

Intensionality, contrast and ellipsis

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This paper argues that ellipsis parallelism requires ‘proper’ contrast with an antecedent, and that this contrast requirement is sensitive to intensionality. Evidence is drawn from ellipsis in tautologous free relatives (4), participant-switching verb phrase ellipsis (VPE) (7), and MaxElide effects in sluicing (15).

Ellipsis parallelism and contrast. Since Rooth (1992), verb phrase ellipsis (VPE) has been argued to be governed by an identity condition of semantic parallelism (1) (simplified):

- (1) For ϵ to be elided, ϵ must be inside a phrase E that has an antecedent A such that:
 (i) $\llbracket A \rrbracket \in F(E)$, the focus membership condition; and (ii) $\llbracket A \rrbracket \neq \llbracket E \rrbracket$, the contrast condition.

Many researchers (Takahashi & Fox 2005, a.o.) assume only the focus membership condition (i) of (1). But recent work has emphasised the crucial role of the contrast condition (ii), which requires E to have A as a ‘proper alternative’. Stockwell (2018) accounts for the ungrammaticality of ellipsis in tautologous conditionals (2) in terms of contrast failure: $\llbracket A \rrbracket = \llbracket E \rrbracket = \textit{wrong}'(j)$. Griffiths (to appear) does likewise for so-called Max Elide effects (3): $\llbracket A \rrbracket = \llbracket E \rrbracket = \textit{kiss}'(x)(j)$ (~~elided structure~~):

- (2) If \textit{John}_j is wrong, then \textit{he}_j is wrong / *~~wrong~~.
 (3) \textit{John}_j will kiss someone, but I don't know who ~~\textit{he}_j will kiss t~~ / * \textit{he}_j will kiss t .

In both (2) and (3) the focus membership condition is met – $\llbracket A \rrbracket$ is a member of the singleton $F(E)$ – but ungrammaticality results from failing the contrast condition. The elliptical versions can be salvaged by replacing *he* with a focused proper alternative, e.g. \textit{MARY}_F , whereby contrast will be satisfied as well as focus membership. I argue based on three case studies that intensionality counts for the contrast condition.

Ellipsis in tautologous free relatives. Consider the status of ellipsis in (4) (Stockwell 2018; cf. Horn 1981: 326 and Russell's 1905 ambiguity in comparatives):

- (4) a. \textit{John}_j eats what \textit{he}_j eats / *does eat.
 b. \textit{Mary} believes that \textit{John}_j eats what \textit{he}_j eats / does eat.

In (4a), wherever the free relative DP takes scope to resolve antecedent containment, and regardless of F-marking, ellipsis is ruled out as a contrast failure: $\llbracket A \rrbracket = \llbracket E \rrbracket = \textit{eats}'(x)(j)$. But embedding under intensional *believe* makes ellipsis grammatical in (4b). This is explained if the contrast condition is sensitive to intensionality. (4b) asserts that *Mary* is correct, equating what *John* actually eats with what *Mary* believes him to eat. The contrast condition is satisfied by the opposition of what *John* eats in *Mary*'s belief worlds with what he eats in the actual world, as in (5). Given the syntactic structure in (5a) and the LF in (5b), this *de re* reading (5e) is the only one available. The *de dicto* reading (5d) that *Mary* believes a tautology is unavailable, since both A and E would be interpreted relative to the same set of worlds, *Mary*'s belief worlds, causing ellipsis to fail the contrast condition. Meanwhile, focus on \textit{DOES}_F in (5a) realises contrast on worlds, satisfying focus membership (5f):

