Explaining the Ambiguity of Past-Under-Past Embeddings*

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Abstract

Past-under-past embeddings have two readings, a simultaneous and a backward-shifted one. While existing accounts derive these readings via distinct mechanisms, be it by means of an ambiguity at the level of LF or via blocking of a cessation implicature, we propose an alternative account which avoids such ambiguity. For us, the meaning of a past tense morpheme, like *-ed*, is comprised of two components. Syntactically, every past tense morpheme carries an uninterpretable past feature [uPAST], to be checked by a (single) covert past tense operator *Op-PAST* carrying an interpretable feature [iPAST]. Semantically, the past tense marker encodes a relative non-future with respect to its closest c-commanding tense node (informally: 'not later than'), immediately yielding the two distinct readings.

1 Introduction

Constructions in which a past tense is embedded under a matrix past tense have two readings: a simultaneous reading and a backward-shifted one.

(1) John said Mary was ill.
   a. John, at some $t' <$ utterance time, t_u : "Mary is ill." (simultaneous reading)
   b. John, at some $t' < t_u$: "Mary was ill." (backward-shifted reading)

The availability of the simultaneous reading for past-under-past sentences – commonly referred to as Sequence of Tense (= SoT) – has been a prevalent topic of research for several years. Drawing on the discussion of whether past is an absolutive or a relative tense, the extraordinarity of the SoT phenomenon can be explained in the following way: In Reichenbachian [Rei47] terms, past morphology establishes a set, absolutive relation between the sentence's utterance time (UT), its event time (ET), and its reference time (RT): ET = RT < UT. In clauses in which a past tense morpheme is embedded under a matrix past, we thus predict one of the following configurations: Either both past tense morphemes establish the said relation between ET, RT, and UT independently of each other, yielding a free order of the two past ETs with reference to each other, or the matrix morpheme's ET locally changes the variable of the embedded morpheme's UT to a time in the past, leading to an obligatory backward-shift. Whereas the former option generates too many possible readings, the latter option generates too few; it can neither explain the existence nor the empirical prominence of the simultaneous reading. Hence, an additional factor must be at play in SoT cases.

In all existing accounts, the simultaneous and the backward-shifted readings are derived via distinct mechanisms. Most implement the distinction as an ambiguity at the level of LF, assuming either a syntactic rule of tense deletion under certain conditions [Ogi95, vS95], a zero

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tense in the embedded clause [Kra98], a feature transfer mechanism that transmits temporal relations [Abu97], or a combination of the last two [GvS10], among others. However, the systematic, cross-linguistic availability of this ambiguity casts doubt on whether it should indeed be attributed to two different LFs, instead of receiving a more principled explanation. A different type of proposal therefore assumes the ambiguity to take place at a higher level, i.e. pragmatics, and derives the two distinctive readings on the grounds of the blocking/existence of a cessation implicature [Alt16, AS12].

2 Proposal

In this paper, we propose an alternative approach for SoT that avoids ambiguity. For us, the meaning of a past tense morpheme, like *-ed*, is comprised of two components. In line with many others (e.g. [vS03, Sto07, Zei12]) we assume that syntactically, each past tense morpheme carries an uninterpretable past feature [uPAST], to be checked by a covert past tense operator *Op-PAST* that carries an interpretable feature [iPAST]. (In this paper we restrict ourselves to temporal interpretations of past tense morphology, taking non-past, non-factual readings of past tense morphology out of consideration.) We implement this past tense operator in the following way:

(2) $[\![\textit{Op-PAST}]\!] = [\ \lambda t^*.\ \lambda P.\ \exists t < t^*\ \&\ P(t)\ ]$

At matrix level, t^* in principle applies to t_u and for the sake of easiness we will take *Op-PAST* to denote $[\ \lambda P.\ \exists t < t_u\ \&\ P(t)\ ]$ in these cases. Nevertheless, later in this paper we will discuss examples in which the value deviates from the default, providing evidence for the necessity of the more complex definition of the operator given in (2).

That past tense takes higher scope than the surface position of the past tense marker has been well-established in the literature [Kle94, Ogi96, Abu97, vS02, Zei12]. Evidence for this comes from examples like:

(3) Wolfgang played tennis on every Sunday. [vS06]

The interpretation of (3) is one in which past tense outscopes the distributive quantifier *every Sunday*, yielding the paraphrase in (4-a). If the scopal order is reversed, the only possible interpretations are (4-b) and (4-c), both of which are infeasible (cf. [Zei12, vS02, vS05]).

