

A formal pragmatic account of Double Access¹

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Abstract. This paper argues that Double Access sentences in English (Smith, 1978) are a kind of loose talk. When the meaning of a Double Access sentence is computed literally, the result is infelicity. Double Access sentences can be used meaningfully only when rescued by pragmatics which intervenes to interpret the embedded clause loosely. A formal model for loose interpretation, building on Klecha (2018), is provided.

Keywords: tense, embedding, Double Access, imprecision, defaults, embedded implicature.

This paper argues that Double Access sentences in English are a kind of loose talk. Double Access sentences (Smith, 1978) are typified in English by featuring a Present-Tensed clause embedded under a Past-Tensed attitude verb (henceforth I refer to this morphosyntactic configuration as *Present-under-Past*).

(1) Dorothy said that Tricia is sick.

Double Access sentences are often characterized as giving rise to two inferences; a simultaneous inference and a speech time inference. The supposed simultaneous time and speech time inferences of (1) are given in (2) and (3) respectively.

(2) *The Simultaneous Inference of (1)*

(1) CONVEYS: *According to D's speech event S, T is sick at $\tau(S)$.*

(3) *The Speech Time Inference of (1) (Classical Analysis)*

(1) CONVEYS: *T is sick at $\tau(I)$*

This second inference, however, is not a consistent consequence of (2). Characterizing the speech time inference of Double Access sentences remains difficult.

I present a characterization of the second inference, and then present a formalized analysis of Double Access as a case of non-literal meaning, one which also critically requires that non-literal meaning to be calculated at a local level. Specifically, I argue that Double Access sentences are, in a sense, grammatically ill-formed, and require pragmatic intervention to be rescued. It is as a consequence of this pragmatic rescue that the second inference arises.

The paper proceeds as follows. In Section 1, I present the essential facts surrounding Double Access, and provide some theoretical context for their significance. In Section 2, I present and motivate the temporal semantic framework I adopt. In Section 3, I present and motivate the pragmatic framework I adopt. In Section 4, I briefly lay out my assumptions regarding

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embedded implicature. In Section 5, I bring these elements together to present the analysis, before concluding.

1. Double Access

Here I present what I take to be the critical facts surrounding Double Access.

1.1. Fact #0: Present-under-Past Morphology

First of all, Double Access sentences have a curious morphological pattern: Present-under-Past morphology. While this is not a semantic fact, it is worth noting. This is because the analysis of embedded tense (at least in English) is tied up with the morphosyntax of tense. Many analyses of English embedded tense posit a syntactic *Sequence of Tense* (SOT) rule (e.g., Ladusaw, 1977; Kratzer, 1998; Schlenker, 2004; Stowell, 2007; Klecha, 2016) which says that certain other sentences of English are not what they appear on the surface.

In particular, an SOT rule is usually invoked to explain the two putative readings of (4).

- (4) Dorothy said that Tricia was sick.
- (5) *Simultaneous Reading of (4)²*
- a. (4) CONVEYS: *According to D's speech event S, T is sick at $\tau(S)$.*
 - b. (4) ~~CONVEYS~~: *According to D's speech event S, T is sick prior to $\tau(S)$.*
- (6) *Backshifted Reading of (4)*
- a. (4) ~~CONVEYS~~: *According to D's speech event S, T is sick at $\tau(S)$.*
 - b. (4) CONVEYS: *According to D's speech event S, T is sick prior to $\tau(S)$.*

According to the SOT rule analysis, the Backshifted Reading is the result of embedding a real Past Tense under another one. Tenses are (or can be) interpreted relatively, meaning that the evaluation time of the embedded Past Tense is the reference time of the matrix one; thus Dorothy's speech event is in the past relative to (4), but Tricia's alleged sickness is further in the past with respect to Dorothy's speech event.

The Simultaneous Reading, however, is the result of embedding a fake Past Tense under a real one. Details vary, but what these analyses generally have in common is that "fake Past Tense" is not a lexical item, but a derived one. For example, Ladusaw (1977) posits that an underlying Present Tense undergoes agreement, so that it becomes morphologically past; Klecha (2016) presents further arguments for this. Kratzer (1998), on the other hand, posits an underlying Null Tense which undergoes agreement. Stowell (2007) argues against a transformational account, instead arguing that Fake Past results from a different combination of lexical items than Real Past.

²Altshuler and Schwarzschild (2013) argue that the simultaneous reading entails the backshifted reading.

What these analyses all have in common, however, is that Present-under-Past morphology can never be realized on the surface under normal circumstances. The Present-Tense-Agreement approach of Ladusaw and Klecha predicts that Present Tense will always be morphologically realized as Past Tense when it is embedded under Past Tense. The Null-Tense-Agreement approach of Kratzer stipulates that Present Tense (and tenses generally) cannot be embedded under an attitude verb for type reasons, while Stowell's account makes Present Tense singularly unembeddable under Past Tense by way of a syntactic polarity mechanism.

Naturally, the mere existence of Present-under-Past morphology is, on its face, problematic for all these accounts. Stowell's account is specifically designed with Double Access in mind, and posits covert movement which rescues Present-under-Past morphology from the polarity violation, but results in the unusual interpretation.

