

# Presupposition Projection in Belief Contexts\*

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Yeom, Jae-Il. (2003). Presupposition projection in belief contexts. *Language Research* 39(4), 859-890.

In this paper, I review satisfaction theory and binding theory of presupposition projection in dealing with presuppositions in belief contexts, and show that a presupposition triggered in a belief context can be accommodated more than once, and that this is not a pragmatic matter, as Geurts (1998) claims. Behind this claim lies the assumption that belief contexts as well as the main context are information states and that a presupposition triggered in a belief context is accommodated to all accessible information states. I furthermore claim on the basis of the strongest meaning hypothesis that the preference order among the possible readings of a sentence is determined by the strength of each reading. Finally, I give the semantics of *believe*-statements to support the claims in this paper. I also discuss *want*-statements, but presuppositions from a desire context behave like those from a belief context as far as accommodation is concerned.

**Key words:** presupposition projection, accommodation, satisfaction, binding, information state, belief context, desire context

## 1. Introduction

Karttunen (1973), Heim (1992), Zeevat (1992) and Geurts (1998) discussed presupposition projection from belief contexts in satisfaction theory or binding theory of presupposition projection. Their common observation is that when a presupposition is triggered within a belief context, the most preferred reading is the one in which the presupposition is accommodated to the main context and still the presupposition holds in the belief context too. Let's take a sentence for example.

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\*I would like to thank the three anonymous reviewers of *Language Research* for their comments and corrections, and for their patience, too. The original version of this paper was longer than this, but the editorial board decided that the paper was too long. I have tried my best to make my point with shorter introductions and argumentations. This work was supported by 2002 Hongik University Research Fund.

- (1) John believes that Mary met Peter's wife.

The most natural reading of this sentence is the following:

- (2) Peter has a wife and John believes that Peter has a wife and that Mary met her.

There is no controversy about this observation, but the explanation of this observation is not unanimous. One difficulty comes from the fact that the same proposition that Peter has a wife is included in two different contexts. Under the assumption that one expression is interpreted only once, it is not easy to get the preferred reading. A possible solution is to assume that the presupposition is part of the belief context and is incorporated into the main context pragmatically, or to assume the opposite way: the presupposition is part of the main context and is incorporated in the belief context pragmatically. The former is what Karttunen (1973) and Heim (1992) take, while the latter is the position Geurts (1998) takes.<sup>1)</sup> I claim that a presupposition is accommodated in every information state accessible because a presupposition is also part of the information conveyed by a sentence and each information state is independent of each other.

Another difficulty comes from the confusion of *de re/de dicto* distinction and presupposition projection. Neither Heim (1992) nor Geurts (1998) makes the distinction clear. In this paper, I distinguish *de re* interpretations between presupposition triggers and expressions which convey presuppositions themselves, in addition to the strict distinction of *de re/de dicto* readings. This allows us to make consistent predictions. With multiple accommodation of presuppositions and distinction of *de re* interpretation from global accommodation, I show that the most preferred reading is the strongest one.

The paper goes in the following order. In Section 2, I will consider Heim's (1992) analysis first, which is followed by the discussion of Geurts's (1998) analysis in Section 3. The reason why I review only Heim (1992) and Geurts (1998) is that there is not much serious discussion of

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1) Zeevat (1992) suggests that one presupposition is accommodated into both contexts, but does not give it any detailed theoretical argumentation. His analysis is purely syntactic, and is not adequate empirically and theoretically. See Geurts (1998) for the problems with Zeevat (1992).

presuppositions in belief contexts other than these two. In Section 4, I propose my own analysis, where I propose that a presupposition in a context can be accommodated to any information state accessible to that context. In Section 5, I introduce formal definitions of contexts and interpretation rules which allow for the proposal in Section 4. In Section 6, I conclude the paper.

## 2. Satisfaction Theory of Presuppositions in Belief Contexts

Heim (1992) analyzes presuppositions in belief contexts and desire contexts within satisfaction theory. The basic idea in this theory is that the update of a context  $c$  with the information conveyed by a statement is defined only when the context satisfies the presupposition of the statement. The idea was proposed in Karttunen (1974), but context change could not be expressed until Heim (1982, 1983) developed a dynamic semantics in which the meaning of a sentence is a context change potential.<sup>2)</sup> The satisfaction theory is more refined in Beaver (1992, 1995, 1997), but the basic predictions of the theory do not change much.

To see how a presupposition in a belief context is projected, we need to see how a belief statement is interpreted. Following Hintikka (1962, 1969), a belief context is defined as a set of doxastic alternatives with respect to an agent and a possible world.

- (3) An agent  $a$ 's belief context  $\text{dox}_a(w)$  in a possible world  $w$  is  $\{w' \mid w' \text{ is a doxastic alternative of } w \text{ with respect to } a\}$ .
- (4) A possible world  $w'$  is a doxastic alternative of  $w$  with respect to  $a$  iff  $w'$  is compatible with what  $a$  believes in  $w$ .

Note that a doxastic alternative is defined with respect to a possible world, which is assumed to specify everything in the world, including every belief of every agent in that possible world, regardless of how much of it is known at the moment. When a statement 'a believes  $A$ ' is

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2) Karttunen and Peters (1979) propose a static analysis of presupposition projection in which a presupposition of a sentence is compositionally calculated instead. But the prediction of this analysis is the same as what Heim (1983) predicts in dynamic semantics.

true in  $w$ ,  $A$  is true in every possible world in  $\text{dox}_a(w)$ .

Based on these notions, the dynamic interpretation of a *believe*-statement is defined as follows:

$$(5) c+(a \text{ believes } A) = \{w \in c \mid \text{dox}_a(w)+A = \text{dox}_a(w)\}$$

Here '+' is the operator of updating a context with the information of an expression. If  $A$  carries a presupposition  $P_A$ , then  $c+(a \text{ believes } A)$  is defined only when  $\text{dox}_a(w)+A$  is defined. The latter holds if  $a$ 's belief context satisfies  $P_A$ . That is,  $(a \text{ believes } A)$  presupposes that  $a$  believes  $P_A$ . This explains how a presupposition in a belief context is canceled or neutralized by a previous belief context, as follows.

- (6) Fred believed that he was attacked. And he also believed that it was John who attacked him.

The presupposition from the second sentence is that Fred believed that someone attacked Fred. This cannot be projected because the first sentence already satisfies it.

It is well-known that a presupposition is not always satisfied in the local context. Instead, the presupposition is readily accepted by the hearer except in a limited range of cases.<sup>3)</sup> Satisfaction theory requires only local satisfaction.<sup>4)</sup> This causes a similar problem with presuppositions from belief contexts. Consider the following sentence.