(4) (In)feasible paraphrases of (3) as the result of different scopal orderings
- a. = 'For every Sunday in the past, there is a time t at which Wolfgang plays tennis.'
- b. ≠ 'There is past time on every Sunday at which Wolfgang plays tennis.'
- c. ≠ 'For every Sunday, there is time before it such that Wolfgang plays tennis at that time.' [vS06]

Even though the locus of past tense is different from its overt instantiation, i.e. the tense marker *-ed*, this does not entail that the past tense morpheme is semantically vacuous. In fact, our approach deviates from existing agreement accounts in assuming that both the covert operator and the past tense morpheme are semantically active. We argue that the tense marker encodes a relative non-future with respect to its closest c-commanding tense node (informally: 'not later than') (cf. [Kra98, vS03]). Accordingly, it has the following denotation:

(5) $[\![\text{-ed}]\!] = [\ \lambda t.\ \lambda P.\ \exists t'.\ t' \leq t\ \&\ P(t')\ ]$

In this context, the expression $t' \leq t$ is defined to mean that the lower boundary of the time interval t' is not later than the lower boundary of the time interval t. Hence, an event happening at time t' starts either strictly earlier than or at the same time as an event happening at time t, but can never start later than it.

A simple sentence such as *Susan left* thus receives the following interpretation:

(6) Susan left.

a. [*Op-PAST*$_{[\text{iPAST}]}$ [Susan leave-ed$_{[\text{uPAST}]}$]]
$\exists t' < t_u$ $\exists t^2 \leq t'$

b. $\exists t' < t_u$ & [$\exists t^2 \leq t'$ & leave(Susan, t^2)]

c. *There is a time t' strictly before the utterance time t_u and Susan leaves at a time no later than t'.*

The analysis deviates from standard analyses in that it introduces an ambiguity with respect to the ordering of t' and t^2: they either refer to the same point in time or the latter precedes the former. Nevertheless, for unembedded sentences such as (6), this ambiguity remains indistinguishable. As a result, the meaning of (6) remains the same, i.e. the time of Susan's leaving is strictly prior to the utterance time.

Whereas the 'not later than'-ambiguity yielded by the semantic meaning component of past tense morphology (i.e. (5)) does not change the meaning of unembedded sentences, it directly entails that every past tense embedded under another past tense is ambiguous between a simultaneous and a backward-shifted reading. This becomes evident from the hierarchy of the tense nodes our proposal yields for such cases: The absolutive past tense operator places the sentence prior to the utterance time, thus providing the temporal head of the time chain; all other past tense nodes semantically express a relative non-future with respect to their closest c-commanding tense node. In cases where *Op-PAST* can check all [uPAST] features via multiple agree, this configuration yields a totally ordered set of tense nodes from the matrix past operator to the most embedded past tense node. For an illustration of our proposal, consider the following derivation (where we take *say* to be an extensional predicate):

(7) John said that Mary was ill.

a. [*Op-PAST*$_{[\text{iPAST}]}$ [John [say-ed$_{[\text{uPAST}]}$ [that [Mary [be-ed$_{[\text{uPAST}]}$ ill.]]]]]]
$\exists t' < t_u$ $\exists t^2 \leq t'$ $\exists t^3 \leq t^2$

b. $\exists t' < t_u$ & [$\exists t^2 \leq t'$ & say(John, t^2, [$\exists t^3 \leq t^2$ & be-ill(Mary, t^3)])]

c. *John's saying is strictly before the utterance time t_u and Mary's being ill starts out no later than the time as John's saying.*

The covert past tense operator in (7) places the proposition at some time $t' < t_u$. Since both of the embedded past tenses lie within the syntactic domain of this higher operator, it can check both morphemes' [uPAST] features via multiple agree. This gives rise to the following semantic relations: The two past tense morphemes each introduce a relation of relative non-future with respect to their closest c-commanding tense node. Hence, t^2 is interpreted as a relative non-future with respect to t', and t^3 constitutes a relative non-future with respect to t^2. The backward-shifted reading of (7) then arises in case that $t^3 < t^2$, while the simultaneous interpretation is yielded for $t^3 = t^2$.

One may wonder why a second *Op-PAST* operator may not have been included in the embedded clause to check off the lower past tense morpheme's [uPAST] feature. Zeijlstra [Zei12] proposes that the number of operators is regulated by economy principles: A second operator may only be included when neccessary. Since the covert past tense operator in (2) can check all

of the uninterpretable past tense features in its syntactic domain (via multiple agree), multiple past tense morphemes in principle require the presence of only one past tense operator. With respect to Zeijlstra's economy constraint, this means that when one *Op-PAST* can check all present [uPAST] features, no further *Op-PAST* may be included.

