BART GEURTS

LOCAL SATISFACTION GUARANTEED: A PRESUPPOSITION THEORY AND ITS PROBLEMS*

INTRODUCTION

After an intermission that lasted for almost a decade, the past few years have witnessed a renewed interest in the notion of presupposition. The recent work in this area shows at least two major trends, one of which is fairly new, while the other has its roots in some of the earliest contributions on the subject. The new trend is the exploration of the links between presupposition and anaphora. This trend has received much of its impetus from van der Sandt's thesis that presuppositional and anaphoric expressions are in one and the same natural category, and are therefore amenable to a unified treatment. I shall come back to van der Sandt's theory towards the end of this paper, but in the following I am primarily concerned with the second trend, which is not necessarily consistent with the first. I am referring to the revival of what I propose to call the 'satisfaction theory' of presupposition.

The ideas underlying the satisfaction theory go back to Stalnaker (1973, 1974) and Karttunen (1974). They were shaped into an explicit theory by Heim (1983), and have recently been taken up, e.g., by Chierchia and McConnell-Ginet (1990), van Eijck (1991, 1993), Beaver (1992, 1993), Heim (1992), Krahmer (1993), and Krifka (1993). In the following I shall criticize the satisfaction theory, mainly on the grounds that the predictions it delivers are too weak. I feel justified in referring to *the* satisfaction theory of presupposition because my objections apply to all varieties that I know of. In fact, they apply to many other theories besides, such as Karttunen and Peters' (1979) and some logical presupposition theories

* This is a revised and expanded version of the second chapter of Geurts (1995). I should like to thank Hans Kamp, Rob van der Sandt, and two reviewers for *L & P*, as well as David Beaver, Emiel Krahmer, and Marc Ronthaler.

Linguistics and Philosophy **19**: 259–294, 1996.

(e.g., van Fraassen 1969), but these fall outside the target area of this paper.[1]

The satisfaction theory has been under attack before, especially from Gazdar (1979) and van der Sandt (1988), but up to a point I concur with Heim (1983) when she states that these criticisms have been inconclusive. Furthermore, many of the arguments that have been launched against the satisfaction theory have become outdated because they are based upon assumptions that aren't generally accepted anymore, such as the idea that presupposition projection should be explained by a single set of rules or principles: as it is now widely agreed that any viable explanation of the presuppositional facts will be a hybrid one (see e.g. Heim 1983, 1992, van der Sandt 1992, Zeevat 1992), at least some of the arguments that were aired in the seventies have lost their potency. Accordingly, the objections that I shall bring forward in this paper are mostly new ones, but I should mention that they are aimed at the same weaknesses that Gazdar and others have complained about.

This paper is organized as follows. In the first section, the satisfaction theory is introduced, and in Section 2 it is shown that the theory's predictions are too weak. In particular, the satisfaction theory often predicts presuppositions of the form $\varphi \rightarrow \psi$ where the intuitively perceived presupposition is simply ψ. I call this the 'proviso problem'. The proviso problem has been tackled in the literature by assuming that there is some process which, in some way or other, allows the hearer to conclude from a conditional presupposition $\varphi \rightarrow \psi$ that the speaker in fact wants to convey that ψ is true. Thus the inference that the speaker is committed to the truth of ψ is obtained in two steps, and I argue that this by itself is already a questionable set-up. In Sections 3 and 4, I discuss the two proposals for implementing this two-stage model which have been suggested in the literature, and find them both wanting. Moreover, I present evidence that strongly suggests that no such model could ever work. Some further problems for the satisfaction theory are discussed in Section 5. Finally, in Section 6, I try to ascertain why the satisfaction theory runs into the problems indicated in the preceding sections. In order to answer this question I briefly compare the satisfaction theory with what I call the 'binding theory' of presupposition, originally proposed by van der Sandt, which doesn't have these problems, although the two theories appear to

[1] Conceptually, the theory proposed by Karttunen and Peters (1979) is quite different from Karttunen's 1974 theory (and much more in the spirit of his 1973 theory), which I consider to be one of the first representatives of the satisfaction theory. Empirically, however, the two theories are equivalent, and consequently they are often treated on a par, e.g. by Gazdar (1979).

be very similar from a conceptual viewpoint. However, despite these similarities, I will argue that, in the final analysis, the notions of presupposition that underlie the two theories are fundamentally different, and that this is what explains the differences that show up at the empirical level.

I should like to stress that I will *not* defend the binding theory in this paper, nor do I want to argue here that it is superior to the satisfaction theory. The purpose of this paper is to criticize a theory of presupposition which, by and large, has dominated the scene for two decades. The binding theory is introduced as a kind of diagnostic tool, in an attempt to explain why the satisfaction theory fails, and in my opinion this comparison is instructive precisely because the theories are, prima facie at least, so similar. For this purpose, it is sufficient if the binding theory doesn't run into the problems discussed in the central part of this paper, and it will be not so hard to see that it doesn't.

1. The Satisfaction Theory

The idea underlying the satisfaction theory of presupposition is a simple and attractive one. It is that the utterance of a sentence changes the context in which it is made, and that the way in which a sentence affects its context determines its projection characteristics. Presuppositions that are triggered within the scope of a negation operator, for example, tend to 'escape from' that scope because of the way negated sentences interact with their contexts. This picture is appealing because it implies that the projection problem doesn't call for a solution at all: the problem simply dissolves once we have a theory of context change, which we want to have anyhow.

A context contains the information that interlocutors share (or take to be shared, see Section 4) between them, or alternatively, the information that a speaker has committed himself to in the preceding discourse. There are of course non-trivial differences between these two perspectives, but although we shall adopt the first one for convenience, these differences don't matter for our present purposes. The important thing is that we view a context as an information pool, and if we do so, a simple sentence φ may be regarded as a function that changes the current context into one that makes φ true. Hence the context that results from uttering φ will contain all the information that the initial context contained, plus the information that φ is true.

Now take a simple sentence that contains a presupposition-inducing expression, which we write as $\varphi\{\chi\}$, where χ is the presupposition that is triggered in φ. E.g., in

(1) I like your toupet.

φ would be the sentence itself, and χ the presupposition that the addressee has a toupet. According to the satisfaction theory, the presupposition χ requires that the context which is being incremented with its carrier sentence φ already contain the information that χ is true. More succinctly: if $\varphi\{\chi\}$ is to be added to c, then c must satisfy χ. If this requirement isn't met, then c is not an appropriate context for $\varphi\{\chi\}$, as Stalnaker would put it. Other authors have preferred a different choice of words: Heim would say that $\varphi\{\chi\}$ is 'not defined' in c or that c doesn't 'admit' $\varphi\{\chi\}$,[2] and Karttunen (1974) that c doesn't 'satisfy-the-presuppositions-of' $\varphi\{\chi\}$. But these terminological differences shouldn't obscure the fact that the essential insight is the same in each case, namely that c cannot without further ado be incremented with $\varphi\{\chi\}$ unless it follows from c that χ is true. This is not to imply, however, that $\varphi\{\chi\}$ just cannot be appropriately uttered if c doesn't satisfy χ: officially c must satisfy χ, but if it doesn't, a cooperative hearer will generally be prepared to revise c so as to make it satisfy χ, before he goes on to process φ. That is, χ will be *accommodated* in c, and φ interpreted in the resulting context. In this way, a presupposition may carry information that is strictly speaking new, although under the pretense that it is already given in the context.[3]

