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Temporal *de Re* and semantic variation: Composing simultaneity in Asante Twi*

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Abstract This paper explores the temporal interpretation of attitude reports (AttR) in the Asante (Twi) dialect of Akan (Kwa, Niger Congo), with a focus on deriving the (past) simultaneous (*SIM*) reading in X-under-Past embeddings. We note that *SIM* in Asante arises when X represents: (i) the bare form, (ii) the distal deictic tense *ná* or (marginally) (iii) the perfective past *LEN* - with a decreasing preference in that order from (i) to (iii). Based on our empirical findings, accounts postulating deletion or binding of the embedded tense are ruled out for (ii) and (iii). Therefore, we propose that, while the bare form is associated with a *de Se* binding construal, both *ná* and *LEN* involve only a *de Re* construal. Consequently, we suggest that the speakers' choices in embedding are guided by two pragmatic principles: one that favours *de Se* over *de Re* LFs (for (i) over (ii) and (iii)) and another that favours unbounded over bounded event structures (for (i) and (ii) over (iii)).

Keywords: tense, sequence of tense, attitude, *de re*

1 Introduction: Sequence of tense and variability

When expressing simultaneity (*SIM*) in (past) attitude contexts, languages differ as to which tense form they display under a past-tensed attitude verb. Specifically, English-like languages typically involve Sequence of Tense (SoT) configurations, where the tense form of the embedded clause agrees in tense features with that of the embedding attitude verb. By contrast, languages like Japanese convey temporal overlap primarily through a relative present in the complement clause. Examples for English and Japanese are given in (1a) and (1b), respectively.[1]

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1 I employ the following glossing abbreviations: 1/2/3=first/second/third person, a=verb prefix 'a', ACC/DAT/NOM=accusative/dative/nominative case, COMP=complementizer, COP=copula,

(1) *SIM*-Context: Jerry (speaking two years ago): 'Elaine is upset.'

a. Jerry said that Elaine {**#is/was**} upset.

b. Jerry-wa Elaine-ga okot-te-{**iru/#ita**} to itteimash-ita.
Jerry-TOP Elaine-NOM upset-PROG-**PRES/PAST** COMP say-PAST

Importantly, as shown in sentence (1a), its indexical nature prevents the English present from generating overlapping interpretations (in cases where the eventuality cannot plausibly extent to the utterance time). Clearly, the use of the past tense is not restricted to simultaneous contexts and can equally produce backward-shifted interpretations (*BACK*), for which Elaine used to be upset at a time preceding Jerry's statement. Crucially, this is the only reading available for this configuration in Japanese.

This typological division has been tied to a linguistic parameter such as the one in (2), for which tense features in attitude reports may or may not be invisible to semantic composition under morpho-syntactic agreement (cf. Ogihara 1996; Ogihara & Sharvit 2012).

(2) *The Tense Vacuity Parameter (TVP)*:

a. +*Vac languages*: Past tense may be semantically vacuous under morpho-syntactic agreement (a.o., English, Dutch, North-Germanic).

b. -*Vac languages*: Past tense is always semantically interpreted, independent of the syntactic environment (a.o., Slavic, Japonic-Koreanic, Hebrew).

In +*Vac* languages, when licensing conditions are met, the embedded past tense may optionally be deleted at Logical Form, leaving behind a (locally) bound variable.[2] As a result, the system generates a co-temporal interpretation, consistent with the simultaneous reading. Setting aside compositional details for the moment, a simplified resulting meaning can be derived as follows.[3]

DEF=definite determiner, DEM=demonstrative, FUT=future, LEN=vowel lengthening suffix, NA=clausal particle 'ná', PAST=past tense, PFV=perfective aspect, PRES=present/non-past tense, PROG=progressive aspect, SG=singular number, TOP=topic marker.

2 Deletion is used here for illustrative purposes only. Any alternative formal implementation of tense agreement would suffice. For instance, see Kusumoto 1999; Kauf & Zeijlstra 2018; Stowell 2007, among others, for a compatible theory that avoids structural manipulations.

3 For propositional attitude verbs, I adopt a Hintikka 1962-like semantics (revised in subsequent work, see Ogihara & Sharvit 2012), for which attitude verbs are universal quantifiers over world-time pairs that are compatible with the attitude holder's mental state.

(i) $[\![\text{ say }]\!] = \lambda w_s.\lambda t_i.\lambda p_{\langle s,\langle i,t\rangle\rangle}.\lambda x_e.\forall\langle w',t'\rangle \in \mathit{Say}(x,w,t) \rightarrow p(w')(t')$.

The formula reads: 'Given an evaluation world w, a reference time t, a proposition p and an attitude holder x, for all worlds w' and times t' compatible with x's say-alternatives in w at t, p holds true of w' and t'.'

(3) a. *Deletion*: [$_{TP_1}$ PAST Jerry say [$_{CP}$ λt [$_{TP_2}$ ~~PAST~~ Elaine be-upset]]]
b. *Post-deletion*: [$_{TP_1}$ PAST Jerry say [$_{CP}$ λt [$_{TP_2}$ t Elaine be-upset]]]
c. ⟦ TP_1 ⟧ = 1 iff for all times t′ and worlds w′ compatible with what Jerry said two years ago in the actual world, Elaine is upset in w′ at t′. (*SIM*)

Against this backdrop, additional variation within the *-Vac* group has emerged, as several languages disallowing tense deletion appear to express *SIM*-readings even in SoT configurations. This is illustrated in (4) for Russian.

