}(P) = \lambda t \lambda w \forall w' : w' \in \text{ACC}(t)(w) . P(w')(t)$

Condoravdi argues that *woll* is relativized to one of two modal bases.¹³ With a *metaphysical* (or totally realistic circumstantial) modal base, it quantifies over all worlds that are identical to the world of evaluation up through some time (though they can diverge after this time). With an *epistemic* modal base, it quantifies over all worlds that are compatible with what someone (often the speaker) knows in the world of evaluation.

There is no clear evidence, one way or another, that the potential in Sierra Zapotec allows for an epistemic modal base. In English, this additional relativization is motivated by epistemic uses of *will*, which express an inference, relative to the speaker’s knowledge, about the world at the time of

¹² There are accounts of *will* in which it is purely temporal, as in Kissine’s (2008) recent proposal. But that proposal, at least, still appeals to a covert epistemic modal. A purely temporal account of *will* would most likely have to attribute its modal flavor entirely to pragmatics and the norms of assertion.

¹³ I set aside the question of whether the potential encodes an ordering source, as Copley (2002) and Werner (2006) argue for *will* in English. It does seem that some further relativization is needed to account for the contrast in (23b–c).

utterance, e.g., *She will be in her room* (see Winans 2016 for details). The potential does not have a present epistemic use.

- (42) *Context: It is January. My cousin Pedro, who lives in Oaxaca, does not like cold weather. When he visits California, he is often cold. Pedro is now in Alaska. I say:*

Ye²yag⁴ Pe²dro⁴ (na'a⁴).

POT.be.cold Pedro now

Intended: 'Pedro **will be cold** (now).'

(FA/RM, GZYZ079, 1:15:25)

While this could be attributed simply to the absence of an epistemic modal base, present epistemic uses in Sierra Zapotec are plausibly ruled out for a different reason. The potential also encode *prospective* aspect, which would locate an eventuality after the topic time (cf. Kratzer 2011).

- (43) $\llbracket \text{PROSP VP} \rrbracket^{u,a,g} = \lambda t \exists t' \exists e . \llbracket \text{VP} \rrbracket^{u,a,g}(e) \wedge \tau(e) \circ t' \wedge t < t'$

In Sierra Zapotec, decomposing the potential into a modal and prospective aspect would be invisible. But there are languages whose future markers also prohibit a present epistemic reading, which mark this prospective aspect overtly: e.g., Gitksan (Matthewson 2012, 2013), Hausa (Mucha 2013), and Washo (Bochnak 2019).

4.2. Toward a solution

With the modal core of the potential's semantics in place, we can work toward a solution for the FPG. Some terminology will be useful first. Condoravdi (2002) distinguishes the *temporal perspective* of a modal — the time at which the modal base (and ordering source) are evaluated — from its *temporal orientation* — the eventuality's run time relative to the temporal perspective. These two parameters can vary mostly independently, as the modal *might* illustrates.

- (44) a. *Present perspective + future orientation*
John **might** win the game.
- b. *Present perspective + past orientation (epistemic use)*
John **might have** won the game (but I'm not sure if he did).
- c. *Past perspective + future orientation (counterfactual use)*
John **might have** won the game (if he hadn't been feeling sick that day).
- (Rullmann and Matthewson 2018:281)

In its canonical future-oriented use, *might* has present perspective and future orientation (44a). But when it is accompanied by the auxiliary *have*, it can have an epistemic use, describing a past eventuality from a present epistemic perspective (44b) or a counterfactual use, in which an eventuality is described in the future of a past perspective point (44c).

The FPG can be reformulated with this distinction in mind. While the potential always has future temporal orientation, it can have either present or past temporal perspective. Since the potential does not admit a future-in-the-past reading in root clauses outside of narratives, it only has present temporal perspective in these contexts.

- (45) *Future-in-the-Past Generalization (FPG; revised)*
The potential can have only present temporal perspective in a root clause outside of narratives.