Thus far we have confined our attention to simple sentences and their presuppositions, but the satisfaction theory's crucial tenet is that the same story can be told about embedded sentences, because they, too, may be viewed as context-change devices. To illustrate this idea, let us consider how the sentences of a simple propositional language can be modeled as context-change devices. We adopt Veltman's (1990) notation and let $c[\varphi]$ stand for the result of incrementing c with φ. A context is simply a subset of a given set of possible worlds W, and a sentence φ will reduce the current context c to those worlds in c that make φ true. If φ is a simple sentence, this is a primitive operation, and the context change brought about by a complex sentence is defined in terms of the contextual effects of its parts, as follows (see, e.g., Heim 1983, 1992, Chierchia and McConnell-Ginet 1990, Veltman 1990, Beaver 1992, 1993):

(2)a. $c[\varphi] = \{w \in c$: φ is true in $w\}$, if φ is a simple sentence
b. $c[\neg\varphi] = c - c[\varphi]$
c. $c[\varphi \vee \psi] = c[\varphi] \cup c[\psi]$

[2] The term 'admit' was suggested, but not used, for this purpose by Karttunen (1974).
[3] The technical term 'accommodation' was coined by Lewis (1979). The notion itself goes back to Karttunen (1974) and Stalnaker (1974).

d. $c[\varphi \wedge \psi] = c[\varphi][\psi]$
e. $c[\varphi \rightarrow \psi] = c - (c[\varphi] - c[\varphi][\psi])$

For any sentence φ, $[\varphi]$ is a total function whose domain is pow(W). If φ is a simple sentence, then this function reduces its input context c to that subset of c in which φ is true. Negation is in effect set complementation: in order to compute $c[\neg\varphi]$ we first compute $c[\varphi]$, and subtract the result from c. Disjunction is defined as set union, as one might expect, but a conjunction is processed from left to right: first c is updated with φ, and then the resulting context is updated with ψ. The definition of the conditional may be somewhat opaque at first sight, but what it gives us is the material implication: $c[\varphi \rightarrow \psi] = c - (c[\varphi] - c[\varphi][\psi]) = c - c[\varphi][\neg\psi] = c - c[\varphi \wedge \neg\psi] = c[\neg(\varphi \wedge \neg\psi)]$.

The semantics in (2) extends the notion of context change to embedded sentences: in order to interpret a complex sentence φ in c, each sentence embedded in φ must be interpreted in its own local context, which may but need not coincide with c. To compute $c[\neg\varphi]$, for example, we have to evaluate $c[\varphi]$ as an auxiliary computation, and thus the local context of φ as it occurs in $\neg\varphi$ is the same as that of its matrix. From (2c) it follows that the members of a disjunction, too, must be evaluated in the same context in which the matrix occurs. Conjunctions are processed in an incremental fashion, and therefore, if c is updated with $\varphi \wedge \psi$, then c is the local context of φ, while the local context of ψ is $c[\varphi]$; the same holds for conditionals. In general: if c is updated with a sentence ξ, and ξ contains a sentence ξ', then the local context of ξ' is given by an expression of the form $c[\zeta_1] \ldots [\zeta_n]$, with $n \geq 0$; this will always be a subset of c. The notion of local context, thus characterized, is at the heart of the satisfaction theory's understanding of presupposition, and will accordingly play a central role in the following.

We now extend our language with a syntactic device for representing presuppositions that we have already been using: if φ and ψ are simple sentences, then $\varphi\{\psi\}$ is a sentence, with the intuitive meaning explained above. Restricting this sentence-forming operation to simple sentences is a natural thing to do as far as the carrier sentence is concerned, but this restriction also excludes complex presuppositions, which is less realistic. However, since this choice simplifies matters without distorting the main issues, we shall proceed with it anyway. Let us say that a context c satisfies φ iff $c[\varphi] = c$. Then we can extend our semantics as follows:

(2)f. $c[\varphi\{\psi\}] = c[\varphi]$, if c satisfies ψ; undefined otherwise

Thus our context-change semantics for propositional logic becomes a partial one, with the following definedness conditions for the connectives:

(3)a. $c[\neg\varphi]$ is defined iff $c[\varphi]$ is defined
b. $c[\varphi \vee \psi]$ is defined iff $c[\varphi]$ is defined and $c[\psi]$ is defined
c. $c[\varphi \wedge \psi]$ is defined iff $c[\varphi]$ is defined and $c[\varphi][\psi]$ is defined
d. $c[\varphi \rightarrow \psi]$ is defined iff $c[\varphi]$ is defined and $c[\varphi][\psi]$ is defined

Once we have added (2f), conjunction ceases to be commutative, and its definedness conditions mirror those of the conditional. The order of the members of a disjunction, on the other hand, remains arbitrary.

The definedness conditions in (3) follow from the semantic definitions in (2), and the predictions that the satisfaction theory makes about presupposition projection follow from these definedness conditions. Presuppositions are contextual requirements: if φ presupposes χ, then $c[\varphi]$ isn't defined unless c satisfies χ. We can therefore define the notion of presupposition as follows:

(4) φ presupposes χ iff for all c, $c[\varphi]$ is not defined unless c satisfies χ

Thus negation is predicted to be a hole, in Karttunen's (1973) terms: $c[\neg\varphi]$ is defined iff $c[\varphi]$ is defined, and therefore the presuppositions of $\neg\varphi$ are the same as those of φ. I take it that this prediction is correct, and the same holds for what the theory says about the projection characteristics of disjunctions. As (3b) indicates, it is predicted that a disjunction will inherit the presuppositions of its parts. In the majority of cases this is surely correct, but prima facie this prediction causes problems with the following types of example (cf., e.g., Gazdar 1979, Soames 1982):[4]

(5)a. Either Theo keeps his Chevrolet hidden somewhere or he doesn't have one in the first place.
b. Either Theo doesn't have a Chevrolet or he keeps his Chevrolet hidden somewhere.

[4] As a matter of convenience, I will often use definite NPs as representatives of the class of presuppositional expressions: examples with definite NPs tend to be shorter than others, which is a great advantage in a discussion that revolves around complex sentences. It is often thought that definite NPs behave differently from (other) presupposition inducers, and if that were true they should be avoided in a discussion of presuppositions. I don't sympathize with such views, but fortunately it doesn't matter which position is the right one, because all the examples with definite NPs that I shall use can be matched by examples with (other) presuppositional expressions. I will briefly return to this point in Section 5.

(6) Walter has either stopped smoking or he has begun to smoke (I forgot which).

As it stands, the theory predicts that (5a) and (5b) presuppose that Theo owns a Chevrolet, and that (6) has an inconsistent set of presuppositions, namely that Walter used to smoke and didn't smoke before the utterance time. I don't believe, however, that these problems are insurmountable.