- (5) a. \textit{Mary} believes that \textit{John} eats what_k he \textit{DOES}_F eat t_k .
 b. \textit{Mary} believes ₇ that [what ₄ \textit{he}_1 [eats $w_{0F}/*w_{7F}$] t_4] ₃ \textit{John}_1 [eats w_7] t_3
 c. $A = \textit{John}_1$ [eats w_7] t_3 $\llbracket A \rrbracket = \lambda x.\textit{eats}'(w_7)(x)(j)$
 d. $E_{de\ dicto} = \textit{he}_1$ [eats w_{7F}] t_4 $\llbracket E_{de\ dicto} \rrbracket = \lambda x.\textit{eats}'(w_7)(x)(j)$ $\llbracket A \rrbracket = \llbracket E_{de\ dicto} \rrbracket$
 e. $E_{de\ re} = \textit{he}_1$ [eats w_{0F}] t_4 $\llbracket E_{de\ re} \rrbracket = \lambda x.\textit{eats}'(@)(x)(j)$ $\llbracket A \rrbracket \neq \llbracket E_{de\ re} \rrbracket$
 f. $F(E_{de\ re}) = \{\lambda x.\textit{eats}'(w)(x)(j) \mid w \in W\}$ $\llbracket A \rrbracket \in F(E_{de\ re})$

Beyond Stockwell (2018), the difference regarding ellipsis in (4) is a fact specifically about intensional embedding, rather than embedding in general. While intensionality (e.g. *believe*, modal *should*) makes ellipsis good (4b), aspectual verbs, which are extensional (Pearson 2016), do not (6a). Intensional embedding can be in the main clause (4b), inside the free relative (6b), or both (6c), with the attendant contrasts among the actual world and different people's belief worlds. Moreover, these facts are not just about intensionality, but *contrasting* intensionality – (6d) embeds both A and E under the same person's beliefs, and contrast failure returns:

- (6) a. John_j started to eat what he_j eats / *does eat last year.
 b. John_j eats what Mary believes he_j eats / does eat.
 c. Mary believes John_j eats what Sally believes he_j eats / does eat.
 d. Mary_m believes John_j eats what she_m believes he_j eats / *does eat.

Participant switching VPE. The sensitivity of the contrast condition to intensionality also explains ungrammatical cases of VPE with participant switch mismatches. In (7) the subject and object participants switch between the antecedent and elided VPs (Stockwell 2017). Crucial is the symmetrical predicate — viz. *dance-with* vs. *criticise* (8):

(7) John₁ wanted to dance with Mary₂, but she₂ didn't want to ~~dance-with-him₁~~.

(8) * John₁ criticised Mary₂, even though she₂ wasn't supposed to ~~criticise-him₁~~.

Beyond Stockwell (2017), based on the symmetry of *dance-with*, which is taken to be fundamentally unary (Winter 2018), and assuming PRO carries the F-marking of its controller, ellipsis in (7) passes the focus membership condition of (1) despite participant switching as in (9):

(9) A = PRO_j dance with Mary $\llbracket A \rrbracket = \textit{dance-with}'(j, m) = \textit{dance-with}'(m, j)$

E = PRO_{mF} dance with John $\llbracket E \rrbracket = \textit{dance-with}'(m, j)$

F(E) = { *dance-with'*(x, j) | x ∈ D_e } $\llbracket A \rrbracket \in F(E)$

However, the contrast condition appears not to be satisfied: while the symmetry of *dance-with* supports focus membership, it also results in A and E meaning the same thing. Intensionality holds the key to (7) passing the contrast condition: A is interpreted with respect to John's desire worlds, E with respect to Mary's. In this light, consider that while *want* introduces both the antecedent and elided VPs in (7), it is sufficient for it to introduce only the antecedent (10) or elided VP (11), contrasting desire worlds with the actual world. Where *want* introduces neither the antecedent nor elided VP (12), ungrammaticality results:

(10) John₁ wanted to dance with Mary₂, and (in the end) she₂ did ~~dance-with-him₁~~.

(11) John₁ danced with Mary₂, even though she₂ didn't want to ~~dance-with-him₁~~.

(12) * John₁ danced with Mary₂, and she₂ did / but she₂ didn't ~~dance-with-him₁~~.

