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Time Reference in Mandarin Relative Clauses

Hongyuan Sun ^{1,*} and Hamida Demirdache ²

¹ Department of Chinese Studies, Université de Picardie Jules Verne, CERCLL UR 4283, 80000 Amiens, France

² Department of Linguistics, Nantes Université/CNRS, LLING UMR 6310, 44000 Nantes, France; hamida.demirdache@univ-nantes.fr

* Correspondence: hongyuan.sun@u-picardie.fr

Abstract: In this paper, we investigate constraints on the time reference of embedded clauses in Mandarin. We show that while English past-tensed embedded clauses disallow later-than-matrix readings in intensional contexts on a *de dicto* construal, Mandarin relative clauses with bare predicates yield temporally free readings across the board. We argue that the contrast between the temporal interpretations of bare embedded clauses in Mandarin vs. past-tensed embedded clauses in English is not due to a putative contrast between ‘tenseless’ languages (as Mandarin is traditionally assumed to be) and ‘tensed’ languages such as English. Mandarin is indeed not tenseless, but rather has a covert Non-Future tense, restricting the reference time of bare sentences to non-future times. Moreover, Mandarin superficially tenseless embedded clauses with overt—be it perfect, perfective, durative/progressive—aspectual marking do not allow later-than-matrix readings on a *de dicto* construal, just like tensed embedded clauses in English. We conclude that the freedom of interpretation of bare embedded clauses in Mandarin cannot be imputed to null semantically underspecified tense, but rather to null semantically underspecified aspect. Our analysis provides, to our knowledge, the first arguments for Non-Future tense in embedded contexts.

Keywords: bare predicate; (covert) aspect; covert tense; intensional context; later-than-matrix; Non-Future tense; Mandarin; relative clause; temporally free reading



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1. Introduction

In this paper, we examine the temporal interpretation of embedded clauses in Mandarin, a language with no overt grammatical tense (Li and Thompson 1981; Klein et al. 2000; Lin 2006 among many others). We put forth the following generalizations:

- i. Mandarin bare Relative Clauses (RCs), that is, RCs with aspectually unmarked predicates, yield temporally free and, in particular, later-than-matrix readings¹ even in intensional contexts.
- ii. Mandarin RCs with overt aspectual marking—be it perfect, perfective, or progressive/durative aspect—do not allow free (later-than-matrix) readings in intensional contexts on a *de dicto* construal, just like tensed embedded clauses in English.

The generalization in (ii), but not that in (i), conforms to the descriptive constraint known as the *Upper Limit Constraint* (ULC, Abusch 1994), according to which the tense of the embedding clause is an upper bound on the tense of an embedded clause.

As first pointed out by Abusch (1988), the temporal construal of RCs in intensional contexts correlates with whether the DP containing the RC is interpreted *de re* or *de dicto*: the later-than-matrix reading of a past-tensed RC is possible if the DP is read *de re*, but banned when the DP is read *de dicto* (Section 2), and the ULC is thus a constraint on intensional contexts:

- (1) ‘The local evaluation time is the upper limit for reference of tenses’.

The question, then, is what is the source of the striking contrast between the temporal interpretations of Mandarin bare RCs and English (past)-tensed embedded clauses in inten-

sional contexts: why are later-than-matrix readings available for Mandarin bare embedded clauses, but not for English past-tensed embedded clauses? We argue that this contrast is not due to a contrast between grammatically ‘tensed’ vs. ‘tenseless’ languages, because Mandarin embedded clauses with overt aspect—be it perfect(ive) or imperfective/durative aspect—behave just like English past/present tensed RCs: they disallow later-than-matrix readings on a *de dicto* construal.² Indeed, we refute the assumption that Mandarin is a tenseless language, a view defended by Li and Thompson (1981), Gōng (1991), Klein et al. (2000), Mei (2002), and Lin (2006), among many others. We show that Mandarin is only superficially tenseless (as also argued by Sybesma 2007; Tsai 2008; Lin 2015). That is, Mandarin has a silent Non-Future tense restricting the reference time of bare sentences to non-future times, as first proposed in Sun (2014) for independent clauses (see also Huang 2015; Chen and Husband 2018). We extend Sun’s hypothesis to embedded clauses which thus by hypothesis contain a null Non-Future tense selecting for times that precede or overlap the local evaluation time.

We then argue that the contrast between aspectually marked RCs (which do not allow temporally free readings in intensional contexts) and aspectually bare RCs which do, follows straightforwardly on the assumption that the latter contain a null semantically underspecified aspect, as a consequence of which the temporal ordering of the matrix and embedded event times is left undetermined. This is ultimately the source of later-than-matrix construals.

This paper is organized as follows. Section 2 presents the temporal construals of English relative clauses and Abusch’s Upper Limit Constraint. Sections 3 and 4 discuss the time reference of Mandarin relative clauses without vs. with overt aspectual marking, and gives an overview of the availability of later-than-matrix readings in Mandarin vs. English RCs. Section 5 presents the Non-Future tense hypothesis defended by Sun (2014) for Mandarin root clauses, extending the analysis to Mandarin embedded clauses in Section 6. We show how the temporal interpretation of aspectually marked vs. unmarked RCs is derived on the Non-Future Tense hypothesis, together with the assumption that Mandarin has a silent underspecified aspect. Section 7 assesses the arguments (the first, to the best of our knowledge) provided here for Non-Future tense in embedded contexts, while offering two further arguments.

2. English Relative Clauses

The temporal interpretation of English relative clauses has been extensively investigated (Abusch 1988; Ladusaw 1977; Ogihara 1996; Stowell 1993, 2007 and references therein). In extensional contexts, English RCs yield *temporally free* construals (Enç 1986). In (2), the *Chronos* speech event is temporally ordered relative to the Utterance Time (UT) by the past tense in the RC, but remains unordered relative to the matrix past meeting event: the past speech event can either be backward-shifted ((3a)) or forward-shifted ((3b)) with regard to the past meeting event.

(2) John met a professor who gave a speech at *Chronos*.

- | | | | |
|-----|----|-------------------------------|---------------------|
| (3) | a. | —[SPEECH—]—[MEETING—]—[UT—]—> | earlier-than-matrix |
| | b. | —[MEETING—]—[SPEECH—]—[UT—]—> | later-than-matrix |

However, in intensional contexts, the later-than-matrix reading is available only if the DP (containing the RC) is interpreted *de re* (Abusch 1988). Consider (4). If the DP headed by ‘a professor’ is interpreted *de re*, the sentence conveys that there is a *specific* professor, say, Prof. Smith, that John was looking for, and Prof. Smith may have given a speech at *Chronos* before ((5a)) or after ((5b)) John’s looking for her. If the DP is interpreted *de dicto*, (4) conveys that John was looking for *any* professor who had given a speech at *Chronos*. The speech time must be earlier than the matrix searching event, so only the past-shifted reading in (5a) is available.

(4) John was looking for a professor who gave a speech at *Chronos*.

- (5) a. —[SPEECH—]—[LOOKING FOR—]—[UT—]—> earlier-than-matrix
- b. —[LOOKING FOR—]—[SPEECH—]—[UT—]—> *later-than-matrix

Why is the later-than-matrix reading not available for past-tensed RCs on a *de dicto* construal? This is where Abusch’s (1994) Upper Limit Constraint comes in. This constraint states that the tense of the embedding clause is an upper bound on the tense of an embedded clause ((1)) and, as such, rules out later-than-matrix readings of a RC, unless the relativized DP raises out of the scope of the matrix tense. The *de re* vs. *de dicto* contrast observed in the interpretation of RCs has thus been taken to provide evidence for a scopal analysis of free interpretations of RCs in English. Later-than-matrix readings are allowed on a *de re* construal because the DP containing the RC scopes above the matrix past tense. Forward-shifted readings are banned on a *de dicto* construal because the DP containing the RC remains *in situ*, and Abusch’s ULC then excludes the forward-shifted reading of the embedded past relative to the matrix past tense. This proposal correctly correlates the distribution of temporally independent readings with noun phrase interpretation (see Stowell 1993; Ogihara 1996; Kusumoto 2005 for further discussion).

3. Mandarin Bare Relative Clauses

We now turn to the temporal interpretation of Mandarin relative clauses, a language with no overt grammatical tense markers, focusing in this section on bare RCs, that is, RCs which also lack overt aspectual marking. We consider in turn two classes of bare RCs, depending on whether the main predicate of the RC denotes an event or a state since, as we shall see, the temporal construal of states appears to be more constrained in the absence of temporal adverbs setting the context.

3.1. Relative Clauses with Bare Eventives

Sun (2015) shows that Mandarin RCs with bare eventives allow temporally free readings in both extensional and intensional contexts, even on a *de dicto* construal. In an extensional context, such as (6), the dancing event described by the RC is temporally free: it can either precede, coincide with, or follow, be it either the matrix event time or the UT.

- (6) Lùlù pāishè-guó [RC yí-ge tiào bālěiwǔ de nǚhàir].
- Lùlù film-PFT one-CL dance ballet DE girl.
- ‘Lùlù filmed a girl who danced/is dancing/will dance ballet.’

In an intensional context, such as (7), the RC allows temporal construals where the dancing event either precedes ((8a)), coincides with ((8b)), or follows ((8c)) the searching event of the matrix clause. Suppose that the ballet show started at 8 p.m. and ended at 9:30 the night before the day where (7) is uttered. Now, when Kǎi meets Lùlù at 8:30 at the show, Lùlù was looking for a girl who at some point performed in the show. Lùlù could be looking for any girl who had already performed ((8a)), or who was dancing when Lùlù was looking for her ((8b)), or who was supposed to dance later in the show ((8c)).

- (7) Context: Kǎi met Lùlù last night during a ballet show. He is now telling Méi what Lùlù was doing when he met her.
- Dāngshí, Lùlù zài zhǎo [RC yí-ge tiào bālěiwǔ de nǚhàir.]
- at.that.time Lùlù PROG look-for one-CL dance ballet DE girl.
- ‘At that moment, Lùlù was looking for a girl who had danced/was dancing/**would** dance ballet.’³

(Adapted from Sun 2015)

- (8) a. —[DANCING—]—[LOOKING FOR—]—[UT—]—> earlier-than-matrix
- b. —[DANCING—]—[LOOKING FOR—]—[UT—]—> simultaneous⁴
- c. —[LOOKING FOR—]—([UT—])—[DANCING—]—([UT—])—> later-than-matrix

Example (9), likewise, allows the temporally free construals in (10) and, in particular, the later-than-matrix construal in (10b) where, say, last year in May, Lǐsì wanted to marry any woman who would win the marathon in July, suggesting that there is no constraint on

the temporal ordering of the matrix event time relative to the embedded event time even on a *de dicto* construal.