(4) Žénja skazal čto Lena byla (togda) beremenna.
Zhenya say.PAST.PFV COMP Lena be.PAST then pregnant.
Possible: 'Zhenya said that Lena was pregnant then.' (*SIM*)

Compared to their *+Vac* counterparts, *SIM*-readings of past-under-past in *-Vac* languages have been argued to be marginal and made accessible by *then*-like adverbs (Ogihara & Sharvit 2012; Tsilia 2021).

In the remainder of this section, a diagnostic is outlined to distinguish *+Vac* from *-Vac* languages. Section 2 provides an overview of temporal meaning in Asante Twi and presents the empirical data on attitude reports. A *de Re* as well as a *de Se* analysis is proposed in Section 3. The variability observed in the data is further explored in Section 4, which concludes the paper.

1.1 Tense vacuity diagnostics

Before turning to Asante Twi, it's crucial to clearly define the methodology used to identify a truly vacuous tense. This carries theoretical significance because, in many simultaneous interpretations (like those discussed earlier), the embedded past tense can still convey a past meaning. For example, in past simultaneous contexts, the embedded event can be interpreted as occurring in the past relative to the time of utterance, even if it does not precede the eventuality denoted by the attitude verb. Therefore, any theory proposing an SoT analysis of simultaneous readings should be evaluated using diagnostics explicitly designed to test the semantic vacuousness of tense morphology.[4] Below I propose two tests that have been variously deployed: breakfast sentences and permanent states of affairs (cf. Khomitsevich 2008; Armenante to appear). Ideally, these tests should show why languages like English and Russian hold a different parametric status, although both permitting simultaneous readings in SoT constellations.

Breakfast sentences, also known as Kamp-Abusch sentences (Abusch 1988, 1997; Ogihara 1996), involve a past-tensed eventuality which holds true of a time

4 This important point is often overlooked in the literature, where studies on under-researched languages frequently rely on deletion-like analyses without supporting them with the appropriate diagnostics.

following the utterance time (UT). Because of this, these predicates don't seem to express pastness in the typical sense. In English, they feature a past-tensed eventuality embedded under a *would*-report, as shown in (5).

(5) *(i) Breakfast context*:
Context (*SIM*): Chidi (next week): 'I love you.'

a. Last week Eleonor said that in two weeks Chidi **would** finally tell her that he **loved** her.

Assuming that *would* is the spell out of a future modal plus past tense morphology, the simultaneous interpretation in (5) arises through the agreement chain "said-would-loved", thus making the tense feature on *loved* vacuous.

Reports of permanent states of affairs also offer a good testing ground for tense vacuity, as they denote properties that are generally true (or false), and therefore are not anchored to any specific (past) reference time (see the examples in (6)).

(6) *(ii) Permanent states of affairs*

a. Donny thought that Martha **was** Scottish.

b. Martha believed that 9 was a prime number.

Crucially, in *-Vac* languages, past-tensed complements cannot yield 'null' simultaneous readings. For future contexts, only a backward-shifted interpretation is attested, while permanent states of affairs can only give rise to an implausible interpretation when past-tensed. This is illustrated below for Russian (see also Khomitsevich 2008).

(7) *(i)* Context (5):

a. Na proshloy nedele Eleonor skazala, chto cherez dve nedeli Chidi
on last week Eleonor say.PAST.PFV COMP after two weeks Chidi
nakonec skazhet yey, chto {**lyubit/#lyubil**} yeyo.
finally say.FUT 3SG.DAT COMP love.**PRES/PAST** 3SG.ACC

(8) *(ii)* Context: Andrey's old mistaken belief: 'Marta is Italian'.

a. Andrey dumal, chto Marta {**-/#byla**} italyanka.
Andrey think.PAST.IPFV COMP Marta COP.**PRES/PAST** Italian
'Andrey thought that Marta was Italian.'

The diagnostics presented in this section help identify languages whose past simultaneous readings are obtained via a deletion-like mechanism - and thus through a *de Se* construal. Languages that, like Russian, cannot resort to *de Se* typically involve a *de Re* mechanism.

This basic typological picture has been further enriched by recent work on under-researched languages (Bochnak 2016; Bochnak, Hohaus & Mucha 2019; Mucha 2015; Chen, Vander Klok, Matthewson & Rullmann 2021). Building on their insights, this paper, while discussing novel data on Asante Twi, addresses two core questions: (i) what is the status of Asante Twi with respect to the TVP? (ii) Does Asante Twi provide any new insights into the cross-linguistic picture?

2 Temporal reference in Asante Twi

This section offers an overview of how Asante Twi — an Akan language (Kwa) spoken in Ghana — encodes temporal meaning. The investigation will focus on the bare form, the suffix *LEN*, and the clausal particle *ná*.[5]

The data presented in this paper[6] follow the guidelines for semantic fieldwork illustrated in Matthewson 2004. Nearly all the data were collected through acceptability judgment tasks, where speakers evaluated whether a sentence was true in a specific context.