Importantly, the interaction between intensionality and contrast is a fact about ellipsis: despite the redundancy/contradiction of (12), it is perfectly grammatical without ellipsis (13). These facts are also specifically about intensional embedding rather than embedding in general: while intensionality (e.g. *want*, modal *should*) supports participant switching VPE (7, 10, 11), extensional aspectual verbs (14) do not:

(13) John₁ danced with Mary₂, and she₂ did / but she₂ didn't dance with him₁.

(14) * John₁ started to dance with Mary₂, and she₂ did / but she₂ didn't ~~dance-with-him₁~~.

MaxElide effects. Griffiths (to appear) argues that so-called MaxElide effects (3) should be analysed not as the result of a transderivational competition between sluicing and VPE (Merchant 2008), but as contrast condition failures. Beyond Griffiths (to appear), the indexical subject *I* above the ellipsis site in (15a) means that there is no intensionality contrast with the antecedent, asserted by the referent of *I*. Compare the improvement in (15b), where the opposition between different people's epistemic states seems sufficient to license VPE, contrary to what MaxElide or consideration of just the embedded clause would predict:

(15) a. * John_j will kiss someone, but I don't know who he_j will ~~kiss-*t*~~.

b. (I think that) John_j likes someone, and Mary knows who he_j does ~~like-*t*~~.

In sum, the contrast condition is active in ellipsis licensing, and intensionality counts: contrast is satisfied when the clause containing ellipsis and its antecedent are interpreted relative to different (sets of) worlds.

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be transitive and contain a *theme* argument. This can be tied to the meaning of a *recipient* semantic role; an individual is a recipient only if there is something received. We can formalize this as part of the meaning of the *recipient* role (Jerro 2016).

- (6) a. $[[\textit{gei}]]: \lambda x \lambda y \lambda e [\textit{give}(e,x) \ \& \ \textit{recipient}(e,y)]$
 b. $[[\textit{gei} \textit{bleached}]]: \lambda P_{\langle s,t \rangle} \lambda x \lambda e [P(e) \ \& \ \textit{recipient}(e,x)]$
 c. *recipient*(*e*,*x*) is true iff $\exists y [\textit{theme}(e,y) \rightarrow \textit{receive}(x,y)]$

The structure and semantics of the V-*gei* construction is shown below. Head movement of the main verb through ‘*gei*’ to the agent-introducing VOICE derives the correct surface order.

- (7) [_{VoiceP} Zhangsan [_{Voice} Voice [_{geiP} Lisi [_{gei}¹ *gei* [_{VP} write letter]]]]]
 (8) a. $[[\textit{VP}]]: \lambda e [\textit{write}(e, \textit{a letter})]$
 b. $[[\textit{gei}^1]]: \lambda x \lambda e [\textit{write}(e, \textit{a letter}) \ \& \ \textit{recipient}(e,x)]$
 c. $[[\textit{geiP}]]: \lambda e [\textit{write}(e, \textit{a letter}) \ \& \ \textit{recipient}(e, \textit{Lisi})]$

Predictions and Extensions: The proposed analysis captures Soh (2005) and Paul & Whitman’s (2010) observation that a distributive quantifier can intervene between the IO and DO. It also explains why semantically the V-*gei* construction behaves like a low applicative denoting a transfer of possession. In the analysis here, it is the lexical semantics of ‘*gei*’ as a bleached transfer verb that imbues it with the transfer of possession semantics rather than Pyllkkänen’s low applicative head. This is attractive as it has been observed that cross-linguistically, the verb of giving seems to be used to mark DOCs in a diverse group of languages including Korean, Japanese, Thai, Malay, Vietnamese etc. (Iwasaki & Yap 1998; Tomioka & Kim 2017 a.o.).

The V-*gei* construction also alternates with what has been called the PDC marked again with ‘*gei*’, based on the same DOC-PDC alternation in English.

- (9) Zhangsan xie-le yi-feng xin **gei** Lisi.
 Zhangsan write-ASP one-CL letter GIVE Lisi
 ‘Zhangsan wrote a letter (and gave it) to Lisi.’