An alternative, of course, is to pursue approaches that simply don't make use of a syntactic SOT mechanism. Some, like Abusch's (1997) semantic feature transmission approach, or Ogi-hara's (1995) highly influential tense deletion approach, are essentially semantic analogs of the syntactic SOT approach, and operate on the same logic—allowing the embedded past in Past-under-Past cases to be interpreted as something other than a simple anterior operator. Because these are not syntactic in nature, they don't problematize Present-under-Past morphology. Others, like Gennari (2003); Altshuler and Schwarzschild (2013), simply reject the ambiguity of Past-under-Past cases altogether, treating them instead as cases of generality, and requiring no SOT mechanism whatsoever.

However, these analyses have difficulty providing a non-stipulative answer to the highly marked semantics of Double Access, whereas syntactic SOT approaches can motivate the marked semantics by way of the marked syntax. Next, I explore said marked semantics.

1.2. Fact #1: The Simultaneous Inference

As discussed before, Double Access sentences give rise two inferences, one of which has proven difficult to characterize. The easy one, however, is the simultaneous inference, repeated below.

(1) Dorothy said that Tricia is sick.

(7) *The Simultaneous Inference of (1)*

(1) CONVEYS: According to *D*'s speech event *S*, *T* is sick at $\tau(S)$.

While easy to characterize, this inference is not always easy to account for. As discussed above, there is an ongoing debate in the embedded tense literature about what kind of SOT rule, if any, is necessary for a proper analysis of the English facts. This debate is also tied up in another controversy, over whether tenses are indexical or relative.

What is uncontroversial is that in unembedded contexts, tenses behave as if they are indexical.

Thus the tense in each of (8a-b) relates event time (ET; the time of the event described by the verb) to speech time (ST; time of the speech event).

- | | | |
|-----|---------------------|---------|
| (8) | a. Tricia is sick. | ET = ST |
| | b. Tricia was sick. | ET < ST |

What is also uncontroversial is that in certain embedded contexts, (certain) tenses behave as if they are relative; i.e., their evaluation time is not ST, but rather another time determined by their syntactic environment. In (9), the Past Tense on *turned* conveys that the turning-in event is in the past with respect to the giving-an-A event, which is in turn in the future with respect to ST. So the turning-in time need not be in the past with respect to ST.

- (9) Alan will give an A to every student who turned in their homework.

The question is which of these behaviors is exceptional. The relative approach says that (9) is the norm, and (8) is due to a default rule for evaluation time determination; whereas the indexical view says that (8) is the norm, and (9) is due to indexical shifting.

This debate is most consequential for the analysis of embedded cases, especially Past-under-Past and Present-under-Past. On the relative view, the backshifted reading of Past-under-Past is readily accounted for, while the simultaneous reading is not—which is what necessitates appeal to SOT rules. The indexical view, on the other hand, predicts no ambiguity, but rather generality between simultaneous and backshifted cases, so one potential advantage to the indexical view is that it could avoid having to posit SOT rules. (The problem for the indexical view is that this generality should extend to a forward-shifted case, which does not usually exist. More on this below.)

As for Present-under-Past, the relative view predicts that it should simply have a simultaneous reading and nothing else (to the extent that Present-under-Past morphology can be squared with SOT). So the simultaneous inference is a strong point for the relative view. The indexical view, on other hand, has no means to predict a simultaneous inference, which makes this inference highly problematic for such views, unless they are considered cases of indexical shifting—but if indexical shifting is available here, it ought to be available in Past-under-Past cases as well, in which case the indexical theory starts to be indistinguishable from the relative one.

What is problematic for the relative theory, however, is that the simultaneous inference isn't the only inference that Double Access sentences give rise to.

1.3. Fact #2: The Speech Time Inference

When Double Access sentences were first discussed by Smith (1978), she characterized the second inference they give rise to as being (10).

- (1) Dorothy said that Tricia is sick.

- (10) *The Speech Time Inference of (1) (Classical Analysis)*
 (1) CONVEYS: *T is sick at $\tau(1)$*

However, Ogihara (1995) showed that this is not the correct characterization; (9) can be uttered, felicitously and truthfully, in cases like (11).

- (11) a. *Tricia's nose is running and her face is puffy.*
 b. *Jamie knows she has allergies, but Dorothy doesn't.*
 c. *D/E: Tricia is sick.*
 d. *A bit later, Jamie runs into Emily.*
 e. *J/E: Tricia has allergies.*
 f. *E/J: Oh, Dorothy said that she's sick.*
 g. *E/J: Guess she's wrong.*

Furthermore, Double Access sentences do not convey that the embedded event hold at ST *in the worlds of the attitude* (i.e., (11f) does not convey that Tricia being sick at ST is an entailment of what Dorothy said), nor do they convey that the embedded event hold at ST in the ST-belief worlds of the attitude holder (i.e., (11f) does not convey that Dorothy currently believes Tricia to be sick at ST); see Ogihara (1995) for detailed arguments.

My characterization of the Speech Time inference is as follows: It is the inference that anyone who believes the content of the attitude believes that the prejacent holds at ST. Thus it is odd for the speaker of a Double Access sentence who endorses the content of described attitude to deny that the prejacent holds at ST.