Stated this way, there is an obvious parallel between the potential and certain epistemic modals that only allow present temporal perspective outside of attitude contexts. In English, *might* (without *have*) is necessarily anchored to a present epistemic state in root contexts (Abusch 1997, Hacquard 2011; Rullmann and Matthewson 2018, among others).

(46) John's bride **might** become rich.

A past temporal perspective is only possible if *might* is embedded under an attitude verb: compare (46a) to the parallel example with a relative clause in (47b).

(47) *Context: In 1990, John married a woman. He knew at that time that she had some financial prospects.*

- a. John believed [that his bride **might** become rich].
 b. # John married [a woman who **might** become rich]. (Abusch 1997:21)

Similarly, with the potential, a past perspective is possible in an attitude context (48a), but not in a relative clause in an extensional context (48b).

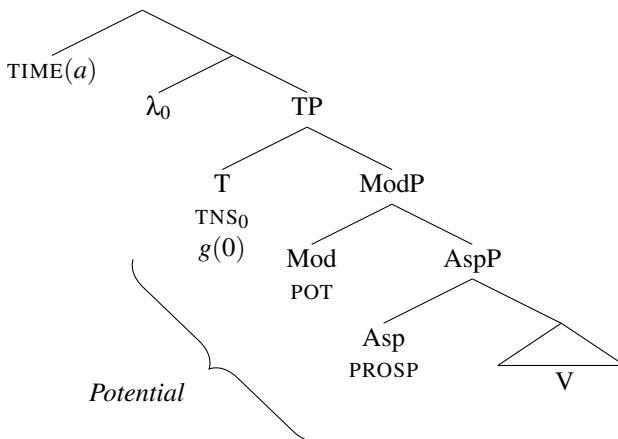
- (48) a. Go⁴shyi⁴ gokd⁴ Pe²dro⁴ [gak² zahg⁴ ne⁴je²].
 last.week COMP.think Pedro **POT.happen** cold yesterday
 'Last week, Pedro thought it **would be cold** yesterday.' (FA/RM, GZYZ081, 12:30)
 b. # Go⁴shyi⁴ bzi'i⁴ Pe²dro⁴ [ba²ke^{'2} e¹xhonj¹⁴=b ne⁴je²].
 last.week COMP.buy Pedro cow **POT.run=3.AN** yesterday
 'Last week, Pedro bought the cow that **would run** yesterday.'
 (FA/RM, GZYZ081, 8:00)

If we take this parallel seriously, the source for the FPG could lie in whatever restricts the temporal perspective for epistemic modals like *might*.

In English, the restriction on *might* is sometimes traced to an inability to take scope under tense, which makes it essentially tenseless (Abusch 1997, among others). Without an outer tense, the modal can only be interpreted relative to the local evaluation time. But there are languages where epistemic modals have past temporal perspective outside of attitude contexts, and this is usually attributed to an outer (past) tense, e.g., Dutch and St'át'imcets (Rullmann and Matthewson 2018). Condoravdi 2002). If all modals have a uniform temporal representation, then even *might* would have to have an outer tense.

For the potential in Sierra Zapotec, one possibility is that it encodes a special null tense that can only be bound: it would contribute a distinguished variable which must be abstracted over (von Stechow 1995). In root contexts, this tense would be bound and saturated by the temporal pronoun in the left periphery, which is indexical to the context of assessment (cf. Kusumoto 1999).

(49)



Potential morphology would thus realize a combination of this null tense and a modal. To exclude a present epistemic use, it would also encode prospective aspect, as discussed above.

With this semantics for the potential, a future-in-the-past reading is impossible outside of narratives, because the assessment time and utterance time are the same. The logical form for the infelicitous utterance in (23a), which is repeated in (50a) below, is given in (50b).