Most authors translate the PDC with the IO in a PP, parallel to the English DOC-PDC alternation. There are, however, reasons to believe that this is misleading. Proponents of a non-derivational approach to the DOC-PDC alternation in English cite various differences between them. For example, Harley (2002) notes that there is an animacy requirement on the DOC that is not observed in the PDC. Biggs (2014) notes that the animacy requirement holds not just of the V-*gei* DOC but also the PDC.

- (10) a. *Zhangsan xie-**gei**-le Lundun yi-feng xin
 Zhangsan write-GIVE-ASP London one-CL letter
 ‘Zhangsan wrote London a letter.’
 b. *Zhangsan xie-le yi-feng xin **gei** Lundun.
 Zhangsan write-ASP one-CL letter GIVE London
 ‘Zhangsan wrote a letter (and gave it) to London.’

Furthermore, the PDC also shows the same restrictions as the V-*gei* DOC in failing high applicative tests; it cannot occur with unergative and stative verbs. This indicates that the supposed PDC marked by ‘*gei*’ also requires a semantic relation between two individuals rather than an individual and an event, and is not a transfer of location.

- (11) *Zhangsan tiaowu-le **gei** Lisi. (12) *Wo kan-zhe bao **gei** Mali ne,
 Zhangsan dance-ASP GIVE Lisi 1SG watch-DUR bag GIVE Mary PRT
 bu neng likai.
 NEG can leave

Contrary to authors like Paul & Whitman (2010) and Jiang (2016), I propose then that the PDC has an identical semantic representation as the V-*gei* DOC but with different syntactic structures, in line with a post-syntactic view of semantic interpretation and argument structure (Wood & Marantz 2017). In the V-*gei* DOC, the transitive VP merges as a complement before the *recipient* is merged while in the PDC, the *recipient* is merged first before the transitive VP.

Adverbial Adjunct Clauses and their LFs

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Aim: We develop an account of *unexpected future orientations* (UFOs, following Copley, 2008) in both *if*-clauses and temporal *adverbial adjunct clauses* (AACs). We provide a compositional syntax-semantics for three types of AACs which derives the observation that UFOs in temporal AACs are dependent on the main clause, while UFOs can appear independently in *if*-clauses. We compare these to a third class of AACs, exemplified by *because*-clauses (as well as *although*-clauses etc.) which never license UFOs.

Data: In each of the AACs in (1a-c) the finite verb is in the present tense. However, in (1a), based on Crouch (1993), the simple present in the *if*-clause may have a UFO independently of the tense/aspect of the main clause (Kaufmann, 2005). The temporal AAC in (1b) can only have a UFO when the main clause contains a future modal (e.g., *will*). Finally, compare the *because*-clause in (1c) which can never license a UFO.

- (1) a. If John comes out smiling later, then the interview {will go/went/is going} well.
 b. When John comes out smiling later, the interview {will go/*went/*is going} well.
 c. *Because John comes out smiling later, the interview {will go/went/is going} well.

The future: While present and past states of affairs are *settled* (i.e., their truth or falsity can no longer be influenced), the future is inherently *unsettled* (Thomason, 1984; Condoravdi, 2001; Kaufmann, 2005). Several recent proposals have taken modal unsettledness to be a licensing condition on the (unscheduled) future (Laca, 2015; Banerjee, 2018a,b; Williamson to appear). Williamson (to appear) proposes a covert future operator FUT (see also Matthewson, 2012; Giannakidou & Mari, 2018) which carries a presupposition that the *modal context* in which it appears is diverse (unsettled) wrt to whether its prejacent holds at a future time. This is captured by making the denotation assignment function sensitive to a modal context parameter S (a set of worlds shifted to the modal base of the most local modal operator) (Yalcin, 2010; Portner, 2018). The following denotation is a minor modification of Williamson’s semantics which renders it more suitable to handle the data considered here. This function takes a world-time proposition, a reference time argument, a future time argument and a world argument, and returns true iff the proposition holds of the world and future time arguments. FUT also carries a presupposition that the modal context S contains some worlds for which the proposition holds at the future time and it contains some worlds for which the proposition does hold at the future time. The future time argument is then subject to existential closure (Heim, 1982).