- (12) a. Dorothy concluded that Tricia is sick.
 b. And Dorothy is always right about this kind of thing.
 c. So Tricia certainly was sick...
 d. #...but she probably isn't anymore.

This can be shown even more clearly with a factive attitude, which requires the speaker to endorse the content of the attitude.

- (13) a. Dorothy realized that Tricia is sick.
 b. #...but she isn't anymore.

This pattern does not depend on the subject being the endorser.

- (14) a. Dorothy said Tricia is sick.
 b. And she stands by what she said.
 c. #But she thinks Tricia isn't sick anymore.

Moreover, as discussed by Schlenker (2004), there is a limit on the span between reference time and UT; but also it depends on the embedded predicate. See also Bary et al. (this volume) for more discussion.

- (15) a. {Yesterday/[?]Last month/#2 years ago}, John said that Mary is pregnant.
 b. {A minute ago/#Yesterday}, Mary said that John is in the kitchen.
 c. The ancient Romans thought that the sun revolves around the earth.

This fact follows from my characterization of the speech time inference.

It is this inference which is troublesome for any analysis of embedded tense. On their face, indexical analyses seem best suited to handle this problem, since a naïve indexical analysis predicts that Present-under-Past should give rise to a speech time inference. However, such an analysis does not predict the inference exactly as I characterized it; it instead predicts the second inference possibility that Ogihara showed to be wrong (i.e., that the prejacent holds at ST in the worlds of the attitude).

What's more, most if not all *non*-naïve indexical analyses posit the existence of an Upper Limit Constraint (ULC). Originating with Abusch (1997), the ULC is a stipulated filter on permissible LFs that bans any LF which lets an embedded reference time be later than the time of embedding attitude verb. In other words, it simply rules out the forward-shifted cases discussed in the previous section that the indexical analysis would otherwise predict. It is the Upper Limit Constraint, on indexical analyses, which rules out (16), whereas on relative analysis, it is ruled out by the semantics of Past Tense.

- (16) #Three days ago Dorothy said that Tricia was sick yesterday.

The ULC further problematizes any attempt to account for Double Access, because it ought to violate it. So there is no obvious mechanism which would derive these facts. I argue that this fact does follow from general mechanisms, but they are pragmatic mechanisms—imprecision and default inferences—which I discuss in Section 3.

1.4. Fact #3: Interaction with Aktionsart

Finally, in many (but not all) contexts, stative attitude verbs are incompatible with Double Access (Altshuler et al., 2015). This is another fact in need of explanation.

- (17) I saw John yesterday.
 a. He said that Mary is pregnant.
 b. #He thought that Mary is pregnant.

1.5. Interim Summary

Although I have presented a characterization of the Speech Time inference, I have not explained how it arises, why it arises together with the Simultaneous inference, nor why this configuration favors eventive predicates. In brief, my analysis is that (18) can be felicitously uttered at t if the difference between t and the time of Dorothy's saying is, for the purposes of discussing Tricia's

(alleged) sickness, irrelevant; we can thus conflate the two and treat Dorothy's saying time as identical to t , allowing use of Present Tense but giving rise to a Simultaneous Inference. But without this conflation there is a violation of the Upper Limit Constraint, so (17) can **only** be felicitously used when conflating the two times, thus the Speech Time Inference.

2. The Temporal Semantics

2.1. Attitude Verbs

I mostly adopt the temporal semantics framework of Klecha (2016). Klecha observes that the Upper Limit Constraint, discussed above, is lexically variable. Thus, some attitude verbs, like *hope*, do allow for forward-shifted readings; (18a) requires that Tricia's sickness be prior to Dorothy's thinking, but (18b) does not.

- (18) a. Dorothy thought Tricia got sick.
b. Dorothy hoped Tricia got sick.

An important upshot of this observation is that the Upper Limit Constraint *does* exist, and needs to be reconciled with Double Access.

I adopt Klecha's analysis of attitude verbs, which accounts for these facts. On Klecha's analysis, attitude verbs (and modals generally) quantify not over worlds but over *histories*, which can be modeled as world-interval pairs.

- (19) *Histories*
if $h = \langle w, t \rangle$, $\omega(h) = w$ and $\tau(h) = t$

Maximal histories are those whose interval component is the maximal temporal interval, representing the whole timeline of a given world. But modals can also quantify over partial histories, and thus restrict the range of possible temporal reference in their prejacent. Particularly, attitude verbs like *say* and *think* (and most other finite-embedding ones) quantify over *actual histories*, whose time component is an interval $(-\infty, t]$ for some t ; i.e., the interval representing the past and present of t , but not its future. This is what prevents forward-shifting in the case of these attitudes.

- (20) *Actual Histories*
 $\mathcal{A}_t := \{h \mid \tau(h) = (-\infty, t]\}$

So the denotation for *think* is (21a), where $\text{DOX}_{x,t,h}$ is the set of histories consistent with x 's beliefs in h at t , and the denotation for *say* is in (21b), where $\text{DC}_{x,t,h}$ is the set of histories consistent with the discourse commitments induced by x 's utterance in h at t .³

³This ignores the eventive component of *say*, since there is no representation of an actual saying event, only the stative/modal component. A better denotation would include this, but I exclude it because modeling this component is not relevant for the present investigation.

