Dissatisfaction Theory

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SALT 26: Session on Presupposition, May 12, 2016

1 Aims

- Sharpen some well-known problems for Satisfaction Theory ('ST').
- Sketch a new theory of presupposition which solves those problems.

2 Subject Matter

Semantic presupposition ('SP') identified by enriched family of sentences test.

We do not assume e.g. that SPs are truth-value gaps or constraints on input contexts ('presupposition' is an unfortunately loaded name).

In particular, *informational*, not *expressive*, SPs. The *enriched family of sentence test*: projection through negation, antecedents of conditionals, 'might'; and *failure* to project when locally entailed.

3 Satisfaction Theory

Two planks:

(1) *Stalnaker's Bridge*: An assertion of p_r can only update c if $c \vDash r$.

(2) *ST Projection*: p can only update c if all its constituents have their SPs *locally* entailed. p SPs r iff $c \vDash r$ for all c which p can update.

Stalnaker (1974), Karttunen (1974), Heim (1983) a.o. I focus on ST for expositional purposes; my challenges extend to most other theories, except DRT. Subscripts denote SPs.

4 Conditionals

ST's predictions about SPs under connectives and attitude predicates are widely recognized not to match observed *speaker* presuppositions.

I argue these problems are worse than has been recognized.

First, ST predicts

(3) If p then q_r
$\rightsquigarrow_{ST}$ p $\supset$ r

'$\rightsquigarrow_{ST}$' represents SPs predicted by ST, and '$\rightsquigarrow_{OBS}$' represents *speaker* presuppositions observed in a null context. Parallel points extend to other connectives as well as material under quantifiers.

But speakers are often felt to presuppose r, not just $p \supset r$:

(4) If Theo hates sonnets, so does his wife.
$\rightsquigarrow_{ST}$ Theo hates sonnets $\supset$ Theo has a wife.
$\rightsquigarrow_{OBS}$ Theo has a wife.

Geurts (1996), but the 'Proviso Problem' was recognized as early as Karttunen and Peters (1979). For responses: Beaver (2001), Heim (2006), Singh (2007, 2008), von Fintel (2008), Pérez Carballo (2009), Schlenker (2011), a.o. See Mandelkern (2016) for more on the present points.

Response: ST is right about *semantic* presupposition, but interlocutors often, for pragmatic reasons, take the *speaker* to presuppose the unconditional.

Problem: conditional SPs get strengthened *even when there is strong pragmatic pressure not to do so.* Consider:

(5) a. How's Jo's health?
b. ??I don't know; he has diabetes or MS, I don't know which. But if he restricts his sugar intake at dinner tonight, then his diabetes is under control.
$\rightsquigarrow_{ST}$ Jo restricts his sugar intake $\supset$ Jo has diabetes.
$\rightsquigarrow_{OBS}$ Jo has diabetes.

Thus the incoherence of (5-b).

But if conditionals had conditional SPs which are *optionally* strengthened through *pragmatic* reasoning, that strengthening should be blocked here.

By a principle of charitable interpretation.

Upshot: ST plus pragmatic strengthening is *prima facie* inadequate.

5 Attitudes

Second, ST predicts

(6) S [believes/wants] p_r
$\rightsquigarrow_{ST}$ S believes r.

But speakers are often felt to presuppose *r* as well:

(7) Jo believes that his uncle will visit soon.
$\rightsquigarrow_{ST}$ Jo believes he has an uncle.
$\rightsquigarrow_{OBS}$ Jo has an uncle.

Karttunen (1973), Heim (1992), Geurts (1998), Sudo (2014). Another response: wide-scoping. But hard to apply beyond definites, as in (8).

Response: pragmatic strengthening again. We tend to defer to a belief if it is *presupposed* (rather than asserted) that someone holds it.

Again, this approach predicts that if we create pragmatic pressure against this kind of deference, the inference will disappear. But it doesn't:

(8) Bernhard has many mistaken beliefs about Bugandan politics. He thinks that Buganda's king has stopped attending parliament!
$\rightsquigarrow_{ST}$ Bernhard thinks Buganda has a king who used to attend parliament.
$\rightsquigarrow_{OBS}$ Buganda has a king who used to attend parliament.

(9) ??I don't know whether the vase was broken. But Lucy thinks that it was Susie who broke it.
$\rightsquigarrow_{ST}$ Lucy thinks someone broke the vase.
$\rightsquigarrow_{OBS}$ Someone broke the vase.

Again: ST plus pragmatic strengthening is *prima facie* inadequate.

Generalization: ST makes correct predictions when no accommodation is needed, but excessively weak predictions in other cases.

6 Dissatisfaction Theory

Dissatisfaction Theory ('DT') replaces ST's two planks as follows:

(10) *Side Entailments*: SPs are side entailments.