We said that, as a rule, a hearer will be prepared to accommodate presuppositions that are not satisfied by the current context. However, against the background of a context-change semantics as exemplified by (2), this informal description requires some sharpening: we have to specify what is meant by 'the context' in which a presupposition arises. To illustrate, suppose that a sentence of the form $\varphi\{\chi\} \vee \psi$ is added to c (note that (5a) is of this form), and that c doesn't satisfy χ. In this situation, χ might be accommodated in c – i.e., χ might be added to c as if it had been asserted in the foregoing. In this case χ is accommodated *globally*. However, it is also possible to only temporarily accommodate χ in c to allow for the intermediate evaluation of $c[\varphi\{\chi\}]$, as required by (2c). In this case χ is accommodated *locally*: χ is added to a copy of c, so to speak, and the global context itself remains untouched. Specifically, in order to compute $c[\varphi\{\chi\} \vee \psi]$, we must evaluate $c[\varphi\{\chi\}]$ as an auxiliary computation, and local accommodation simply means that we take $c[\chi][\varphi\{\chi\}]$ instead of $c[\varphi\{\chi\}]$. Thus, if we opt for local accommodation, $c[\varphi\{\chi\} \vee \psi] = c[\chi][\varphi\{\chi\}] \cup c[\psi]$. For (5a), this means that we obtain the following reading: 'Either (Theo owns a Chevrolet and he keeps it hidden somewhere) or he doesn't own a Chevrolet', which is what we want this sentence to mean. Similar remarks apply to (5b) and (6). So these examples can be accounted for, following a suggestion by Heim (1983), if we may assume that the presuppositions that initially appeared to be problematic are accommodated locally.[5]

It is obvious that, without further provisions, the distinction between global and local accommodation would give rise to the prediction that presuppositional expressions cause systematic ambiguities, a prediction that is not borne out by the facts. E.g., if the following sentence (which

[5] Incidentally, it is not at all easy to see how accommodation could be implemented within this framework. To be sure, it is intuitively clear what accommodation does as long as one is talking *about* a semantics along the lines of (2), but it is by no means trivial to integrate the notion of accommodation into such a semantics. See however Beaver (1992, 1993) for an account of global accommodation. To my knowledge, no formal theory of local accommodation has been proposed so far. Problems of implementation aside, it will be argued in Section 5 that the satisfaction theory's account of local accommodation is untenable.

is of the form $\neg\varphi\{\chi\}$) is uttered in a context which doesn't satisfy the proposition that it is raining,

(7) Barney doesn't know that it is raining.

then the audience might either globally or locally accommodate the presupposition that it is raining. In the former case, the sentence would be construed as: 'It is raining and Barney doesn't know that it is raining'; in the latter, as: 'It isn't the case that it is raining and that Barney knows that it is raining'. Arguably, (7) allows for both construals, but it is evident that the first is strongly preferred. It is always assumed, therefore, that global accommodation is the default option, and that it requires special circumstances for a presupposition to be accommodated locally.[6]

It isn't hard to see that, in the examples in (5) and (6), such special circumstances apply. For a disjunction of the form $\varphi \vee \psi$ will rarely be uttered unless the speaker doesn't know if φ is true and doesn't know if ψ is true (cf. Gazdar 1979, Soames 1979, Geurts 1993, 1995): if it were part of the common ground that the speaker took either φ or ψ to be true, his uttering the disjunction of the two would be needlessly inefficient. But in the examples given, if the relevant presuppositions were accommodated globally, their carrier sentences would become inefficient in precisely this sense. E.g., if in (5a) we would globally accommodate the presupposition that Theo owns a Chevrolet, it would become something of a mystery why the speaker has chosen to volunteer a disjunction whose second half he takes to be false. Thus, local accommodation is required to avoid the conclusion that the speaker is being uncooperative. In the other cases, analogous explanations apply.

This analysis of the examples in (5) and (6) strikes me as a plausible one, and seems to be perfectly reconcilable with the satisfaction theory. But anyway, whether or not one is prepared to accept this account, it is clear that the definition of disjunction in (2c) is by far the most natural one, and although we could try to solve the problems that (5) and (6) cause by tinkering with this definition, this would entail that we sacrifice one of the most appealing features of the satisfaction theory, which is the close connection that it maintains between the semantics of the connectives and their projection properties.

[6] The distinction between local and global accommodation and the principle that the latter has priority over the former are due to Heim (1982, 1983).

2. The Proviso Problem

The principal problem with the satisfaction theory is not that it is too strong, as (5) and (6) initially suggested, but rather that it is too weak. This defect of the theory, which I shall argue is beyond repair, manifests itself with conjunctions and conditionals, and it is to these that we now turn. Given the definedness conditions in (3c) and (3d), the theory predicts that conjunctions and conditionals have the same presuppositional behaviour. Let us look at conjunctions first. A sentence of the form $\varphi\{\chi\} \wedge \psi$ is predicted to presuppose that χ, which is correct: (8a) presupposes that (8b) is true.

(8)a. Theo's wife hates sonnets and so does his manager.
b. Theo has a wife.

However, if we take a sentence of the form $\varphi \wedge \psi\{\chi\}$, the presuppositional requirement is *not* that the context satisfy χ. For $c[\varphi \wedge \psi\{\chi\}]$ is defined iff $c[\varphi]$ is defined and $c[\varphi]$ satisfies χ, and it is easily proved that this is the same as requiring that $c[\varphi]$ be defined and c satisfy $\varphi \rightarrow \chi$. In other words, it is necessary as well as sufficient for χ to be satisfied in its local context $c[\varphi]$ that c satisfy $\varphi \rightarrow \chi$, and thus $\varphi \rightarrow \psi\{\chi\}$ is predicted to presuppose that $\varphi \rightarrow \chi$ instead of χ, as one would expect. E.g., (9a) is predicted to presuppose merely that (9b) is true.

(9)a. Theo hates sonnets and so does his wife.
b. Theo hates sonnets $\rightarrow$ Theo has a wife

Nonetheless, we would infer from (9a) that Theo has a wife, just as we would from (8a), but this inference is easily accounted for, because if (9a) is updated to a context that meets the requirement that (9b) is true, then the resulting context will satisfy the proposition that Theo has a wife, via modus ponens. Thus both sentences will license the inference that (8b) is true, but only (8a) presupposes (8b); (9a) merely presupposes (9b). Besides, one would probably want to say that (8a) and (9a) entail (8b) anyhow, so although it seems a bit peculiar that these sentences should have different presuppositions, the predictions we get are otherwise unobjectionable.

Things take on a different aspect, though, if we embed (8a) and (9a) under a negation operator or in a modal context. First, let us have a brief look at the type of example for which the satisfaction theory gives the correct predictions:

(10) It is {possible/not true} that Theo has a wife and that his wife hates sonnets.

Negation, as we have seen, is transparent to presuppositions: $\neg\varphi$ is defined iff φ is, and I assume here that the same would hold for modal operators such as *possible*, although officially our language doesn't contain any.[7] Thus (10) is predicted to impose upon its context the same presuppositional requirements as the embedded conjunction does, and if we may pretend that this sentence contains just a single presupposition-inducing expression, i.e. the possessive NP, the set of its presuppositional requirements is empty. For the embedded conjunction is of the form $\varphi \wedge \psi\{\varphi\}$, and since $c[\varphi]$ will always satisfy φ, no matter what information c contains, this conjunction imposes no requirements on its context at all. In particular, the satisfaction theory correctly predicts that (10) doesn't presuppose that Theo is married.

Now compare the following sentences:

(11)a. It is {possible/not true} that Theo's wife hates sonnets and that his manager does so too.

b. It is {possible/not true} that Theo hates sonnets and that his wife does so too.