- (9) Qùnián, Lìsì xiǎng qǐ [RC yí-ge yíng mǎlāsōng de nǚzǐ].
 last.year Lìsì want marry one-CL win marathon DE woman
 ‘Last year, Lìsì wanted to marry a woman who had won/**would** win the marathon.’
- (10) a. —[WINNING—]—[WANTING—][UT—]> earlier-than-matrix
 b. —[WANTING—]—([UT—])[WINNING—]—([UT—])> later-than-matrix

We have established that bare eventive RCs allow later-than-matrix readings in both extensional and intensional contexts, and even on a *de dicto* reading. We now show that this generalization extends to the temporal construal of stative bare RCs.

3.2. Relative Clauses with Bare Statives

In extensional contexts and in the absence of time adverbs, bare stative predicates in RCs do not show the freedom of temporal interpretation that bare eventive predicates show (Sun 2015): the event described by the embedded clause in, say, (11), is understood to coincide with either the utterance time or the matrix event time. Example (11) thus conveys that Lùlù interviewed a painter who lives in Beijing at the utterance time ((12a)), or who had lived in Beijing at the moment of the interview ((12b)).

- (11) Lùlù cǎifāng-guó yí-ge zài Běijīng shēnghuó de huàjiā.
 Lùlù interview-PFT one-CL at Beijing live DE painter
 ‘Lùlù interviewed a painter who lives/lived in Beijing.’

(Adapted from Sun 2015)

- (12) a. —[INTERVIEW—]—[LIVING—][UT—]> earlier-than-matrix
 b. —[LIVING—][INTERVIEW—]—(I)—[UT—]—(I)—> simultaneous

We are not warranted, however, to conclude that bare statives in RCs only allow simultaneous construals, where the event time of the RC coincides with either the utterance time (12a) or the matrix event time (12b). We can indeed show that later-than-matrix readings are in fact available by adding a temporal adverb to the sentence, which serves to temporally anchor the time of the event described by the bare stative embedded in the RC. The state time of the RC will thus coincide with the time denoted by the adverb, whether this time precedes, follows, or overlaps the matrix event time. Crucially, if the time denoted by the adverb is itself a time in the future relative to the matrix event time, a later-than-matrix reading arises, be it in an extensional or intensional context.

To illustrate, consider the intensional context in (13). Example (13) allows temporal construals where the state described by *dāi zài bālí* ‘stay in Paris’ either precedes ((14a)) or follows ((14b)) the event of Lùlù’s looking for a girl even on a *de dicto* construal. In other words, the temporal adverb *qiūtiān* ‘fall’ can refer either to the fall preceding the matrix event time or to the fall following the matrix event time. Thus, suppose that (13) is uttered in August 2020. The time adverbial *qiūtiān* ‘fall’ can refer to the fall of either 2019 or 2020.^{5,6}

- (13) Shànggèyuè, Lùlù zài zhǎo [RC yí-ge qiūtiān dāi zài]
 last.month Lùlù PROG look.for one-CL fall stay at
 bālí de nǚhái].
 Paris DE girl
 ‘Last month, Lùlù was looking for a girl who stayed/**would** stay in Paris in the fall.’

✓fall 2019, ✓fall 2020

- (14) a. —[STAYING—]—[LOOKING FOR—][UT—]> earlier-than-matrix
 b. —[LOOKING FOR—]—([UT—])[STAYING—]—([UT—])> later-than-matrix

We conclude that bare stative and eventive RCs pattern alike in that they both allow temporally free readings relative to the matrix event time—be it in extensional or intensional contexts. It is only that it is harder to show with statives because they need to be temporally anchored to a reference time. This reference time, however, need not be the matrix event time, but rather can be provided by a temporal adverbial.⁷

3.3. Mandarin vs. English Relative Clauses

Let us recapitulate our findings. While the ULC holds for English past-tensed RCs that are read *de dicto*, it does not hold for Mandarin RCs with bare (be it eventive or stative) predicates on a *de dicto* construal: the later-than-matrix reading is available for Mandarin RCs with bare predicates.

What, then, is the source of this striking contrast in temporal interpretation between Mandarin and English RCs? Why can the former but not the latter appear to violate the ULC (Abusch 1994)? Could we impute this contrast to the fact that English is a tensed language, whereas Mandarin lacks overt tense? We contend that this cannot be the case, since, as we shall now show, the ULC is enforced in Mandarin intensional contexts when the RC is overtly marked with aspect (be it perfect(ive) or imperfective). We will conclude that the source of the difference in interpretation of Mandarin vs. English RCs is not surface tenselessness, but rather surface aspectlessness.

4. Mandarin Relative Clauses with Overt Aspect

We discuss below the temporal construals of aspectually marked RCs, distinguishing in turn for types of aspectual marking in the RC: perfect, perfective, progressive, and durative.⁸

4.1. Relative Clauses with Overt Perfect Aspect

Recall our example (7), repeated below as (15a). We saw that the bare eventive predicate in the RC allows the temporally free readings in (8). Now, if we add the overt perfect marker *guo*⁹ to the predicate *tiào bālěiwǔ* ‘dance ballet’ in the RC, as in (15b), the later-than-matrix construal which was available for (15a) on a *de dicto* construal of the relativized DP is no longer available: the dancing event must have occurred *prior* to the matrix searching event, as schematized in (16a). In other words, (15b) does not allow a later-than-matrix reading ((16c)), nor a simultaneous reading of the RC relative to the matrix past, where the searching and the dancing temporally overlap ((16b)).

- (15) a. Shàngzhōu, Lùlu zài zhǎo [RC yí-ge tiào bālěiwǔ de nǚhái.]
 last.week Lùlu PROG look-for one-Cl dance ballet DE girl.
 ‘Last week, Lùlu was looking for a girl who had danced/was dancing/would dance ballet.’
- b. Shàngzhōu, Lùlu zài zhǎo [RC yí-ge tiào-**guo** bālěiwǔ
 last.week Lùlu PROG look-for one-Cl dance-**PFT** ballet
 de nǚhái.]
 DE girl.
 ‘Last week, Lùlu was looking for a girl who had danced ballet.’
- (16) a. [DANCING-]-[LOOKING FOR-]-[UT-]-> earlier-than-matrix
 b. [DANCING-][LOOKING FOR-]-[UT-]-> *simultaneous
 c. [LOOKING FOR-]-[DANCING-]-> *later-than-matrix

Mandarin stative RCs with overt perfect aspect, just like Mandarin eventive RCs, only allow earlier-than-matrix readings on a *de dicto* construal. Example (17) below differs from (13) in two respects¹⁰: morphologically, the stative predicate in (17) is marked with perfect aspect *guo*, while in (13), it is bare; semantically, the event described by the RC in (17) is not temporally free, unlike (13), which allows either of the temporal readings in (14), repeated in (18). Example (17) conveys that Lùlu was looking for any girl who had stayed in Paris, but her stay in Paris is understood to precede Lùlu’s searching time. Thus, (18a), but not (18b), illustrates correctly the only temporal ordering conveyed by (17). Suppose that (17) is uttered in August 2020; the adverb *qiūtiān* ‘fall’ can only be interpreted as a fall earlier than August 2020 and, therefore, cannot refer to the fall of 2020.

- (17) Shànggeyuè, Lùlu zài zhǎo [RC yí-ge (qiūtiān) zài bālí
 last.month Lùlu PROG look.for one-Cl fall at Paris
 dāi-**guo** de nǚhái.
 stay-PFT DE girl.
 ‘Last month, Lùlu was looking for a girl who had stayed in Paris (in the fall).’
 ✓fall 2019, ✗ fall 2020
- (18) a. —[STAYING—]—[LOOKING FOR—]—[UT—]—> earlier-than-matrix
 b. —[LOOKING FOR—]—([UT—])—[STAYING—]—([UT—])—> *later-than-matrix

In sum, on a *de dicto* reading, Mandarin RCs overtly marked by perfect aspect only allow earlier-than-matrix readings. Temporally free readings are no longer available.

4.2. Relative Clauses with Overt Perfective Aspect

Generally, to convey a past reading of an eventive predicate, a bare predicate is the most commonly used form in Mandarin RCs. Perfective aspect *le* is used in the RC when the speaker seeks to emphasize the fact that the described event has *already* taken place.¹¹

Imagine that the latest Harry Potter movie was released last Wednesday, and for her TV report, Lùlu, a journalist, interviews some movie fans in a cinema hall. Suppose Lùlu is interested in both the expectations of those who have not seen it yet and the impressions of those who already have. The sentence in (19a) with the bare predicate *kàn hāilǐ bōtè* ‘watch Harry Potter’ perfectly fits this scenario, and can thus be used to convey that Lùlu was looking for any Harry Potter movie fan, where the time of watching the movie could be earlier or later than the searching time.

In a similar scenario, if Lùlu is only interested in the impressions of the spectators, one can utter (19b) with perfective *le* to emphasize that Lùlu is looking for a fan who would have just seen the movie, and whose recollection of the movie is therefore still fresh. Now, in the very same scenario, should the speaker not wish to emphasize this requirement, she would use (19a) without *le*.

- (19) Context: *A Harry Potter movie was released last Wednesday. Lùlu was looking for a spectator to interview.*
- a. (Shàng-zhōusān,) Lùlu zài zhǎo [RC yí-ge kàn
 last-Wednesday Lùlu PROG look-for one-Cl watch
 hāilǐ bōtè de yǐng-mí.]
 Harry Potter DE movie-fan.
 ‘(Last Wednesday,) Lùlu was looking for a movie fan who had watched/was watching/would watch Harry Potter.’
- b. (Shàng-zhōusān,) Lùlu zài zhǎo [RC yí-ge kàn-**le**
 last-Wednesday Lùlu PROG look-for one-Cl watch-PFV
 hāilǐ bōtè de yǐng-mí.]
 Harry Potter DE movie-fan.
 ‘(Last Wednesday,) Lùlu was looking for a movie fan who had seen Harry Potter.’

If perfective *le* in (19b) is replaced by the perfect marker *guo*, as in (20), the watching event could have taken place in a relatively distant past with regard to Lùlu’s searching time. Thus, (20) could be used to convey that Lùlu was looking for a movie fan who had already seen, say, the first Harry Potter movie years earlier.

- (20) Shàng-zhōusān, Lùlu zài zhǎo [RC yí-ge kàn-**guo**
 last-Wednesday Lùlu PROG look-for one-Cl watch-PFT
 hāilǐ bōtè de yǐng-mí.]
 Harry Potter DE movie-fan.
 ‘Last Wednesday, Lùlu was looking for a movie fan who had seen Harry Potter.’

It is important to point out that RCs with either *le* (e.g., (19b)) or *guo* ((20)) require the embedded (here watching) event to be completed before the matrix (searching) event, which itself serves as the evaluation time of the RC (since we are dealing here with an intensional context). (This anteriority requirement relative to the evaluation time (that is,

the matrix searching time) will be accounted for by the semantics given for *guo* ((49)) and *le* ((53)) in Section 6.)

