Presupposition and Belief in DRT: Towards A New Implementation

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1 Introduction

This poster is part of current research investigating presupposition and belief in human dialogues using Dynamic Interpretation Theory (DIT) to categorize dialogue utterances within the framework of Discourse Representation Theory (DRT). The work in progress aims at making dialogue representation within DRT more pragmatic, especially in relation to presupposition.

The developing implementation builds on Bos and Blackburn's Curt DRT program [1], and Bos's DORIS program [2] to include more examples of presupposition, augment DRT with DIT's dialogue acts, and to represent the beliefs of the participants to the dialogue [3].

2 Presupposition, Assertion, and Belief

As in dynamic semantics, presupposition is viewed here as anaphoric, lexically triggered and dependent on context (van der Sandt 1992). Examples of presupposition include:
(1) a. Speaker: **The** red book is interesting.
b. Speaker: Vincent likes **her** dress.
c. Speaker: **Mia** loves Vincent.

To make presupposition within DRT more pragmatic, presupposition is understood as being the property of the speaker. In this sense, the presupposition being 'taken for granted' means: the speaker believes the presupposition to be known or given information and not the focus or centre of her utterance. For example,
(2) Speaker: My car just broke down.

'my car' constitutes the given information that the speaker has a car, while 'just broke down' provides new information; the information that speaker is attempting to communicate is called assertion.

Presupposition is related to the beliefs of the speaker, regardless of whether the beliefs are part of the 'common ground' or not. Speaker belief leads to presupposition, which conveys the beliefs of the speaker to the hearer. This approach takes a stronger position to beliefs' relation to presupposition than Geurts (1999) by assuming that Grice's Cooperative principle is in place. Consider Stalnaker's example (2002):
(3) I have to pick up my sister at the airport.

If we were to assume that the participants in the dialogue are being cooperative, not lying, being relevant, etc, we can take the stronger position that the information introduced by the presupposition, here 'having a sister', is indeed a belief held by the speaker. This applies to whether 'having a sister' is known to the hearer or not.

The point to be made here is that the relationship between belief and presupposition, and belief and assertion helps clarify what is meant by presupposition. Additionally, introducing speaker and hearer perspectives contributes to the clarification of presupposition. Let us refer to presupposition by P, to assertion by A, to believe by bel, speaker by S, and hearer by H.

[1] www.comsem.org
[2] www.coli.uni-sb.de/ bos/doris/
[3] I would like to thank Dr Johan Bos for kindly sending me the code for DORIS and for his advice.

(4) Speaker: Vincent's wife likes chocolate.
Hearer: I thought she was allergic to it.

In the first part of examples (4), P is 'Vincent has a wife and Vincent is male', whereas A is 'she likes chocolate'. On the assumptions given above, the hearer can correctly come to the result that bel(S,P).

Belief places some constraints on assertion. 'Beliefs Constraint on Assertion I' is a constraint placed by beliefs on uttering A, that bel(S,¬bel(H,A)). Another constraint beliefs place on A, is called 'Beliefs Constraint on Assertion II': being cooperative, to utter A, S must bel that A, bel(S,A). Assuming the cooperative principle, belief also places a constraint on P, 'Beliefs Constraint on Presupposition': to utter P, bel(S,P).

The following is the representation of the requirements and consequences of the first part in a mini dialogue. From S's perspective, before uttering A and P: bel(S,P) ('Beliefs Constraint on Presupposition'), bel(S,A) ('Beliefs Constraint on Assertion II'), and bel(S,¬bel(H,A)) ('Beliefs Constraint on Assertion I'). If bel(S,bel(H,P)), S expects H to take P for granted. If bel(S,¬bel(H,P)), S expects H to accommodate P if P is unremarkable (Geurts 1999).

From H's perspective, for H to receive P, the new belief bel(H, bel(S,P)) is formed. If ¬bel(H,P) and P is unremarkable, accommodate(H,P). Accommodate can either mean accept(H,P), or bel(H,P). If bel(H,¬ P), reject(H,P). If bel(H,P), H takes P for granted. For H to receive A, the new beliefs bel(H, bel(S,A)) and bel(H,bel(S,¬ bel(H,A))) are formed. There are three options, accept(H,A), reject(H,A), or bel(H,A). Accept means put on hold, not yet believed, but not rejected. H has to provide feedback according to choice made.

3 Augmenting DRT with DIT's Dialogue Acts

DRT supports the idea that a description of dialogue has to represent mental states and their relation to the context. To represent beliefs, it is necessary to have a representation of dialogue acts in order to gain an insight into the cognitive states of both the speaker and the hearer (Asher 1986). Our implementation uses DIT's dialogue acts in order to shed light on the beliefs of the participants in a dialogue.

The use of dialogue acts in relation to belief, presupposition, and assertion is most relevant in the case of feedback. Generally speaking when S says something to H, H provides positive or negative feedback. 5.a represents weak positive feedback indicating A is received, accept(H,A), whereas 5.b represents strong positive feedback, where H indicates reception of A, and that bel(H,A). Rejecting A is a way of giving negative feedback, reject(H,A), 5.c.
(5) Speaker: Jody loves Butch.
a. Hearer: aha.
b. Hearer: I couldn't agree more!
c. Hearer: No, Jody is married to Vincent!

4 Towards a New Implementation of Belief and Presupposition

Current work on implementation involves incorporation of belief spaces, presupposition/ assertion distinction marked in Prolog, and relating presupposition to belief. Separating presupposition from assertion results in two stages with each new utterance, the presupposition stage and the assertion stage. The former represents the presupposition, relates it to beliefs and then applies it to context. The assertion part then gets represented, related to beliefs and then merged with the resulting context, context{P}. Future work will involve working on using the same method in representing more than one presupposition. An algorithm is currently under development for merging strategies that will represent both the speaker's and the hearer's beliefs in the main DRS.

References

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