Not constraints on input contexts, *pace Stalnaker's Bridge*. Borrowing from work on conventional implicatures: Karttunen and Peters (1979), Potts (2005), AnderBois et al. (2010), Murray (2014). I remain agnostic about what *local entailment* amounts to, following predictions of Heim (1983, 1992). See Schlenker (2009), Rothschild (2015) for recent discussion.

As side entailments, SPs are hard to target with propositional anaphors and shouldn't answer a QUD; they *impose* their content rather than propose it.

(11) *DT Projection*: The SP of an atomic sentence filters past a node iff it isn't locally entailed at that node.

An obvious resemblance to *ST Projection*. But while *satisfaction* theory sees SPs as *constraints* that must be locally *satisfied*, *dissatisfaction* theory sees SPs as contents that are always passed up *unless* locally satisfied.

Roughly: We match the predictions of ST about when a sentence SPs nothing; but make stronger predictions in other cases.

7 Conditionals

(12) If p then q_r.

DT predicts (12) SPs r *unless p* contextually entails *r*; then it SPs nothing.

Very similar to Karttunen (1973).

We thus accommodate intuitions that drive ST, since we predict no SPs for

(13) If p, q_p.

(14) If Theo has a wife, then his wife likes sonnets.

Since p ('Theo has a wife') is locally entailed in the consequent of the conditional.

But we also accommodate the intuitions elicited above: e.g. that

(15) If Theo hates sonnets, so does his wife.
$\rightsquigarrow_{DT}$ Theo has a wife.

Since 'Theo has a wife' *isn't* locally entailed in the consequent (assuming a null context here and throughout). We thus also predict the infelicity of (5-b). This extends, *mutatis mutandis*, to connectives.

- *Side Entailments* is crucial here: if we stuck with *Stalnaker's Bridge*, speakers would still be predicted to have a choice between conditional and unconditional accommodation, and the Proviso Problem would re-arise.

- What of cases which seem to confirm ST's conditional predictions?

(16) If France is a monarchy, then its king is tall.
$\rightsquigarrow_{ST}$ France is a monarchy $\supset$ France has a king.
$\rightsquigarrow_{DT}$ France has a king.

DT's prediction too strong here; ST's is plausible.

Question 1: When is a conditional inference of this kind available?

Hypothesis: iff the inference is a *default* of some kind.

Examples like (5-b) show it is not *always* available.
See Kálmán (1990). Much more to be said.

Question 2: How does DT predict this kind of conditional inference?

Hypothesis: if the predicted SP of DT would yield infelicity of some kind, the interlocutors will cast around for a default which would rescue the assertion.

E.g., accommodate *monarchies have kings*; then DT says (16) SPs nothing. Accommodation thus has a role in DT, but it isn't the *normal* way that SPs get added to the common ground; rather, a repair strategy. Note that local accommodation will also play a role for DT; we treat it as reconstruction at LF, not a pragmatic mechanism: e.g. we may reinterpret ⌜Not p_r⌝ as ⌜Not ($p \wedge p_r$)⌝.

They will *accommodate* the default and evaluate the utterance against the updated context, to avoid the infelicity.

Upshot: a speaker will sometimes be felt to presuppose a default conditional as a way of rescuing her assertion (not as an SP).

8 Attitudes

DT predicts

(17) S [believes/wants] p_r.

SPs r unless r is entailed by S's [belief/desire]-worlds as viewed in c. So:

Both predictions here are correct. Section A.5 below shows how DT can capture ST's predictions.

(18) Jo [believes/wants] that his uncle will visit.
$\rightsquigarrow_{DT}$ Jo has an uncle.
$\rightsquigarrow_{ST}$ Jo believes he has an uncle.

DT also captures intuitions behind ST: both predict no SPs for (19)-(21):

Since r ('Jo has an uncle') will be locally entailed. Assuming that S's desire-worlds are a subset of her belief-worlds, as in Heim (1992) a.o..

(19) S believes r, and S [believes/wants] p_r.

(20) Jo believes he has an uncle, and believes that his uncle will visit.

(21) Jo believes he has an uncle, and he wants his uncle to visit.

Heim (1992), Sudo (2014) propose to avoid this by invoking modal subordination.

And we improve on the predictions of ST for want-want sequences:

(22) S wants r and S wants p_r.
$\rightsquigarrow_{DT}$ $\varnothing$
$\rightsquigarrow_{ST}$ S wants r $\supset$ S believes r.

(23) Sue wants it to have rained, and wants it to have stopped raining.
$\rightsquigarrow_{DT}$ $\varnothing$
$\rightsquigarrow_{ST}$ Sue wants it to have rained $\supset$ Sue believes it rained.

A Appendix: Sketch of Implementation

Implementation requires commitments beyond the core planks of DT.