- (7) Fred believed that it was John who attacked him.

The primary reading of this sentence is that someone attacked Fred, and that Fred believed that it was John who did it. Satisfaction theory only predicts that the sentence presupposes that Fred believed that someone attacked him. In an attempt to explain how we infer from Fred's belief that he was actually attacked, Heim (1992) suggests that when a presup-

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3) It is well known that presuppositions from *too*, *also*, *again*, etc. cannot be readily accommodated. They need to be satisfied overtly. See Soames (1989), Kripke (1990), and van der Sandt and Geurts (2001).

4) For this reason, the theory predicts a rather weak presupposition. See Soames (1982), van der Sandt (1992), Geurts (1995, 1996), etc. for the detailed discussion of it.

position seems to escape from the belief context, an expression involved is being given a *de re* interpretation.

A first question Heim asks about the mechanism of *de re* construal is whether *de re* interpretation can be extended to other expressions than definite descriptions. Heim tries to show the possibility by dealing with aspectual verbs and focus particles like *also*, following Kaplan's (1969) idea of *de re* interpretation.

(8) John thought I had stopped proof-reading.

(9) A: I am already in bed.

B: My parents think I am also in bed.

Sentence (8) is interpreted as meaning that John believed of my proof-reading that I had stopped it. This means that I had been proof-reading, which corresponds to the presupposition which escapes from the belief context. Then we can assume that John thought the speaker had been proof-reading only because the presupposition flows into John's belief context pragmatically. In (9), the presupposition is satisfied outside the belief context, given that B's parents do not know if Speaker A is in bed, without being incorporated into the belief context.

Geurts (1998) shows that this is not a solution. There are cases where *de re* interpretations and presuppositions do not coincide.

(10) Fred thought I had started proof-reading.

If the expression *proof-reading* is construed *de re*, it gets the meaning that John thought of the activity of my proof-reading, which John may, or may not, recognize as such, that I had started it. This is supposed to mean that I had been proof-reading, but the presupposition actually triggered is that I had not been proof-reading. The *de re* interpretation of *proof-reading* cannot substitute for the presupposition accommodated in the main context.

Another problem with Heim's suggestion is that *de re* interpretation should apply consistently to a presupposition trigger or to the other part than the presupposition trigger, but Heim's examples are not consistent in this respect. In (8) *de re* interpretation applies to some other expression than the presupposition trigger *stopped*, whereas in (9) *de re* interpretation

applies to the presupposition trigger *also*. If we are to obtain the presupposition Heim intends, it is the presupposition trigger that must have a *de re* interpretation, as in (9). In (10), the reading in which a *de re* reading becomes the same as the reading in which the presupposition is globally accommodated obtains when the verb *started* has a *de re* reading. But it is quite difficult to define the *de re* interpretation of the verb *started*. There are only a limited range of expressions which can be given *de re* interpretations. One such expression is the definite description.

If a presupposition trigger must be given a *de re* interpretation, how can a cleft construction be given a *de re* interpretation?

(11) Fred believes that it was John who attacked him.

We can make the inference that someone attacked Fred, but this cannot be obtained from the *de re* interpretation of any particular expression. Consider the following example.

(12) No one slandered Lucy, but Lucy thought that it was Fred who slandered her.

The discourse sounds unnatural. This seems to be related to the fact that the presupposition is triggered by the structure, not by an expression. The speaker tends to be responsible for the structure. Therefore it is not quite natural to negate his/her own presupposition.

The discussion of Heim's (1992) problems shows that global accommodation of presuppositions from belief contexts is a broader phenomenon than *de re* interpretation because it is observed even when *de re* interpretation is not well defined. So it should be based on *de dicto* interpretation. Geurts (1998) also points out problems with Heim's (1992) analysis in relation to *de re* interpretation, but he is not clear about his position about *de re/de dicto* distinction. When we want to see what is going on in presupposition projection, we have to exclude the effect of *de re/de dicto* interpretation. The unmarked interpretation is *de dicto* interpretation. So *de re* interpretation must be excluded in discussing presupposition projection.

### 3. Binding Theory of Presuppositions in Attitude Contexts

#### 3.1. Geurts's Analysis of Presuppositions in Attitude Contexts

The binding theory of presuppositions was first proposed by van der Sandt (1989), and further developed in van der Sandt (1992), Zeevat (1992), and Geurts (1995), among others. In the binding theory, presuppositions are regarded as anaphors within the framework of Discourse Representation Theory. The following are examples in which presuppositions are bound by their antecedents.

- (13) a. If Fred has a niece, then he believes that his niece lives in Leeds.  
 b. It is possible that Barney was tripped and that he believes that it was Fred who tripped him.
- (14) a. If Fred believes that he has a niece, then he believes that his niece lives in Leeds.  
 b. Barney believes that he was tripped and he believes that it was Fred who tripped him.

In (13) the presuppositions are bound by some elements outside the belief contexts. In (14) the presuppositions are bound by some antecedents in the previous belief contexts.

In order to explain anaphora in belief contexts, Geurts (1998) added the set of propositional discourse markers to the set of individual discourse markers in DRSs. A DRS consists of a presupposed and non-presupposed part. In the modified DRT, sentence (13a) can be represented as follows:

- (15) [ : [y: y is F's niece] ⇒  
 [p, p': F believes p, F believes p', p'= p+ [z: z is F's niece, z lives in Leeds]]  
 = [p: F believes p, [y, z: y=z, y(=z) is F's niece] ⇒  
 [p': F believes p', p'= p+ [z(=y) lives in Leeds]]

Here the underlined parts are presupposed waiting to be resolved. Geurts assumes that a belief statement 'a believes S' presupposes that a has beliefs. In the example at stake, the belief sentence in the consequent

clause of the conditional presupposes that Fred has beliefs, which is represented as F believes p. This has no antecedent, and it is accommodated to the main DRS. The expression *her niece* also presupposes 'z is F's niece' in the belief context, but z is bound by y and the condition on z is added to the antecedent clause of the conditional trivially. The binding relation is expressed by the equation 'y=z'.

Let's consider the example (14a), in which the presupposition is bound by some element in the previous belief context.