A few comments on the semantics of these particles are thus in order here, since a precedence relation is typically associated with perfect aspect, but not with perfective aspect (Kratzer 1998). Many authors explicitly state that *le* in Mandarin encodes anteriority to some extent. Both Lin (2003, 2006) and Sun (2014) explicitly write a precedence relation into the semantics of *le*, requiring either the topic time (Klein 1994) ('*t*₂' in (21)) or the running time of the event ('*τ*(*e*)' in (22)) to be earlier than the evaluation time.

$$(21) \llbracket le \rrbracket = \lambda P \lambda t_2 \lambda e \exists e' [P(e) \wedge P(e') \wedge e' \leq_E e \wedge \tau(e') \subseteq t_2 \wedge t_2 < \tau(e_{pro})] \quad (Lin\ 2003)$$

$$(22) \llbracket le \rrbracket^{g,c} = \lambda P_{\langle v, t \rangle} \cdot \lambda t' \cdot \lambda t \cdot \exists e [P(e) = 1 \wedge t' \supseteq \tau(e) \wedge \tau(e) < t] \quad (Sun\ 2014)$$

Now, although both the perfect marker *guo* in (20) and the perfective marker *le* in (19b) shift the time reference of their RC to the past of the matrix event time, they do not yield the same range of temporal interpretations when combined with the same predicate. While *guo* always marks anteriority, *le* can give rise to a continuous reading (Lin 2000, 2003; Jin 2002), as shown in (23b).¹³

- | | | | | | |
|------|----|--------------------------|------------------|--------|-----|
| (23) | a. | Mòmo | yǎng- guo | yì-zhī | māo |
| | | Mòmo | raise-PFT | one-Cl | cat |
| | | 'Mòmo raised a cat.' | | | |
| | b. | Mòmo | yǎng- le | yì-zhī | māo |
| | | Mòmo | raise-PFV | one-Cl | cat |
| | | 'Mòmo is raising a cat.' | | | |

In other words, although Mandarin *le* is commonly referred to as a perfective marker, it cannot be defined as encoding a simple inclusion relation between the running time of an eventuality and the topic time ($\tau(e) \subseteq t_{Top}$), in the sense of Klein (1994) and Kratzer (1996), since *le* encodes not only perfectivity/completion but also imperfectivity/continuity (Lin 2003). According to Lin's (2003) definition, in (21), *le* requires the inclusion of a subpart of the event time within the topic time, itself in turn constrained to precede the evaluation time. In other words, the event denoted by the embedded clause is required to have been at least partially realized at the evaluation time. This explains why some RCs with *le* yield simultaneous reading with regard to the matrix event time, as is the case in (24b), where the event of raising a cat is understood as having begun at a time earlier than the beginning of the searching event, and is still ongoing at the searching time (as illustrated in (25b)). In contrast, with perfect *guo*, the raising event described by the RC in (24a) must be located entirely in the past of the event time of searching, as illustrated in (25a).

- | | | | | | | | |
|------|----|-----------------------------------------------------------------|---------|----------|-----------|------------------|--------|
| (24) | a. | Shàngzhōu, Lùlù | zài | zhǎo | [RC yí-ge | yǎng- guo | yì-zhī |
| | | last.week Lùlù | PROG | look-for | one-Cl | raise-PFT | one-Cl |
| | | māo de | nǚhái.] | | | | |
| | | cat DE | girl | | | | |
| | | 'Last week, Lùlù was looking for a girl who had raised a cat.' | | | | | |
| | b. | Shàngzhōu, Lùlù | zài | zhǎo | [RC yí-ge | yǎng- le | yì-zhī |
| | | last.week Lùlù | PROG | look-for | one-Cl | raise-PFV | one-Cl |
| | | māo de | nǚhái.] | | | | |
| | | cat DE | girl | | | | |
| | | 'Last week, Lùlù was looking for a girl who was raising a cat.' | | | | | |

- | | | | |
|------|----|------------------------------------------|---------------------|
| (25) | a. | —[RAISING—]—[LOOKING FOR—]—[UT—]—> | earlier-than-matrix |
| | b. | —[RAISING—[LOOKING FOR—]—()—[UT—]—()—> | simultaneous |

We do not take a stand here on whether Lin's analysis of *le* is the most accurate one, since the semantics of *le* is a far-reaching and controversial issue. What is of importance for the purpose of this paper is to elucidate the interpretational contrasts between bare and aspectual marked RCs. The crucial generalization so far is that RCs with overt either perfect *guo* or perfective *le* do not allow than later-than-matrix readings on a *de dicto* construal.

Summarizing, there are two correlated differences between the RCs in (15a) vs. (15b) on the one hand, and (19a) vs. (19b) on the other: (i) morphologically, the verbs in the RC in (15b) and (19b) are overtly marked by perfect or perfective aspect; (ii) semantically, the RC in (15b) and (19b) no longer allow temporally free construals when read *de dicto*—the dancing/watching must have occurred *prior* to the matrix searching event, thus excluding forward-shifted readings of the RC relative to the matrix event time. Note that when the RC containing *le* receives a continuous reading, such as in (24b), the event time denoted by the RC must crucially have begun before the matrix event time and a later-than-matrix reading is thus also excluded. In other words, whether *le* encodes completion or continuity, a later-than-matrix reading where the event time of the RC is entirely in the future of the event time of the matrix is unavailable.

4.3. Eventive Relative Clauses with Overt Progressive Aspect

We now turn to eventive predicates with the overt progressive marker *zài*. RCs marked by progressive *zài* yield simultaneous readings, and take as topic time a time that is salient (either a time denoted by an adverb or another contextually salient time) (Sun 2015). On a *de dicto* reading, (26b) conveys that Lùlu was looking for any girl who, at the moment of searching, was dancing ballet. That is, the time of the dancing event denoted by the RC with a progressive verb form must coincide with the matrix event time, as shown in (27a). The later-than-matrix reading where the dancing event occurs after the searching event ((27c)) is thus not available.

(26) Context: When Kǎi met Lùlu at 9 last night during a ballet show, Lùlu uttered (a). At the present time of speech, Kǎi utters (b) to tell Méi what Lùlu was doing when he met her last night.

- a. [Lùlu:] Wǒ zài zhǎo [RC yí-ge zài tiào bālěiwǔ de nǚhái.]
 1SG PROG look-for one-Cl PROG dance ballet DE girl.
 ‘I’m looking for a girl who is dancing ballet.’
- b. (Dāngshí), Lùlu zài zhǎo [RC yí-ge zài tiào bālěiwǔ de nǚhái.]
 at.that.time Lùlu PROG look-for one-Cl PROG dance ballet DE girl.
 ‘(At that moment,) Lùlu was looking for a girl who was dancing ballet.’
 *(At that moment,) Lùlu was looking for a girl who would be dancing ballet.’
 (Adapted from Sun 2015)

- (27) a. –[DANCING—[LOOKING FOR—]]—[UT—]> simultaneous
 b. –[DANCING—][LOOKING FOR—][UT—]> earlier-than-matrix
 c. –[LOOKING FOR—][DANCING—]> later-than-matrix

Note that in the absence of an overt time adverbial in (26b), the event time of the RC is understood as coinciding with the matrix event time of searching. If a past time adverb such as *liǎng-ge xiǎoshí zhīqián* ‘two hours earlier’ is added to the RC as in (28b), the time denoted by the adverb will serve as the topic time for the progressive RC. The dancing event will then be understood as in progress/ongoing two hours prior to the searching event. Example (28b) thus allows the earlier-than-matrix reading schematized in (27b).

- (28) a. [Lùlu:] Wǒ zài zhǎo [RC yí-ge liǎng-ge xiǎoshí zhīqián/
 1SG PROG look-for one-Cl two-Cl hour before
 qī-diǎn zài tiào bālěiwǔ de nǚhái.]
 seven-o’clock PROG dance ballet DE girl.
 ‘I’m looking for a girl who was dancing ballet two hours ago/at seven.’
- b. [Kǎi:] (Dāngshí), Lùlu zài zhǎo [RC yí-ge liǎng-ge xiǎoshí
 at.that.time Lùlu PROG look-for one-Cl two-Cl hour
 zhīqián zài tiào bālěiwǔ de nǚhái.]
 before PROG dance ballet DE girl.
 ‘(At that moment,) Lùlu was looking for a girl who was dancing ballet two hours earlier.’

Crucially, when a progressive RC is read *de dicto*, future time adverbs fail to shift the time reference to a time later than the matrix event time. Example (29), for instance, does not mean that Lùlu, at 9 p.m., was looking for any girl who would be dancing ballet at

11 p.m. Example (29) only allows a *de re* reading, namely, where there is a girl who was dancing ballet at 11 p.m., and Lùlu was looking for her at 9 p.m.

- (29) [Kǎi:] (Dāngshí), Lùlu zài zhǎo [RC yí-ge liǎng-ge xiǎoshí
 at.that.time Lùlu PROG look-for one-Cl two-Cl hour
 zhǐhòu zài tiào bālěiwǔ de nǚhái.]
 after PROG dance ballet DE girl.
 ‘(At that moment,) Lùlu was looking for a girl who was dancing ballet
 two hours later.’

In sum, eventive RCs in Mandarin marked with progressive aspect, just like RCs marked with either perfect or perfective aspect, do not allow later-than-matrix readings when the RC is read *de dicto* in intensional contexts.

4.4. Relative Clauses with Overt Durative Aspect

The finding for RCs with the progressive aspect marker *zài* carries over to the durative marker *zhe*, which is another imperfective marker (Yeh 1993; Smith 1991; Pan 1996; Djamouri and Paul 2018; a.o.). Generally, *zhe* modifies atelic predicates (Lin 2006). Smith (1991) argues that *zhe* differs from *zài* in that while the former has a static meaning, the latter has a dynamic meaning. Example (30a) describes a state of Mòmo wearing blue glasses. Example (30b) focuses on the state of the window being closed, as opposed to the closing event, and (30c) is almost equivalent to an existential clause even if it contains the eventive verb *guà* ‘hang’.¹⁴

- (30) a. Mòmo dài zhe yí-fù lán-sè de yǎnjìng.
 Mòmo wear DUR one-pair blue DE glass
 ‘Mòmo is wearing a pair of blue glasses.’
 b. Chuānghù guān zhe.
 window close DUR
 ‘The window is closed.’
 c. Qiáng shàng guà zhe yí-fú huà’er.
 wall on hang DUR one-Cl painting
 ‘There is a painting on the wall.’