3 Explaining Challenging Past-Under-Past Embeddings

The previous section has shown that for standard SoT sentences, our theory yields the correct results: it derives the simultaneous and the backward-shifted reading in past-under-past embeddings, but crucially not the forward-shifted reading. Nevertheless, in principle, any theory of SoT also has to account for more complex cases of temporal embeddings, e.g. cases in which an embedded past tense refers to a time in the future, or in which a past tense is not even ordered relatively to a higher tense node. This section is devoted to showing how our approach deals with these cases of more challenging SoT sentences.

3.1 Complement Clausal Embeddings

3.1.1 Future Reference in Past-Under-Past Embeddings – Embedded Past

The following examples show that a past-embedded past tense can make reference to a time interval that lies strictly after the time of utterance:

(8) He said he would buy a fish that was still alive.

(9) He decided a week ago that in ten days he would say to his mother that they were having their last meal together.

The challenge comes from the interpretation of their most embedded past tense forms (underlined in the above examples). As has been well-established in the literature (cf. e.g. [Abu97, Ogi95]) the most prominent reading of these past tense morphemes is one of simultaneity with respect to their c-commanding tense nodes, which, in these examples, have been shifted to a time later than the matrix time by means of the modal *would*. In (8) a past tense can thus be used to describe the state of a fish's being alive, even if this time interval lies in the strict future of the utterance time. In (9), past tense morphology is used to describe a containment relation between the time of the saying event (which is necessarily interpreted as being later than the matrix time due to the overt modifier clauses) and the event time of the last meal. In this example, it is further the case that the backward-shifted relation between the most embedded past tense and its c-commanding tense node that our analysis predicts to be available is independently blocked due to additional aspectual information (i.e. the imperfective aspect on *having*); hence, this does not provide a problem for the proposed analysis.

Our approach successfully captures the multiple interpretations of such 'fish-sentences' under the assumption that *would* is a combination of the operator *woll* (a tense operator that places the evaluation time of a proposition in the relative future of the sentence's current evaluation time) plus a [uPAST] feature that restricts it to past tense sentences (again taking non-past, non-factual readings of *would* out of consideration here).

(10) $[\![\text{woll}_{[\text{uPAST}]}]\!] = [\ \lambda t.\ \lambda P.\ \exists t'.\ t' > t\ \&\ P(t')\ ]$[1]

[1] Here, we ignore the modal contribution of the operator *woll* in terms of universal quantification over possible worlds (cf. e.g. [Ipp13]), which is orthogonal to the analysis presented in this paper.

Crucially, we thus assume that *would* does not carry complete past tense morphology, which is why it does not introduce a relative-non future relation with respect to its closest c-commanding tense node.

(11) John said he would buy a fish that was alive.

a. [*Op-PAST*$_{[\text{iPAST}]}$ [John [say-ed$_{[\text{uPAST}]}$ [he [woll$_{[\text{uPAST}]}$ [buy a fish [that
$\exists t' < t_u$ $\exists t^2 \leq t'$ $\exists t^3 > t^2$
be-ed$_{[\text{uPAST}]}$ alive.]]]]]]]
$\exists t^4 \leq t^3$

b. $\exists x$ [fish(x) & $\exists t' < t_u$. $\exists t^2 \leq t'$: say(John, t^2, [$\exists t^3 > t^2$: buy(he, t^3, x) & $\exists t^4 \leq t^3$: alive(x, t^4)])]

c. *There is a time t^4 which is the time of a contextually salient fish's being alive, and t^4 is prior or equal to some time t^3. The time t^3 is the time of John's buying the fish which lies strictly after t^2, i.e. the time of John's saying event. t^2 is prior or equal to t' which, in turn, is a time strictly before the utterance time t_u.*

What is essential about the analysis is that the most embedded past, i.e. *was* in (11), is ordered prior or equal to the time of the buying, and not prior to any other time, such as the matrix time or the utterance time. This correctly yields a later-than-matrix interpretation of the embedded past tense. The simultaneous and the backward-shifted reading of sentence (11) can be made evident via adding suitable modifier clauses:

(12) The two readings of (11):

a. *Backward-shifted interpretation*
John said (three days ago) that (in ten days) he would buy a fish that was alive (a day before).

b. *Simultaneous interpretation*
John said (three days ago) that (in ten days) he would buy a fish that was (still) alive (then).

