

# Comments on Enlightened Update

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This is the handout for an invited commentary on Richmond H. Thomason, Matthew Stone, and David DeVault, “Enlightened Update: A Computational Architecture for Presupposition and Other Pragmatic Phenomena.” It was presented at the OSU Accommodation Workshop, October 13, 2006.

## Planning architecture

$$(1) \quad c \rightarrow \begin{array}{|c|} \hline c'' \\ \hline \hat{c} \\ \hline c''' \\ \hline \end{array} \\ Z(c)$$

$c$  shared discourse state

$\hat{c}$  obtained from  $c$  by covert actions of speaker

$Z(c)$  Set of states (horizon) obtainable from  $c$  by possible covert actions of speaker

- (2) a.  $Z(c)$  represents the hearer’s uncertainty about the covert actions performed by the speaker
- b. Enlightened update is a feature of planned, structured communication: the hearer identifies (aspects of) the covert state of the speaker which are not directly represented in utterance semantics.
- c. The speaker plans an utterance which will allow the hearer to recover  $\hat{c}$  from  $Z(c)$ .
- d. Speaker and hearer evaluate competing discourse structures in an abductive architecture. Enlightened update is possible in part because they do this in the same (or similar) ways.

## Coref example

- (3) *Following page, reproduced from Thomason et. al.*
- (4) a. Step 7 explicitly gives a predication “solid” on the current collaborative referent.
- b. Implicitly, the clarification dialogue about property referred to by “light brown” is ended.
- c. The subtopic is also a collabref dialogue, and there is a competing discourse structure in which *it’s solid* continues the embedded topic.
- d. In this case, the hearer is able to figure out that the speaker intends to end the subtopic. This is a feature of  $\hat{c}$ , and not of the common ground  $c$ .

Utterance	Task Moves	Resulting Task State	
		Task Stack	Facts
1.		<u>ClarkGame</u>	square(a) solid(a) sandybrown(a)
2. C: <i>This one is a square.</i>	(tacit) Push(Collabref( $t_1$ )) addcr( $t_1$ , square( $t_1$ ))	<u>CollabRef(<math>t_1</math>)</u> <u>ClarkGame</u>	square(a) solid(a) sandybrown(a) square( $t_1$ )
3. U: <i>Um-hm.</i>	ack	<u>CollabRef(<math>t_1</math>)</u> <u>ClarkGame</u>	square(a) solid(a) sandybrown(a) square( $t_1$ )
4. C: <i>It's light brown.</i>	addcr( $t_1$ , sandybrown( $t_1$ ))	<u>CollabRef(<math>t_1</math>)</u> <u>ClarkGame</u>	square(a) solid(a) sandybrown(a) square( $t_1$ ) sandybrown( $t_1$ )
5. U: <i>You mean like tan?</i>	(tacit) Downdate( $C_3$ ) (tacit) Push(Clarify( $C_3$ , $S_1$ )) (tacit) Push(CollabRef( $S_1$ )) (tacit) Push(YNQ) ynq(addcr( $S_1$ , $S = sandybrown$ ))	YNQ <u>CollabRef(<math>S_1</math>)</u> <u>Clarify(<math>C_3</math>, <math>S_1</math>)</u> <u>CollabRef(<math>t_1</math>)</u> <u>ClarkGame</u>	square(a) solid(a) sandybrown(a) square( $t_1$ )
6. C: <i>Yeah.</i>	addcr( $S_1$ , $S = sandybrown$ )	<u>CollabRef(<math>S_1</math>)</u> <u>Clarify(<math>C_3</math>, <math>S_1</math>)</u> <u>CollabRef(<math>t_1</math>)</u> <u>ClarkGame</u>	square(a) solid(a) sandybrown(a) square( $t_1$ ) $S = sandybrown$
7. C: <i>It's solid.</i>	(tacit) Pop(CollabRef( $S_1$ )) (tacit) Pop(Clarify( $C_3$ , $S_1$ )) (tacit) Reinstate( $C_3$ ) addcr( $t_1$ , solid( $t_1$ ))	<u>CollabRef(<math>t_1</math>)</u> <u>ClarkGame</u>	square(a) solid(a) sandybrown(a) square( $t_1$ ) $S = sandybrown$ sandybrown( $t_1$ ) solid( $t_1$ )
8. U: <i>[Action]</i>	(tacit) Pop(CollabRef( $t_1$ )) place(a)	<u>ClarkGame</u>	square(a) solid(a) sandybrown(a) square( $t_1$ ) $S = sandybrown$ sandybrown( $t_1$ ) solid( $t_1$ )

Figure 2: A trace of task actions and task states through which COREF represents and participates in the interaction of (9).