- (50) a. # Ne⁴je² gul¹ Pe²dro⁴.
yesterday POT.sing Pedro
Intended: ‘Pedro **was going to sing** yesterday.’ (FA/RM, GZYZ028, 7:57)
- b. $[\text{TIME}(a) \lambda t_0 [\text{TP TNS}_0 [\text{ModP } \lambda t \lambda w \forall w' : w' \in \text{ACC}(t)(w) .$
 $\exists t' \exists e . \text{sing}(e)(w') \wedge \tau(e) \circ t' \wedge t < t' \wedge t' \subseteq \text{the day before TIME}(u)]]]$

When $\text{TIME}(u) = \text{TIME}(a)$, combining the temporal adverbial with prospective aspect yields a contradiction.

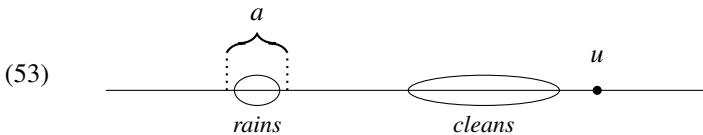
- (51) $\lambda w \forall w' : w' \in \text{ACC}(\text{TIME}(a))(w) .$
 $\exists t' \exists e . \text{sing}(e)(w') \wedge \tau(e) \circ t' \wedge \boxed{\text{TIME}(a) < t'} \wedge \boxed{t' \subseteq \text{the day before TIME}(u)}$

A future-in-the-past reading thus depends entirely on whether the assessment time has been shifted. In an out-of-the-blue context, it has not been shifted, since the utterance time is the default. In an information-seeking exchange like (37b), the same presumably holds.

A future-in-the-past reading becomes available in narratives, when the assessment time can be unmoored from the utterance time after the first sentence has introduced an eventuality into the discourse.

- (52) a. Nlle'e²³ bzu²law⁴ gok⁴ yejw⁴. E¹lhua¹ Pe²dro⁴ yelh⁴...
at.night COMP.begin COMP.be rain POT.clean Pedro milpa
‘Last night, it started to rain. Pedro **was going to clean** the *milpa*[...]’
(FA/RM, GZYZ080, 39:50)
- b. $[\text{TIME}(a) \lambda t_0 [\text{TP TNS}_0 [\text{ModP } \lambda t \lambda w \forall w' : w' \in \text{ACC}(t)(w) .$
 $\exists t' \exists e . \text{clean}(\text{the-milpa})(e)(w') \wedge \tau(e) \circ t' \wedge t < t']]]$

Once the assessment time is updated to the time of the raining event, the cleaning event is located after this, so that it can, in principle, take place entirely in the past of the utterance time.



For coordinations like (23a), these are plausibly just narratives, with each coordinate equivalent to an independent sentence for assessment time shift.

In an attitude context, such as (48a), the future-in-the-past reading arises from the semantics of the verb, which quantifies over times (and worlds). The left-peripheral temporal pronoun is absent in this case, with tense being bound directly by the matrix verb instead.

- (54) a. Go⁴shyi⁴ gokd⁴ Pe²dro⁴ [gak² zahg⁴ ne⁴je²].
last.week COMP.think Pedro POT.happen cold yesterday
‘Last week, Pedro thought it **would be cold** yesterday.’ (FA/RM, GZYZ081, 12:30)
- b. **think** $\lambda t_0 [\text{TP TNS}_0 [\text{ModP } \lambda t \lambda w \forall w' : w' \in \text{ACC}(t)(w) .$
 $\exists t' \exists e . \llbracket \text{VP} \rrbracket(e)(w') \wedge \tau(e) \circ t' \wedge t < t' \wedge t' \subseteq \text{the day before TIME}(u)]]]$

The potential has restricted past temporal perspective, then, because it encodes a special null tense. The continuative and completive are more free, because they realize an anaphoric tense.

4.3. A prediction about relative clauses

A future-in-the-past reading is impossible inside the relative clause in (48b) for the same reason it is impossible in root clauses. When the assessment and utterance times are identical, an eventuality must temporally follow the utterance, cf. (50) above. But under this account, a future-in-the-past reading should become available when a relative clause occurs in a narrative. This prediction is borne out.