- (21) a. $\llbracket \text{think} \rrbracket_s^c = \lambda p_{st} \lambda x \lambda t \lambda h [\forall i \in \mathcal{A}_t \cap \text{DOX}_{x,t,h} [p(i)]]$
 b. $\llbracket \text{say} \rrbracket_s^c = \lambda p_{st} \lambda x \lambda t \lambda h [\forall i \in \mathcal{A}_t \cap \text{DC}_{x,t,h} [p(i)]]$

(21) says that *think* combines with a prejacent proposition (a property of histories; denoted by the embedded clause), individual (the subject), a time, and a history, and is true iff, in every actual history consistent with the beliefs of the subject at the evaluation time in the evaluation history, *p* is true.

2.2. Indexical Tenses

Klecha also argues for an SOT rule and a relative semantics for tenses. But his analysis of the ULC alone does not demand a relative semantics for tense, and in fact makes an indexical analysis possible, at least without considering other data. I will not weigh in on this question, except to point out that indexical readings of embedded tenses must at least be *possible*. This is shown by the behavior of the Past Perfect under Past.

First, consider that the Past Perfect requires the existence of a salient past time.

- (22) *Andy walks into Chuck's party and sees Bella.*
 a. A/B: Why so serious?
 b. B/A: Chuck (#had) kissed my ex.

(22b), which is discourse initial, is bad when put into a Past Perfect configuration, but good in the simple Past. Presumably the requirement is a uniform property of the Past Tense; it always requires its reference time to be salient. But in cases of the Simple Past, the time of the event is identified with reference time, and so it can be accommodated to act as the salient past time. In the case of the Past Perfect, however, the event time must be in the past with respect to Past's reference time, so this is what requires a genuinely salient past time from prior discourse apart from the event time.

However, when embedded under a Past Tense attitude, this requirement seems to go away.

- (23) *Andy walks into Chuck's party and sees Bella.*
 a. A/B: Why do you look grim?
 b. B/A: Chuck told me a few weeks ago that he (had) kissed my ex the day before.

This can only be because the salient past time needed by the Past Tense is the time of the matrix attitude verb, *tell*. But this would require that the reference time of the embedded Past Tense is simultaneous with, not prior to, the time of the attitude. The only way for purely relative past theories to account for this is to posit SOT. But this cannot be a case of SOT either—that would mean that (23b) is a case of the Present Perfect which has undergone SOT; but the Present Perfect is incompatible with frame adverbs like *the day before* (see e.g., Portner, 2011).

So either tenses are indexical, or, if they are relative, there is a mechanism which allows the

possibility of indexical readings, while perhaps also allowing relative readings. This mechanism could be Stowell's movement operation, which would make the seemingly embedded relative tense unembedded, and thus behave as if indexical. But for the sake of simplicity and space, I will simply adopt an indexical analysis of tense for the purposes of this discussion. So the denotation I assume for the tenses are as follows, where 0 is the distinguished variable that all assignments map to ST; thus $g_c(0)$ below represents ST.

- (24) a. $\llbracket \text{PST}_j \rrbracket_s^c = \lambda p \lambda h [p(g_c(j))(h) \ \& \ g_c(j) < g_c(0)]$
 b. $\llbracket \text{PRS}_0 \rrbracket_s^c = g_c(0)$

2.3. The Upper Limit

A typical verb phrase is modeled as in (26), where $h|t$ is defined in (25).

- (25) a. $h|t$ is defined iff $\tau(h) \cap t$ is a non-empty interval
 b. if defined, $h|t := \langle \omega(h), \tau(h) \cap t \rangle$

- (26) $\llbracket \text{Tricia be sick} \rrbracket_s^c = \lambda t \lambda h [\exists s [\text{sick}(s)(\omega(h)) \ \& \ \tau(s) = \tau(h|t)]]$

Combining such a verb phrase with tense, and then an attitude, gives (27) and ultimately (28).

- (27) $\llbracket \text{Tricia PST}_j \text{ was sick} \rrbracket_s^c = \lambda h [\exists s [\text{sick}(s)(\omega(h)) \ \& \ \tau(s) = \tau(h|g_c(j))] \ \& \ g_c(j) < g_c(0)]$

- (28) $\llbracket \text{PST}_k \text{ Dorothy say Tricia PST}_j \text{ was sick} \rrbracket_s^c = \lambda h [g_c(k) < g_c(0) \ \& \ \forall i \in \mathcal{A}_{g_c(k)} \cap \text{DC}_{d, g_c(k), h} [\exists s [\text{sick}(s)(\omega(i)) \ \& \ \tau(s) = \tau(i|g_c(j))] \ \& \ g_c(j) < g_c(0)]]]$

(28) models the meaning of (29).

- (29) Dorothy said Tricia was sick.

Notice that if $g_c(j)$, the salient time picked out by Past Tense, is later than $g_c(k)$, the evaluation time of *think*, and thus outside the interval component of (all values of) i , the result will be a crash, because the term $i|g_c(j)$ will be undefined. This is what enforces the Upper Limit Constraint. Thus (28) correctly predicts that (29) is consistent with backshifted or simultaneous cases, but not forwardshifted ones.