$$(2) \quad \llbracket \text{FUT} \rrbracket^S = \lambda p_{\langle s, it \rangle} \cdot \lambda t_i \cdot \lambda t'_i : \left[\begin{array}{l} \exists w' \in S : \langle w', t' \rangle \in \llbracket p \rrbracket^S \\ \wedge \exists w'' \in S : \langle w'', t' \rangle \notin \llbracket p \rrbracket^S \end{array} \right] \cdot \lambda w_s \cdot t' > t : \langle w, t' \rangle \in \llbracket p \rrbracket^S$$

Assertion and presupposition: When a proposition is asserted or presupposed, it is taken to be settled according to a set of worlds (the speaker’s epistemic alternatives, and the worlds compatible with the common ground respectively). Modifying the proposal of Alonso-Ovalle & Menendez-Benito (2008), we propose that bare assertions contain a covert modal which universally quantifies over the modal context, which, in matrix assertions is the speaker’s epistemic state in the actual time and world (Epist_{w*, t*, speaker}).

$$(3) \quad \llbracket \text{ASSERT} \rrbracket^S = \lambda p_{\langle s, it \rangle} \cdot \forall w' \in S : \langle w', t^* \rangle \in \llbracket p \rrbracket^S$$

It is well established that *because*-clauses may be asserted, while temporal AACs are presupposed (Hooper & Thompson, 1973; Sawada & Larson, 2004). For instance, this can be seen by comparing the question-answer pairs in (4) and (5). In (4), the content of the *because* clause can be *at-issue* (e.g., the main point of a question). In (5), on the other hand, the content of the *when* clause cannot be felicitously denied as it is not *at-issue* (i.e., it is presupposed).

- (4) A: Was John smiling because the interview was going well?
 B: No, the interview was a disaster.

(5) A: Was John smiling when the interview was going well?

B: #No, the interview was a disaster.

Since a *because* clause is asserted, and a temporal AAC is presupposed, neither is able to license FUT. However, when temporal AACs are predicated of a time in the scope of a future-licensing modal operator, they can dependently exhibit UFOs. In contrast, *if*-clauses are neither presupposed nor asserted (Sæbø, 2011). Rather, the antecedent of an indicative conditional is required to be possible (von Stechow, 1998), but not certain (Veltman, 1986). This is compatible with the presupposition of FUT, and UFOs are licensed freely in indicative *if*-clauses.

Details: Caponigro (2004) proposes that temporal AACs are PP-like free relatives. They serve to restrict the reference time of the main clause to a definite time denoted by the free relative (6a). In the case of *when*-clauses, the preposition is covert, while the *wh*-operator is overt. In *before*- and *after*-clauses the situation appears to be reversed. In either case, the content of a temporal AAC is presupposed. In all worlds compatible with the *common ground* (Stalnaker, 1978) (i.e., the *context set*, *cs*), there is some time which makes *p* true (6c). This renders temporal AACs unsuitable environments to embed FUT since if *p* contains FUT the presupposition of the *when* clause will lead to a contradiction. However, nothing in the semantics of FUT precludes the temporal free relative being associated with a future time, provided that the future time is independently licensed. For this reason, temporal AACs exhibit UFOs only when the main clause features a future reference time.