- (16) [ $[p, p': \underline{F \text{ believes } p}, F \text{ believes } p', p' = p + \{y: y \text{ is F's niece}\}] \Rightarrow$   
 $[q, q': \underline{F \text{ believes } q}, F \text{ believes } q', q' = q + \{z: \underline{z \text{ is F's niece}}, z \text{ lives in Leeds}\}]$   
 $= [p, z, F \text{ believes } p, [p', q: p' = q, F \text{ believes } p', (F \text{ believes } q), p' =$   
 $p + \{y, z: y \text{ is F's niece}, y = z, z \text{ is F's niece}\}] \Rightarrow [q': F \text{ believes } q', q' =$   
 $q + \{z: z \text{ lives in Leeds}\}]$

The presupposition triggered in the antecedent clause is that Fred has beliefs (= F believes p), which is accommodated to the main DRS, just as in (15). The belief sentence in the consequent clause also presupposes that Fred has beliefs (= F believes q). This time it is bound by the belief context p' which is extended from the belief context p. Now the presupposition from *her niece* (= z is F's niece) is bound by the niece introduced in the antecedent clause of the conditional.

As mentioned above, presuppositions are accommodated when they cannot find their antecedents. The reason that presuppositions can be accommodated, unlike other anaphors, is that they have rich descriptive content. When they are accommodated, global accommodation is preferred to local accommodation. Now consider an example of accommodation.

- (17) Maybe Fred does not believe that his niece lives in Leeds.

In these examples, the presuppositions triggered in the belief contexts are globally accommodated. Sentence (17) is interpreted as in (18).

- (18) [**maybe**: [p, p': F believes p, F believes p', p'=p+[z: z is F's niece, z lives in Leeds]]]  
 = [p, z: F believes p, z is F's niece, **maybe**: [p': F believes p', p'= p+[z: z lives in Leeds]]]  
 (Fred has a niece and maybe he does not believe that she lives in Leeds.)

In (17) two presuppositions are triggered in the *believe*-statement, and they are globally accommodated and give rise to the DRS in (18).

As pointed out at the beginning, the normal reading of the sentence is the following:

- (19) Fred has a niece, and he believes that he has a niece, and maybe he does not believe that she lives in Leeds.

Geurts tries to explain this by proposing pragmatic importation, by which process some information in the main DRS is readily incorporated into a belief context. This is observed even when there is no presupposition involved, as in (20).

- (20) a. Fred was tripped by somebody, and he believes that it was Barney.  
 b. Wilma believes that a boy scout has fallen in love with her.

In (20a), the information that somebody tripped Fred is imported into Fred's belief. In (20b), if the indefinite is construed as a specific indefinite, it is assumed to be construed *de re*. But still we infer that Wilma believes that the one who has fallen in love with her is a boy scout.

### 3.2. Problems with Geurts (1998)

The first problem I want to mention in relation to Geurts (1998) is technical. Unlike van der Sandt (1992), Geurts (1998) assumes that a DRS has a presupposed and non-presupposed part mixed in it. This can cause a problem when a new discourse marker is introduced in a presupposition. Consider the following case.

- (21) Louise believes that Fred stopped beating a donkey.

- (22) [p, p': L believes p, L believes p', p' = p+[x: x is a donkey, F had been beating x, Fred stopped beating x]

The presupposition that Louise has beliefs is already accommodated in the main DRS. The aspectual verb triggers the presupposition that Fred had not been beating something and that something is a donkey. Here the discourse marker for a donkey is not anaphoric, so it is not underlined. In this case the underlined part cannot be accommodated to the main DRS because it would leave the variable *x* unbound up there. But intuitively the sentence has the following meaning.

- (23) Fred had been beating a donkey, and Louise believes that Fred stopped it.

This reading obtains when the presupposition is accommodated to the main DRS, including the content which is not anaphoric. For this purpose, we need a separate structure which contains presuppositions, anaphoric or non-anaphoric.

The binding theory is basically syntactic: presupposition projection is a matter of syntactic relations in DRSs. But presupposition projection is a matter of information, not a matter of representation. Consider the following examples.

- (24) a. If John has a wife, he believes that his wife will make coffee for him.  
 b. If John believes that he has a wife, he believes that his wife will make coffee for him.

It may be natural to say that the presuppositions from *his wife* are bound by the wife John has. But in the following two examples, there is no binder for the same presupposition. Still the presuppositions are not projected.

- (25) a. If John is married, he believes that his wife will make coffee for him.  
 b. If John believes that he is married, then he believes that his wife will make coffee for him.

Notice in particular that in (25a) the triggered presupposition that John has a wife is blocked from being projected from the belief context, due to the content outside the belief context, even though the proposition that John is married does not entail that John believes that he has a wife. So it is not uniquely a property of the binding theory that a presupposition in a belief context is bound by some antecedent outside the belief context.

Then the next question is whether it is possible for John not to believe that he has a wife. The binding theory predicts that it is possible, because presupposition projection is purely a syntactic matter. Let's consider the following example.

- (26) Louise has a niece. Maybe Louise does not believe that her niece lives in Leeds.

The presupposition from the second sentence is bound by the first sentence. Then it is not clear whether Louise believes that she has a niece. Geurts claims that whether she believes so is context-dependent. Geurts shows this by giving the following examples:

- (27) a. My mother thought that my sister was drunk. (Geurts, 1998, p. 590)  
 b. The policeman thought that my sister was drunk.

Let's assume that the presuppositions are globally accommodated in both sentences. In the first sentence, the presupposition is likely to be imported in the belief context since a mother will normally know her daughter. In the second sentence, on the other hand, it is plausible to assume that the policeman thought that the person who was drunk was not the speaker's sister. So he claims that the importation is "a certain class of context-dependent plausibility inferences".

A problem with the idea that a material in the main context can bind the presupposition in a belief context without the agent's actual belief of the presupposition is that it leads to a wrong *de re* reading. Consider the following sentence.

- (28) I had not been proof-reading. Fred thought that I had started proof-reading.

If (28) does not presuppose something like 'Fred knew/believed that the

speaker had not been proof-reading,' the expression of *proof-reading* must be given the *de re* interpretation. The reason is that if the verb *started* is given the *de dicto* interpretation, then it is clear that Fred thought that the speaker had not been doing something. But that something must not be the activity of proof-reading. The only way to get this reading is that the expression *proof-reading* must be interpreted *de re*. Then the whole meaning would be as follows:

- (29) I had not been proof-reading. Fred believed of my proof-reading that the speaker had started it.

This sounds contradictory because the speaker had not been proof-reading and I actually had been proof-reading.

As I pointed out in discussing Heim's (1992) problems, a presupposition from a belief context can be projected to the main context without being incorporated into the belief context only when the presupposition trigger is given the *de re* interpretation. When the *de re* interpretation of a presupposition trigger is not well defined, the presupposition must be satisfied in the belief context. Consider the following example.