When *zhe* is present in a RC read *de dicto*, such as in (31b), it yields a simultaneous stative reading: the state of wearing blue glasses must overlap the time of searching ((32a)). The later-than-matrix reading illustrated in (32c) is not available for (31b). The corresponding bare RC in (31a) allows earlier ((32b)) and later ((32c)) than the matrix readings, in addition to the simultaneous (and most salient) reading ((32a)). Suppose that Mòmo and Tíngtíng are actresses who do not wear glasses in their daily life, but will have to wear special blue glasses to perform in a play. Before the play begins, Lùlu is looking for any of the actresses who will wear these blue glasses in the play. One can use (31a) but not (31b) to report this scenario. In other words, bare RCs but not RCs with durative *zhe* allow later-than-matrix readings.

- (31) a. (Dāngshí), Lùlu zài zhǎo [RC yí-ge dài lán-sè yǎnjìng
 at.that.time Lùlu PROG look.for one-Cl wear blue glasses
 de nǚhái.
 DE girl.
 ‘At that moment, Lùlu was looking for a girl who was wearing/wore/would wear/wears blue glasses.’
 b. (Dāngshí), Lùlu zài zhǎo [RC yí-ge dài zhe lán-sè
 at.that.time Lùlu PROG look.for one-Cl wear DUR blue
 yǎnjìng de nǚhái.
 glasses DE girl.
 ‘At that moment, Lùlu was looking for a girl who was wearing blue glasses.’
- (32) a. —[WEARING—][LOOKING FOR—]—[UT—]> simultaneous
 b. —[WEARING—][LOOKING FOR—]—[UT—]> earlier-than-matrix
 c. —[LOOKING FOR—]—([UT—])[WEARING—]—([UT—])> later-than-matrix

To summarize, in the absence of overt aspect, Mandarin RCs allow temporally free (earlier-than-matrix, simultaneous, and later-than-matrix) readings with regard to the matrix event time, and this is the case even on a *de dicto* construal in intensional contexts. In contrast, in the presence of overt aspect, they have restricted temporal interpretations depending on the semantics of the aspectual marker: (i) while RCs with perfect *guo* only allow earlier-than-matrix readings, (ii) RCs with perfective *le*, progressive *zài*, or durative *zhe* allow either earlier-than-matrix or simultaneous readings.

We conclude that Mandarin RCs with overt aspect, unlike bare RCs, but just like English tensed RCs, do not allow later-than-matrix readings on a *de dicto* construal, in keeping with the ULC.

4.5. Recapitulating

Table 1 below recapitulates the availability of later-than-matrix readings in Mandarin vs. English embedded clauses. While in extensional contexts, both English and Mandarin embedded clauses allow later-than-matrix readings, in intensional contexts, the later-than-matrix reading is not available in the presence of an overt past tense (English) or of an overt aspect (Mandarin), on a *de dicto* construal. Embedded clauses in Mandarin with neither overt tense or aspect marking allow later-than-matrix readings, in violation of the ULC.

Table 1. Availability of later-than-matrix readings.

	Extensional/Intensional <i>de re</i>		Intensional <i>de dicto</i>	
	Bare	Past/PFT/PFV PROG/DUR	Bare	Past/PFT/PFV PROG/DUR
English		✓		✗
Mandarin	✓	✓	✓	✗

The obvious question is then why, in intensional contexts, do Mandarin RCs with bare predicates allow later-than-matrix readings on a *de dicto* reading, unlike Mandarin RCs with aspectually marked predicates.

One might seek to ascribe this freedom of temporal interpretation to the status of Mandarin as presumably a tenseless language, as claimed by [Li and Thompson \(1981\)](#), [Klein et al. \(2000\)](#), [Smith and Erbaugh \(2005\)](#), and [Lin \(2003, 2006\)](#). This hypothesis is not tenable since, as we shall now show, Mandarin does indeed have tense.

5. Non-Future Tense in Mandarin

Following [Kratzer \(1998 a.o.\)](#), we assume that tenses are pronouns that denote time intervals. Like pronouns, they are variables that receive their value from a contextually determined assignment function. Tense morphemes thus introduce a time variable which, following [Klein \(1994\)](#), we call the *topic time* (henceforth, TopT)—that is, the time for which an assertion is made, together with a restriction on its possible values. In particular, past tense introduces the condition that the TopT precede the evaluation time, and present tense introduces the condition that it coincide with the evaluation time. While the evaluation time of a root clause uttered out of the blue is the utterance time, in subordinate contexts, it may also be the matrix event or attitude time.

[Sun \(2014\)](#) argues for syntactic and semantic tense in Mandarin. Her specific claim is that Mandarin has a T(ense) projection hosting a covert Non-Future tense (NF in (33)), which restricts the TopT of bare sentences to the non-future times, as shown in (33). This hypothesis is largely inspired by [Matthewson’s \(2006\)](#) silent TENSE hypothesis for St’át’imcets.¹⁵

$$(33) \quad \llbracket \text{NF} \rrbracket_{\langle i, \text{ii} \rangle}^{g,c} = \lambda r. \lambda t: t \leq r. t \quad (\text{where } r \text{ is the evaluation time and } t \text{ the TopT})$$

(Adapted from [Sun 2014](#))

Sun’s Non-Future tense hypothesis explains why future time adverbs fail to fix the temporal reference of Mandarin bare sentences, as illustrated in (34) with the bare predicate *hěn jǔsàng* ‘very frustrated’.¹⁶ Examples (34a) and (34b) are well formed, yielding a past

and a present reading, respectively, because both *dāngshí* ‘at that time’ in (34a) and *xiànzài* ‘now’ in (34b) denote non-future intervals that constrain the time reference of their clause to (respectively) precede or overlap the utterance time, thus falling in the domain of Non-Future tense. Crucially, (34c), on the other hand, is not felicitous because the time interval denoted by *míngtiān-shídiǎn* ‘tomorrow at 10 o’clock’ lies entirely after the utterance time and, as such, does not fall in the domain of Non-Future tense.

- (34) a. Context: *Kǎi met Lùlu yesterday and he was very surprised because usually she is very calm, but ...*

Dāngshí	Lùlu	hěn	jǔsàng.
at.that.time	Lùlu	very	frustrated

 ‘At that moment, Lùlu was very frustrated.’
 b. *Xiànzài* Lùlu hěn jǔsàng.

now	Lùlu	hěn	jǔsàng.
	Lùlu	very	frustrated

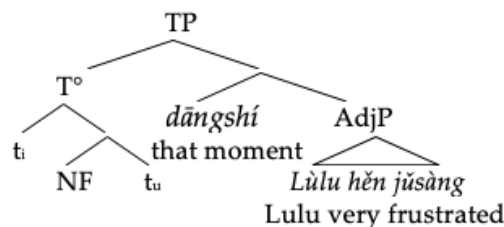
 ‘Now, Lùlu is very frustrated.’
 c. Context: *Lùlu always gets very frustrated when she receives her transcript with her grades. The transcript of the semester will be delivered tomorrow morning.*

*Míngtiānshí-diǎn	Lùlu	hěn	jǔsàng.
tomorrowten-o’clock	Lùlu	very	frustrated

 Intended: ‘Tomorrow at 10 o’clock, Lùlu will be very frustrated.’

In (35) and (36) below, we give a simplified derivation of the semantics of (34a) (full derivations will be given in Section 6, once we introduce aspect). We assume that temporal frame adverbs such as *dāngshí* ‘at that time’, *xiànzài* ‘now’, and *míngtiān-shídiǎn* ‘tomorrow’ denote properties of times (Kamp and Reyle 1993; Demirdache and Uribe-Etxebarria 2004) and, as such, can be base-generated adjoined to the AdjP in (35), also a predicate of times, with which the adverb thus combines via Predicate Modification (Heim and Kratzer 1998).¹⁷ Example (34a) is well-formed on this derivation since the TopT coincides with a past time which in the context is a subinterval of the day before the utterance time (t_u in (35) below) at which Kǎi met Lùlu, and as such, falls in the domain of Non-Future tense.

(35)



(36)

- $\llbracket \text{NF} \rrbracket^{g,c} = \lambda r. \lambda t: t \leq r. t$
- $\llbracket \text{dāngshí} \rrbracket^{g,c} = \lambda t. t \subseteq \text{That Moment (where } K \text{ met } L)$
- $\llbracket \text{AdjP } Lùlu \text{ hěn } jǔsàng \rrbracket^{g,c} = \lambda t. \text{FRUSTRATED } (L)(t)$
- $\llbracket \text{dāngshí } Lùlu \text{ hěn } jǔsàng \rrbracket^{g,c} = \lambda t. t \subseteq \text{That Moment} \ \& \ \text{FRUSTRATED } (L)(t)$
- $\llbracket T^\circ \ t_i \ \text{NF} \ t_u \rrbracket^{g,c} = g(i)$; defined only if $g(i) \leq t_u$.
- $\llbracket \text{TP} \rrbracket^{g,c} = 1$ iff $g(i) \subseteq \text{That Moment} \ \& \ \text{FRUSTRATED } (L)(g(i))$;
 defined only if $g(i) \leq t_u$.

Further evidence for Non-Future tense comes from bare sentences such as (37), from Sun (2014, p. 205), inspired by Matthewson (2006). If uttered in 2021, (37) conveys that *Gǔlóng*, a Chinese novelist who passed away in 1985, used to smoke, and *Mòyán*, a writer who is alive in 2021, is a smoker. The smoking habits of these two individuals are true for different time intervals. The one and only main predicate of the sentence (and, by hypothesis, the one and only syntactic tense (TP) projection) in (37) thus yields past and present readings simultaneously. Example (37) can only be translated to English with a biclausal sentence ((37a)), because the temporal information encoded in (37) cannot be conveyed with a single tense in English. Only a tense that can select simultaneously for

both past and present intervals could fit the truth conditions of the covert tense heading TP, and this is exactly how Non-Future is defined (cf. (33)).

- (37) Gǔlóng hé Mòyán dōu chōuyān.
 Gǔlóng and Mòyán DOU smoke
 a. 'Gǔlóng used to smoke and Mòyán smokes.'
 b. *'Gǔlóng used to smoke/smokes and Mòyán will smoke.'

Importantly, (37) uttered in 2021 cannot be used to convey simultaneously a past state of Gǔlóng's smoking and a future state of Mòyán's smoking ((37b)). Now, suppose (37) were uttered in 1970, at a time when Gǔlóng was still alive. Example (37) could not be used either to convey a present ongoing state of Gǔlóng's smoking and a future state of Mòyán's smoking. The unavailability of the readings in (37b) is correctly predicted under the Non-Future Tense Hypothesis since Non-Future cannot range over an interval that falls after the utterance time.

Consider now the contrast between (38) vs. (37) on the one hand, as well as (38) vs. (39) on the other hand. Note that (38), if uttered, say, in March 2021, can be used to convey simultaneously a past state of Lùlu staying in Paris in the summer of 2020, and a future-oriented state of Lùlu staying in Paris in the summer of 2021. Why does this construal involving past and future-oriented eventualities, unavailable in (37), become available in (38)? Because the single bare predicate *dāi zài bāli* 'stay in Paris' in (40) can be used to describe simultaneously a past state/stay in Paris and a future state/stay in Paris that is being *planned* at the utterance time—that is, (38) can be used to report that Lùlu stayed in Paris last summer and *is planning* to stay in Paris next summer (of this year). Non-Future is thus ranging over a past state and a present plan for a future state. In contrast, its English counterpart in (39) with a single tensed predicate (be it past or future) is not grammatical.