Similarly, the same applies to example (9). Even when neglecting the temporal modifier clauses, which indubitably place the time of the meal in the future, the formula derived from the tense nodes within the sentence already shows that the time of the meal is not restricted to a past interval. As it is ordered relatively to the future-shifted time of the saying event, the time of the meal can lie strictly after t_u.

(13) He decided (a week ago) that (in ten days) he would say to his mother that they <u>were</u> having their last meal together.

a. [*Op-PAST*$_{[\text{iPAST}]}$ [He [decide-ed$_{[\text{uPAST}]}$ [he [woll$_{[\text{uPAST}]}$ [say to his mother [that
$\exists t' < t_u$ $\exists t^2 \leq t'$ $\exists t^3 > t^2$
they be-ed$_{[\text{uPAST}]}$ having their last meal together.]]]]]]]
$\exists t^4 \leq t^3$

b. $\exists t' < t_u$ & [$\exists t^2 \leq t'$ & decide(he, t^2, [$\exists t^3 > t^2$ & say-to-mom(he, t^3, [$\exists t^4 \leq t^3$ & be-having(they, last meal together), t^4])]]

c. *There is a time t^4 which is the time of their last meal, and t^4 is prior or equal to some time t^3. The time t^3 is the time of his saying and lies strictly after t^2, i.e. the time of his deciding. t^2 is prior or equal to t' which, in turn, is a time strictly before the utterance time t_u.*

3.1.2 Future Reference in Past-Under-Past Embeddings – Matrix Past

Another set of challenging data which invokes a future reference for a past-embedded past tense in a complement sentence is comprised of sentences like the following:

(14) He hoped she tried to kill him first. [Kle16]

The novel challenge posed by these examples lies in the fact that they have an interpretation akin to that of (8) and (9), even though they do not contain an overt future shifter, like *woll*. Klecha [Kle16] argues that the availability of such an independent future-shifted interpretation is restricted to predicates that already have an inherent future orientation, such as *hope* or *pray*. Such a view is in accordance with our proposal; even though the past tense morphology on *hope* places the time of the matrix sentence prior to the utterance time, as a future-oriented predicate, *hope* by itself can shift the evaluation time of its complement proposition to a future point in time – even in the absence of the modal *woll*. Consequently, our analysis derives the correct meaning of these sentences *mutatis mutandis*: Since the forward-shifted evaluation time t' is introduced in the matrix clause (which can lie strictly after the time of utterance t_u), the verb *tried* then simply means *tried at time* t^2, where t^2 is no later than t' (but can also lie in the strict future of t_u).

3.1.3 Future Reference in Past-Under-Future Embeddings – Embedded Past

Future-embedded past tenses (cf. (15)) also give rise to a reading in which the past-marked predicate may take place after the utterance time and thus pose a further challenge to SoT theories.

(15) Alan will think everyone hid.

Since the modal *woll* is instantiated as *will* in this case, it becomes immediately evident that the *Op-PAST* cannot take higher scope than the modal (as otherwise it would be spelled out as *would*). Hence, the underlying structure of (15) must be the following:

(16) [will think [*Op-PAST*$_{[\text{iPAST}]}$ [everyone hide-ed$_{[\text{uPAST}]}$]]]

Taking the same denotation for the modal operator *woll* as in (10), modulo the [uPAST] feature, yields the semantics for *will*. As before, the open value t^* again gets valued by its default value t_u in this case. With *will* taking scope over the past tense operator and changing the local evaluation time t^* against which the past operator gets valued to a time in the future, the correct interpretation of (15) is yielded.

(17) Alan will think everyone hid.

a. [will think [*Op-PAST*$_{[\text{iPAST}]}$ [everyone hide-ed$_{[\text{uPAST}]}$]]]
   $\exists t' > t_u$ $\exists t^2 < t'$ $\exists t^3 \leq t^2$

b. $\exists t' > t_u$ & think(Alan, t', [$\exists t^2 < t'$ & $\exists t^3 \leq t^2$ & hide(everyone, t^3)])

c. *There is a time* t' *in the strict future of* t_u *and Alan thinks at* t' *that there is a time* t^2 *earlier than* t' *such that everyone from a contextually salient group hid at a point* t^3 *no later than* t^2.