Intuitively, we would infer from both sentences that Theo has a wife, but the satisfaction theory only predicts this for (11a). Since in each case the highest operator is a hole to presuppositions, (11a) and (11b) are predicted to have the same presuppositions as (8a) and (9a), respectively: (11a) presupposes that Theo is married, but (11b) merely presupposes that Theo has a wife *provided that* he hates sonnets, and in this case it is not at all clear how the stronger inference might be obtained. So in its pristine form the satisfaction theory cannot explain why we would normally infer from (11b) that Theo has a wife. Since this problem arises because a presupposition is weakened by a condition that is not intuitively observable, I will call this the 'proviso problem'.

The proviso problem arises because what is intuitively speaking presupposed is often more (or stronger) than what is required to guarantee local satisfaction of a given presupposition. The problem isn't restricted to conjunctions but also turns up with conditionals, which isn't so remarkable since conjunctions and conditionals share the same definedness conditions. Thus, the theory predicts that (12a) presupposes that Theo has a wife, while (12b) merely presupposes that he has a wife if he hates sonnets:

(12)a. If Theo's wife hates sonnets then his manager does so too.

[7] It should be noted, however, that non-extensional contexts cause the satisfaction theory serious trouble (as will be shown in Section 4), and that it is doubtful that the theory can account for the fact that *possible* is a presuppositional hole.

b. If Theo hates sonnets then his wife does so too.

And again, although intuitively both sentences imply that Theo has a wife, the satisfaction theory straightforwardly predicts this for (12a) but not for (12b), which is predicted to presuppose merely that the conditional in (9b) is true.

In short, it appears to be characteristic of all satisfaction theories that for a certain range of constructions they deliver predictions that are too weak. This proviso problem arises, in particular, when a presupposition is triggered in the consequent of a conditional or in the second member of a conjunction that occurs in a non-entailed position, e.g., in the scope of a negation or a modal operator. The problem isn't restricted to these environments, however. It was noted above that the local context in which a presupposition χ arises is given by an expression of the form $c[\varphi_1][\varphi_2]\ldots[\varphi_n]$, $n \geqslant 0$, where c is the global context. The general proviso problem is that the satisfaction theory predicts that in this situation only a presupposition of the form $(\varphi_1 \wedge \varphi_2 \wedge \cdots \wedge \varphi_n) \rightarrow \chi$ will survive, whereas the intuitive inference will often be that χ is true. Thus for the following example, which is of the form $\varphi \rightarrow (\psi\{\chi\} \wedge \psi'\{\chi'\})$,

(13)a. If Theo writes one more sonnet, his wife will be happy and his manager will be sore.
b. Theo writes one more sonnet $\rightarrow$ Theo is married
c. (Theo writes one more sonnet $\wedge$ Theo's wife is happy) $\rightarrow$ Theo has a manager

the satisfaction theory predicts that (13a) presupposes (13b) and (13c) rather than 'Theo is married' and 'Theo has a manager', respectively.

It should have become clear in the foregoing that the proviso problem isn't a problem about conditionals – it is *also* a problem about conditionals. However, in the following, conditionals will play an important role, because if we want to keep the complexity of our data at a minimum, samples of the form $\varphi \rightarrow \psi$ are preferable to, say, ones of the form $\neg(\varphi \wedge \psi)$ or $\varphi \vee (\psi \wedge \chi)$. In a sense it is unfortunate that this should be so, because the semantics of conditionals is a very moot issue indeed. It is generally acknowledged that the natural-language conditional cannot be identified with the material implication, as we have done so far and will do for the time being, and a number of semantic theories are available designed, e.g., to avoid the notorious 'paradoxes' of material implication. But although I agree that the material implication is at best a very rough approximation to the meaning of the natural language conditional, I don't think that the problems to be discussed below are alleviated by adopting a more

sophisticated semantics of 'if ... then'. To illustrate this point, let us consider the possibility of incorporating into our context-change semantics the theory of conditionals developed by Stalnaker and Lewis, which surely ranks among the more respectable accounts (see Stalnaker 1968, 1976, Lewis 1973). Formulated in truth-conditional terms, this analysis says that 'if φ then ψ' is true in the current world iff ψ is true in all those φ-worlds that are maximally similar to the current world. Adopting a proposal by Heim (1992), this translates into the context-change format as follows, where '$\rhd$' represents the Lewis/Stalnaker conditional:

(14) $c[\varphi \rhd \psi] = \{w \in c$: $\mathrm{sim}_w(c[\varphi])$ satisfies $\psi\}$, where $\mathrm{sim}_w(c[\varphi])$ is the set of $w' \in c[\varphi]$ such that w' is maximally similar to w

This is defined iff $c[\varphi]$ is defined and for all $w \in c$, $\mathrm{sim}_w(c[\varphi])[\psi]$ is defined. So, assuming that $c[\varphi]$ is defined, $c[\varphi \rhd \psi\{\chi\}]$ is defined iff for all $w \in c$, $\mathrm{sim}_w(c[\varphi])$ satisfies χ, and this holds iff c satisfies $\varphi \rhd \chi$. That is to say, if we adopt '$\rhd$' instead of '$\rightarrow$' as the formal counterpart to the natural language conditional, the prediction that $\varphi \rightarrow \psi\{\chi\}$ presupposes $\varphi \rightarrow \chi$ gives way to the parallel prediction that $\varphi \rhd \psi\{\chi\}$ presupposes $\varphi \rhd \chi$. Intuitively, this is still not right. However, while in the former case the presupposition predicted is weaker than the inference that is intuitively perceived, in the latter case the predicted presupposition is neither stronger nor weaker than the observed inference.

Note that if we decide to represent the natural language conditional by '$\rhd$' instead of '$\rightarrow$', the theory's predictions about conditionals and conjunctions will diverge: $\varphi \rhd \psi\{\chi\}$ presupposes $\varphi \rhd \chi$ but of course $\neg(\varphi \wedge \psi\{\chi\})$ still presupposes $\varphi \rightarrow \chi$. So unless the interpretation of the conjunction is changed, too, the proviso problem will now appear in two forms: some of the presuppositions that the theory predicts will be too weak, while others will be logically unrelated to what is observed.

For the time being, I will stick to the context-change semantics defined in (2), and construe conditionals in terms of material implication. The main reason for doing so is that the proposal by Karttunen and Peters which is discussed in the next section starts out from the assumption that the conditionalized presuppositions predicted by the satisfaction theory are truth-functional. In Section 4 an argument is discussed that requires them to be *non*-truth-functional, and then the Lewis/Stalnaker analysis will be taken up again.

It may perhaps be less than obvious why the proviso problem is a problem at all. For intuitively speaking it is perfectly clear how examples like (11b) and (12b) should be analysed: since the presupposition that Theo has a wife is not satisfied in these cases, *that presupposition* (i.e. the

presupposition as triggered by the possessive NP) should be accommodated. However, for a satisfaction theorist this isn't an appealing line to take, to say the least. The beauty of the satisfaction theory is that the facts about presupposition projection automatically fall out of a theory of context change and some general principles governing accommodation.[8] According to the satisfaction theorist, there is no need for a *theory* of presupposition projection; all he needs, or so he hopes, is a list of presupposition *inducers*, which records that definite NPs trigger existential presuppositions, that factive verbs presuppose their complements, and so on. Once he has such a list, he expects his context-change semantics to tell him what requirements any given sentence imposes on a context in which it is uttered. But seen from this perspective, if he is prepared to stipulate that under certain circumstances a stronger proposition must be accommodated than is required by the rules of context change, the satisfaction theorist can dismiss not only the proviso problem, but one of his main tenets, to boot.