2.1 Matrix clauses and theoretical assumptions

In Asante, past temporal reference is primarily expressed through the particle *ná* and the vowel lengthening of the verb's stem *LEN*.[7] While the free morpheme *ná* denotes a distal deictic tense that picks out non-present temporal intervals, the affixal morpheme *LEN* is only restricted to past times. Moreover, the two markers differ with respect to their aspectual profile, as *LEN* is inherently perfective and may produce an inchoative reading, whereas *ná* is only compatible with imperfective eventualities.[8] By contrast, when in main clauses, the bare form of the verb yields a present interpretation, with an aspectual interpretation akin to *ná*, as shown in sentences (9).

(9) Context: Last week, you visited Afiba. Since she had gotten the flu, you couldn't stay long. Today, one of your friends asks you about Afiba. You tell them why you had to cut your visit short:

5 For a more comprehensive formal investigation, I refer the reader to Armenante & Lecavelier 2024

6 The data were collected through fieldwork elicitation from March 2022 to November 2023 with five L1 speakers of Asante Twi.

7 Alongside *ná* and *LEN*, the language also deploys the prefix *a*, denoting a resultative universal perfect (Armenante & Lecavelier 2024; Armenante to appear).

8 Specifically, *ná* in isolation correlates with stative readings when combining with stative predicates and with habitual readings when combining with eventive predicates. Episodic interpretations are strictly ruled out unless progressive (when co-occurring with the progressive marker *re*) (see also Armenante & Lecavelier 2024).

a. # Awusi yare.
Awusi sick
'Awusi is sick (now).'

b. Afiba yare**-è**.
Afiba sick-**LEN**
'Afiba was/got sick.'

c. **Ná** Afiba yare.
NA Afiba sick
'Afiba was sick.'

Importantly, both overt markers are predominantly found in referential contexts, as the one in (9). In fact, they're incompatible with purely experiential interpretations (see example (4) in Armenante & Lecavelier 2024: 80).[9]

Notably, the particle *ná*, though more commonly found in past contexts, can also occur in future-oriented ones, as in (10). Crucially, present interpretations for *ná* are strictly ruled out (see (11)).

(10) Context: Kofi is going to an 'all you can eat' event tonight. He has barely touched any food today, as he plans to stuff himself like a bottomless pit. However, you warn him that he will most likely feel sick tomorrow.

a. ɔkyena *(ná) wó-yare.
tomorrow NA 2SG-sick
'You will be sick tomorrow.'

(11) Context: You look pale and your forehand is burning. I say:

a. seisei (*ná) wó-yare.
now NA 2SG-sick
Intended: 'You are sick now.'

In the light of these findings, Armenante & Lecavelier (2024) adopt a pronominal tense analysis for both *ná* and *LEN*.[10] Specifically, *ná* picks out a contextually salient temporal interval other than the utterance time (here t*, see (12)). The overt particle *ná* as well as the bare form further combine with covert imperfective aspectual operators, which determine a stative or habitual interpretation. A possible semantics for the stative operator *STAT* is offered in (13).[11] Conversely, *LEN* involves a relative

9 In experiential contexts, the perfect aspect *a* must be used instead.

10 For a more detailed overview of the referential properties and the semantics of Asante Twi temporal markers, I refer the reader to Armenante & Lecavelier 2024.

11 For simplicity, examples with *ná* or the bare form will be limited to stative ones.

pronominal past in addition to a Kratzer-style perfective aspect (cf. Kratzer 1998).[12] Both meaning components are illustrated in (14).

(12) a. $[\![\text{ná}_7]\!]$ defined iff there is a contextually salient time g(7) $[\neg(g(7) \circ t^*)]$

b. When defined, $[\![\text{ná}_7]\!] = g(7)$

(13) $[\![\text{STAT}]\!] = \lambda p_{\langle v,t\rangle}.\lambda t_i.\exists e[t \subseteq \tau(e) \,\&\, p(e)]$

(14) a. $[\![\text{PFV}]\!](p_{\langle v,t\rangle})(\text{past}_{2,3_i})$ defined iff $g(2) < g(3)$

b. When defined, $[\![\text{PFV}]\!](p_{\langle v,t\rangle})(\text{past}_{2,3}) = 1$ iff $\exists e[\tau(e) \subseteq g(2) \,\&\, p(e)]$

For the bare form, no additional covert operators are introduced other than the aspectual ones. In absence of a reference time (RT), bare clauses are simply interpreted relative to the default evaluation time t* (i.e., the utterance time).[13] Armed with these tools, the meaning of matrix clauses is computed below.[14]

(15) *(i) Temporal interpretation of bare matrix clauses:*

a. Awusi yare. ('Awusi is sick.')

b. *LF*: $[_{CP}\ t^*\ [_{TP}$ - $[_{AspP}$ STAT $[\lambda e_5\ [_{VP}$ A-yare$_{w_0,e_5}]]]]]$

c. $[\![(15b)]\!] = 1$ iff $\exists e[t^* \subseteq \tau(e) \,\&\, \textit{sick}(w@)(e)(A)]$
Paraphrase: 'There is an eventuality e, such that e temporally includes the utterance time UT and e is an eventuality of Awusi being sick in the actual world w@.'