Note that if the operator *Op-PAST* entailed an absolutive past ordering of the sentence it takes scope over with respect to the utterance time, these cases could not be accounted for by our proposal. However, as seen in (2), the relation 'prior to time of utterance' is not cooked into the semantics of *Op-PAST*; Instead, the operator is defined as a relative past with respect

to a time variable t^*, whose value may be t_u, but which can also refer to a time interval later than t_u if introduced by an independent source, e.g. by the modal operator *will* (cf. (17)).

3.2 Relative Clausal Embeddings

A further set of data where past-under-past morphology exhibits a deviant behavior from the default is comprised of (non-restrictive) relative clauses: In non-restrictive relative clauses as in example (18), the embedded past can yield any of the following readings: a backward-shifted, a simultaneous and a later-than-matrix one. By contrast, in (19) with a restrictive relative clauses, the later-than-matrix reading is not available [Hei94, Ogi95, Sto07]:

(18) Mary met a woman who was president. [non-restrictive]
   a. In 2000, Mary met a woman who was president in 1995.
   b. In 2000, Mary met a woman who was president in 2000.
   c. In 2000, Mary met a woman who was president in 2004.

(19) Mary was looking for a woman who was president. [restrictive]
   a. In 2000, Mary was looking for a woman who was president in 1995.
   b. In 2000, Mary was looking for a woman who was president in 2000.
   c. *In 2000, Mary was looking for a woman who was president in 2004.

In (18), under the most salient reading, the relative clause is non-restrictive. Example (19) is structurally ambiguous between the relative clause being restrictive and being non-restrictive. The *de dicto* reading is only available, however, in a restrictive relative clause.

Following Enç's [Enç87] observation that relative clause tenses differ from complement clause tenses in allowing an independent, or absolute interpretation, Abusch [Abu88] showed that this only applies to relative clauses that receive a *de re* interpretation (see also [Ogi89, Ogi96]). The *de re*/*de dicto* distinction is strongly connected to the distinction between restrictive and non-restrictive (or appositive) relative clauses, as can also be witnessed in the above examples: (18) contains a non-restrictive and a *de re*-interpreted relative clause. By contrast, under the triggered *de dicto* reading of (19), the relative clause is understood to be restrictive. *De dicto* interpretations are only available in restrictive relative clauses. This enables us to connect the availability of an absolute tense interpretation to the syntactic difference between restrictive and non-restrictive relative clauses.

As is well known, restrictive and non-restrictive relative clauses behave differently with respect to syntactic locality. Whereas non-restrictive relative clauses are syntactically opaque (cf. [Saf86, Fab90, Dem91, Bor92, Arn07] for different accounts for the locality effects of non-restrictive relative clauses), restrictive relative clauses are more accessible. That allows us to entertain the hypothesis (in line with Stowell [Sto07] , though also substantially different) that the past tense morpheme inside a relative clause can have its [uPAST] feature checked against a higher covert tense operator carrying [iPAST], but that the past tense morpheme inside a non-restrictive relative clause cannot do so. Consequently, the latter requires a covert past tense operator of its own, with t^* being valued for the time of utterance. Therefore, a restrictive relative clause allows only a simultaneous reading and a backward shift (when containing past tense morphology embedded by a higher past tense clause), whereas a non-restrictive relative clause in the same situation yields a simultaneous reading, a backward shift and a forward shift. This explains why the two past tense markers in (20) need to be evaluated independently of each other with respect to the time of utterance: Given the syntactic opacity of non-relative clauses, the lower *Op-PAST* in (20) cannot be bound by any higher tense variable, licensing its

existence under the economy principle [Zei12].

(20) Mary met a woman who was president.

a. [*Op-PAST*$_{[iPAST]}$ [Mary meet-ed$_{[uPAST]}$ a woman [who [*Op-PAST*$_{[iPAST]}$ [be-ed$_{[uPAST]}$ president]]]]]
$\exists t' < t_u$ $\exists t^2 \leq t'$ $\exists t'' < t_u$ $\exists t^3 \leq t''$

b. $\exists x$ [woman(x) & $\exists t' < t_u$. $\exists t^2 \leq t'$: meet(Mary, x, t^2) & $\exists t'' < t_u$. $\exists t^3 \leq t''$: president(x, t^3)]

c. *There is a woman x and at t^2, prior or equal to t' which, in turn, is a time strictly before the utterance time t_u, Mary met x, and at t^3, prior or equal to t'' which, in turn, is a time strictly before the utterance time t_u, x is president.*

A restrictive relative clause as (19), for which agreement inside of the relative clause is possible, on the other hand, receives the following interpretation; The most embedded past tense is ordered with respect to the matrix tense and cannot independently be placed prior to the utterance time:

(21) Mary was looking for a woman who was president

a. [*Op-PAST*$_{[iPAST]}$ [Mary be-ed$_{[uPAST]}$ looking for a woman [who [be-ed$_{[uPAST]}$ president]]]]
$\exists t' < t_u$ $\exists t^2 \leq t'$ $\exists t^3 \leq t^2$

b. $\exists x$ [woman(x) & $\exists t' < t_u$. $\exists t^2 \leq t'$: be-looking-for(Mary, x, t^2) & $\exists t^3 \leq t^2$: be-president(x, t^3)]

c. *There is a woman x and at t^2, prior or equal to t' which, in turn, is a time strictly before the utterance time t_u, Mary is looking for x, and at t^3, prior or equal to t^2, x is president.*

4 Advantages of this SoT Approach

The account proposed in this paper has several advantages over existing approaches. First, we do not have to postulate that there is a difference between a real past and a surface past, which is, in fact, a present tense in disguise (cf. e.g. [Ros67, Abu88]). By defining past as non-future, the proposed approach can account for the same cases as the present-in-disguise proposals while at the same time avoiding unwanted ambiguity and instead retaining a clear 1:1 mapping between temporal form and temporal meaning.

Secondly, the proposed SoT account neither is dependent on the intensional/extensional distinction for the embedding predicates [Abu97], nor is it dependent on the stative/eventive distinction of the past embedded verbs [Alt16, AS12]. In her pioneering proposal, Abusch [Abu97] assumes that feature transmission (leading to the SoT effect) only arises with intensional embeddings – a claim that appears to be too strong. As has been illustrated in (7), the analysis we propose in principle also applies to extensional embeddings, yielding the same SoT effects as for intensional embeddings. Existing pragmatic theories of SoT [Alt16, AS12] on the other hand assume that past-under-past embeddings are not ambiguous between a simultaneous and a backward-shifted reading but that they always have a backward-shifted interpretation. According to their theory, the perception of simultaneity arises in the absence of a cessation implicature, which arises only when there is competition with a present tense. Such an absence

of cessation is only licensed by the temporal profile of stative (and not eventive) predicates (i.e. For any tenseless stative clause ϕ, if a moment m is in $[\![\,\phi\,]\!]$, then there is a moment m' preceding m and a moment m'' following m such that m' and m'' are in $[\![\,\phi\,]\!]$) [Alt16, AS12]. Since the absence of cessation is restricted to stative predicates, this type of proposal in principle predicts that past-under-past embedded eventive predicates are always interpreted in a backward-shifted manner, which is the standard assumption. This claim, however, has been refuted by Kusumoto [Kus99], who – with Partee (p.c. to Kusumoto) (cf. [Kho07]) – argues that the examples in (22) have a simultaneous reading even though they embed a past eventive verb:

(22) a. Elliott observed/noticed/perceived that Josephine *got* hurt.
b. He didn't realize that his car *hit* the curb.
c. The pilot was sure that the plane *landed* in the correct spot. [Kus99]

Lastly, the account proposed in this paper is built on a number of parameters (e.g. the no-later-than semantics of past tense morphemes, *Op-PAST* being a relative past operator, a.o.), which, taken together, yields our analysis of past-under-past embeddings. The existence of such parameters opens up a space for variation, which in principle should account for cross-linguistic differences attested with respect to SoT: Whereas English-like SoT-languages may for example encode a constraint in order to rule out an unwanted forward shift of default past-under-past clausal embeddings (e.g. Mary's illness in (7) cannot have started later than at t^2) directly as part of their semantics (cf. (5)), non-English-like SoT languages may exhibit different parameter configurations. An example of a language which is, presumably, built on a different parameter setting is Japanese, for which a past-embedded past tense can only yield a backward-shifted reading (cf. e.g. [Ogi89, Ogi96]). Hence, at least the semantic contribution of Japanese past morphology differs from that of English. A proper investigation of this hypothesis is part of future research.

5 Conclusion

In this paper, we provide a novel SoT-account which avoids ambiguity at the level of LF while at the same time retaining the possibility for both a simultaneous and a backward-shifted reading independent of the temporal profile of the embedded predicates. The two readings are licensed via the weak precedence relation introduced by the semantic meaning component of past tense morphology (i.e. 'no later than' rather than 'strictly earlier than' semantics). We show that this approach, even though various questions are still open, can deal with the same challenges as other SoT approaches and has certain additional advantages as well.

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