This point is important enough to be laboured a bit. As we have seen, the satisfaction theory predicts that $\varphi \rightarrow \psi\{\chi\}$ presupposes that $\varphi \rightarrow \chi$. In fact, this prediction follows automatically from the context-change semantics given in the previous section. Suppose now that we would rule that if c doesn't satisfy $\varphi \rightarrow \chi$, then χ must be accommodated. It would be easy, in fact trivial, to postulate this. But if we adopt this measure, there ceases to be a connection between the presuppositions predicted by our context-change semantics, on the one hand, and what the theory says about accommodation, on the other. So the point is not that a postulate to this effect wouldn't solve the problem, but that the problem would be solved by sacrificing the theory's sober elegance.

There are cases in which the conditionalized presuppositions that the satisfaction predicts are arguably correct.[9] The following examples are due to one of the reviewers for *L & P*:

(15)a. If Theo is a scuba diver, then he will bring his wet suit.
b. Theo is a scuba diver $\rightarrow$ Theo has a wet suit

(16)a. It is possible that Theo has diabetes and must eat his regular diet.
b. Theo has diabetes $\rightarrow$ Theo must eat his regular diet

[8] I am prepared to grant that these principles aren't restricted to presuppositional phenomena (cf. Lewis 1979), and can therefore be motivated on independent grounds.

[9] See Beaver (1993), who argues that these are counterexamples against van der Sandt's theory of presupposition projection, which will be briefly discussed in Section 6.

It seems possible to read (15a) as implying that Theo has a wet suit, no matter what. But it is certainly more natural to merely infer from (15a) that (15b) is true, which is what the satisfaction theory predicts.[10] And for (16a), too, it seems that the satisfaction theory produces an adequate prediction. Therefore, these examples present no problems to the theory, but it should be noted that the support that they offer is perhaps more apparent than real. To see why, consider the following variation on (15):

(17)a. If Theo is a scuba diver and wants to impress his girlfriend, then he will bring his wet suit.

b. (Theo is a scuba diver $\wedge$ Theo wants to impress his girlfriend) $\rightarrow$ Theo has a wet suit

(17a) is the result of strengthening the antecedent of (15a), and intuitively this has no consequences for the presuppositions that this sentence gives rise to: if the favoured presupposition of (15a) is (15b), then the same presupposition should be associated with (17a). However, in this case the satisfaction theory cannot offer more than (17b), and I find it difficult to understand in the abstract why a theory that makes correct predictions about (15a) should fail to make sufficiently strong predictions about (17a), unless of course the correct predictions are simply due to a happy coincidence.

The proviso problem isn't restricted to the satisfaction theory: it also arises in Karttunen and Peters' (1979) system and in various presuppositional logics. If we construe, say, strong Kleene logic as a presupposition theory,[11] we find again that $\varphi \rightarrow \psi\{\chi\}$ presupposes $\varphi \rightarrow \chi$. Predictably, therefore, the problem hasn't gone unnoticed, but although the proviso problem has often been mentioned in the literature,[12] I know of only two attempts at solving it. One proposed solution, first suggested by Karttunen and Peters, will be discussed in the remainder of this section and in Section 3; the second proposal is the subject of Section 4.

Karttunen and Peters maintain that there is really nothing wrong with the predictions that the satisfaction theory makes: it is *correct* that (11b)

[10] This particular prediction is pre-empted by the fact that (15b) is already entailed by (15a), anyway, but this doesn't hold for the next example.

[11] Quite apart from the problem noted here, this would be a rather unfortunate decision. See, e.g., Karttunen and Peters (1979) and Krahmer (1993) for discussion.

[12] E.g., by Karttunen and Peters (1979), Gazdar (1979), Soames (1982), Heim (1983), van der Sandt (1988), Krahmer (1993), and Beaver (1993).

and (12b) merely presuppose that (9b) is true.[13] On the other hand, Karttunen and Peters don't want to deny that under normal circumstances both sentences would license a stronger inference, namely that Theo has a wife. The conclusion that they draw from this is that there must be some train of reasoning which on the basis of, inter alia, the conditional presupposition in (9b) produces the inference that Theo is married. Hence, this inference is not itself of a presuppositional nature, the 'real' presupposition in (9b) being just one of the premisses on which it is based. In the following I shall first criticize the general outlines of Karttunen and Peters' account, and then turn to two arguments that have been proposed in order to explain the alleged strengthening of conditional presuppositions like (9b).

Regardless of what the details of the strengthening process look like, Karttunen and Peters' proposed solution to the proviso problem is a priori implausible. They assume a systematic difference between, e.g., sentences of the form $\varphi\{\chi\} \rightarrow \psi$ or $\neg(\varphi\{\chi\} \wedge \psi)$ on the one hand and $\varphi \rightarrow \psi\{\chi\}$ or $\neg(\varphi \wedge \psi\{\chi\})$ on the other, and this difference is simply not there, intuitively speaking: introspectively each of these forms licenses the inference that χ is true (still assuming that φ and χ are logically independent), and there is simply no pre-theoretical evidence in favour of the assumption that this inference has different sources depending on whether the presupposition is triggered in the first or in the second half of the sentence. Karttunen and Peters' argument is therefore quite clearly an attempt to reason away the unwelcome side effects of the satisfaction theory.

There is another objection, due to van der Sandt (1992), against the very idea of tackling the proviso problem by postulating an inferential chain that, given a presupposition of the form $\varphi \rightarrow \chi$ and some additional premisses, allows us to conclude that χ is true. It has often been observed that objects whose existence may be assumed only on the basis of an inference aren't easily accessible to anaphoric expressions. The following pair illustrates this familiar point:

(18)a. Mark's head was chopped off but even so it kept smiling.
b. Mark was decapitated but even so it kept smiling.

In (18a) it is easy to interpret the pronoun as being corefential with *Mary's*

[13] As I indicated in the introduction, unlike Karttunen's 1974 proposal, the theory that Karttunen and Peters present in their 1979 article is not a satisfaction theory as I understand that notion. Empirically, however, their theory runs into the same problems as Karttunen's earlier theory. So originally the following argument was intended to save not the satisfaction theory, but some of the predictions that it has in common with the theory of Karttunen and Peters.

head, but in (18b) it is hard to get the pronoun to pick up Mary's head, although it may be inferred that it is there. In general, merely inferred objects aren't eligible to be picked up by pronouns. This rule holds for objects whose existence is inferred, but not for objects that are introduced with the help of an indefinite NP or that enter the context through accommodation: in (19a) the pronoun *she* may refer back to Theo's wife.

(19)a. If Theo's wife hates sonnets then his manager does so too. But anyway, she is very fond of elegies.
b. If Theo hates sonnets then his wife does so too. But anyway, she is very fond of elegies.

The problem for the satisfaction theory is (19b). For the theory claims that in (19b) Theo's wife is not accommodated but enters the discourse as the result of an inference. So how is it that the pronoun can pick up Theo's wife just as easily here as it can in (19a)? The drift of this argument is the same as that of the previous one: the satisfaction theory would have us believe that although both (19a) and (19b) imply that Theo is married, they do so in entirely different ways; and apart from the fact that this conclusion is inevitable for theory-internal reasons, there is no independent evidence to confirm it.