- (38) Qùnián xiàtiān hé jīnnián xiàtiān Lùlu (dōu) dāi zài bāli.
 last.year summer and this.year summer Lùlu DOU stay at Paris
 'Lùlu stayed in Paris last summer and will stay in Paris this summer.'

- (39) *Lùlu stayed/will stay in Paris last summer and next summer.

We turn now to the contrast between (38) vs. (37) again, vs. this time that between (38) vs. (40) below, where a future-oriented reading is here unavailable. The generalization is that a Mandarin bare predicate can simultaneously describe past and future-oriented states only if the forthcoming state can be understood as a futurate—that is, as a future eventuality that is planned at the utterance time (Copley 2008; Sun 2014; Thomas 2015). As Copley (2002, 2008) emphasizes, bare states yield futurate readings only if the described eventuality is plannable or under the control of some natural force. Since neither Mòyán's smoking ((37)) nor Lùlu's being nervous during the exam ((40)) can readily be construed as planned eventualities, simultaneous past and futurate readings are unavailable in (37) and (40), even when the future time adverb *míngtiān* 'tomorrow' is present.

- (40) *Zuótiān hé míngtiān kǎoshì shí Lùlu (dōu) hěn jǐnzhāng.
 yesterday and tomorrow exam time Lùlu DOU very nervous
 Intended: 'Lùlu was nervous yesterday during the exam, and will be nervous tomorrow during the exam.'

We close this section by pointing out that the Non-Future tense hypothesis has also been defended for Mandarin by Huang (2015), who argues for a syntactic Non-Future tense on the basis of the distribution of the morpheme *jīng*, a future 'tense' morpheme according to Huang, as well as by Chen and Husband (2018), who provide experimental evidence for a Non-Future tense in Mandarin.

6. Deriving Embedded Time Reference: The Distribution of Later-Than-Matrix Readings

Let us now go back to the question of why later-than-matrix readings are available for Mandarin bare RCs, but not for English (past-)tensed RCs. This contrast between English

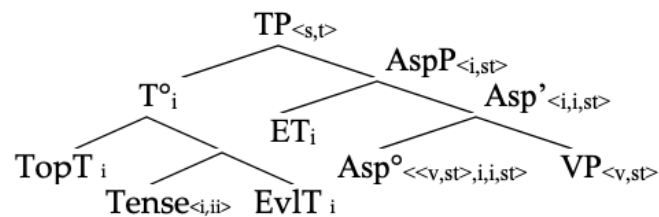
and Mandarin cannot be imputed to a putative difference between grammatically ‘tensed’ vs. ‘tenseless’ languages since, as we have just established, Mandarin is *not* a tenseless language: Mandarin sentences that appear on the surface to not have items dedicated to expressing tense are in fact underlyingly tensed since Mandarin has a silent tense and, moreover, this tense, although more underspecified than tense in, say, English, is not semantically underspecified since it restricts the TopT to non-future times with regard to the local evaluation time.

6.1. (Covert) Aspect

Now, although the freedom of interpretation of bare embedded clauses in Mandarin cannot be imputed to a null semantically underspecified tense, since Mandarin has a covert Non-Future tense, it can, however, be imputed to a null semantically underspecified aspect. We thus contend that the contrast between aspectually marked RCs which do not allow temporally free readings in intensional contexts in Mandarin and aspectually bare RCs which do, follows straightforwardly on the assumption that the latter contains a null semantically underspecified aspect, as a consequence of which the temporal ordering of the matrix and embedded event times will ultimately be left undetermined, as we shall see in Section 6.3.

We illustrate in (41) below our assumptions about how tense and aspect combine compositionally with the main predicate (VP) of their sentence. Both tense and aspect each combine with two temporal arguments (as can be seen in the lexical entries given for Non-Future tense in (33) above, and (41) for Mandarin (im)perfect(ive) aspects in (43) below), both of which are projected in the syntax, as shown in (41).¹⁸

(41)



Tense imposes a condition on the relation between the TopT and the evaluation time, which is the utterance time by default in an independent clause, though in subordinate contexts, it may be bound by the matrix event or attitude time (as we shall see in (48), (52), (56), and (61) below). The tense node takes as sister an aspect projection (AspP), which denotes a property of times, <sub>i, st>. Following Kratzer (1998), aspect crucially serves to map its sister node VP, which itself denotes a property of eventualities, <sub>v, st>, onto a property of times so that the VP can ultimately combine with tense, as shown in (41). On Kratzer’s proposal, the aspect head mediates between events and times by introducing a running time function, and in so doing can impose conditions on the relation between the event time and the TopT. These restrictions are illustrated with the denotations given below for the perfect, which constrains the event to be over by the TopT, and the imperfective, which constrains the TopT to be included in the (running) time of the event (Kratzer 1998, p. 107).

- (42) a. Perfect: $\lambda P_{\langle v, \langle s, t \rangle \rangle} . \lambda t_i . \lambda w_s . \exists e_1 (\text{time}(e) < t \ \& \ P(e)(w) = 1)$
- b. Imperfective: $\lambda P_{\langle v, \langle s, t \rangle \rangle} . \lambda t_i . \lambda w_s . \exists e_1 (t \subseteq \text{time}(e) \ \& \ P(e)(w) = 1)$

We break with the assumption encoded in (42) that the event time is existentially bound in the lexical entry of the aspect heads, but rather assume that aspect (like tense) combines with two temporal arguments (as shown in (43) with the denotation of perfect aspect *guo* and progressive *zài*), both of which are projected in the syntax. The event time will be existentially bound in the syntax (as shown in the tree in, e.g., (48), where the event time is *t*₅).

- (43) a. Perfect: $\llbracket guo \rrbracket^{g,c} = \lambda p_{\langle v, st \rangle}. \lambda t_i. \lambda u_i: t < u. \lambda w_s. \exists e[p(e)(w) \ \& \ \tau(e) = t]$
- b. Progressive: $\llbracket zài \rrbracket^{g,c} = \lambda p_{\langle v, st \rangle}. \lambda t_i. \lambda u_i: u \subseteq t. \lambda w_s. \exists e[p(e)(w) \ \& \ \tau(e) = t]$

On this proposal, aspect, just like tense, combines with two temporal arguments projected in the syntax. While tense imposes a condition on the relation of the TopT relative to the evaluation time, aspect imposes a condition on the relation of the TopT relative to the running time of the event ($\tau(e)$ in (43)). This specific implementation thus captures Klein’s seminal proposal that aspect relates the event time to the TopT, which tense in turn relates to another time (that is, the local evaluation time).

Given these assumptions, AspP is always projected—that is, is always present, even in sentences with no overt aspectual marker appearing on the surface—since it serves to mediate between eventualities and times by introducing, via a running time function, the eventuality time argument. This means that alongside the overt aspectual heads in (43), Mandarin must also have a covert aspectual head whose denotation is given in (44).

- (44) Underspecified covert aspect
 - a. $\llbracket \text{Asp}^\circ \emptyset \rrbracket^{g,c} = \lambda p_{\langle v, st \rangle}. \lambda t_i. \lambda u_i: t \leq u \text{ or } t > u. \lambda w_s. \exists e[p(e)(w) \ \& \ \tau(e) = t]$
 - b. $\llbracket \text{Asp}^\circ \emptyset \rrbracket^{g,c} = \lambda p_{\langle v, st \rangle}. \lambda t_i. \lambda u_i. \lambda w_s. \exists e[p(e)(w) \ \& \ \tau(e) = t]$
 (where t is the event time and u the TopT)

The silent aspectual morpheme in (44), just like the overt aspectual morphemes in (43), combines with two temporal arguments, the TopT itself introduced by tense and the event time introduced via a running time function, and, as such, serves to map properties of eventualities onto properties of times. Crucially, however, the silent aspectual morpheme in (44), unlike the overt aspectual morphemes in (43), imposes no restriction on the relation between the TopT and the running time of the event. We give two different implementations of this hypothesis in (44). According to the lexical entry given in (44a), the relation holding between these two time intervals can be interpreted as either precedence, overlap, or subsequence, while according to the lexical entry in (44b), there is simply no condition holding on the temporal ordering between these two times.¹⁹ As we shall see, the hypothesis that the temporal ordering of the event time relative to the TopT is free, undetermined, is ultimately the source of the later-than-matrix construals that RCs allow when they are aspectually unmarked/bare *on the surface*.

On this proposal, both tense and aspect are always projected in Mandarin since Mandarin has a silent Non-Future tense present in all finite clauses, as well as a silent unspecified aspect present whenever there is no overt aspectual head. In what follows, we show how these two assumptions derive the interpretative differences in the temporal construals of Mandarin bare vs. aspectually marked RCs, without having to stipulate a constraint such as the ULC. We conclude that the source of these interpretative contrasts lies ultimately not in surface tenselessness or underspecified/undetermined tense since Mandarin has a silent Non-Future tense, but rather in surface aspectlessness and underspecified/undetermined aspect since Mandarin has a silent radically underspecified aspect.

6.2. Intensional Contexts with Overt Aspect: Lack of Later-Than-Matrix Readings

6.2.1. RCs with Overt Perfect Aspect *guo*

In an intensional context, when the DP containing a perfect RC is embedded in a matrix clause describing a past event, as is the case in (45), the time of the event described by the RC is constrained to precede the matrix event time on a *de dicto* construal. That is, Lùlu in (45) was looking for a girl who had already danced ballet before the searching time. The later-than-matrix reading where the dancing event happens after the searching time is not available. We now show how the temporal readings of (45), and the lack of the later-than-matrix readings, automatically fall out from the assumptions put forth in Section 6.1.