The COREF trace from Thomason et. al., page 23.

## Enlightened update and E-presupposition

Enlightened update is suggested as a *replacement* for the common ground pragmatics for presupposition.

- (5) Common ground/compositional architecture
  - A. Notion of speaker's presupposition as a constraint on common ground.
  - B. Independent encoding of semantic presuppositions in semantic values with truth value gaps or definedness of information-increment functions.
  - C. Piece of pragmatic logic by which an utterance semantic presupposition in the sense of B is a pragmatic presupposition in the sense of A. (Stalnaker's Bridge)
- (6) At a couple of junctures the paper assumes that the *grammar* specifies a link to a common ground in a common ground analysis of presupposition. This is conceivable, but we don't take it to be the standard formulation.  
[ASS [<sub>s</sub> ... ] ]  
ASS has an indexical semantics referring to the propositional CG component of a context of utterance.
- (7) If the reference to CG is introduced pragmatically, it's easy to substitute something else.
  - A'. Notion of speaker's E-presupposition as a constraint on the speaker's private discourse state  $\hat{c}$ .
  - B'. Independent encoding of semantic presuppositions in semantic values with truth value gaps or definedness of information-increment functions.
  - C'. Piece of pragmatic logic by which an utterance semantic presupposition in the sense of B is a E-presupposition in the sense of A'.

The term E-presupposition refers to *enlightened*. It's a kind of presupposition which constrains a planning attitude of the speaker, rather than the common ground.

## Preconditions and presuppositions

- (8) Cooking example (p. 16)
  - a. Andrew and Bess are preparing dinner.
  - b. Bess asks Andrew to wash the spinach for the salad.

- c. She turns away to attend to the stove.
  - d. Andrew washes the spinach unobserved. (Private action)
  - e. Bess turns around again.
  - f. Andrew mixes the spinach with the rest of the salad ingredients. (Public action.)
  - g. Bess infers that the salad has been washed, and this becomes mutual information.
- (9)
- a. In Andrew and Bess's plans, washing the spinach is a precondition for mixing it with the other salad ingredients.
  - b. *Precondition* is a technical term of the theory of action and planning.
  - c. In some everyday sense, mixing the spinach into the salad presupposes having washed it.
  - d. But given a background premise that Andrew would mix in the spinach only if he has washed it, that he has washed the spinach is a *logical consequence* of his having mixed it into the salad.
  - e. Maybe something similar is true of enlightened update.

The case for something like the planning architecture seems good, both in verbal and non-verbal action:

- (10) B needs to go somewhere.  
 A: Why don't you borrow my bike?  
 A hands B a key.  
 Implication: this is the key to the lock on my bike. (Abusch 2005)
- (11)a. The speaker has silently formed a plan (represented in  $\hat{c}$ ) which includes the hearer to taking the key and unlock the bike with it.  
 b. Abstractly, the hearer recognizes the plan (including the information that the key is a key to the bike lock) by decoding  $\hat{c}$  from the set of competitors  $Z(c)$ .

The planning architecture is a great idea for pragmatics, but we think the paper doesn't make the case that it has anything to do with presupposition in the linguistic sense.

- (12) Consistent with the well-developed claims of the paper?
- a. Private but publically recognizable speaker commitments play an important role in the theories of action and dialogue, and in implementations of them.
  - b. E-presuppositions have the status of preconditions for utterances.

- c. They have no connection with the semantic presuppositions of linguistic semantics (the elements of meaning which come from presupposition triggers, and are transformed by compositional semantics).
- d. The information gained in enlightened update has the status of a conversational implicature, of the ordinary non-presuppositional kind.

### Holistic architecture

- (13) a. Many sources of indeterminacy:
  - Syntactic ambiguity
  - Anaphora resolution
  - Covert actions of speaker
  - Uncertainty about initial common ground
  - ...
- b. These result in a bunch of possibilities for the discourse structure associated with a given utterance.
- c. Pragmatics (and specifically the utterance planning algorithm) exploit an holistic ranking of possible discourse structures.

Abduction is inference to the best OVERALL explanation, taking all the data into account. This methodology requires a holistic approach to pragmatic reasoning. Disparate pragmatic phenomena, such as disambiguation, anaphora resolution, and implicature detection, must be considered together to produce an overall preference for a single, best interpretation in the reasoning process that leads from a contextualized utterance to an update of interlocutors' information.