- (6) a. $\llbracket \llbracket_{Free.Rel} [when_1 [p(w) \dots t_1]] \rrbracket \rrbracket^S = \iota t [\langle w, t \rangle \in \llbracket p \rrbracket^S]$
 b. $\llbracket [when\ p, ASSERT(PAST(q))] \rrbracket^S = 1$ iff $\forall w \in \text{Epist}_{w^*, t^*, sp} : \exists t < t^* :$
 $\langle w, t^* \rangle \in \llbracket q \rrbracket^{\text{Epist}_{w^*, t^*, sp}} \wedge t = \iota t' [\langle w, t' \rangle \in \llbracket p \rrbracket^{\text{Epist}_{w^*, t^*, sp}}]$
 c. *presupposes*: $\forall w \in cs : \exists t' : \langle w, t' \rangle \in \llbracket p \rrbracket^{cs}$

Consider a conditional construction. Kratzer's (1986, 2012) *if*-clause-as-restrictor analysis requires that the domain of an operator in the main clause is restricted by the antecedent clause. When the main clause does not contain an overt modal, it is standardly assumed that it contains a covert epistemic necessity operator (i.e., ASSERT). Nothing about the semantics of an indicative *if*-clause therefore conflicts with the presupposition of FUT. Indeed, it has often been noted that conditionals are felicitous only when the domain of quantification of the modal operator (i.e., ASSERT) contains both *p* and $\neg p$ worlds (Veltman, 1986).

- (7) a. $\llbracket [if\ p, ASSERT\ q] \rrbracket^S = 1$ iff $\forall w \in (\text{Epist}_{w^*, t^*, sp} \cap p(t^*)) : \langle w, t^* \rangle \in \llbracket q \rrbracket^{\text{Epist}_{w^*, t^*, sp} \cap p(t^*)}$
 b. *presupposes*: $\exists w \in \text{Epist}_{w^*, t^*, sp} : \langle w, t^* \rangle \in \llbracket p \rrbracket^{\text{Epist}_{w^*, t^*, sp}} \wedge$
 $\exists w' \in \text{Epist}_{w^*, t^*, sp} : \langle w', t^* \rangle \notin \llbracket p \rrbracket^{\text{Epist}_{w^*, t^*, sp}}$

Both *when*-clauses and *if*-clauses can restrict quantificational elements in the verbal spine, and neither can exhibit main clause phenomena such as argument fronting (Sawada & Larson, 2004; Haegeman, 2010). In contrast, *because*-clauses never function as restrictors (Johnston, 1994). Rather, *because* is a sentential operator that has an at-issue content identical to coordination of two propositions, each of which features ASSERT. *Because*-clauses predictably behave like root clauses, not only in exhibiting main clause phenomena (Haegeman, 2010), but also with respect to licensing of the future: they require an appropriate modal within the AAC in order to license FUT. In other words, they can never exhibit UFOs.

Selected References: Copley, B. (2008). Temporal orientation in conditionals. *Time and modality* • Kaufmann, S. (2005). Conditional truth and future reference. *Journal of semantics* • Kratzer, A. (2012). *Modals and conditionals* • Williamson, G. (to appear). The temporal orientation of infinitives. *Sinn und Bedeutung* 23

The Temporal Anteriority/Posteriority Parameter in Inferenceals

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Introduction This paper propose a parameterization of semantic variation among inferential expressions including epistemic modals and evidentials (I use the term *inferentials* as the cover term for the two categories). With the observation that the English modal *should* and the Japanese indirect evidential *yooda* restrict the temporal relation between the prejacent (PR) and the proposition serving as evidence (Evidence Proposition, EP), I claim that the variation in them is parameterized in terms of which of the two propositions temporally precedes the other.

The basic idea What is at issue is seen in (1) and (2) (# on *should*-examples means that *should* in them cannot be interpreted epistemically). (1) shows that the inference with *yooda*, but not with *should*, allows EP (*there are puddles*) to serve as evidence for PR (*it rained*), while *should*, but not *yooda*, is felicitous in (2), where EP is *it is raining* and PR is *puddles appear*.