Building on Karttunen and Peters (1979). Σ is the type of sets. Treating π as a *set* lets us (1) avoid taking SPs to be closed under multi-premise closure − if we did, then we would wrongly predict that 'If p, then $q_{r,p}$' presupposes p; and (2) use the type of sets to force certain contents to compose with SPs rather than main content.

Two dimensions of content. $[\![\cdot]\!]^c$ takes a string α to a set $\{\pi_\Sigma, \mu_{st}\}$, s.t. μ is α's 'main' content at c (of type $\langle st\rangle$), and π is the set of α's SPs at c (of type Σ).

Bivalent framework; we remain agnostic about what to say if e.g. $\mu(w) = 1$ but for some $\delta \in \pi$, $\delta(w) = 0$. Various possibilities for defining entailment.

A.1 Pragmatics

When $[\![\alpha]\!]^c = \{\pi_\Sigma, \mu_{st}\}$, asserting α will *impose* $\bigcap \pi$ on the common ground (barring objections); and will *propose* to add μ to the common ground.

Again, borrowing from literature on CIs cited above.

A.2 Compositional Semantics

Abbreviations and Assumptions:

- Shorthands: $[\![\alpha]\!]^c_\mu$ is α's main content at c, $[\![\alpha]\!]^c_\pi$ its SP content.
- For any sets s, r: let $s^{r\nvDash}$ be the set of elements of s not entailed by r.
- Each node α is tagged with that node's local context, κ_α.

We remain agnostic about how these are calculated. The top node's local context is c.

Composition Rules: We extend Heim and Kratzer (1998) as follows:

(24) **Functional Application**: For node α with daughters β, γ, with $[\![\gamma]\!]^c_\mu$ in the domain of $[\![\beta]\!]^c_\mu$: $[\![\alpha]\!]^c = \{\delta^{\kappa_\alpha \nvDash}, [\![\beta]\!]^c_\mu([\![\gamma]\!]^c_\mu)\}$, with δ the smallest set s.t. for all ρ:

An intensional extension of H&K. $f(\langle a, b\rangle)$ is $a(b)$ or $b(a)$, if one is defined, else $\top$ (the set of all worlds).

- $\rho \in ([\![\beta]\!]^c_\pi \setminus D_{st})^{\kappa_\beta \nvDash} \times [\![\gamma]\!]^c \rightarrow f(\rho) \in \delta$.
- $\rho \in ([\![\gamma]\!]^c_\pi \setminus D_{st})^{\kappa_\gamma \nvDash} \times [\![\beta]\!]^c \rightarrow f(\rho) \in \delta$.
- $\rho \in ([\![\beta]\!]^c_\pi \cup [\![\gamma]\!]^c_\pi) \cap D_{st} \rightarrow \rho \in \delta$.

Intuition: SPs freely functionally apply with either dimension of content of sister, until they become propositions. Then pass up iff not locally entailed.

Very big picture: formulate a compositional version of the cumulative hypothesis (Langendoen and Savin, 1971), then filter on projection by entailment at local contexts.

1. normal FA for main contents
2. the SP content is the set of contents not locally entailed at α which are
   - propositions SPed by either daughter; or
   - obtained by functional application of a non-propositional element SPed (but not locally entailed) by one daughter, with either the main or SP content of the other daughter.

(25) **Predicate Abstraction**: For node α with daughters β and γ, where β dominates only a numerical index i, for any variable assignment g: $[\![\alpha]\!]^g = \{\{\, f_{e,st} : \exists \rho_{st} \in [\![\gamma]\!]^g_\pi (\rho = [\![\delta]\!]^g_\mu \wedge f = \lambda x_e . [\![\delta]\!]^{g^{x/i}}_\mu)\}, \lambda x_e . [\![\gamma]\!]^{g^{x/i}}_\mu\}$.

Ignoring, for readability, elements of context other than variable assignments. Note this follows immediately from FA if we treat quantification categorematically (Rabern, 2013). Other composition rules can be generalized straightforwardly.

PA applies normally to main content and pointwise to SP content.

A.3 Key Predictions: Propositional Fragment

For the 'propositional fragment' we validate *DT Projection*: propositional SPs move up the tree unless they hit a node where they are locally entailed.

A.4 Key Predictions: Predication

Ordinary predication is straightforward. E.g. let

(26) $[\![\text{won}]\!]^c = \{\{\lambda x_e.\lambda w.x \text{ participated in } w\}, \lambda x_e.\lambda w.x \text{ won in } w\}$

$\top$=null context.

(27) $[\![\text{S won}]\!]^\top = \{\{\lambda w.\text{ S participated in } w\}, \lambda w.\text{ S won in } w\}$

Else have unwanted interactions with presupposed material.

Assumption: conjunction and negation are of types $\langle st, \langle st, st\rangle\rangle$, $\langle st, st\rangle$ resp.