- d. Stated in terms of abductive proof.

- (14) Presumably holism doesn't require the architecture for grammar and pragmatics to be non-modular at the symbolic level.

- (15) a. It is hard to work with the holistic architecture with paper and pencil, because there are no short pragmatic proofs.

Gricean pragmatist: I don't see that your theory makes any prediction one way or the other about this example. My theory predicts such-and-such a reading for the discourse because of the proof on the blackboard. (It's the wrong reading, but at least I've got the right kind of theory.)

Enlightened pragmatist: Actually it works out ok with our numbers.

Gricean pragmatist: Great, but I'm no wiser.

- b. We nevertheless share the hunch that pragmatics needs to exploit a measure of overall plausibility of competing scenarios, perhaps with a non-symbolic component.
  - c. To make predictions, the holistic architecture requires computational modeling.
- (16)
- a. Speaker's utterance planning uses modeling of the hearer's interpretation-preference function. (In the simplest model it's the same as the speaker's function.)
  - b. Speaker plans an utterance whose optimal discourse parse according to the hearer's preference function includes his internal state  $\hat{c}$ .
  - c. This works also if the preference criteria are non-symbolic, e.g. use numerical criteria trained from experience and/or reflecting subsymbolic cognition.
- (17)
- a. Connection with interpretations according to which hearers are able to resolve ambiguous definite reference in visually presented environments by virtue of alignment with the attentional state of the speaker.
  - b. Environment with objects being manipulated by one participant under the instruction of the other. There are numerous cubes.

Pick up the cube.

Michael Tanenhaus (2005) Referential domains in spoken language comprehension: using eye movements to bridge the product and action traditions.

- c. In effect, the symbolic reasoning components for both speakers exploit the same most-salient-referent oracle.
- (18) When communication works, it can be hard to distinguish an optimally planning speaker from a solipsistic speaker who makes stray statements reflecting his internal state, relying on the hearer to figure out what he must or should intend. Probably in reality, there is a mixture of the two, or a continuum between them.

### Novel presuppositions

- (19) Does E-presupposition generalize CG-presupposition?
- a.  $\hat{c} = c +$  information about speaker's covert actions

- b. If  $c$  satisfies the presuppositions of  $\phi$ , then so does  $\hat{c}$ .  
 In this sense E-presupposition generalizes CG-presupposition. Presuppositions can be satisfied by information in the CG  $c$ , but also by information in the internal state  $\hat{c}$  which is not in  $c$ .
  - c. But because of indexical information in the state, the update is not informationally monotonic. Maybe for propositional information, the reasoning works.
- (20)
- a. The paper points out that the planning architecture opens up some space between the CG and the information state where semantic presuppositions are checked.
  - b. In covert action, the speaker forms an intention to refer to his cat, so  $\hat{c}$  has information about the speaker's cat which  $c$  lacks.
  - c. Presupposition of *I've got to pick up my cat at the vet* is satisfied.
  - d. This is okay, but it doesn't provide any *specific* motivation for the architecture. If the speaker can form any intention, any accommodation goes.
- (21)
- a. It would be good to start with to show that presuppositions can be satisfied by information in independently motivated covert actions.
  - b.  $c$  + info about covert actions +  $\phi$
- (22)
- a. We're out of milk.
  - b. The store is on the corner. (A nearby store where I intend for you to buy milk.)
  - c. The money is on the table.
- These are like the examples in Frazier's paper, except that what prompts the small world is in  $\hat{c}$  rather than earlier linguistic material.
- (23)
- a. I'm out of money. / It's a beautiful day.
  - b. I won't ask you for a loan again.
- (24)
- a. It's rather far to the store.
  - b. ? The bike is in the garage. (The one I intend for you to use.)
- (25)
- a. I {going to/want to} buy a motorcycle.
  - b. I won't ask you for loan again.
- (26)
- a. I {going to/want to} make steaks for dinner.
  - b. The store is on the corner.

## Accommodation theorems?

(27) A: I request that you turn down your radio.

Theorem of action theory: If A declares that he requests that B turn down his radio, then A does request that B turn down his radio.

Performatives in a Rationally Based Speech Act Theory. Philip R. Cohen, Hector J. Levesque (1990).

(28) Under such and such circumstances, A asserting the sentence  $\phi$  with presupposition  $\text{pres}(\phi)$ , is equivalent in its effects to A asserting  $\text{pres}(\phi) \wedge \phi$ .