(16) *(ii) Temporal interpretation of LEN-marked matrix clauses:*

a. Afiba yare-è. ('Afiba was sick.')

b. *LF*: $[_{CP}\ t^*\ [\lambda t_3\ [_{TP}\ \text{past}_{2,3}\ [_{AspP}$ PFV $[\lambda e_5\ [_{VP}$ A-yare$_{w_0,e_5}]]]]]]$

c. $[\![(16b)]\!]$ defined iff $g(2) < t^*$ When defined, $[\![(16b)]\!] = 1$ iff $\exists e[\tau(e) \subseteq g(2) \,\&\, \textit{sick}(w@)(e)(A)]$

(17) *(iii) Temporal interpretation of matrix clauses containing ná:*

a. Ná Afiba yare. ('Afiba was/will be sick.')

b. *LF*: $[_{CP}\ t^*\ [_{TP}\ \text{na}_7\ [_{AspP}$ STAT $[\lambda e_5\ [_{VP}$ A-yare$_{w_0,e_5}]]]]]$

c. $[\![(17b)]\!]$ defined iff there is a contextually salient time g(7) $[\neg(g(7) \circ t^*)]$
When defined, $[\![(17b)]\!] = 1$ iff $\exists e[g(7) \subseteq \tau(e) \,\&\, \textit{sick}(w@)(e)(A)]$

12 The doubly indexed pronoun *past*$_{2,3}$ carries two indices: the first index *2* picks out the reference time (RT), the second index *3* refers to the evaluation time (EvalT), which is usually locally bound.

13 It is worth stressing that grammatical aspect is encoded in *LEN*, but not in *ná* or the bare form. On this note, it is important to point out that *ná* and *LEN* are mutually exclusive.

14 Predicates like *yare* ('sick') are of type $\langle s,\langle v,\langle e,t\rangle\rangle\rangle$ and map worlds to functions from eventualities to functions from entities to truth-values.

The bare clause in (15) is morphologically and semantically tenseless, with a present interpretation arising through the distinguished variable *t**. By contrast, the reference time in sentences containing *LEN* or *ná* is explicitly supplied by the pronominal tense heading the TP. In both cases, this is restricted presuppositionally. In particular, the output of the computations for the *ná* variant in (17c) displays semantic underspecification, as the RT is compatible with a past as well as a future orientation.

2.2 Complement clauses

Having looked at the composition of matrix clauses, we now turn to complement clauses. In what follows, we will see that bare and *LEN*-embeddings are essentially unambiguous, in that they naturally convey only a simultaneous and a backward-shifted interpretation, respectively. In turn, *ná*-embeddings exhibit a systematic ambiguity between the two readings, akin to that found in English.

In Asante Twi, (past) simultaneous readings are typically generated by embedding a bare clause under a past-oriented verb. Similar interpretations emerge under *ná*-embeddings, although some variation among speakers and embedded predicates is observed.[15] In contrast, LEN-embeddings are rejected in simultaneous contexts, as shown in the following examples containing an embedded stative (see (18)) and eventive predicate (see (19)).

(18) Context: You and Aba were supposed to watch a movie last Friday night. Unfortunately, Aba called you to cancel one hour before the movie. She told you: 'I am sick'. The week after you explain to your friend why Aba could not make it on Friday night:

a. Aba ka-à sɛ ɔ-yare. (Bare-under-*LEN*)
Aba say-LEN COMP 3SG-sick
'Aba said that she was (currently) sick.'

b. # Aba ka-à sɛ ɔ-yare-è. (*LEN*-under-*LEN*)
Aba say-LEN COMP 3SG-sick-LEN
'Aba said that she had been sick.'

c. ? Aba ka-à sɛ ná ɔ-yare. (*ná*-under-*LEN*)
Aba say-LEN COMP NA 3SG-sick
'Aba said that she was sick (at that time).'

15 Two consultants accepted sentence (18c), while one rejected it, hence the question mark. However, the same consultant accepted the same configuration under a simultaneous context in (19) and for different stative predicates. Generally speaking, my consultants reported that, though acceptable, *ná*-embeddings are less natural than bare ones in SIM-scenarios.

(19) Context: Aba is a great cook. Since she has little time during the week, she tries to cook more on Sundays, so that she has meals ready for the whole week. Yesterday was Sunday. You called Aba and asked her what she was up to. Unsurprisingly she was busy making food! You report this later to a friend:

a. Aba ka-à sɛ ɔ-re-noa aduane. (Bare-under-*LEN*)
Aba say-LEN COMP 3SG-PROG-cook food
'Aba said that she was cooking (at the moment).'

b. # Aba ka-à sɛ ɔ-noa-à aduane. (*LEN*-under-*LEN*)
Aba say-LEN COMP 3SG-cook-LEN food
'Aba said that she had cooked food.'

c. Aba ka-à sɛ ná ɔ-re-noa aduane. (*ná*-under-*LEN*)
Aba say-LEN COMP NA 3SG-PROG-cook food
'Aba said that she was cooking (then).'