- (30) Sue was attacked. John believes that it was Fred who attacked her.

It was not mentioned that John believes that someone attacked Sue. Geurts claims that it can be inferred pragmatically. Then it would be possible to cancel the inference overtly. But it leads to awkwardness, as in the following example.

- (31) ??Sue was attacked. John does not believe that anyone attacked her, but he believes that it was Fred who attacked her.

The reason is that it is not easy to define the *de re* interpretation of a cleft construction. The intended meaning of (27b) is fine because the *de re* interpretation of a definite NP is well-defined. This shows that the incorporation of a globally accommodated presupposition into a belief context is not simply a pragmatic inference.

I will give another piece of evidence for claiming that a presupposition in a belief context must be satisfied in the local context. We can suppose that if some mechanism were pragmatic, it would not be restricted

structurally. Consider the following example.

- (32) Sue left. If John thinks that the situation gets worse, Bill will believe that Mary will leave too.

If the information that Sue left is pragmatically imported into belief contexts, we can understand the discourse in either of the following two readings.

- (33) a. The situation is not good, so Sue has left. John does not know this. If John thinks that the situation gets worse, Bill will believe that Mary will leave too.  
 b. ??The situation is not good, so Sue has left. Bill does not know this. If John thinks that the situation gets worse, Bill will believe that Mary will leave too.

The two discourses show different acceptability. With the *de dicto* interpretation of *too*, it is necessary that Bill believe that Sue left, but not that John think that Sue left. Whether John believes that Sue left is purely context-dependent. If the fact that Sue left is taken to be part of the situation, it is likely that John knows the fact. On the other hand, if the fact is independent of the situation, it is more likely that John does not know the fact. This is contrasted with the question of whether the fact is known to Bill. The latter is required for the interpretation of the sentence. If the projection of a presupposition in a belief context were context-dependent, it would not show such a difference. Furthermore, suppose that the first sentence is not uttered, as in (34).

- (34) If John thinks that the situation gets worse, Bill will believe that Mary will leave too.

According to Geurts (1998), it would be expected that John could think that someone other than Mary has left or will leave, because the presupposition is expected to be globally accommodated and then to be imported to John's belief context. But it is quite implausible. The presupposition that someone other than Mary has left does not seem to be part of the worsening situation in John's belief. This shows that whether John believes that someone other than Mary left in (32) is purely pragmatic.

On the other hand, Bill definitely believes that someone other than Mary left.

Consider examples of conjunction and disjunction.

- (35) a. Mary believes that John started writing a novel and Sue believes that Fred finished writing a novel.  
 b. (Either) Mary believes that John started writing a novel or Sue believes that Fred finished writing a novel.

In the most natural reading of the sentences above, it is supposed that John had not been writing a novel and Fred had been writing a novel. And it is required that Mary believe that John had not been writing a novel, and that Sue believe that Fred had been writing a novel. Mary may, or may not, believe that Fred had not been writing a novel, and Sue may, or may not, believe that John had been writing a novel. The whole inference pattern is not simply pragmatic but closely related to semantic structures.

The discussion so far shows that a presupposition triggered in a belief context must be satisfied in the sense of satisfaction theory. But this does not mean that it is always the case. Let's look at a case in which a presupposition in a belief context is actually canceled.

- (36) a. Fred did not think that I had started proof-reading. He may have thought that I had been proof-reading.  
 b. Lucy did not think that it was Fred who slandered her, because she thought that no one slandered her.

In these examples, the presuppositions triggered in the belief contexts are neutralized or canceled overtly within the belief contexts. Even in this case, the presuppositions seem to be accommodated in the main context. This might be thought to support the binding theory. But it should be explained why a presupposition can be canceled in this case, and not in other cases. In the examples in (36), the beliefs are negated. This follows the pattern observed in the following:

- (37) a. ??John stopped smoking. Actually he had not been smoking.  
 b. John did not stop smoking. Actually he had not been smoking.

A presupposition can be canceled or neutralized only when there is an operator which can cancel or neutralize it. When there is no such operator, presuppositions behave like entailments. The same pattern is observed within a belief context too. In (39), the beliefs are negated, so presuppositions can be canceled.

Someone might claim that a propositional attitude verb itself is an operator which can cancel or neutralize a presupposition, as follows:

- (38) Fred thought that I had stopped smoking, but actually I had not been smoking.

But this is a different thing. I am only interested in Fred's belief context. In Fred's belief context, the presupposition is not canceled or neutralized, as given below again.

- (39) ??Fred thought that I had stopped smoking, but he thought I had not been smoking.

The reason why a presupposition in a belief context is not canceled in the belief context is that when it is canceled, there is no possible world which is compatible with the belief statement, just like a presupposition in the main context. In (37a) the presupposition cannot be canceled because there is no possible world in which John had not been smoking and John stopped smoking. Similarly, there is no possible world in which Fred believed that the speaker had stopped smoking, but he thought the speaker had not been smoking, unless the meanings of the words *stopped* and *smoking* are different in Fred's belief.<sup>5)6)</sup>

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5) If the second belief statement goes like the following, there will be a possible understanding of the sentence.

(i) Fred thought that I had stopped smoking, but he thought I had not been smoking.

We can suppose that Fred did not know that I had been smoking. Instead he thought that I had been doing something other than smoking. This requires that the expression *smoking* is interpreted *de re*. The distinction of *de re/de dicto* should be conceptually independent of presupposition projection. Sometimes these two cannot be independent of each other, though. A definite description is such a case. This will be discussed below.

6) This is a little different from a case of contradictory beliefs. Someone might have beliefs which are inconsistent, and such a belief state cannot be expressed as a set of possible worlds in a simple-minded possible world semantics. But we are discussing a little different case. Impossibility in our discussion of presuppositions comes from the meanings of words. It is a linguistic matter.

## 4. Analysis of Presuppositions in Belief Contexts

### 4.1. Multiple Satisfaction of Presuppositions

I have shown in discussing Geurts's problems that even when a presupposition is accommodated to the main context, the local belief context needs to satisfy the presupposition. This means that a presupposition can be accommodated more than once. Then why is one presupposition accommodated more than once?