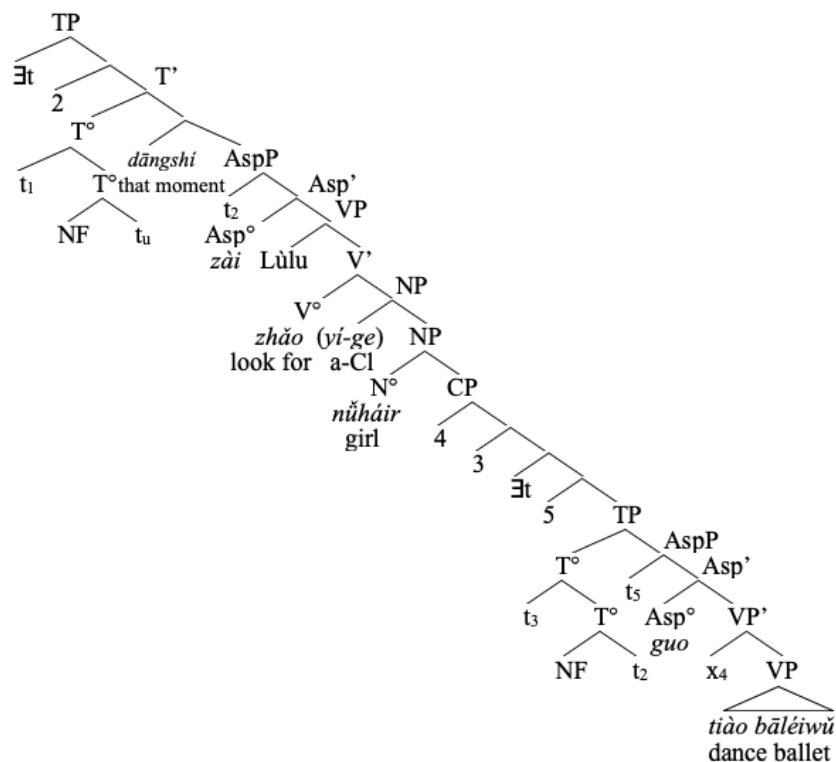
- (45) Context: *Kǎi met Lùlù last week. Kǎi is now telling Méi what Lùlù was doing when he met her.*
 Dǎngshí, Lùlù zài zhào yí-ge (liǎng-zhōu qián)
 at.that.time Lùlù PROG look-for one-Cl (two-week before)
 tiào-**guo** bālěiwǔ de nǚhái.
 dance-PFT ballet DE girl
 ‘At that moment, Lùlù was looking for a girl who had danced ballet (two weeks ago/earlier).’

In an intensional context, on a *de dicto* reading, the RC is anchored into the matrix via the binding of the embedded evaluation time ($t_{RC\ evaluation}$ in (46)/the lower t_2 in (48)) by the matrix event time ($t_{matrix\ event}$ /the higher t_2 in (48)). As shown in (48a), Non-Future tense in the RC restricts its TopT ($t_{RC\ top}$ in (46)/ t_3 in (48)) to times that are non-future relative to the evaluation time, which itself coincides with the matrix event time (via binding). As shown in (46b), perfect aspect (*guo*), in turn, restricts the event time of the RC ($t_{RC\ event}$ in (46)/ t_5 in (48)) to times earlier than the TopT in the RC. Consequently, $t_{RC\ event}$ is constrained to always precede $t_{matrix\ event}$, as illustrated in (49a,b), and a later-than-matrix reading is therefore excluded. Mandarin perfect aspect thus plays a role similar to the English past tense in embedded clauses.

- (46) a. NF tense in the RC: $t_{RC\ top} \leq t_{RC\ evaluation} (= t_{matrix\ event})$
 b. PFT aspect: $t_{RC\ event} < t_{RC\ top}$

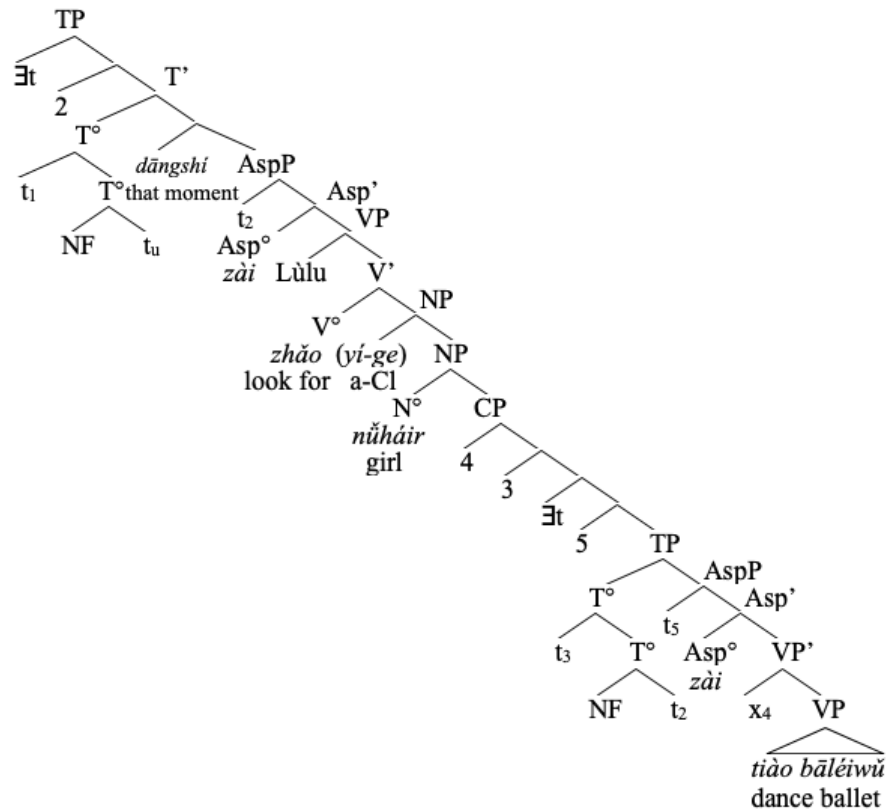
(47) —[$t_{RC\ event}$]—[$t_{matrix\ event}$]—> → ✗ later-than-matrix

(48)



Here, progressive aspect *zài* constrains the RC event time $g(5)$ to coincide with the TopT $g(3)$ ($g(5) \subseteq g(3)$), while Non-Future constrains the TopT $g(3)$ to precede or coincide with the RC evaluation time ($g(3) \leq g(2)$). Once again, since the RC evaluation time and the matrix event time are assigned the same value $g(2)$ (via binding), the RC dancing time $g(5)$ is required to coincide with the matrix searching time $g(2)$, itself constrained to either precede or coincide with utterance time. Putting all this together yields the ordering $g(5) \subseteq g(3) \leq g(2) \leq t_u$, which ensures that no subinterval of the dancing time $g(5)$ can lie in the future of the searching time $g(2)$. This is why/how RCs with progressive aspect fail to yield later-than-matrix readings.

(56)



(57) Relative clause with *zài*:

- a. $\llbracket zài \rrbracket^{g,c} = \lambda p_{\langle v, st \rangle}. \lambda t_i. \lambda u_i: u \subseteq t. \lambda w_s. \exists e[p(e)(w) \ \& \ \tau(e) = t]$
- b. $\llbracket_{AspP} t_5 zài [x_4 tiào bāléiwǔ] \rrbracket^{g,c} = \lambda u_i: u \subseteq g(5). \lambda w_s. \exists e[\text{DANCE BALLET}(g(4))(e)(w) \ \& \ \tau(e) = g(5)]$
- c. $\llbracket TP \rrbracket^{g,c} = \lambda w_s. \exists e[\text{DANCE BALLET}(g(4))(e)(w) \ \& \ \tau(e) = g(5)]$; defined only if $g(3) \subseteq g(5)$, and $g(3) \leq g(2)$
- d. $\llbracket NP \rrbracket^{g,c} = \lambda x_e. \lambda t_i: t \leq g(2). \lambda w_s. \text{GIRL}(x)(t)(w) \ \& \ \exists e[\text{DANCE BALLET}(x)(e)(w)] \ \& \ \exists u[t \subseteq u \ \& \ \tau(e) = u]$

(58) $\llbracket (55) \rrbracket^{g,c} = \lambda w_s. g(1) \subseteq \text{That Moment} \ \& \ \exists t_i \exists e_v [\tau(e) = t \ \& \ g(1) \subseteq t] \ \& \ \forall \langle t', w' \rangle [\text{REACH ONE'S GOAL}(L)(e)(w)(t')(w') \rightarrow \exists z_e \exists f_v [\text{GIRL}(z)(t')(w') \ \& \ \text{DANCE BALLET}(z)(f)(w') \ \& \ t' \subseteq \tau(f)] \ \& \ \text{FIND}(z)(L)(t')(w')]$; defined only if $g(1) \leq t_u$

At this stage, we have derived the temporal interpretations of embedded RCs with overt—be it perfect(ive) or imperfective—aspect (as identified in Section 4 above), without having to stipulate the ULC. The lack of later-than-matrix readings followed automatically from how the meaning of the RC and the matrix clause compose, on the assumption that Mandarin has a covert Non-Future tense. We now turn to the interpretations of aspectually bare RCs.

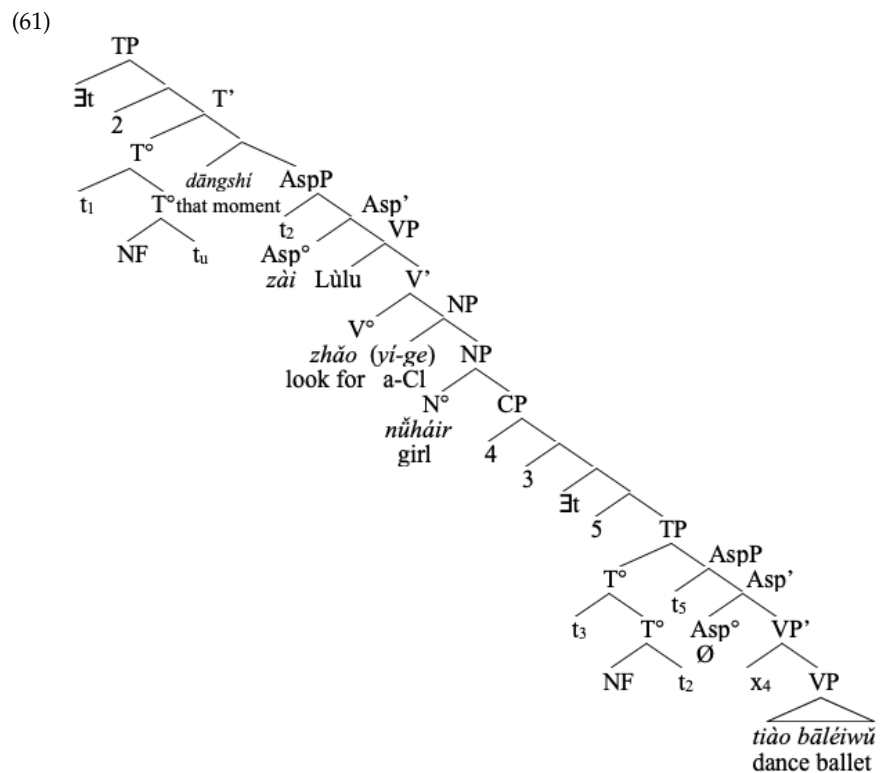
6.3. Intensional Contexts without Overt Aspect

Recall example (7), repeated below as (59), which showed that Mandarin RCs without overt aspect allow freely ordered temporal construals, since the time of dancing in the RC can either precede, follow, or coincide with the matrix searching time.