Interestingly, when slightly modifying the sentence with a deictic adverbial as in (20), simultaneous interpretations become accessible even for *LEN*-under-*LEN*. This seems to mirror the behaviour of embedded past in some -*Vac* languages like Russian (cf. example (4)).[16]

(20) Aba ka-à sɛ ɔ-yare-è saa nandwo nó.
Aba say-LEN COMP 3SG-sick-LEN DEM night DEF
'Aba said that she was sick that night.' (*SIM* possible)

The fact that deictic adverbials may strengthen simultaneous interpretations for past-under-past in -*Vac* languages has been taken as evidence for a *de Re* analysis (Tsilia 2021; Vostrikova 2018; Armenante 2024, to appear).

To complete the empirical picture, the same sentences are presented in backward-shifted contexts. Unsurprisingly, both *LEN*- and *ná*-marked complement clauses are accepted. However, bare clauses are consistently rejected in BACK-contexts if the embedded eventuality has ceased to hold at the attitude time. This is illustrated below for an embedded stative predicate.

(21) Context: Aba was absent from work last week due to sickness, but she is fine now. When you saw her back at work yesterday, she told you about it. You report her words today:

a. # Aba ka-à sɛ ɔ-yare. (Bare-under-*LEN*)

b. Aba ka-à sɛ ɔ-yare-è. (*LEN*-under-*LEN*)

16 Note, however, that this interpretation is still not very natural.

c. Aba ka-à sɛ ná ɔ-yare. (*ná*-under-*LEN*)

The findings of this section are summarized in Table (22).[17]

(22) *The temporal interpretation of attitude reports in Asante Twi*

	Bare-under-*LEN*	***LEN*-under-*LEN***	***ná*-under-*LEN***
Simultaneous	✓	?#	?✓
Backward-shifted	#	✓	?✓

The picture emerging from our empirical investigation can be summarized as follows: while bare and *LEN*-embeddings are associated with *SIM* and *BACK*, respectively, *ná*-embeddings exhibit an ambiguity between the two interpretations. Moreover, *SIM*-readings are preferentially conveyed through the bare form and are rarely found in *LEN*-embeddings, except when they are modified by a deictic PP.

3 Composing simultaneity

This section presents an analysis of the temporal interpretation of attitude reports in Asante Twi. It is demonstrated that the respective readings for both bare and *LEN*-embeddings naturally follow from their semantics, based on a *de Se* analysis of the embedded complement clause. For *ná*-embeddings, I show that their interpretation is best captured by a *de Re* analysis that relies on concept generators.

3.1 Temporal *de Se*: Bare and *LEN*-embeddings

Before turning to the composition of complement clauses, let me briefly outline some key theoretical assumptions regarding the semantics of attitude reports. In line with Ogihara (1996), I assume that the complements of propositional attitude verbs denote functions of both worlds and times, which are quantified over by the attitude predicate. A denotation of the attitude verb in the style of Hintikka 1962 and compatible with eventualities is given in (23) (cf. Bochnak et al. 2019: 437).

(23) $[\![\text{ka}]\!] = \lambda w_s.\lambda e_v.\lambda p_{\langle s,\langle i,t\rangle\rangle}.\lambda x_e.\forall\langle w',t'\rangle\,[\langle w',t'\rangle \in \textit{Say}(x,w,\tau(e)) \rightarrow p(w')(t')]$[18]

The denotation of an embedded bare clause is calculated in (25b) from the *de Se* LF in (25a).

17 The symbol '?#' means that the reading was available only in exceptional cases. The symbol '?✓' means that the reading was ruled out only for one consultant out of four and for specific predicates.

18 *Say*(x,w,t = { ⟨w,t⟩:⟨w,t⟩ is compatible with what x says in w throughout t }.

(24) Aba ka-à [sɛ ɔ-yare]. (*Bare-under-LEN*)
Aba say-LEN COMP 3SG-sick
'Aba said that she was (currently) sick.'

(25) a. LF_{emb}: [$_{CP}$ sɛ [λw_1 [$_{TP\ \langle i,t\rangle}$ - [$_{AspP\langle i,t\rangle}$ [$_{Asp}$ STAT] [$_{VP\langle v,t\rangle}$ λe_4 [$_{VP}$ [$_{DP}$ ɔ$_9$] [$_{V'\langle e,t\rangle}$ yare$_{w_1,e_4}$]]]]]]]
b. ⟦ (25a) ⟧ = $\lambda w.\lambda t.\exists e'[t \subseteq \tau(e') \ \&\ \textit{sick}(w)(e')(g(9))]$ (with g(9) = Aba)

In the absence of a temporal operator, the embedded reference time is supplied by the attitude verb after this composes with the complement clause. The resulting *de Se* interpretation is that of simultaneity, as shown in (26b).