I have claimed that *de re* interpretation is limited to a small set of expressions, while presupposition projection is a more general phenomenon. This implies that presupposition projection is based on *de dicto* interpretation. And *de dicto* interpretation of a presupposition trigger requires the local satisfaction for the presupposition in a belief context. But still we get the inference that the same presupposition holds in the main context. The reason for multiple accommodation is that a presupposition is a matter of information, and that who takes some information for granted depends on who is responsible for the use of the presupposition trigger. Take the use of *also* in (9) for example again. Only the speaker is responsible for the use of the expression. So only the speaker takes the presupposition triggered for granted. Even in this case, the calculation of the presupposition is done within the belief context. This shows that *de re/de dicto* distinction is not a matter of scope. It can be a matter of indexation, depending on who is responsible for the use of an expression. This opens the possibility that a presupposition is accommodated more than once.

I propose the following rule as a rough generalization of presupposition projection.

#### (40) Presupposition Projection Rule:

A presupposition can be projected to every information state accessible to the information state in which the presupposition is triggered.

Here information states include belief contexts, as well as the main context, because they can be taken to be information states which the conversational participants think the agents involved are in under the current information state. By "accessible" I assume a normal notion of the path for anaphora resolution. I follow the notion of accessibility in update

semantics or file change semantics: accessibility is defined with respect to the availability of discourse markers and their values. Accessibility can be defined depending on how a context is defined and how interpretation rules are defined. These will be discussed below.

Information states are independent of each other. When the main context includes some information, it does not mean that belief contexts embedded in the information state automatically contain the information. When someone believes something, it does not have to be part of the main context. When a presupposition is triggered in a belief state, the agent of the belief does not have to take the information from the presupposition for granted. It is the speaker who takes it for granted. Under the *de dicto* interpretation, however, the speaker attributes the information to the agent of the belief. For this reason one presupposition trigger gives rise to more than one accommodation of a presupposition.

Let's look at various cases of showing how the rule works. The simplest case is the one in which a presupposition is accommodated both in the main context and in the belief context.

(41) Fred thought that I had stopped proof-reading.

From this sentence we preferably infer that the speaker had been proof-reading and Fred knew this. It is also possible that while the presupposition for the main context is canceled, that for a belief context survives.

(42) I had never been proof-reading, but Fred thought that I had stopped proof-reading.

In this example, only the presupposition for the main context is canceled. It is presupposed that Fred thought that the speaker had been proof-reading.

This analysis also explains how a presupposition is accommodated in the main context even when the presupposition is canceled in a belief context.

(43) Fred did not think that I had stopped proof-reading, because he thought that I had not been proof-reading.

A presupposition in a belief context can be canceled only when there is

an operator that can neutralize or cancel a presupposition, such as the negation operator and the possibility operator. In (43), the presupposition is overtly canceled within the belief context. This indicates that the presupposition stays within the belief context (and within the scope of the negation). But we still infer that the speaker had been proof-reading. This shows indirectly that the presupposition which goes to the main context is independent of the presupposition canceled in the belief context.

Then how is a presupposition in a belief context blocked from projection by a previous belief statement?

- (44) Fred believed that I had been proof-reading an article, and thought that I had stopped proof-reading.

The presupposition that Fred thought that the speaker had been proof-reading is not accommodated because it is overtly stated in the first conjunct. And the presupposition that the speaker had been proof-reading is canceled because when it is stated that someone believes *p*, it is implied that *p* actually does not hold. The first conjunct implies that the speaker actually had not been proof-reading an article. This conversational implicature cancels the presupposition which otherwise might be accommodated in the main context.

All these cases can be covered in Geurts (1998) too, but Geurts was not clear about the distinction between the *de re/de dicto* distinction and presupposition projection. On the one hand, he claims that the two must be distinguished. On the other hand, he proposes pragmatic importation of information into belief contexts, which makes the distinction blurred. In this paper, presupposition projection from *de re* interpretation is dealt with separately from normal presupposition projection. This allows us to capture the basic point that a presupposition is triggered due to the meaning of a lexical item or a construction. A presupposition is required to be satisfied in order to interpret presupposition triggers. Geurts tries to explain a heterogeneous set of phenomena by including presupposition projection via *de re* interpretation, and ignores the fact that a presupposition must be satisfied in the local context for the interpretation of the presupposition trigger.

## 4.2. Strongest Meaning Hypothesis

The same expression can generate a set of readings according to the linguistic structure in which the expression is used. One important fact in these phenomena is that when a context is given, the actual interpretation of a sentence is the strongest possible among the given set of interpretations.<sup>7)</sup>

I claimed in Yeom (1998, 2001) that presupposition projection is also one of such phenomena. The actual interpretation of a sentence is determined in the context, but the possible readings of the sentence are determined by the semantics of the sentence. One problematic case was where a presupposition is triggered in an attitude context. When a presupposition in a belief context is accommodated in the main context, it does not entail that the agent of the belief also believes so too. When a presupposition triggered in a desire context is accommodated only in the main context, it does not entail that the agent of the desire wants it to hold. But I have shown that when a presupposition is accommodated in the main context, it can be accommodated in a belief context, too. This will allow us to apply the strongest meaning hypothesis to the projection of presuppositions in belief contexts too. In the rest of this section, I will show this.

Satisfaction theory claims that presupposition projection is determined by the minimal requirement that a presupposition is satisfied in the local context. This leads to the weak presupposition. We can loosen this condition, and get a set of interpretations. Let's consider a conditional sentence. The interpretation of a conditional is given below.

$$(45) \text{ c-if } A, \text{ then } B = c - ((c+A) - (c+A+B))$$

If B contains a presupposition  $P_B$ , it can be satisfied in one of the following ways:<sup>8)</sup>

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7) Reciprocals, plural predicates and donkey sentences are such examples. See Dalrymple et al. (1994), Kim and Peters (1995), Krifka (1996) and Winter (1996). The idea behind this principle is clear. Suppose that an expression generates a set of readings. If the weakest is adopted, the sentence cannot indicate what the actual situation is like. It always remains vague. This is true of the case in which an interpretation of medium strength is adopted. So the most clear and efficient way of conveying information is to take the strongest one as a principle.

8) This can be formalized using Cooper's (1983) storage, but I will not do this. In Yeom (1998, 2001), I suggest an implementation of this mechanism.

- (46) a.  $c+P_B-((c+P_B+A)-(c+P_B+A+B))$   
 b.  $c-((c+A+P_B)-(c+A+P_B+B))$   
 c.  $c-((c+A)-(c+A+P_B+B))$

In these three ways, the condition that the presupposition  $P_B$  is satisfied before  $B$  is processed. From these three ways of accommodation, (47) generates the three readings in (48).

(47) If John is late, he is bringing his wife to the party.

- (48) a. John has a wife. If John is late, he is bringing his wife to the party.  
 b. If John has a wife and he is late, he is bringing his wife to the party.  
 c. If John is late, he has a wife and is bringing his wife to the party.