3. The Argument from Truth-Functionality

Let us consider how Karttunen and Peters' proposal might be fleshed out. I shall first outline the argument that Karttunen and Peters themselves propose, and then present a number objections against it. In the next section, I will consider another argument, and attempt to show that most of these objections apply to it as well. Karttunen and Peters (1979) propose a quasi-Gricean argument for deriving χ from the presupposition that $\varphi \rightarrow \chi$. The general pattern of this argument from truth-functionality, as I call it, is the following (see also Soames 1979):

(20) *The argument from truth-functionality*
a. The speaker has uttered a sentence of the form $\varphi \rightarrow \psi\{\chi\}$ and therefore has *said* that $\varphi \rightarrow \psi$ and *presupposed* that $\varphi \rightarrow \chi$.
b. It may be assumed that the speaker's grounds for presupposing $\varphi \rightarrow \chi$ are of a truth-functional nature – i.e. he knows either that φ is false or that χ is true.
c. It may be assumed that the speaker doesn't know if φ is true or false (this is conversationally implicated by his saying

$\varphi \rightarrow \psi$), and more particularly, it may be assumed that he doesn't know that φ is false.

d. Therefore, the speaker knows that χ is true.

This version only applies to conditional sentences, but it is clear that an analogous schema could be given for embedded conjunctions. The two essential clauses in this schema are (20b) and (20c). Note that the latter is dependent upon a conversational implicature, but not necessarily so: the argument would still apply if we had other grounds for assuming that the speaker doesn't know that φ is false (the relevance of this point will become clear later on).

To illustrate how this argument is supposed to work, let us consider the following example, which is discussed by Soames (1982: 494f):

(21)a. If the problem was difficult, then Morton isn't the one who solved it.

b. The problem was difficult $\rightarrow$ someone has solved the problem.

c. Someone has solved the problem.

The consequent of (21a) contains an it-cleft which triggers the presupposition that (21c) holds, and therefore the satisfaction theory predicts that the sentence as a whole presupposes that (21b) is true. Since in most contexts, a problem's being difficult will not count as a reason for supposing that someone has solved it, the speaker is presumably presupposing (21b) on truth-functional grounds. But by asserting (21a) he has conversationally implicated that he doesn't know if the problem was difficult, and we must therefore assume that he doesn't take (21b) to be true by falsity of antecedent. Therefore, it must be the case that he takes (21c) to be true.

I have four objections against this argument. First, the argument only goes through if we may plausibly assume that the speaker has truth-functional grounds for presupposing a conditional. Unfortunately, however, the inference that (20) seeks to account for will in general go through even when the speaker is likely to have *non*-truth-functional grounds for making this presupposition. To illustrate this, we need only slightly change Soames' example:

(22)a. If the problem was easy, then Morton isn't the one who solved it.

b. The problem was easy $\rightarrow$ someone has solved the problem.

All we have done in (22a) is replace the adjective *difficult* with its antonym, but the strong inference still goes through: (22a) implies that someone

solved the problem just as much as (21a) does. However, the conditional presupposition that the satisfaction theory predicts is (22b), and in this case it is perfectly plausible that the speaker doesn't have truth-functional grounds for making this presupposition: if a problem is easy the degree of probability that it has been solved is relatively high. And since, furthermore, non-truth-functional interpretations are generally preferred to truth-functional ones, the second step in the inference schema, (20b), surely doesn't go through, and thus the truth-functionality argument is inapplicable to (22a).

I can see two ways this objection might be avoided, neither of which strikes me as very promising though. The first would be to claim that, in a context in which (22a) is typically uttered, (22b) will have a truth-functional interpretation after all, but I cannot think of an argument that would even begin to support this claim. But then the only alternative that remains is to try and come up with another explanation. Such an explanation would be quite different from the one schematized in (20), because we have just seen that one of the crucial premisses in this schema doesn't hold. But then, no matter what the details of this prospective explanation look like, since it will be different from the one schematized in (20), it will follow that the presuppositional domain is even more fragmented than the satisfaction theory already assumes it is. For as we have seen, the satisfaction theory entails that

(23) If it is Morton who solved the problem, then it was an easy one.

presupposes (21c) while (21a) and (22a) don't. Now in addition, the theory would claim that, although (21c) follows from (21a) and (22a), too, the inference is of a fundamentally different nature in each case. Once more, the satisfaction theory is forced to assume that what seems to be a homogeneous phenomenon is in reality a disparate bunch of facts.

My second objection against the argument from truth-functionality has to do with the fact that it hinges upon the assumption that the speaker does not presuppose (21b) because he takes the antecedent to be false. In the examples that we have considered thus far this premiss is derived as a conversational implicature: since the speaker has uttered a sentence of the form $\varphi \rightarrow \psi$ his audience is entitled to assume that he doesn't know that φ is false (or true). As this is a conversational implicature it can be overwritten: the speaker might simply say that he knows the antecedent to be false, for example. But if he chooses to do so, the inference schema in (20) no longer holds, and we would expect the inference to be retracted as well. This is not what happens, however.

(24) If the problem was difficult, then Morton isn't the one who solved it. But as a matter of fact the problem wasn't difficult at all.

In (24), the speaker explicitly asserts that the problem wasn't difficult, thus overwriting the conversational implicature that his first utterance gives rise to. Consequently, condition (20c) is no longer fulfilled, and the inference should not go through anymore. But of course, we would still infer from the discourse in (24) that the speaker assumes that someone solved the problem. Again, this suggests rather strongly that nothing like the truth-functionality argument is involved in this inference,

The third objection concerns the same clause in the argument, i.e. (20c). This clause makes the desired inference contingent upon a conversational implicature (at least in the cases we have discussed sofar), which leads us to expect that the inference is cancellable. We saw in (24) how the conversational implicature licensed by the first member of a conditional (in this case, that the speaker doesn't know if the problem was difficult or not) can be cancelled. Now compare that discourse with the following:

(25) ?If the problem was difficult, then Morton isn't the one who solved it. But as a matter of fact the problem wasn't solved at all.

Or compare the following two discourses:

(26) If there are piranhas in the Rhine, then Theo's wife should know about it.
  a. But of course, there are no piranhas in the Rhine.
  b. ?But of course, Theo isn't married.

It seems to me that while it is perfectly okay to cancel an ordinary conversational implicature, it is impossible to cancel the inference which, according to the satisfaction theory, is based upon such an implicature.

The observation which the fourth and final objection turns upon is a straightforward one. The argument from truth-functionality is meant to strengthen conditional presuppositions which arise, or are supposed to arise, in an indirect way, as they are pieced together out of material contributed by a presuppositional expression as well as its carrier sentence (e.g., the antecedent of a conditional). But actually it shouldn't make a difference *how* this presupposition arises. In particular, the argument should also apply if the presupposition were triggered directly, e.g., because a conditional is embedded within the scope of a factive predicate, as in the following example:

(27) Walter knows that if the problem was difficult, then someone solved it.