Accordingly, replacing Past Tense in the embedded clause with Present Tense guarantees infelicity, according to the present model, since $g_c(0)$ is now necessarily later than $g_c(k)$.

- (30) $\llbracket \text{PST}_k \text{ Dorothy say Tricia PRS}_0 \text{ is sick} \rrbracket_s^g = \lambda h [g_c(k) < g_c(0) \ \& \ \forall i \in \mathcal{A}_{g_c(k)} \cap \text{DC}_{d, g_c(k), h} [\exists s [\text{sick}(s)(\omega(i)) \ \& \ \tau(s) = \tau(i|g_c(0))]]]$

This is a feature of the analysis, not a bug: I argue that the literal meaning of Double Access sentences is ill-formed. I argue that Double Access sentences are only uttered meaningfully

3.2. Imprecision

Per Klecha (2018), imprecision is determined by the domain goals. The domain goals for a given discourse are the issues, choices, or questions, which are considered by the interlocutors to be worthy of their attention. The domain goals can be modeled as a partition K on the logical space. Each cell in the partition contains worlds which are *indistinguishable* for the purposes of the domain goals. So, if it is in my domain goals that I catch my train at 3, then perhaps a cell in the partition which models it will contain both a world where I leave at 2:59 and a world where I leave at 3:00, because the question of leaving at 2:59 versus 3:00 is doesn't matter for the purposes of catching my train; either way, I'll make it in time. But if leaving at 3:05 would result in my missing the train, worlds where I do so will end up in a different cell.

One effect of pragmatic interpretation is that meanings are *coarsened*. In other words, they are pixelated according to the resolution imposed on the logical space by the domain goals. Consider a proposition p against the backdrop of the logical space W .

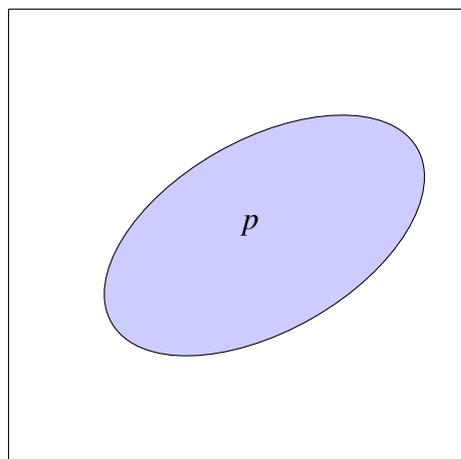


Figure 1: W (maximum resolution)

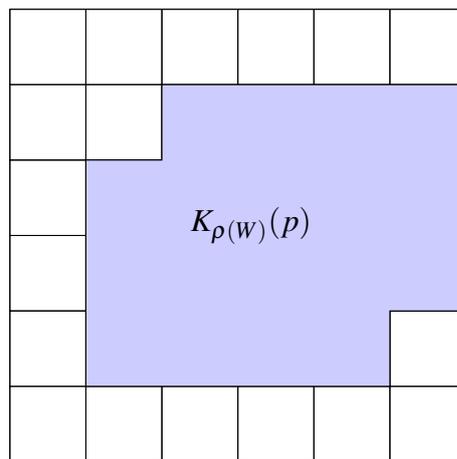


Figure 2: W_ρ

So in a context *where imprecision is the only pragmatic effect on meaning*, the pragmatic meaning of a sentence S will be as in (34).

$$(34) \quad \llbracket S \rrbracket_p^c = K_{\rho_c(W)}(\llbracket S \rrbracket_s^c)$$

3.3. Defaults

Default inference is a related phenomenon (e.g., Jäger, 2012; Franke, 2014; Klecha, 2018). Here I assume that the pragmatic context has another parameter, prevailing assumptions, which are responsible for default inferences. Prevailing assumptions are simply propositions which both interlocutors either assume to be true, or act as if are true because they believe the other interlocutor to be assuming them. Prevailing assumptions narrow the logical space, making assertions more informative than they might otherwise be. I'll use P_{ρ_c} to stand for the prevailing

assumptions in a given context c .

For any sentence uttered in a context *where default inferences and imprecision are the only pragmatic effect on meaning*, the pragmatic meaning of a sentence S will be as in (35).

$$(35) \quad \llbracket S \rrbracket_p^c = K_{\rho_c(P_{\rho_c})}(\llbracket S \rrbracket_s^c)$$

3.4. Accommodation

The domain goals and prevailing assumptions are both discourse parameters. They can, at least in some cases, be modified by a process similar to accommodation, à la Lewis (1979). As discussed by Klecha (2018), for example, utterance of a non-round number in a context that otherwise makes such a number equivalent to a round number causes the standard of precision to rise; i.e., it causes the domain goals to become richer, and thus the logical space becomes more finely partitioned. As Klecha argues, since non-round numbers are more costly to utter, one should have no reason to utter them when imprecision makes nearby round numbers indistinguishable. Once they are uttered, the hearer has no choice but to recognize that the speaker must be assuming a higher standard of precision. Accommodation of prevailing assumptions is crucial to the present analysis, as discussed below.