If a person is married and his wife's making herself up takes a lot of time, he is likely to be late for a party. Under these circumstances, (48a) is the most preferred, and (48b) is the least preferred. Below I suggest the possibility that (48b) is not a reading we normally get from (47). The reading of (48c), which we get when it is implied that the speaker does not know if John is married, is weaker than (48a) semantically.

This can be extended to belief statements when more than one accommodation is allowed. Consider the following sentence.

(49) Fred didn't think that I had stopped proof-reading.

The interpretation of this sentence is given below, following Heim (1992).

- (50)  $c+\text{neg}$  (F **believed** S), where  $S = \text{I had stopped proof-reading}$   
 $= c-\{w \in c \mid \text{dox}_F(w)+S = \text{dox}_F(w)\}$

The presupposition of  $S$   $P_S$  can be accommodated twice, once in Fred's belief context and/or once in the main context. This leads to the following four interpretations.

- (51) a.  $c+P_S+(F \text{ believed } P_S)-\{w \in c+P_S+(F \text{ believed } P_S) \mid \text{dox}_F(w)+S = \text{dox}_F(w)\}$   
        $= \{w \in c+P_S+(F \text{ believed } P_S) \mid \text{dox}_F(w)+S \neq \text{dox}_F(w)\}$   
       b.  $c+P_S-\{w \in c+P_S \mid \text{dox}_F(w) + P_S+S = \text{dox}_F(w)\}$   
       c.  $c+(F \text{ believed } P_S)-\{w \in c+(F \text{ believed } P_S) \mid \text{dox}_F(w)+S = \text{dox}_F(w)\}$   
       d.  $c-\{w \in c \mid \text{dox}_F(w)+P_S+S = \text{dox}_F(w)\}$

In the readings (51a,b) the main context is updated with  $P_S$  first. This expresses the accommodation of the presupposition in the main context. In the readings (51a) and (51c), the same presupposition is accommodated in the belief context. But this is expressed by the main context being updated with ‘F believed  $P_S$ .’ This may look arbitrary, but it is not. The reason why I take this arbitrary notation is that the context  $c$  we are assuming now just expresses the main context. Even if  $c$  also includes belief contexts and a triggered presupposition is directly accommodated in the belief context, it has the same effect as the main context being updated with ‘F believed  $P_S$ .’ This is what I am doing now. In Section 5, I propose a new representation of context in which this clumsy way of accommodation can be avoided. Once a belief context is updated with the presupposition first, it will satisfy the presupposition when the presupposition trigger is interpreted within the scope of the negation. That is, in (51a) and (51c)  $\text{dox}_F(w)$  already satisfies the presupposition  $P_S$  when it is updated with  $S$ . It is as if we have two belief contexts, one within the scope of the negation and the other outside it. A belief context in  $c$  behaves like the highest belief context for accommodating presuppositions triggered in the belief context.

The four interpretations correspond to the following four readings.

- (52) a. I had been proof-reading, and Fred thought that I had been proof-reading, and didn’t think that I had stopped it.  
       b. I had been proof-reading, and Fred didn’t think that I had been proof-reading, and I had stopped it.  
       c. Fred thought that I had been proof-reading, and didn’t think that I had stopped it.  
       d. Fred didn’t think that I had been proof-reading, and so he didn’t think that I had stopped it.

Among these readings, the first is the most preferred and the last is the least preferred. We cannot say any of (52b) and (52c) is preferred to the other. Notice that the first is the most strong, and the last is the weakest. The four readings show partial ordering among themselves with respect to the strength of the readings.

What is the motivation for accommodating the triggered presupposition to the main context even when it can be accommodated in the local condition? In satisfaction theory, a presupposition is required to be satisfied locally. This is why satisfaction theory generally predicts weak presuppositions. I suppose that presupposition has the function of conveying information.<sup>9)</sup> But it is different from normal assertion. It conveys information as background knowledge. Presupposing is a more efficient way of conveying information because sentences with presupposition triggers are simpler than those asserting all information. When we pay attention to this function of presupposition, we can see why a presupposition tends to lead to the strongest possible interpretation. We can maintain the strongest meaning hypothesis by accepting (52a) as one of the readings, in which a presupposition is accommodated more than once.

#### 4.3. Desire Contexts and Presupposition Projection

The main point of this paper is that presupposition projection from belief contexts also can be accounted for by the strongest meaning hypothesis. Desire contexts are beyond the scope of this paper. But in order to maintain the strongest meaning hypothesis as the principle behind presupposition projection, I need to show at least that presuppositions from desire contexts are not exceptions to the hypothesis.

There are examples which might seem to show that a presupposition triggered in the desire context can be accommodated in the same desire context. Consider the following example.

(53) Fred wanted to dance with his wife.

The presupposition from the definite NP *may*, or *may not*, be accommodated

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9) This is partially supported in Spender (2001). In the binding theory, it is generally claimed that accommodation is a repair strategy, but Spender shows that factive verbs with their presupposed complements are exploited by speakers to the fullest as this is the most effective and economical way to introduce new information.

in the main context, the belief context and the desire context. Considering the three possibilities independently, theoretically we could obtain eight readings. Among the eight, one reading in which the presupposition is accommodated nowhere is excluded because the presupposition is not satisfied anywhere. Two readings in which the presupposition is accommodated both in the belief context and in the desire context are excluded too because no one wants A when A is already believed to hold. So we now have the following five readings left.

- (54) a. Fred had a wife, and he knew this, and he wanted to dance with her.  
 b. Fred believed that he had a wife, and he wanted to dance with her.  
 c. ??Fred had a wife, and (he did not know this, and) he wanted to have a wife and dance with her.  
 d. Fred had a wife, and (he did not know this, and) he wanted to dance with her. (*de re*)  
 e. Fred wanted to have a wife and dance with her.

Here (54c) and (54e) are the readings in which the presupposition seems to be accommodated in the desire context. The two readings show that when the information from the definite NP is part of the desire context, it is not accommodated in the main context (or in the belief context). This implies the possibility that the two readings are not obtained from the accommodation of a presupposition.

Consider the following examples.

- (55) a. John wanted to stop smoking.  
 b. John wanted to see Susan again.  
 c. ??John wants to know that Mary loves him.

These sentences do not seem to presuppose the following, respectively.

- (56) a. John wanted to have been smoking.  
 b. John wanted to see Susan before.  
 c. John wants it to be a fact that Mary loves him.

Especially the last one (55c) sounds awkward. The reason seems to be that the presupposition that Mary loves John is accommodated into

John's belief context, which makes it awkward to say that he wants to know what he already knows. The other two sentences also show that a presupposition in a desire context normally goes to the belief context rather than the desire context.