- (1) (Seeing puddles on the ground) (2) (Seeing raindrops falling heavily from a window)
- | | |
|---|--|
| a. # It should have rained. | a. Puddles should appear. |
| b. Ame-ga futta yooda.
rain-Nom fell yooda
'It seems that it rained.' | b. # Mizutamari-ga dekiru yooda.
puddles-Nom form yooda
'It seems that puddles will appear.' |

I argue that the two inferenceals restrict the temporal relation between PR and EP. Letting $\text{EARLIEST}(p)$ be the initial time p becomes true, *should* requires $\text{EARLIEST}(\text{EP}) < \text{EARLIEST}(\text{PR})$, and *yooda* requires $\text{EARLIEST}(\text{PR}) \leq \text{EARLIEST}(\text{EP})$. Given the fact that raining precedes the appearance of puddles, we have $\text{EARLIEST}(\text{PR}) < \text{EARLIEST}(\text{EP})$ in (1), which is compatible only with *yooda*, and $\text{EARLIEST}(\text{EP}) < \text{EARLIEST}(\text{PR})$ in (2), which goes well only with *should* (Matthewson (2015) similarly argues that *should* requires the evidence to precede PR's event, but her analysis rules out (2a), where raining and the appearance of puddles temporally overlap).

It might be argued that what matters is the causality. In (1), PR's event causes EP, while in (2), EP causes PR. So the contrast might be explained if we assume that *should* requires EP to cause PR, and *yooda* requires PR to cause EP (as in Davis and Hara (2014)). But (3) and (4) show that those causal requirements are insufficient to capture the two inferenceals' distribution.

- (3) (John comes to university in a suit only if he is going to a party that night. Yesterday, you saw him wearing a suit at the university at lunchtime. Today, you say)
- #John-wa kinoo paatii-ni syussekitisa yooda. [PR = John attended a party.]
John-Top yesterday party-to attended yooda [EP = John wore a formal suit.]
'It seems that John went to a party yesterday.'

- (4) (John is a forecaster and always predicts correctly how the weather is going to be. Now, it is raining. You and a friend are discussing whether John predicted that rain. You say)
- #John should have predicted that rain.

[PR = John predicted that rain.] [EP = it is raining.]

In (3), the event in PR causes that in EP, but $\text{EARLIEST}(\text{EP}) < \text{EARLIEST}(\text{PR})$. In (4), the event in EP causes the event in PR, but $\text{EARLIEST}(\text{PR}) < \text{EARLIEST}(\text{EP})$. The oddity in those examples indicates that the temporal requirements proposed just above are necessary.

Implementation For the sake of perspicuity, I adopt the pronominal view of tenses (Kratzer (1998)). So we have the following denotations for present- and past- tensed propositions:

- (5) a. $\llbracket \text{Pres } p \rrbracket^s = \lambda w. \llbracket p \rrbracket^s(t_1)(w)$. (Presupposition: $t_1 \subseteq t_0$ (t_0 is the utterance time))
b. $\llbracket \text{Past } p \rrbracket^s = \lambda w. \llbracket p \rrbracket^s(t_1)(w)$. (Presupposition: $t_1 < t_0$)

Following Beaver and Condoravdi (2003), I adopt the EARLIEST -operator as in (6a). It takes a proposition p and picks up the unique p -time that precedes any other p -time. Since its argument must be of type $\langle s, \langle i, t \rangle \rangle$, I assume the standard abstraction rule as in (6b) to change propositions of type $\langle s, t \rangle$ (those in (5)) to those of type $\langle i, \langle s, t \rangle \rangle$. (6c) shows how it works.

- (6) a. $\text{EARLIEST}_w(p) = t$. $\forall t'[\llbracket p \rrbracket^g(t)(w') \wedge \llbracket p \rrbracket^g(t')(w') \rightarrow t \leq t']$ for some world w' that is maximally similar to w (c.f. Beaver and Condoravdi (2003)).
 b. $\llbracket \alpha \rrbracket^g$ can be shifted to λx : $[\llbracket \alpha \rrbracket^{g[n \rightarrow x]}$ is defined]. $\llbracket \alpha \rrbracket^{g[n \rightarrow x]}$.
 c. $\llbracket \text{Past } p \rrbracket^g$ can be shifted to $\lambda t \lambda w$: $t < t_0$. $\llbracket p \rrbracket^g(t)(w)$.