4. Embedded Implicature

Lasersohn's (1999) analysis of imprecision says that each lexical item in a derivation is assigned an imprecise interpretation, and then those are composed alongside the literal meanings, thus determining a pragmatic interpretation for the sentence as a whole. Klecha (2014, 2018) argues against this; since different expressions within a sentence might be interpreted with different levels of precision.

(36) For the dinner tonight we need 50 place settings and 200 bottles of beer.

According to Lasersohn (1999), individual terms like *50* and *200* would need to be assigned standards of precision before composing with other elements in the sentence. But since (36) provides a sentence where, conceivably, *50* could be interpreted with maximum precision, and *200* with less than maximum precision, it can't be that precision is determined at the lexical item level, with no input from the rest of the sentential context. So Klecha argues for an entirely post-semantic pragmatic interpretation mechanism.

The present analysis of Double Access says that the literal interpretation of a Double Access sentence is ill-formed, and needs to be rescued by pragmatics. But this pragmatic rescue cannot happen entirely after semantic composition. If it did, the input to pragmatic interpretation would be an infelicitous sentence with no meaning.⁴ Instead, the embedded clause must be assigned a pragmatic interpretation before composing with the attitude verb, to avoid violation of the Upper Limit Constraint.

⁴Thanks to Julian Grove (p.c.) for making this point especially clear to me.

The notion that pragmatics may occur below the sentence level is not a new one. Besides Lasersohn (1999), it has been recently argued that certain implicatures can be calculated in the midst of composition. For example, Potts et al. (2015) argues that embedded implicatures are derived in a manner not so dissimilar from Lasersohn, with pragmatic alternatives being assigned to every lexical item, composing pointwise, resulting in a set of alternative interpretations for the whole sentence. The optimal alternative is then selected and becomes the pragmatic interpretation for the sentence.

However, to avoid the problem with imprecision raised by Klecha (2014, 2018), I propose that alternatives be assigned to every clause (i.e., proposition denoting projection) rather than every lexical item. This allows for an analysis of (36) whereby the difference between 50 place settings and 51 matters, but the difference between 200 bottles of beer and 201 doesn't. It also still allows for Potts et al.'s (2015) treatment of embedded scalar implicatures.

5. Analysis

Recall the literal meaning of Double Access sentences is undefined, thanks to the term $i|g_c(0)$.

$$(37) \quad \llbracket \text{PST}_k \text{ Dorothy say Tricia PRS}_0 \text{ is sick} \rrbracket_s^c = \lambda h [g_c(k) < g_c(0) \ \& \ \forall i \in \mathcal{A}_{g_c(k)} \cap \text{DC}_{d,g_c(k),h} [\exists s [\text{sick}(s)(\omega(i)) \ \& \ \tau(s) = \tau(i|g_c(0))]]]]$$

But Double Access is acceptable at sufficiently low *temporal resolution*, where we can (due to pragmatic enrichment) conflate ST and the past ET of the attitude verb, so that the Upper Limit Constraint is not violated. The fact that this low-resolution construal is necessary to rescue (1) explains its various interesting behaviors.

5.1. Step One: Temporal Resolution

Being at temporal resolution d (for the purposes of discussing Tricia's sickness) means we i) partition the temporal space into intervals of length d , and ii) ignore the possibility that Tricia's sickness state will change within any of the cells. This is modeled as a prevailing assumption; the discourse participants assume that if Tricia is sick at one moment within any of the partition-intervals, she is sick at all moments within said interval. This is the sense in which ST and the past ET of the attitude verb are conflated.

5.2. Step Two: Imprecision

Klecha's (2018) theory of imprecision assumes that any discourse's domain goals will provide a partition on the logical space, where that logical space is composed of worlds. But having enriched the logical space so that it is made up of histories, rather than worlds, per Klecha (2016), how does the partition work? For the most part, the same-histories are world-interval pairs, so partitioning can mostly continue by partitioning histories according to their world-components.

But what about histories who share a world component, but have different temporal components? Are they ever sorted into different partitions by the domain goals? I assume that a principle applies in these cases.

First, let us say that history h branches from actual history i if their world components are identical up to the endpoint of $\tau(i)$ and $\tau(i)$ ends prior to the end of $\tau(h)$.

$$(38) \quad i \sqsubset h := \omega(i) \approx_{RB(\tau(i))} \omega(h) \ \& \ RB(\tau(i)) < RB(\tau(h))$$

In other words if h branches from i , then h is a continuation of i . Consider now a principle for determining whether branches ought to be lumped by a given partition or not.

(39) *Principle of Temporal Imprecision*

- a. If all $k \in P_\rho$ such that $i \sqsubset k$ and $t \in \tau(k)$ answer $p(t)$? the same
- b. and $i \sqsubset h$ and $t \in \tau(h)$
- c. h and i will not be distinguished by $p(t)$? in P_ρ

So in other words, if h is a branch of i , and $p(t)(h)$ is true, but $p(t)(i)$ is undefined because i does not extend far enough into the future to include t , then i will not be considered to answer $p(t)$? the same as h , unless it's also true that *all* live branches of i that do extend up to t answer the question the same way, where *live* means “in P_ρ ”, i.e., consistent with the prevailing assumptions of ρ .