Then we have to explain why a definite description behaves exceptionally in (53). A definite description shows some properties which cannot be explained merely by presupposition projection.

- (57) a. A car is parked at the backyard. The right side mirror is missing.  
 b. The King of France does not exist.

The expressions underlined do not presuppose that there are objects that satisfy the descriptions. They express some possible objects that satisfy the descriptions. I cannot go into the semantics of these definite descriptions in this paper, but such a use seems to allow the definite NP in (53) to stay within a desire context. A possible object which satisfies a definite description is not believed to exist yet. But such an object can exist in a desired world.

I suppose that this is closely related to the fact that the *de re* interpretation of a definite NP is well defined. A definite NP can be readily used in one world to refer to an individual which does not exist in that world. And I suppose that this property is not what characterizes presupposition triggers in general. I claimed that *de re* interpretation is independent of presupposition projection. In a desire context, a definite NP can refer to a possible individual in some desired possible worlds. But this is not what is presupposed. A presupposition is what is taken for granted. And taking something for granted is an epistemic matter. So what is presupposed is supposed to go into epistemic contexts, not to desire contexts.

As Geurts (1998) claims, it is true that a presupposition in a desire context can be satisfied by the previous desire context. This indicates that accommodation is a different matter than binding. In the discussion of conditionals, a presupposition in the consequent clause can be bound by the context updated with the antecedent clause. But when a presupposition is accommodated, it does not seem to go into the antecedent clause.

- (58) a. ??If Fred read a book, he would regret not returning it.  
 b. ??If Fred read a book, he would not return the book and regret it.  
 c. If Fred read a book and did not return it, he would regret it.

Sentence (58a) sounds awkward because reading a book does not seem to be the reason for regretting not returning the book. The same effect is observed if the presupposition is accommodated in the consequent clause of the conditional. But if the presupposition is accommodated in the antecedent clause, such an effect disappears. This implies that a normal accommodation site for a presupposition triggered in the consequent clause is not the antecedent clause. But we know that an element in the antecedent clause can satisfy the presupposition in the consequent clause, as observed in (59).

(59) If Fred is married, he will bring his wife to the party.

This shows that accommodation is constrained by some mechanism different from the one which constrains binding or satisfaction. Binding is constrained by accessibility and the preference of a closer antecedent, while accommodation is constrained by the preference of a stronger reading. When a presupposition is accommodated in the antecedent clause, the reading becomes weaker.

From the discussion so far, we can conclude that a presupposition from a desire context is not accommodated to the previous desire context. When it looks as if it were, the reading comes from the interpretation of the definite description as an expression which does not trigger a presupposition.

## 5. Structure of Contexts

So far I have been assuming that a context has the structure which can deal with presupposition projection from a belief context, but I do not give the exact form of it. First, I need to show how accessibility is defined. Presuppositions are not anaphors, but they are satisfied when they are accommodated in contexts which are accessible. Second, I need to show that a presupposition triggered in a belief context is satisfied in the local belief context. To ensure this, a context must include belief contexts so that they can be readily accessed whenever a *believe*-statement is interpreted.<sup>10</sup> The purpose of this section is to show that my

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10) In Geurts (1995, 1998) and Rooy (1997) a belief context is introduced by a propositional discourse marker, and this is assigned a belief context as its value. But in this paper. I

claim can be fully formalized with no inconsistency. For this reason, this section is somewhat technical.

An interpretation function is determined by the structure of a context. So the rest depends on how we define a context. The standard theory assumes a context is a set of world-assignment pairs. In such a theory, a belief context is temporarily derived for the interpretation of a *believe*-statement. I assume that a context includes belief contexts in addition to world-assignment pairs. A context is defined as follows:

- (60) A context  $c$  is a set of triples  $\langle w, f, \langle \dots, b_1, \dots \rangle \rangle$  where  $w$  is a possible world,  $f$  is an assignment, and  $b_i$  is the belief context of the individual  $f(i)$  in  $w$ .

A context is a set of triples of a possible world, an assignment, and a sequence of belief contexts embedded in the context. The number of belief contexts depends on how many belief contexts are introduced in the discourse. A belief context  $b_i$  can have the same form as  $c$ , but the actual form of it is determined by the discourse. Between a possible world and a belief context, there is a relation of doxastic alternativeness.

- (61) Let  $W(c) = \{w \mid \langle w, f, \langle b_1, \dots, b_j \rangle \rangle \in c\}$ .  
 Let  $\langle w, f, \langle b_1, \dots, b_j \rangle \rangle$  be in  $c$ . Then  
 $W(b_i) = \text{dox}_{f(i)}(w)$ .

Here  $W$  is a function of giving the set of worlds from a context. Now let's see how sentences are interpreted.

- (62) Let  $F$  be an interpretation function for constants in the language.
- $c + P(x_k) = \{ \langle w, f, \langle b_1, \dots, b_j \rangle \rangle \in c \mid f(k) \in F(w)(P) \}$
  - $c + \text{neg } A = c - \{ \langle w, f, \langle \dots, b_i, \dots \rangle \rangle \in c \mid \exists f' \exists i: \langle w, f \cup f', \langle \dots, \langle w', g', \langle \dots, b_j, \dots \rangle \rangle \rangle \in b_i \ \& \ \exists g': g' = g \cup g' \}, \dots \rangle \in c + A \}$
  - $c + (A \text{ and } B) = c + A + B$
  - $c + (\text{if } A \text{ then } B) = c + \text{neg } (A \text{ and } \text{neg } B)$

When a simple sentence is interpreted, it just changes the context by

selecting a possible world and an assignment in the main context  $c$ . A negative sentence 'neg A' is defined as a set subtraction as usual. The affirmative sentence 'A' may introduce new discourse markers, but the whole interpretation rule says that a triple which allows for such an extension must be removed from the original context. When the sentence 'A' is a *believe*-statement, a discourse marker can be introduced in the main context or in a belief context. So I use two extended parts of assignments,  $f$  for the main context and  $g$  for a belief context  $b_i$ , respectively.