- (59) Dāngshí, Lùlu zài zhǎo [RC yí-ge tiào bāléiwǔ de nǚhái.]
 at.that.time Lùlu PROG look-for one-CL dance ballet DE girl.
 'At that moment, Lùlu was looking for a girl who had danced/was dancing/would dance ballet.'

In an intensional context, on a *de dicto* reading, the RC in (59) (just like the RCs in (45), (51), or (55) above) is anchored into the matrix via binding of the RC evaluation time by the matrix event time. Now, the only difference between (59) and (45) is that there is no overt aspect in the RC in (59). Recall the assumptions defended in Section 6.1: AspP is always projected since Asp^o serves to mediate between eventualities and times by introducing, via a running time function, the eventuality time argument. Aspect is thus always present, even in sentences with no overt marker appearing on the surface. This means that alongside overt aspectual heads (e.g., *guo*, *le*, *zài*, or *zhe*), Mandarin also has the covert aspectual head, whose denotation was given in (44) above. This covert aspectual head is semantically underspecified: it imposes no restriction on the temporal ordering of its two time arguments. Consequently, the ordering between the RC event time and the RC TopT can be freely construed as precedence, coincidence, or subsequence, as illustrated in (60c,d). We go through the semantic derivation of (59) in (60) and (61) step by step to see how the availability of later-than-matrix reading automatically falls out.

- (60)
- a. NF tense in the RC: $t_{RC\ top} \leq t_{RC\ evaluation} (= t_{matrix\ event})$
 - b. \emptyset Asp: $t_{RC\ event} \leq t_{RC\ top}$ OR $t_{RC\ top} < t_{RC\ event}$
 → Ordering undetermined
 - c. $t_{RC\ event} \leq t_{RC\ top}$ → ✗ later-than-matrix
 - i. —[$t_{RC\ top}$]—[DANCING—]—[LOOKING FOR]—→
 - ii. —[DANCING—]—[$t_{RC\ top}$ LOOKING FOR]—→
 - d. $t_{RC\ top} < t_{RC\ event}$ → ✓ later-than-matrix
 - i. —[$t_{RC\ top}$]—[DANCING—]—[LOOKING FOR]—→
 - ii. —[$t_{RC\ top}$]—[LOOKING FOR]—[DANCING—]—→
 - iii. —[$t_{RC\ top}$ LOOKING FOR]—[DANCING—]—→



- (62) Relative clause with *covert* aspect:
- a. $\llbracket \text{Asp}^\circ \emptyset \rrbracket^{g,c} = \lambda p_{\langle v, st \rangle} . \lambda t_i . \lambda u_i : t \leq u \text{ or } u < t . \lambda w_s . \exists e [p(e)(w) \ \& \ \tau(e) = t]$
 - b. $\llbracket \text{TP} \rrbracket^{g,c} = \lambda w_s . \exists e [\text{DANCE BALLET}(g(4))(e)(w) \ \& \ \tau(e) = g(5)]$; defined only if $g(3) \leq g(2)$, and $g(5) \leq g(3)$ or $g(5) > g(3)$
 - c. $\llbracket \text{NP} \rrbracket^{g,c} = \lambda x_e . \lambda t_i : t \leq g(2) . \lambda w_s . \text{GIRL}(x)(t)(w) \ \& \ \exists e [\text{DANCE BALLET}(x)(e)(w)] \ \& \ \exists u [u \leq t \text{ or } t < u \ \& \ \tau(e) = u]$
- (63) $\llbracket (59) \rrbracket^{g,c} = \lambda w_s . g(1) \subseteq \text{The Moment} \ \& \ \exists t_i \exists e_v [\tau(e) = t \ \& \ g(1) \subseteq t] \ \& \ \forall \langle t', w' \rangle [\text{REACH ONE'S GOAL}(L)(e)(w)(t')(w') \rightarrow \exists z_e \exists f_v [\text{GIRL}(z)(t')(w') \ \& \ \text{DANCE BALLET}(z)(f)(w')] \ \& \ \text{FIND}(z)(L)(t')(w')]$; defined only if $g(1) \leq t_u$

Compare the derivation of (59) in (62) and (63) with that of the RC in (45), where perfect *guo* constrains the time of dancing $g(5)$ to precede the TopT $g(3)$ ($g(5) < g(3)$). Now, silent aspect in (61)–(62a) places no constraint on the ordering of these two times: $g(5)$ can precede $g(3)$, as was the case with perfect *guo* in (48) and (49); overlap $g(3)$, as was the case with progressive *zài* in (56) and (57); or follow $g(3)$. Suppose then that $g(3)$ follows $g(5)$. Tense then constrains the TopT $g(3)$ to precede or coincide with the RC evaluation time ($g(3) \leq g(2)$), but since $g(3)$ is free to fall after $g(5)$ ($g(5) < g(3)$), the ordering ($g(3) \leq g(2) < g(5)$) can freely be generated. Since, moreover, the RC evaluation time and the matrix event time are assigned the same value $g(2)$ (via binding), then on this ordering, the RC dancing time $g(5)$ is future-shifted relative to the matrix searching time $g(2)$. This is why/how RCs with bare predicates allow later-than-matrix readings.

Recapitulating, why are later-than-matrix readings possible in Mandarin bare RCs, but not in RCs with overtly marked aspect, or English tensed RCs? Mandarin bare RCs are tensed (have a silent Non-Future) and, in intensional contexts, their evaluation time is bound by the matrix event time ($g(2)$) in all of the derivations in Sections 6.2 and 6.3). When aspect is silent, however, the (indirect) ordering of the matrix event time $g(2)$ and the embedded event time $g(5)$ is undetermined and, as such, can be freely construed as precedence, yielding an earlier-than-matrix construal, as coincidence yielding a simultaneous construal, or subsequence yielding the later-than-matrix construal proscribed by the ULC. The underspecification of silent aspect thus ultimately explains why Mandarin embedded clauses with bare predicates allow later-than-matrix readings, even in intensional contexts.

7. Conclusions: Evidence for Non-Future Tense in Embedded Contexts

We first sought in this paper to establish that Mandarin bare embedded clauses in intensional contexts allow later-than-matrix readings. We then argued that this freedom of temporal interpretation could not be imputed to the lack of tense: Mandarin clauses are only superficially tenseless, since they carry a silent Non-Future tense (Sun 2014).

We have shown that the intricate distribution of the temporal readings of Mandarin relative clauses with or without aspectual markers nicely follows the Non-Future tense hypothesis first defended by Sun (2014) for Mandarin root clauses, together with the assumption that Mandarin has a silent underspecified aspect. The source of temporally free readings of bare embedded clauses in Mandarin does not lie in surface tenselessness or undetermined tense since Mandarin has a silent Non-Future tense, but rather in surface aspectlessness and undetermined aspect.

We close this paper by assessing the arguments provided here (the first to the best of knowledge) for Non-Future tense in embedded contexts, as well as offering two further arguments.

One of the core arguments for Non-Future tense in independent clauses (Matthewson 2006; Sun 2014) comes from the absence of future readings for bare sentences. As discussed at length in Section 5, Mandarin bare sentences cannot be used to describe future eventualities even when a future adverbial is added to the sentence. Future (though not futurate) readings require a future-oriented modal. This restriction follows straightforwardly the assumption that Mandarin has a covert Non-future tense restricting the reference of the TopT to non-future times.

Turning to embedded contexts, we have seen that RCs overtly marked with aspect do not allow readings in intensional contexts where the RC eventuality lies in the future relative to utterance time, if the matrix eventuality is itself in the past or the present. On the assumption that Mandarin has a covert Non-Future tense, this restriction follows straightforwardly how the meaning of the RC and the matrix clause compose, without stipulating the ULC—but why not appeal to the ULC itself to rule out later-than-matrix readings without positing silent Non-Future tense in the embedded clause? (This is indeed the position that Bochnak (2016) takes for Washo, a language with morphologically tensed and tenseless clauses.) Well, first, Non-Future in embedded contexts is the null hypothesis once we have established its existence in matrix contexts. Second, the ULC is clearly too strong since it does not hold in Mandarin aspectually unmarked RCs in intensional contexts, as established in Section 4. Thirdly, the other major argument provided in the literature for Non-Future tense in independent clauses carries over to embedded contexts. Thus, consider the RC in (64b):

- (64) a. Preceding discourse context:
 Gǔlóng shēng yú Xiānggǎng, Mòyán shēng yú Shāndōng.
 Gǔlóng be.born at Hong Kong Mòyán be.born at Shandong
 ‘Gǔlóng was born in Hong Kong, and Mòyán was born in Shandong.’
 b. Zhè liǎng-ge [RC chōuyān hěn xiōng de] zuòjiā dōu
 DEM two-Cl smoke very terrible DE writer DOU
 hěn yǒumíng.
 very famous
 ‘These two writers who smoked a lot and smokes a lot (respectively) are both very famous.’

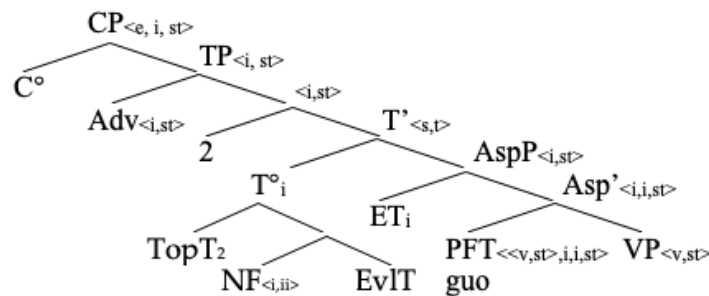
The argument provided in (64) parallels that given in (37) above for independent clauses. As the preceding context in (64a) makes clear, the two writers under discussion in (64b) are Gǔlóng, a novelist who passed away in 1985, and Mòyán, a writer (alive in 2021 when the sentence is uttered). Example (64b) thus conveys that Gǔlóng, who used to be a heavy smoker, and Mòyán, who is heavy smoker, are both very famous. Their smoking habits as depicted by the RC are true for different time intervals. The one and only main predicate in the RC (and, by hypothesis, the one and only syntactic tense (TP) projection in the RC) thus yields past and present readings simultaneously. Example (64b) can only be

translated to English with two occurrences of the predicate ‘smoke’ inside the RCs because the temporal information encoded in the RC in (64b) cannot be conveyed with a single tense in English. Only a tense that can select simultaneously for both past and present intervals could fit the truth conditions of the covert tense heading the TP in the RC, and this is exactly how Non-Future is defined.