5.3. Accounting for Double Access

So generally a history which extends only up to the past time of Dorothy's thinking will not be lumped in with one that extends up to ST. But if a prevailing assumption has been adopted that imposes a temporal resolution on the discourse that conflates Dorothy's thinking time with ST, such histories can be lumped together.

Thus, at such a context, the pragmatic interpretation of the embedded clause (40a) will contain (as usual) a bunch of histories extending up to speech time at which Tricia is sick at speech time (h_{5-8} in Fig. 3); but it will also include histories which do not extend up to speech time, so long as they extend at least as far the left boundary of the cell t_d in the temporal resolution which also contains speech time, and so long as Tricia is sick during the portion of t_d which is included in the history (h_{9-13} in Fig. 3). Since that now means that it contains worlds that are actual histories of Dorothy's saying time t_{say} (h_{12}, h_{13} in Fig. 3), (40a) can be embedded under *say*, where *say*'s evaluation time is t_{say} , without incurring a violation of the ULC.

(40) *Semantic and pragmatic values for Tricia is sick given model in Fig. 3*

- a. Tricia is sick.
- b. $\llbracket(40a)\rrbracket_s^c = \{h_2, h_3, h_4, h_5, h_6, h_7, h_8\}$
- c. $P_\rho \cap \llbracket(40a)\rrbracket_s^c = \{h_5, h_6, h_7, h_8\}$
- d. $K_{\rho(P_\rho)}(\llbracket(40a)\rrbracket_s^c) = \{h_5, h_6, h_7, h_8, h_9, h_{10}, h_{11}, h_{12}, h_{13}\}$

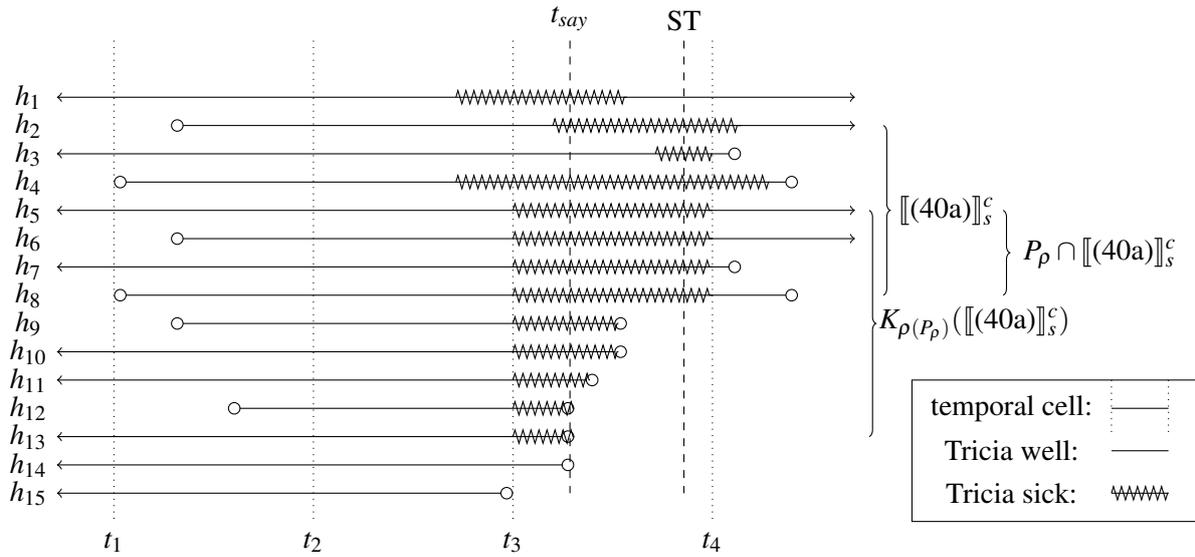


Figure 3: Pragmatic interpretation of (40a)

The inference modeled by (40d) is the Simultaneous Inference—because in all the histories that are actual histories of t_{say} , Tricia is sick at t_{say} .

- (41) a. $\llbracket \text{Tricia is sick} \rrbracket_p^c = K_{\rho(P_\rho)}(\llbracket \text{Tricia is sick} \rrbracket_s^c)$
 b. $\llbracket \text{PST}_k \text{ say } [\text{Tricia is sick}] \rrbracket_s^c = \lambda x \lambda h [g_c(k) < g_c(0) \ \& \ \forall i \in \mathcal{A}_{g_c(k)} \cap \text{DC}_{x, g_c(k), h} [i \in \llbracket \text{Tricia is sick} \rrbracket_p^c]]$

So the pragmatic enrichment obviates the ULC, and derives the Simultaneous Inference.

And what about the Speech Time inference? It is not properly a part of the meaning of the sentence itself, pragmatic or otherwise. But recall that Double Access sentences can only be interpreted if the context is one with an appropriate temporal resolution. If the context does not already have that resolution, it must be accommodated. Accommodating that resolution gives rise to the Speech Time Inference—it amounts to accommodating the presupposition that Tricia is either sick or well throughout the duration of each interval of the temporal partition.

This accounts for why a speaker who commits herself to believing the content of the attitude must also believe that the prejacent eventuality still holds at speech time. In order to utter the Double Access sentence in the first place, the speaker commits to a temporal resolution whereby the eventuality’s runtime must include all or none of the interval spanning both the time of the attitude and speech time, in any world.