The interpretation of a complex sentence can be defined compositionally. Now let's look at the interpretation rule of a *believe*-statement, and see how presupposition projection can be accounted for.

$$(63) \ c+(a_k \text{ believes } B) = \{ \langle w, f, \dots, (b_k[+f]+B)[-f], \dots \rangle \mid \langle w, f, \dots, b_k, \dots \rangle \in c \ \& \ W(b_k) = W((b_k[+f]+B)[-f]) \}$$

A *believe*-statement ' $a_k$  believes B' presupposes that there is a belief context of the individual  $f(k)$ . If there is no belief context for the individual  $f(k)$ , it is accommodated in the context. The function *dox* provides a belief context  $b_k$  with respect to  $w$  and  $f(k)$ . I assume that the domain of an assignment in a belief context is the set of discourse markers introduced in the belief context. When a *believe* statement is interpreted, every assignment in a belief context is extended by the assignment of the main context. For this purpose I use the notion of  $[\pm f]$ .  $b_i[+f]$  is a new belief context in which every assignment in  $b_i$  is extended by  $f$ .  $b_i[-f]$  is a new belief context in which every assignment in  $b_i$  by subtracting  $f$  from each assignment in  $b_i$ . This returns the assignment only for discourse markers introduced in a belief context.

$$(64) \ c[+f] = \{ \langle w, g \cup f, \dots, b_i, \dots, b_j \rangle \mid \langle w, g, \dots, b_i, \dots, b_j \rangle \in c \} \\ c[-f] = \{ \langle w, g-f, \dots, b_i, \dots, b_j \rangle \mid \langle w, g, \dots, b_i, \dots, b_j \rangle \in c \}$$

When a *believe*-statement is interpreted, an assignment in a belief context is extended temporarily with the assignment for the main context. Assignments reflect discourse information. So an element in the main context is accessible to anaphoric expressions in a belief context. If presuppositions are anaphors, they can be bound by discourse markers in the main context. Real world information is reflected on possible worlds, and real world information in the main context is not accessible to belief contexts

embedded in it.<sup>11)</sup> In my analysis, presuppositions are assumed to convey real world information, and the main context and a belief context embedded in it are not accessible to each other.

Now I will show how a negative *believe*-statement can be interpreted and a presupposition in a belief context is projected.

(65) Fred didn't think that I had stopped proof-reading.

S = I had stopped proof-reading.

P<sub>s</sub> = I had been proof-reading.

(66) c+neg (F<sub>k</sub> **believes** S)

$$\begin{aligned}
 &= c-\{ \langle w, f, \langle \dots, b_i, \dots \rangle \in c \mid \exists f' \exists i \langle w, f \cup f', \langle \dots, \langle w', g', \langle \dots, b_j, \dots \rangle \rangle \mid \langle w', g', \langle \dots, b_j, \dots \rangle \rangle \in b_i \ \& \ \exists g': g'' = g \cup g' \}, \dots \rangle \in c+(F_k \text{ **believes** S}) \} \\
 &= c-\{ \langle w, f, \langle \dots, b_k, \dots \rangle \in c \mid \langle w, f, \langle \dots, \langle w', g', \langle \dots, b_j, \dots \rangle \rangle \mid \langle w', g', \langle \dots, b_j, \dots \rangle \rangle \in b_k \ \& \ \exists g': g'' = g \cup g' \}, \dots \rangle \in c+(F_k \text{ **believes** S}) \} \\
 &= c-\{ \langle w, f, \langle \dots, b_k, \dots \rangle \in c \mid \langle w, f, \langle \dots, \langle w', g', \langle \dots, b_j, \dots \rangle \rangle \mid \langle w', g', \langle \dots, b_j, \dots \rangle \rangle \in b_k \}, \dots \rangle \in c+(F_k \text{ **believes** S}) \} \\
 &= c-(c+(F_k \text{ **believes** S}))
 \end{aligned}$$

The sentence does not introduce any new discourse marker, so the negative statement can be simplified as shown above. A presupposition P<sub>s</sub> can be satisfied in the following ways.

(67) c' = {  $\langle w, f, \langle \dots, b_k + P_s, \dots \rangle \mid \langle w, f, \langle \dots, b_k, \dots \rangle \in c$  }

a. c'-(c'+(F<sub>k</sub> **believes** S))

b. c-(c'+(F<sub>k</sub> **believes** S))

c' can satisfy the presupposition, and c' can be established outside or within the scope of the negation operator. Notice that reading (67a) is stronger than (67b). This is quite similar to the following case.

(68) John did not meet her husband there (because she is not married).

S = John did not meet her husband there.

P<sub>s</sub> = She was married.

11) Geurts (1998) employs the terms *strong* and *weak* accessibility. The former is the accessibility of real world information, and the latter is that of discourse information.

- (69)  $c' = c + P_s$   
 a.  $c' - (c' + S)$   
 b.  $c - (c' + S)$

The presupposition can be accommodated in the context over the scope of the negation or in the context within the scope of the negation. And reading (69a) is stronger than (69b). This shows that there is a parallelism between a presupposition in the main context and a presupposition in a belief context with respect to the negation operator. The reason for this is that both the main context and a belief context are a kind of information states.

## 6. Conclusion

In both satisfaction theory and binding theory of presuppositions, presuppositions must be satisfied or bound in a previous context, and when they are not, they are accommodated to satisfy the condition. That is, accommodation is a repair strategy. In this paper, I claim that presupposition is a way of conveying information in a different way than assertion. So how accommodation works can be accounted for by considering relationships with respect to information. When a presupposition gives rise to a set of possible readings, the most effective way of communication is to take the principle of selecting the strongest reading among them. The strongest reading may be canceled when a presupposition is canceled or neutralized by an entailment, an implicature, or another presupposition. But the rest of the readings still constitute a partial order with respect to strength. In some sense, my analysis is a more refined analysis of Gazdar (1979). His analysis cannot go into a sub-sentential level, but my analysis can deal with sub-sentential interactions of presuppositions, entailments, and implicatures.

One difficulty in claiming that the strongest meaning hypothesis rules presupposition projection is that when a presupposition triggered in a belief context is accommodated once, it does not lead to the strongest reading. I claim that when a presupposition in a belief context can be accommodated in the main context, it must be accommodated in the belief context too. This is required because of the meaning of the presupposition trigger. It is not a pragmatic importation from the main context. And if

this is the case, we can claim the strongest meaning is the most preferred among the possible readings.

Finally, a presupposition in a desire context might be satisfied in a previous desire context. If accommodation also followed the pattern of satisfaction, presupposition projection in desire contexts would be counter-evidence against the strongest meaning hypothesis, because a reading in which a presupposition is accommodated in a belief context cannot entail the reading in which it is accommodated in the desire context. But accommodation is different from binding or satisfaction. A presupposition in a desire context is not accommodated in the local desire context.

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Received: Sep. 1, 2003

Revised version received: Oct. 25, 2003

Accepted: Nov. 7, 2003