(26) a. $LF_{(24)}$: [$_{CP}$ t* [λt_3 [$_{TP}$ past$_{2,3}$ [$_{AspP}$ PFV [λe_5 [$_{VP}$ [$_{DP}$ Aba][$_{V'}$ ka$_{w_0,e_5}$ [$_{CP_{emb}}$ ...LF$_{(25a)}$...]]]]]]]]
b. ⟦ (26a) ⟧ defined iff g(2) < t*
When defined, ⟦ (26a) ⟧ = 1 iff $\exists e[\tau(e) \subseteq g(2) \ \&\ \forall\langle w',t'\rangle\ [\langle w',t'\rangle \in \textit{Say}(A,w@,\tau(e)) \rightarrow \exists e'[t' \subseteq \tau(e') \ \&\ \textit{sick}(w')(e')(g(9))]]]$ (with g(9) = Aba)
Paraphrase: 'There is an eventuality e, such that e is temporally included in g(2) - with g(2) preceding UT - and for all the worlds w′ and times t′ accessible from what Aba said in w@ throughout the running time of e, there is an eventuality e′ such that e′ temporally includes t′ and e′ is an eventuality of Aba being sick in w′.'

As things stand, bare LFs can only produce *SIM*-readings in attitude contexts, as they're temporally dependent on the attitude time. The same compositional mechanism correctly derives *BACK*-readings for *LEN*-embeddings, as illustrated below.

(27) a. Aba ka-à sɛ ɔ-yare-è. (*LEN-under-LEN*)
Aba say-LEN COMP 3SG-sick-LEN
'Aba said that she had been sick.'
b. LF_{emb}: [$_{CP}$ sɛ [λw_1 [λt_5 [$_{TP}$ [$_{T}$ past$_{2,5}$] [$_{AspP\langle i,t\rangle}$ [$_{Asp}$ PFV] [$_{VP\langle v,t\rangle}$ λe_4 [$_{VP}$ [$_{DP}$ ɔ$_9$] [$_{V'\langle e,t\rangle}$ yare$_{w_1,e_4}$]]]]]]]]
c. ⟦ (27b) ⟧ defined iff $\boxed{g(2) < t}$
When defined, ⟦ (27b) ⟧ = $\lambda w.\lambda t.\exists e'[\tau(e') \subseteq g(2) \ \&\ \textit{sick}(w)(e')(g(9))]$ (with g(9) = Aba)

(28) a. $LF_{(27a)}$: [$_{CP}$ t* [λt_3 [$_{TP}$ past$_{7,3}$ [$_{AspP}$ PFV [λe_6 [$_{VP}$ [$_{DP}$ Aba][$_{V'}$ ka$_{w_0,e_6}$ [$_{CP_{emb}}$ ...LF$_{(27b)}$...]]]]]]]]
b. ⟦ (28a) ⟧ defined iff g(7) < t* & $\boxed{g(2) < t'}$
When defined, ⟦ (28a) ⟧ = 1 iff $\exists e[\tau(e) \subseteq g(7) \ \&\ \forall\langle w',t'\rangle\ [\langle w',t'\rangle \in$

Say(A,w@,τ(e)) $\rightarrow$ $\exists$e$'$[τ(e$'$) $\subseteq$ g(2) & *sick*(w$'$)(e$'$)(g(9))]]] (with g(9) = Aba)
Paraphrase: 'There is an eventuality e, such that e is temporally included in g(7) - with g(2) preceding UT - and for all the worlds w$'$ and times t$'$ accessible from what Aba said in w@ throughout e, there is an eventuality e$'$ such that e$'$ is temporally included in g(2) - with g(2) preceding t$'$ - and e$'$ is an eventuality of Aba being sick in w$'$.'

Crucially, in *LEN*-marked embedded clauses, the eventuality is located a time always preceding the attitude time, thus yielding only a backward-shifted interpretation.[19]

3.2 *ná*-embeddings are not *de Se*

Section 2.2 has revealed a systematic ambiguity for *ná*-embeddings between a simultaneous and a backward-shifted interpretation. Given the pronominal semantics assigned to *ná*, a straightforward solution would be to derive *SIM* via a *de Se* mechanism and *BACK* via a *de Re* one (cf. Bochnak et al. 2019).

For simultaneous readings, two compositional pathways to temporal *de Se* can be explored: deletion and binding. While the two strategies yield equivalent truth-conditions - akin to those of bare embeddings, they differ in their definedness conditions. Specifically, as we have seen in Section 1, *ná*'s restriction might be "deleted" under temporal agreement, leaving a co-indexed trace behind.[20] Alternatively, temporal pronouns may be simply bound by an antecedent, thus preserving their semantic input. The two analytical options are tested through examples (29) and (30).

Example (29) targets a temporal interval extending from the start of the weekend until the utterance time - also called double access (Abusch 1988). Recall that *ná* is restricted to times that do not overlap UT. Therefore, if this restriction can disappear in SoT configurations, we expect *ná*-embeddings to be felicitous. This is not borne out.

19 The anteriority relation is not asserted but imposed by the framed definedness condition in (28b). Specifically, *LEN*'s presupposition sketched in (14) projects up to the abstractor 'λt_5' binding the EvalT index of the pronominal tense. This is eventually saturated by the attitude time t$'$.

20 Strictly speaking, the sentences in Section 2.2 do not exhibit morpho-syntactic agreement, as the matrix predicates consistently contained the perfective past *LEN*, even when the complement clause featured the particle *ná*. However, agreement is often understood in terms of feature matching rather than morphological identity (cf. Sequence of Tense in Romance (Ferreira 2017; Rodríguez 2008; Armenante to appear); also cf. Ogihara 1996: 130). Nevertheless, to be cautious, I will present data where *ná* is included even in the matrix.