It also explains the time limit facts, since one would only adopt such a temporal resolution if they believed that the state of affairs in question was unlikely to change in the timespan of the relevant interval. And it goes further, in fact, predicting that sometimes the time limit would be shorter than others simply based on what temporal distinctions are relevant. For example, it generally predicts that while (42) is bad, (43) is good, as has been noted previously.

- (42) #John told me Ted is pregnant a year ago.
- (43) a. A: Ted hasn't been drinking lately because he's pregnant.
 b. B: Whoa, wait, how is it you know that he's pregnant?
 c. A: {A minute ago/Yesterday,} John told me he is.

This is because pregnancies generally remain stable from minute to minute or day to day, but not year to year. Thus a temporal resolution on the order of minutes or days is generally acceptable, but on the order of years is not.

However, the present theory also predicts that the temporal resolution *can* be even smaller than what the embedded predicate requires, and thus the embedded predicate provides only an *upper* bound on the time span for Double Access sentences. (44) bears this prediction out.

- (44) a. A: Ted hasn't given birth yet; but he will sometime in the next few hours.
 b. B: Whoa, wait, how is it you know that Ted's pregnant?
 c. A: {A minute ago/#Yesterday}, John told me he is.

(44a) establishes a temporal resolution no coarser than a few hours, since (44a) makes an important distinction between the present moment, when Ted has not given birth, and a time a few hours from now when is expected to have done so. The *yesterday*-variant of (44c) is therefore bad, since it requires a temporal resolution broad enough to conflate ST with the previous day.

5.4. Preference for Eventives

The last thing to explain is the fact that eventive attitudes are much more common in Double Access sentences than stative ones (Altshuler et al., 2015). This can be explained in light of the assumption that there is a preference for the Present Tense over the Past Tense; Altshuler and Schwarzschild (2013) argue that the Present Tense is more informative than the Past Tense. It could also be that the Present Tense is inherently more relevant, in the sense that, all things being equal, information about the present is more likely to bear on the domain goals of any given discourse than information about the past. Or it could be that the Present Tense is simply less marked than the Past. In any case, this assumption is important to the logic of the present analysis of Double Access—pragmatic enrichment allows for the use of the Present-under-Past construction, but it for the most part gives rise to the same inference that Past-under-Past would. So there must be a reason for speakers to want to use Present-under-Past in the first place.

So, if our temporal resolution is coarse enough to conflate ST and ET, and thus use Present Tense in the embedded clause instead of Past, why then should it be that we don't also use Present Tense on the attitude verb? Since past and present are conflated, shouldn't *everything* be in Present Tense? Yes, and that's why Double Access is often bad with stative attitude verbs:

- (45) a. #John thought Ted is pregnant.
 b. John thinks Ted is pregnant.

The reason this doesn't carry over to eventive attitudes, is that episodic present tense with eventive verbs is impossible (Bennett and Partee, 1978).

- (46) a. John discovered that Ted is pregnant.
b. #John discovers that Ted is pregnant.

Following Bennett and Partee (1978), I assume this is for type-reasons—ST is a moment, and the runtimes of events must be non-singleton intervals. Thus when an eventive VP composes with Present Tense, the result is a crash.

$$(47) \quad \llbracket \text{PRS}_0 \text{ Tricia get sick} \rrbracket_s^c = \lambda h [\exists e [\text{getsick}(e)(\omega(h)) \ \& \ \tau(e) \subseteq \tau(h|g_c(0))]] = \lambda h [\#]$$

Lastly, a crucial point: The present proposal allows for the pragmatic enrichment of certain constituents as a way to rescue what might otherwise be a compositional crash. This could lead to the concern that pragmatic enrichment creates an escape hatch for type-clashes or presupposition failures—depriving semantic theory of its ability to predict infelicity of certain lexical combinations for semantic reasons. But this example illustrates why that concern would be misplaced—this particular clash cannot be remedied by pragmatic enrichment, because it happens below the clause level. And pragmatic enrichment generally can only rescue compositional mishaps that would otherwise happen at clause boundaries—this is because of the amendment to the Lasersohn (1999)/Potts et al. (2015) apparatus for pragmatic enrichment whereby enrichment only occurs to clause-typed constituents.

6. Conclusion

This paper presents a proposal by which Double Access is a special kind of loose talk. In particular, Double Access sentences can be felicitously used when the temporal resolution in the discourse is sufficiently coarse so as to conflate the event time of the attitude verb with speech time; in other words, in discourses where the interlocutors don't care to make the distinction between event and speech time for the purposes of discussing what they're discussing. This can be accounted for by simply allowing for the application of certain well-known pragmatic enrichments—imprecision and default inferences—to embedded clauses.

For reasons of space, no discussion of prior analyses of Double Access is presented, in particular, the dominant *de re* theory (Ogihara, 1995; Abusch, 1997). See Gennari (2003) for critique of these approaches. The biggest advantage of the present theory is that it keeps the semantic theory of tense quite simple. Some outstanding questions do still need to be answered, especially how the present theory bears on debates over relative and indexical treatments of tense.

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