- (55) a. “Ka’ chhak bllinha’ [gan’ gonh=a’ llinh=a’].”
 thus CONT.happen COMP.arrive=1SG where POT.do=1SG work=1SG
 “That’s what was happening when I arrived [where I **would do** work].”
 (Long 1993:40)
- b. Go⁴dwiz⁴ bi²de² Ma¹ria¹ lni⁴ La⁴xop²=e’nh². Da⁴ nezdzw¹⁴. Nha⁴
 last.year COMP.come Maria fiesta Laxopa=DEF EXIST first then
 bda⁴=ba³ lao² yell². Nha⁴ bye^{j2}=ba³ yu’u⁴dao⁴. Nha⁴
 COMP.walk=3.HU around town then COMP.go=3.HU church then
 ja¹-na⁴le¹=ba³ go’on²⁴ [ye¹-se’e⁴-xhi²=e’² llah⁴ yo⁴ble²]. Nha⁴
 COMP.AND-visit=3.HU bull POT-PL-ride=3.EL day next then
 blhe’ed¹⁴=ba³ tu⁴ bidao²³ dzue²=ba³ da² dzaw² go’on²⁴=e’nh⁴.
 COMP.see=3.HU one child CONT.give=3.HU ? CONT.eat bull=DEF
 ‘Last year, Maria came to Laxopa for the fiesta. It was her first time. She took a walk
 around the town. She visited the church. She visited [the bull they **would ride** the next
 day]. She saw a boy feeding the bull.’ (RM, GZY086, 44:00)

This effect of narratives is general. Any environment that would normally prohibit a future-in-the-past reading should permit it when embedded in a narrative.

5. Final thoughts

In sum, it does not seem possible to do without a topic time in Sierra Zapotec. A silent tense in Sierra Zapotec, anaphoric to a contextually salient time, enables backshifting with the completive and continuative. At the same time, the potential obeys the FPG in (17), restricting a future-in-the-past reading to non-initial segments in a narrative, just like the future marker in Guaraní. While Pancheva and Zubizarreta (2020) attribute this to the general absence of a topic time in the language, such a solution is not available in Sierra Zapotec. Instead, I argued that the potential encodes a modal whose temporal perspective must be the local evaluation time, which in a bicontextual framework is the time of the assessment context.

Under this account, the source of the FPG in Sierra Zapotec lies in the semantic properties of the potential, combined with a general mechanism for assessment time shift. It might seem inherently desirable to replace specific constraints that make reference to particular grammatical categories with more general ones, but we have to wonder why, for the potential, temporal perspective is restricted to the local evaluation time. While this is also true of *might*, other epistemic modals in English and in other languages are not so restricted (see Rullmann and Matthewson 2018). Thus, while the semantics I have offered for the potential is descriptively adequate, the more explanatory task of understanding why it is restricted in this particular way remains.

In closing, I would highlight the important role that narratives have played in the development of the accounts of both Guaraní and Sierra Zapotec. For Pancheva and Zubizarreta, a contrast between narrative and other conversational genres motivated a tenseless semantics. And it was the availability of backshifting in narratives that demonstrated the need for a topic time in Sierra Zapotec. These results recommend an increased attention to narratives, in tensed languages and tenseless languages alike, for constructing and arbitrating theories of how time is encoded in language.

Appendix: Perfective, not perfect

We have been assuming that the completive conveys only *perfective* aspect. But even without tense, its participation in backshifting would not be surprising if it conveyed *perfect* aspect, either solely or in addition to perfective aspect. While there are several possibilities for the semantics of perfect aspect (see Kamp and Reyle 1993:593–601 for an overview), it minimally must encode anteriority of the event relative to a temporal anchor (Reichenbach’s “reference point”). One possible lexical entry for perfect aspect simply locates an event before a salient time interval:

$$(56) \quad \llbracket \text{PERF}_i \text{ VP} \rrbracket^{c,g} = \lambda t \exists e. \llbracket \text{VP} \rrbracket^{c,g}(e) \wedge \tau(e) < t$$