Here the presupposition that (21b) is true is triggered directly, and intuitively (27) does indeed presuppose that (21b) is true, *and nothing more*. In fact it would be quite remarkable if (27) would ever give rise to the inference that someone solved the problem, except of course in contexts in which it is given that the conditional's antecedent is true. According to the satisfaction theory, however, (27) parallels (21a) and it should therefore be possible to find contexts in which it implies that someone solved the problem. In fact, it should be sufficient that a speaker who utters (27) doesn't know if the problem is difficult, for then the two essential conditions in the truth-functionality argument, viz. (20b) and (20c), would be fulfilled. This prediction doesn't tally with our intuitions, however: it is obvious that even in such a context, we wouldn't infer from (27) that someone solved the problem.

Or consider the following discourse:

(28) I don't know if the problem was difficult or not, but I do find it surprising that if the problem was difficult, then someone has solved it.

A speaker who utters (28) presupposes that (21b) is true and asserts that he doesn't know if the problem is difficult or not. But we wouldn't normally infer from his utterance that he assumes that someone has solved the problem. So again, the truth-functionality argument makes the wrong predictions.

I believe that the contrast between (21a) and (27) is of considerable interest, because at least prima facie it looks as if it will present a problem for practically any theory which claims that the inference from (21a) to (21c) is mediated by the presupposition in (21b). As the following examples show, this contrast is produced not only by it-clefts but by other presuppositional expressions as well:

(29)a. If Walter is sensible, then he will stop smoking.
b. Theo knows that if Walter is sensible, then he is a habitual smoker.
c. Walter is sensible → Walter is a habitual smoker.
d. Walter is a habitual smoker.

(30)a. If Julius had canard à l'orange, then what his wife ate was potato chips.

b. Theo knows that if Julius had canard à l'orange, then his wife ate something (too).
c. Julius had canard a l'orange → Julius' wife ate something.
d. Julius' wife ate something.

(31)a. If that's a Mercedes, then this is a BMW.
b. Theo knows that if that's a Mercedes, then this is a car (too).
c. That is a Mercedes → this is a car.
d. This is a car.

Intuitively, we would infer from an utterance of any of the (a) sentences in (29)–(31) that the speaker takes the corresponding (d) sentence to be true as well; in (29a) this presupposition is triggered by the aspectual verb, in (30a) by the wh-cleft, and in (31a) by the predicate *is a BMW*. In contrast, these inferences would not normally follow from the (b) sentences. However, the satisfaction theory predicts that, in each of these cases, the (a) and (b) sentences have the same presupposition, viz. (c), and that in the first case it is strenghtened to (d). But why is this presupposition strengthened in the former case but not in the latter? Clearly, this is bound to be an embarrassing question not only to theories that incorporate the argument from truth-functionality, but to virtually any attempt at dealing with the proviso problem.

The problem exemplified by (29)–(31) is unlikely to go away if we adopt an alternative analysis of conditionals. Thus far we have construed *if . . . then* sentences in terms of material implication, and it is well known that this construal is a problematic one. However, as we have seen in Section 2, the proviso problem will remain even if we adopt the Lewis/Stalnaker analysis of conditionals, for example. What this means is that if we adopt this construal, the satisfaction theory still predicts that the (a) and (b) sentences have the same presupposition, the only difference being that the conditional is no longer construed as material implication but as a relation between possible states of affairs. It would be premature to conclude from this that there is no analysis of conditionals that will solve the problem, but it does suggest that this line of defence isn't very promising, either.

Another way of approaching the problem would be to deny that the conditionals involved in the (a) and (b) sentences in (29)–(31) are of the same type, and to argue on this basis that these sentence pairs don't give rise to the same presuppositions. There are at least two problems with this idea. First, it will have to be shown on independent grounds that in the (a) sentences *if . . . then* is construed differently than in the corresponding (b) sentences, and it is by no means obvious how that can be done.

Secondly, it is clear that such an argument wouldn't work for the following minimal pairs:

(32)a. Maybe Theo knows that if Walter is sensible, then he will stop smoking.
b. Maybe Theo knows that if Walter is sensible, then he is a habitual smoker.

(33)a. Maybe Theo knows that if that's a Mercedes, then this is a BMW.
b. Maybe Theo knows that if that's a Mercedes, then this is a car (too).

Intuitively, while (32a) presupposes that Walter is a habitual smoker, (32b) doesn't seem to have this presupposition, and analogously, (33a) but not (33b) presupposes that 'this' is a car. But of course there is no reason whatsoever for believing that the conditionals in the (a) sentences are construed differently from those in the (b) sentences.

4. The Argument from Improbability

I believe that the objections that I have mustered in the foregoing justify the conclusion that the argument from truth-functionality is wrong as well as on the wrong track: the problems it faces are so serious that it calls for replacement rather than repair. One possible replacement might be the following, which is based on the same assumptions as Karttunen and Peters': it takes as its point of departure the idea that the predictions of the satisfaction theory are correct, but occasionally require strengthening. The argument goes as follows:[14]

(34) *The argument from improbability*
a. The speaker is presupposing that $\varphi \rightarrow \chi$.
b. It is more plausible (or less controversial) to assume that χ than to assume that $\varphi \rightarrow \chi$.
c. Therefore, he is probably assuming that χ.

This is similar to the first argument in that both assume that the conditional presuppositions that cause the proviso problem are deficient in some way, but in (34) Karttunen and Peters' original idea that these conditionals are

[14] The provenance of the argument from improbability is unclear to me. I have the impression that many people have taken it for granted that something like it would work, but the only printed version that I know of is Beaver's (1992, 1993), which will be discussed below.

purely truth-functional has been watered down to the assumption that they are comparatively unlikely, or more controversial than their consequents.

Prima facie, the argument from improbability seems to be much more plausible than the argument from truth-functionality, but on closer inspection it turns out to be equally inadequate. To begin with, the argument requires that χ be more plausible than $\varphi \rightarrow \chi$, but it is obviously impossible for a proposition to be more plausible than a proposition which it entails. Therefore, this argument will not work unless we give up our construal of natural language conditionals in terms of the material implication. E.g., if we adopted '$\rhd$' as defined in (14) instead of '$\rightarrow$', 'if φ then $\psi\{\chi\}$' would presuppose $\varphi \rhd \chi$, which is neither weaker nor stronger than χ. Then it might be possible to claim that $\varphi \rhd \chi$ is more plausible than χ, and the argument outlined in (34) might go through.

However, although '$\rhd$' surely comes much closer to the way conditionals are construed in everyday practice, adopting it instead of the material implication in this case causes more problems than it solves.[15] First, as we have seen in Section 2, even if we decide to construe conditionals in terms of '$\rhd$', the satisfaction theory will still give rise to presuppositions of the form $\varphi \rightarrow \chi$ where we would like to have χ. This is because conjunctions are not (and, evidently, shouldn't be) affected by the decision to reinterpret the conditional. E.g., although $\varphi \rhd \psi\{\chi\}$ presupposes $\varphi \rhd \chi$, $\neg(\varphi \wedge \psi\{\chi\})$ still presupposes $\varphi \rightarrow \psi$. So the argument from improbability will solve only part of the problem, at best. I say 'at best' because it is easily seen that the argument will not work for conditionals, either. One of the so-called 'paradoxes' of the material implication is that it is weaker than its consequent: ψ entails $\varphi \rightarrow \psi$. Clearly, the semantics of *if . . . then* shouldn't imply that a conditional and its consequent are logically related, and one of the advantages of the Lewis/Stalnaker theory is precisely that it manages to avoid this conclusion. However, if we introduce a conditional with this property to replace the material implication, the proviso problem is actually exacerbated. As long as the satisfaction theorist can say that his context-change semantics produces presuppositions that are just sometimes too weak, his predicament at least makes sense. But, ironically, the plausibility of his position diminishes as soon as he adopts a semantics of conditionals that is more adequate than what the propositional calculus has to offer. In general, if a sentence of the form $\varphi \rhd \psi\{\chi\}$ has just been uttered in a context in which $\varphi \rhd \chi$ is not yet given, the hearer's accepting χ doesn't contribute towards the satisfaction of χ in its local context.