I argue that *should* and *yooda* have the following definedness conditions (I do not commit to what they assert. They involve some kind of inference in their assertion).

- (7) Let q be the contextually salient proposition serving as evidence.
 a. $\llbracket \text{should} \rrbracket^g(p)(w)$ is defined only if $\text{EARLIEST}_w(q) < \text{EARLIEST}_w(p)$.
 b. $\llbracket \text{yooda} \rrbracket^g(p)(w)$ is defined only if $\text{EARLIEST}_w(p) \leq \text{EARLIEST}_w(q)$.

(7b) might look incompatible with the case where the prejacent describes a future event as in (8), since future events cannot precede $\text{EARLIEST}_w(\text{EP})$. However, (7b) can accommodate it if we assume that the Japanese future-interpreted form is a modal (c.f. Enç (1996)), as in (9).

- (8) (You watch a weather forecast saying that it will rain. You say)
 Ame-ga furu yooda. [**PR = it will rain.**]
 rain-Nom fall yooda [**EP = the weather forecast says it will rain.**]
 ‘[It seems/I hear] that it will rain.’

- (9) $\llbracket \text{Future } p \rrbracket^g = \lambda t \lambda w$. $\forall w' [w' \in \text{MB}(w) \rightarrow \exists t' [t < t' \wedge \llbracket p \rrbracket^g(t')(w')]]$.

(9) becomes true at t if it follows from the available facts at t that p will be true after t , so $\text{EARLIEST}(\text{PR})$ in (8) is the moment the available facts begin to entail that it will rain. That moment precedes the time that the weather forecast starts to say that it will rain, fulfilling (7b).

Parameterization The temporal contributions we have seen can be parameterized as follows:

- (10)

	<i>should</i>	<i>yooda</i>
[PR is anterior/posterior to EP]	[posterior]	[anterior]

If this parameter exists, we expect that the requirements in (7) are not idiosyncratic to *should* and *yooda*. This prediction is borne out. Matthewson and Truckenbrodt (2018: 298-299) observe that the German modals *sollte* and *müsste* show the same temporal restriction as *should* does. (11) is acceptable in (11a), but not (11b). (11a) satisfies $\text{EARLIEST}(\text{EP}) < \text{EARLIEST}(\text{PR})$ in (7a) since poisoning precedes M being sick. But (11b) violates $\text{EARLIEST}(\text{EP}) < \text{EARLIEST}(\text{PR})$ since the doctors begin to look worried after they know M’s condition. Therefore (11) shows that the three modals are all [posterior].

- (11) Sie sollte/müsste sehr krank sein. [**PR = she is very sick.**]
 she sollte/müsste very sick be
 ‘She should be very sick.’
 a. (P poisons M’s food and leaves. Later P says) [**EP = P poisoned M’s food.**]
 b. # (P visits M in the hospital. P sees through the window of the hospital room that the doctors look worried. P says) [**EP = the doctors look worried.**]

Like *yooda*, a Japanese reportative evidential *sooda* can be used in (8), while they cannot in (12), where $\text{EARLIEST}(\text{EP})$ precedes $\text{EARLIEST}(\text{PR})$ (since PR is past-tensed, so $\text{EARLIEST}(\text{PR})$ is the moment it started to rain). This indicates that *yooda* and *sooda* are both [anterior].

- (12) (Yesterday morning, you watched a weather forecast that it would rain that afternoon. Today, you say)
 #Kinoo ame-ga futta yooda/sooda. [**PR = it rained yesterday.**]
 yesterday rain-Nom fell yooda/sooda [**EP = the forecast said it would rain.**]
 ‘[It seems/I hear] that it rained yesterday.’

These facts indicate that the parameter in (10) is cross-linguistically at work in the semantic variation among inferentials, introducing a new perspective into the formal typology of them.

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