(29) Context: On Saturday you asked Kofi why Ama was not around. Kofi told you: "I think Ama is working this whole weekend." It's Sunday morning now and Ama is working her last shift. A friend asks you why Ama is not at home, you reply:

a. ɛnnora ná Kofi gye di sɛ (# ná) Ama re-yɛ adwuma dapɛn
yesterday NA Kofi believe COMP NA Ama PROG-COP work week
awiei yi.
end DEM
Intended: 'Yesterday Kofi believed that Ama is/was working this weekend.'

The unacceptability of sentence (29a), when *ná* is overt, indicates the incompatibility of *ná* with double access readings, thus speaking against a deletion account. This view is additionally supported by example (30) involving false beliefs of permanent states.

(30) Context: Last year, on Ama's birthday, Kofi expressed a peculiar belief: 'The moon is a star.' Today, you report it.

a. ɛwɔ Ama awoda nó ná Kofi re-ka sɛ (# ná) ɔseramo nó yɛ
on Ama birthday DEF NA Kofi PROG-say COMP NA moon DEF COP
nsoroma.
star.
Intended: 'At Ama's birthday, Kofi was claiming that the moon was a star.'

According to my consultants, sentence (30a) is not acceptable in the given context. It may only convey a nonsensical interpretation, for which according to Kofi the moon used to be a star and ceased to be so at some later point. This finding rules out *de Se* analyses.

3.2.1 *ná*-embeddings and temporal *de Re*

The data discussed in the previous subsection strongly suggest that the simultaneous interpretation for *ná* embeddings cannot result from tense deletion or semantic binding. In the absence of a *de Se* construal, the only compositional option is a *de Re* analysis. Building on Percus & Sauerland (2003); Charlow & Sharvit (2014), I assume that *de Re* tenses are interpreted in situ and accessed by the attitude holder via concept generators (CGs). CGs are acquaintance-based and denote functions from times to to time concepts. A concept generator is defined as follows (after (Sharvit 2018: 221)).

(31) A time-concept generator suitable for x in world w and time t is a function *G* such that:[21]

a. The domain D of *G* is the set of times that x is acquainted with in w at t; and

b. $\forall t''$: $t'' \in D(G)$, it follows:

c. $G(t'')$ is a suitable time-concept;

d. $\forall \langle w', t' \rangle \in ACC(x,w,t) \rightarrow G(t'')(t')(w')$ is defined;[22]

e. $G(t'')(t)(w) = t''$;

The thus-generated time concept offers the attitude holder a way to describe to themselves a given temporal interval - the one denoted by the *de Re* tense. As an additional step, CGs are quantificationally bound by the attitude predicate, whose semantics is revised accordingly:

(32) $[\![\text{ka}_{CG}]\!] = \lambda w_s.\lambda e_v.\lambda p_{\langle\langle i,\langle i,\langle s,i\rangle\rangle\rangle,\langle s,\langle i,t\rangle\rangle\rangle}.\lambda x_e.\exists G$ [G suitable for x in w at τ(e) & $\forall \langle w', t' \rangle$ [$\langle w', t' \rangle \in Say(x,w,\tau(e)) \rightarrow p(G)(w')(t')$]]

With these ingredients, *ná*-embeddings receive the simplified structure in (34), whose meaning is given in (35).

(33) Aba ka-à sɛ ná ɔ-yare.
Aba say-LEN COMP NA 3SG-sick
'Aba said that she was sick.'

(34) *LF*: [$_{CP}$ … [$_{TP}$ $\text{past}_{1,3}$ … [$_{VP}$ ka_{w_0,e_6} [$_{CP_{emb}\langle\langle i,\langle i,\langle s,i\rangle\rangle\rangle,\langle s,\langle i,t\rangle\rangle\rangle}$ λG_7 [$_{\langle s,\langle i,t\rangle\rangle}$ λw_5 [$_{\langle i,t\rangle}$ λt_1 [$_{TP}$ [[G_7 **na**$_9$] t_1] w_5 [$_{AspP\langle i,t\rangle}$ STAT [$_{\langle v,t\rangle}$ λe_4 [$_{VP}$ ɔ$_8$-$\text{yare}_{w5,e4}$]]]]

(35) $[\![34]\!]$ defined iff $g(1) < t^*$
When defined, $[\![34]\!] = 1$ iff $\exists e[\tau(e) \subseteq g(1)$ & $\exists G$[G a time CG suitable for Aba in w@ at τ(e) & $\forall \langle w', t' \rangle$ [$\langle w', t' \rangle \in Say$(Aba,w@,$\tau$(e)) $\rightarrow$ $\exists e'$[$G(g(9))(t')(w') \subseteq \tau(e')$ & $sick(w')(e')$(Aba)]]]]

One suitable denotation for G in a *SIM*-biasing scenario such as context (18) is given below.

(36) For all worlds w' and times t' compatible with what Aba said at g(1) in w@, there is a suitable time concept G, such that $G = \lambda t.\lambda t'.\lambda w'$. t is a temporal interval including Aba's phone call at t' in w'.