Finally, consider (65), which provides yet another argument for Non-Future tense in embedded context from the temporal reference of adverbs. The predicate *mǎi cǎipiào* ‘buy lottery tickets’ in the RC marked by *guo* can only be understood as describing a past-shifted event relative to the matrix search time. That is, Lùlu was/is looking (at the past time under discussion) for a customer who had already bought tickets at the search time. The time adverb *shíèryuè* ‘December’ can in principle refer to either a past or a future December. If Lùlu’s search time is in, say, June 2021, *shíèryuè* in (65) can felicitously refer to the previous December—that is, December 2020—but not the following December, that is, December 2021. Now, this constraint on the reference of the adverb will follow the Non-Future tense hypothesis, but not if the *guo* marked RC in (65) is tenseless. To see why, consider the syntax of the RC as sketched in (66) (all irrelevant information omitted).

- (65) (Dāngshí,) Lùlu zhǎo guo [RC yí-ge zài shíèryuè yǐqián
 at.that.time Lùlu look-for PFT one-Cl at December before
 mǎi guo cǎipiào de gùkè].
 buy PFT lottery.ticket DE customer.
 ‘At that moment, Lùlu had looked for a customer who had bought lottery tickets before December.’

- (66) TopT modification by a temporal adverb (in the RC):



Perfect *guo* in the RC places the RC event time in the past of the RC TopT. Since we are dealing with an intensional context, the embedded evaluation time will be bound by the matrix event time. The RC TopT is thus constrained to be a time before December that does not fall after the matrix search time. Perfect *guo* in the matrix places the search time in the past of the past topic time under discussion. These constraints yield the temporal ordering schematized below:

- (67) BUYING TICKETS < [TopT-RC BEFORE DECEMBER] ≤ SEARCH < [TopT-Matrix AT THAT PAST MOMENT]

It thus follows that if Lùlu’s search time is in, say, June of 2021, the adverb *shíèryuè* in (65) can felicitously refer to the preceding December (of 2020), but not to the upcoming December (of 2021). Suppose, however, that tense in Mandarin imposes no restriction on the embedded TopT relative to the embedded evaluation time—that is, relative to the matrix event time (since in intensional contexts the former binds the latter). The only constraints we would then have are thus those in (68a) and (68b) imposed respectively by perfect aspect in the RC (68a), and perfect aspect in the matrix (68b). So what, then, prohibits either of the orderings in (68c–d) which satisfy both these constraints, but are nonetheless unavailable?

- (68) a. BUYING TICKETS < [TopT-RC BEFORE DECEMBER] (via perfect *guo* in the RC)
 b. SEARCH < [TopT-Matrix AT THAT PAST MOMENT] (via perfect *guo* in the matrix)
 c. ✗ later-than-matrix
 SEARCH < [TopT-Matrix AT THAT PAST MOMENT] < BUYING TICKETS < [TopT-RC BEFORE DECEMBER] < UT.
 d. ✗ earlier-than-matrix
 BUYING TICKETS < SEARCH < [TopT-Matrix AT THAT PAST MOMENT] < [TopT-RC BEFORE DECEMBER] < UT.
- (69) Dāngshí, Lùlu zhǎo guo [RC yí-ge jiānghuì zài shìeryuè
 at.that.time Lùlu look-for guo one-Cl WOLL at December
 yǐqián mǎi guo cǎipiào de gùkè].
 before buy PFT lottery.ticket DE customer.
 ‘At that moment, Lùlu had looked for a customer who would have bought lottery tickets before December.’

Note importantly that on the ordering in (68d), *only the past reference time of the adverb is future-shifted relative to the matrix search event*. That is, the ticket buying event itself remains past-shifted relative to the matrix search event, so this unavailable construal is not a later-than-matrix reading, but rather an earlier-than-matrix reading. In order to convey the forward-shifted readings schematized in (68c,d), a modal is required, as shown in (69). The Non-Future tense hypothesis straightforwardly accounts for the unavailability of such construals, whether the embedded event is itself past- or future-shifted relative to the matrix event, by ensuring that (any subinterval of) the TopT of the RC does not lie in the future of the matrix search time—that is, of the embedded evaluation time in intensional contexts.

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Abbreviations

AdjP: adjective phrase, Cl: classifier, DEM: demonstrative, DP: determiner phrase, DUR: durative, EvIT: evaluation time, LF: logical form, NF: non-future, PFT: perfect, PFV: perfective, PP: prepositional phrase, PROG: progressive, RC: relative clause, Top/top: topic, TopT: topic time, ULC: upper limit constraint, UT: utterance time.

Notes

- ¹ To our knowledge, the term ‘later-than-matrix reading’ is first used in Kusumoto (1999), referring to the temporal ordering of the event time of the embedded clause with regard to the matrix event time, on construals where the former follows the latter.
- ² We restrict our attention here to RCs, the issues that the time reference of complement clauses raises going well beyond the scope of this paper. Suffice to say, however, that the generalizations given in (i) and (ii) in the text above carry over to complement clauses in Mandarin (see Demirdache and Sun 2017; Sun and Demirdache 2018).
- ³ Note that the eventive predicate *tiào bālěiwǔ* ‘dance ballet’ in the RC can also receive a habitual reading, in which case the RC describes a girl who was/is a ‘ballet dancer’. For the purpose of this paper, we focus exclusively on episodic readings and leave aside the generic/habitual readings of eventive predicates, but see Sun (2014) for extensive discussion.

4 The bracketing in (8b) and (12b) is intended to illustrate a simultaneous reading where the matrix search/interview time coincides with (that is, starts at or during) the past dancing/living time of the RC. The reader might wonder why the RC event time can extend up to/after the UT in (12b) but not in (8b); this is merely because of the presence of the adverb *dāngshí* ‘that time’ in (7), which (given the context provided for (7)) restricts the search time to a time located last night.

5 That stative predicates receive simultaneous readings with regard to the utterance time or the matrix event time—in the absence of an overt time adverb in the RC—leads Sun (2015) to incorrectly conclude that stative RCs, unlike eventive RCs, do not allow temporally free readings. Her generalization is roughly as follows. Out of the blue, the default anchor time for the state eventuality in the RC in, say, (i) is either the utterance time or the matrix event time, thus yielding a simultaneous interpretation where the state described by the RC (the time of staying in Paris) overlaps either the utterance time, or the matrix event search time. When, however, an adverb is added to temporally anchor the state eventuality described by the RC, the bare stative RC can be construed as either past- or future-shifted relative to the matrix event time.

- (i) Shànggèyuè, Lùlù zài zhǎo [RC yí-ge dāi zài bālí de nǚhái].
 last.month Lùlù PROG look.for one-CL stay at Paris DE girl
 ‘Last month, Lùlù was looking for a girl who is/was staying in Paris.’

Now, this construal is also available in the absence of a temporal adverb as long as the discourse context is properly set up. Suppose, for instance, that Lùlù wants to interview people about the COVID-19 shutdown in 2020. Example (i) could be felicitously uttered, in June of 2021 on a past-shifted reading where Lùlù is looking for a girl to interview who lived in Paris during the 2020 shutdown. Or, suppose that Lùlù is preparing a TV program about Paris scheduled to be filmed the following fall. In this context, (i) could be felicitously uttered in July of 2021 on a future-shifted reading where Lùlù was looking for a girl who will be living in Paris at the future time of filming.

6 Note, moreover, that since there is no temporal specification of the relevant fall in (13) (e.g., whether it is last or next fall), the RC can also receive a habitual reading (cf. footnote 3), where Lùlù was looking for a girl who generally stays in Paris in the fall. As mentioned previously (footnote 3), however, we leave aside here habitual and generic construals, restricting ourselves to episodic readings.

7 For further discussion of the temporal interpretation of bare stative vs. eventive predicates, see Caudal and Bednall (2022) (in this Special Issue), who convincingly argue against the view found in the literature that aktionsart largely determines the temporal anchoring of sentences with bare predicates (e.g., Smith and Erbaugh 2005), concluding that biases towards a particular temporal anchoring can always be overruled by additional contextual temporal information, whatever the event structure type of the predicate.

8 For an extensive discussion of Mandarin perfective aspect, see Zhao (2022) (in this Special Issue).

9 Often referred to as an ‘experiential’ marker, *guo* indicates that ‘the event has been experienced at some indefinite time, often in the past’ (Klein et al. 2000). It differs from the English perfect in that it has a ‘discontinuity’ effect (Chao 1965; Smith 1991; Lin 2006). See also discussions in Zhao (2022) (in this Special Issue) and Bertrand et al. (2022) (in this Special Issue) for a cross-linguistic perspective.

10 Note that (17) also differs from (13) in that the locative PP *zài bālí* ‘in Paris’ is in a preverbal position. This is because a post-verbal locative PP would be infelicitous with *guo*.

11 The analysis of *le* is extensively debated among scholars, many of which distinguish verbal *le*, commonly analyzed as encoding perfectivity, from sentential *le*, analyzed as an inchoative marker (Chao 1965; Li and Thompson 1981; Sybesma 1999; Paul 2015). Only verbal *le* is relevant for the discussion in this paper.

12 In (21), $e' \leq_E e$ means e' is a subpart of the event e ; e_{PRO} is a pronoun-like free variable.

13 What follows owes a lot to a reviewer who inquired about later-than-matrix readings of *le* on its continuous meaning, and brought to our attention verbs such as *yǎng* ‘raise’, which yield continuous rather than past-shifted readings when modified by *le*.

14 We set aside cases where *zhe* modifies a verb other than the main verb of the sentence, such as (i), where *zhe* marks simultaneity of the event denoted by the verb *kāi* ‘drive’ with the event denoted by the main verb *tīng yīnyuè* ‘listen to music’. In this case, the verb modified by *zhe* does not encode a result state.

- (i) Tā jīngcháng kāi zhe chē tīng yīnyuè
 3SG often drive DUR car listen music
 ‘He often listens to music while driving his car.’

15 *i* in (33) is the type of time intervals.

16 The paradigms in (34) and (37) in the text are adapted from St’át’imcets (Matthewson 2006) to Mandarin. The reader is also referred to Chen and Husband (2018), who provide interesting experimental evidence for the contrasts illustrated in (37).

17 In Section 6, we introduce aspect, which serves to map predicates of eventualities onto predicates of times, following Kratzer (1998), and in this way can impose conditions on the relation between event time and TopT. Temporal frame adverbs can modify either of these two times (Hornstein 1990; Kamp and Reyle 1993; Demirdache and Uribe-Etxebarria 2000, 2004). Example (66) in Section 7 illustrates the syntax and semantic composition of modification of the TopT once we introduce AspP.

- 18 *v* in (41) is the type of events.
- 19 We leave these two options open here, as we see at this stage no empirical differences in the predictions they respectively make.
- 20 We give this definition of *le* for simplicity. The exhaustive semantics of *le* remains controversial in the literature due to the complexity of its uses and as such is well beyond the scope of this paper. Suffice to say that capturing the full range of temporal construals of *le* when applied to different types of predicates (e.g., whether or not a result state is inferred) would require reformulating (53a) in order to make reference to subevent structure, in the spirit of Lin (2003, 2006).

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