A.5 Key Predictions: Some Intensional Operations

Thus, in contrast to Potts (2005), it's crucial that the SP contents can functionally apply within their own dimension. I assume that SP material is *also* entailed by the main content. This is important in getting belief ascriptions right, and for the 'managed' binding puzzle. '$\alpha \rightsquigarrow_{DT} \beta$' should now be read as 'β denotes a proposition in $[\![\alpha]\!]^c_\pi$ according to DT'.

Recapturing ST's prediction that 'S believes p$_r$' SPs 'S believes r':

(28) $[\![\text{believes}]\!]^c = \{\{\lambda\sigma_\Sigma.\lambda x_e.\lambda w.\forall p_{st} \in \sigma : \forall w' \in Dox_x(w) : p(w') = 1\}$,
$\lambda p_{st}.\lambda x_e.\lambda w.\forall w' \in Dox_x(w) : p(w') = 1\}$

(29) $[\![\text{wants}]\!]^c = \{\{\lambda\sigma_\Sigma.\lambda x_e.\lambda w.\forall p_{st} \in \sigma : \forall w' \in Dox_x(w) : p(w') = 1\}$,
$\lambda p_{st}.\lambda x_e.\lambda w.\forall w' \in Bul_x(w) : p(w') = 1\}$

Then in a null context:

(30) S [believes/wants] p$_r$.
$\rightsquigarrow_{DT}$ r. [by composition rules alone]
$\rightsquigarrow_{DT}$ S believes r. [by composition rules plus entry for 'believes']

(31) $[\![\text{knows}]\!]^c = \{\{\lambda\sigma_\Sigma.\lambda x_e.\lambda w.\forall p_{st} \in \sigma : \forall w' \in K_x(w) : p(w') = 1, \lambda p.p\}$,
$\lambda p_{st}.\lambda x_e.\lambda w.\forall w' \in K_x : p(w') = 1\}$

Then in a null context:

(32) S knows p$_r$
$\rightsquigarrow_{DT}$ r. [by composition rules alone]
$\rightsquigarrow_{DT}$ S knows r. [by composition rules plus entry for 'knows']
$\rightsquigarrow_{DT}$ p. [by composition rules plus entry for 'knows']

A.6 Key Predictions: Nuclear Scope of Quantifiers

For any quantifier Q:

(33) $Q(f)(g_h)$
$\rightsquigarrow_{DT}$ $Q(f)(h)$ [by FA and PA]

Assuming f, g, and h of type $\langle est\rangle$ and h not locally entailed. For strong quantifiers, we can add a lexical SP.

(34) Every student won.
$\rightsquigarrow_{DT}$ Every student participated.

If we treat 'might' as an object language existential quantifier over worlds, we will predict projection through 'might'.

(35) Some student won.
$\rightsquigarrow_{DT}$ Some student participated.

(36) Most students won.
$\rightsquigarrow_{DT}$ Most students participated.

So far so good. Problems for right- down- and non-monotone quantifiers:

(37) $No(f)(g_h)$
$\rightsquigarrow_{DT}$ $No(f)(h)$

(38) No student won.
$\rightsquigarrow_{DT}$ No student participated.

This is wrong. Must assume decomposition of negative quantifiers, e.g.:

See Sauerland (2000) a.o. for evidence from split scope readings, cross-linguistic data.

(39) $No(f)(g_h) \approx Not(some(f)(g_h))$
$\rightsquigarrow_{DT}$ $Some(f)(h)$

Prediction will depend on how negative quantifiers decompose. E.g., controversial whether this is strong enough for 'none'. Could get stronger projection if we assume different decomposition. Similar moves elsewhere: 'fewer than n'≈'not(n)'; 'exactly one'≈'only(one)'.

A.7 Key Predictions: Restrictor of Quantifiers

Plausible predictions wrt projection out of scope. But not wrt restrictors:

(40) $Q(f_h)(g)$
$\rightsquigarrow_{DT}$ $Q(h)(g)$

(41) Everyone who won a race is happy.
$\rightsquigarrow_{DT}$ Everyone who participated in a race is happy.

This is wrong. For positive quantifiers, predicts SP stronger than assertion.

Possibility: tacit domain argument which must entail the restrictor's SP.

This would render the SP 'inert' in our system. We could motivate this on Gricean grounds (don't SP something stronger than assertion) or grammaticalize it.

Result: universal projection out of the restrictor in the domain.

Plausible, provided the domain doesn't have to line up with anything explicit.

A.8 Notes and Questions

- Source of triggers?
- How are local contexts calculated?
- Relation to theories of CIs, 'expressive' SPs.
- If DT is right, why do things work this way?

DT is compatible with different accounts, including pragmatic ones like Stalnaker (1974), Simons (2001).
N.B.: on DT, SPs are *never* old; makes the contrast with CIs less striking.

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