Consider now the hypothetical logical form for a sentence in the perfect aspect without tense:

$$(57) \quad [\text{TIME}(a) \text{ } [_{\text{TP}} \text{ } [_{\text{ASP}} \lambda t \exists e. \llbracket \text{VP} \rrbracket(e) \wedge \tau(e) < t]]]]$$

If the assessment time has been shifted, as in a narrative, then the perfect will locate an event even farther in the past.¹⁴

There are three reasons, however, to think that the completive in Sierra Zapotec does not convey perfect aspect. First, the present perfect in English can only describe a past eventuality that has some “current relevance.” If I am making dinner and I want to find out whether you will be having any, I can ask you *Have you eaten?* But the completive cannot be used in this way without the adverb *ba*² ‘already’.

- (58) Q: E¹ #(ba²) u⁴daw⁴=u⁴?
 Q already COMP.eat=2SG
 Intended: ‘Have you eaten?’
 A: #(Ba²) u¹⁴daw⁴=a⁴.
 already COMP.eat=1SG
 Intended: ‘I have eaten.’ (FSR, 03/03/2020)

This is only a weak argument, though, since “current relevance” is particular to the present perfect in English. Parallel forms in Romance and Germanic are more liberal in how they describe past events.

A stronger argument comes from temporal adverbials, which can pick out a time after the event’s termination with the perfect, e.g., *At 3 o’clock, John had left the store* (Hornstein 1990:24). With the completive, this is not possible. The temporal adverb *be’ey*²³ *zil*⁴-*te*⁴ ‘in the morning’ can only frame the event itself, as in (59a), and so it is infelicitous in (59b) where the event culminates before the morning.

- (59) a. *Context: Every day, Pedro must finish his homework before going to school in the morning. Today, he did it in the morning.*
Be’ey²³ **zil**⁴-**te**⁴ **benh**⁴=**ba**³ **ta**²**rea**⁴ **tse**⁴=**ba**³.
early morning-since COMP.do=3.HU homework of=3.HU
 ‘He did his homework this morning.’ (FA/RM, GZYZ067, 1:17:33)
- b. *Context: Every day, Pedro must finish his homework before going to school in the morning. Today, he did it yesterday evening.*
 # **Be’ey**²³ **zil**⁴-**te**⁴ **benh**⁴=**ba**³ **ta**²**rea**⁴ **tse**⁴=**ba**³.
early morning-since COMP.do=3.HU homework of=3.HU
 Intended: ‘This morning, he had done his homework.’ (FA/RM, GZYZ067, 1:18:53)
 [RM: “No, porque lo hizo ayer.”]

¹⁴ By analogy, a present or past perfect sentence in a historical present narrative obligatorily induces backshifting:

- (i) The administration **fires** Mike. He **{has, had}** **met** with the ambassador.

This argument is not completely watertight, though, since temporal adverbials in Sierra Zapotec could directly constrain the run time of the event, rather than the topic time. This is, for instance, what Pancheva and Zubizarreta are committed to in Guaraní, where they argue there is no topic time.

A stronger argument comes from temporal adjunct clauses. Like a temporal adverbial, they can pick out a time after the event terminates with the perfect aspect, e.g., *When Liz woke up, the basement had flooded*. This is not, however, possible with the completive in Sierra Zapotec.

- (60) [Ka²te⁴ b-e⁴-banh⁴ Ma¹ria¹=’nh], #(ba²) be⁴-se⁴e⁴-dzu⁴ jed² tse⁴=ba³=nh.
when COMP-REP-live Maria=DEF already COMP-PL-leave chicken of=3.HU=DEF
 Intended: ‘When Maria woke up, her chickens had escaped.’ (FA/RM, GZYZ080, 56:00)
 [RM: “Cuando despertó...no [en la noche].”]

Importantly, a time following the event can be targeted as long as *ba*² ‘already’ is present. This would not be possible if the temporal adjunct clause directly constrained the run time of the event. It seems reasonable to conclude, then, that the completive conveys perfective aspect, not perfect aspect.

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