This, in turn, produces the time concept 'now', as the temporal interval considered in (36) includes the phone call interval.[23]

21 To simplify, this definition does not include an additional constraint on the embedded RT imposed by the Upper Limit Constraint.

22 *ACC* is a function serving as placeholder for a specific accessibility relation.

23 In a way, the *de Re*-generated *SIM*-reading is a *de Se* reading in disguise.

Similarly, a *BACK*-biasing scenario as that depicted in (21) may yield the time concept 'last week', thus producing a backward-shifted interpretation.[24]

Importantly, with this approach, both readings are linked to the same structure and can only be resolved contextually, depending on which time concept is appropriate. In this regard, a key contrast arises between the temporal ambiguity seen in Asante Twi *ná*-embeddings and that found for past-under-past in +*Vac* languages like English, where the two interpretations correspond to distinct structural configurations.

The proposal put forth in this section presents Asante Twi as a -*Vac* language, given the absence of a mechanism that rids tense morphology of its temporal meaning. However, contrary to what traditionally observed for other languages that lack optional tense vacuity, *de Re* readings do not appear to be marginal in Asante, thus pointing to micro-variation within the -*Vac* group. This point is taken up in the next section.

4 Gradable *de Re* and variability

A formal investigation of Asante Twi has highlighted two main mechanisms to derive temporal interpretations in the language: on the one hand, temporal *de Se*, associated with bare and *LEN*-embeddings - yielding a simultaneous and a backward-shifted reading, respectively - on the other, temporal *de Re*, stemming from *ná*-embeddings, naturally ambiguous between both readings. Although, temporal *de Se*, appears to be the preferred device for speakers to talk about temporal simultaneity or anteriority, analogous *de Re* interpretations remain prominent.

As previously discussed, *de Re* readings have been argued to be marginal, if possible at all, and subject to speaker variation. Their marginality compared to *de Se* construals has been attributed to a pragmatic principle favouring *de Se* construals over *de Re* ones (first noted in Schlenker 1999, cf. Ogihara & Sharvit 2012; Tsilia 2021).

(37) *Prefer de Se!* (Schlenker 2005: 17):
Whenever this is compatible with the situation which is reported, prefer a *de Se* over a *de Re* Logical Form.

The principle in (37) readily explains the preference for bare embeddings over *ná*-embeddings in the expression of simultaneous readings. Of course, *Prefer de Se!* should not be taken as dogmatic, in the sense that *de Se* always blocks its *de*

24 The analysis developed here for *ná*-embeddings gains further support from contexts involving mistaken temporal self-location, which have been argued to facilitate *de Re* interpretations (cf. Ogihara & Sharvit 2012; Schlenker 1999). In these contexts, speakers preferred *ná* over the bare form in the embedded clause (for details, see Armenante to appear: 112).

Re counterpart. In other words, the degree of sensitivity to (37) might vary across languages on an individual basis, thus determining a more gradable variation than previously noted. Similar observations - although restricted to backward-shifted readings - are found in Bochnak 2016, who posit the following additional parameter:

(38) *The De Re Variability parameter* (after Bochnak et al. (2019: 446))
Languages vary in the degree of availability of temporal *de Re*.

Looking at *de Re* variation through the lens of the parameter in (38) helps position Asante Twi on the crosslinguistic spectrum.

4.1 Exceptional *de Re* and internal variation

As a final note, let's briefly address the marginal availability of simultaneous readings for *LEN*-embeddings. Recall that *LEN*-embeddings can only be compatible with simultaneous readings if modified by an adverbial phrase forcing co-reference with the attitude time. Given that *LEN* projects a temporal pronouns, this is not entirely surprising, given that temporal *de Re* can be generalized to all referential expressions. However, compared to *ná*, simultaneous readings for *LEN* are severely restricted. What accounts for this difference? One working hypothesis, consistent with typological distribution,[25] is that *SIM* is harder to generate for perfective predicates compared to stative/imperfective ones. This is what the principle in (39) aims to regulate.

(39) *Prefer unbounded structures!*
In the derivation of simultaneous readings for complement clauses of homogeneous attitude predicates, unbounded attitude reports are preferred over bounded ones.

Recall that the two pronominal tenses differ in their aspectual properties: *ná* is compatible only with imperfective aspect, while *LEN* conveys perfective aspect. Given this contrast, *Prefer unbounded structures!* predicts a systematic preference for *ná* over *LEN*.[26]

25 This is the case for English and Romance languages, for example.

26 Due to space constraints, I must omit the details of how the principle in (39) arises. Briefly, Armenante (to appear) derives (39) from the temporal homogeneity of attitude predicates in combination with Abusch's Upper Limit Constraint (ULC, Abusch 1988). Specifically, because of their temporal homogeneity, each subinterval of the attitude time serves as an upper limit to the embedded eventuality, such that its running time may not extend beyond any subinterval of the attitude time, including the initial one. This is always true for imperfective embeddings like those involving *ná* (which, in fact, contain the entire attitude time). In contrast, perfective eventualities, such as those marked by *LEN*, are contained within the attitude time and thus violate the ULC, unless the initial subintervals of both the attitude and the eventuality time align perfectly. This alignment can be achieved through the use of a deictic adverbial as in (20).

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