[15] The problem to be discussed in the following extends to non-extensional contexts in general.

Regardless whether he accepts χ or not, he must *also* accommodate $\varphi \rhd \chi$ (or something stronger). But then what is the point of inferring χ on the basis of $\varphi \rhd \chi$, even if the former is more plausible than the latter? Or, to put it the other way round, the satisfaction theory implies that even if χ is contextually given, the presupposition in $\varphi \rhd \psi\{\chi\}$ isn't automatically satisfied – a consequence which strikes me as paradoxical if not absurd.

But even if we set these difficulties aside, there are further problems that defenders of the improbability argument will have to face. Since it is based on comparative plausibility judgments, the argument implies that there is a parallel between our intuitions about the presuppositions of sentences of the form, e.g., $\varphi \rightarrow \psi\{\chi\}$ on the one hand, and our intuitions about the relative plausibility of χ and $\varphi \rightarrow \chi$ on the other.[16] As I observed in Section 3, (35a) (= (22a)) strongly suggests that (35c) (= (21c)) is true, and the argument from improbability seeks to explain this fact on the premiss that (35c) is more plausible than (35b) (= (22b)), which according to the satisfaction theory is presupposed by (35a).

(35)a. If the problem was easy, then Morton isn't the one who solved it.
b. The problem was easy → someone has solved the problem.
c. Someone has solved the problem.

I am not going to quibble about the relative probabilities of (35b) and (35c) (although, off the record, I don't believe that the latter is more plausible than the former). My point is the following. On the one hand it is obvious that (35a) implies (35c), in a fairly strong sense of 'imply'. On the other hand it is anything but obvious that (35c) is more plausible than (35b). However, if the argument from improbability is correct, then the two preceding statements cannot be true together, because judging that (35c) is more plausible than (35b) is tantamount to judging that (35a) implies (35c). But since these two statements are, evidently, not the same thing, the argument must be wrong. Nor is this problem restricted to a single example:

(36)a. If Mwamba is a monarchy, then Mzamba is a monarchy (too).
b. Mwamba is a monarchy → Mzamba is a sovereign state.
c. Mzamba is a sovereign state.

[16] I reintroduce the arrow here because I have been using it for most of the time, and as I have just argued, '→' and '▷' are equally problematic in the present context. Put otherwise, the following remarks don't depend on any particular way of construing conditionals.

(37)a. If Mwamba is a monarchy, then the king of Mzamba will support it.
b. Mwamba is a monarchy → Mzamba has a king.
c. Mzamba has a king.

(38)a. If Mwamba is a monarchy, then the king of Mzamba will continue to support it.
b. Mwamba is a monarchy → until now, the king of Mzamba has supported Mwamba.
c. Until now, the king of Mzamba has supported Mwamba.

The argument from improbability requires that the strong intuition that the (a) sentences in (36)–(38) imply the corresponding (c) sentences should be matched by an equally strong intuition that the (c) sentences are more plausible than the corresponding (b) sentences. But there is no such match.

One of my objections against the truth-functionality argument was that it makes the strengthening of conditional presuppositions contingent upon conversational implicatures, and thus leads us to expect, wrongly, that these inferences are cancellable. Although the argument from improbability doesn't rely upon conversational implicatures, the foregoing observations suggest that a similar objection is justified in this case, too. The reason is that this argument crucially relies upon judgments of relative probability, which aren't always clear-cut. But if an inference is based upon uncertain premisses, we shouldn't expect it to be particularly solid. And as we have seen, this expectation is simply incorrect. There are differences of a presuppositional nature between sentences of the form $\varphi \rightarrow \psi\{\chi\}$ and $\varphi\{\chi\} \rightarrow \psi$,[17] but it is not that *if* we conclude that χ from either of these, the inference is more easily cancelled, or less secure, in the former case than in the latter. With respect to the examples in (35)–(38), I think it is clear that most hearers would confidently judge that the (a) sentences imply the corresponding (c) sentences. But they would not nearly be as confident in their judgments about the comparative probabilities of the (b) and (c) sentences. But then it seems rather unlikely that the former judgments should be based, inter alia, upon the latter.

Of course, I don't want to argue that projection phenomena are completely impervious to (certain forms of) uncertain knowledge; an example like (39) (= (15a)) suffices to prove that this isn't the case.

(39) If Theo is a scuba diver, then he will bring his wet suit.

[17] In particular, in $\varphi \rightarrow \psi\{\chi\}$, but not in $\varphi\{\chi\} \rightarrow \psi$, the presupposition that χ may be 'blocked' by information in the antecedent of the conditional.

It is *apparent* that if we don't infer from this that Theo has a wet suit, then it is because we assume that scuba divers often if not always possess wet suits. But if the inference from (35a) to (35c) were likewise based upon some piece of world knowledge, we should expect this to be equally apparent. But it isn't.

Finally, the improbability argument applies to (40a) (= (27)), and delivers the patently false prediction that we would infer from this sentence that someone solved the problem.

(40)a. Walter knows that if the problem was difficult, then someone solved it.
b. If the problem was difficult, then Morton isn't the one who solved it.

This counterexample is even more problematic for the present argument because we don't have to make any special provisions about the context in which (40a) is uttered: if the argument from improbability applies to (40b) (= (21a)), it should apply to (40a) as well, because according to the satisfaction theory the relevant presupposition is the same in both cases. Conclusion: although prima facie it is less artificial than the argument from truth-functionality, the improbability argument doesn't fare any better.

To conclude my discussion of the proviso problem, I want to briefly consider a version of the argument from improbability proposed by Beaver (1992, 1993). Thus far I have construed this argument as based upon a plausibility measure of propositions: it is because the hearer believes that $\varphi \rightarrow \chi$ is less plausible than χ that he is prepared to infer that χ. Beaver claims, however, that the relevant plausibility judgments concern the hearer's beliefs not about the world, but rather about what he takes to be the common ground between the speaker and himself. The idea is that in general it is not fully determinate what is in the common ground and what is not (at any given point in the discourse). Rather, each of the interlocutors may entertain several hypotheses about the common ground, some of which he may deem to be more plausible than others. An interesting consequence of this conception is that it opens a new perspective on one of the problems that I discussed in the foregoing. I observed that it is difficult to see how χ can be more plausible than the weaker $\varphi \rightarrow \chi$, as the argument from improbability requires, but Beaver would say that this difficulty only arises because I have been asking the wrong question. What I should have asked instead, according to Beaver, is whether the hearer finds it more likely that the *common ground* satisfies χ or just $\varphi \rightarrow \chi$. And the hearer's answer to this question might very well be that the former possibility is more likely than the latter.

Although Beaver's proposal offers a solution to one of the problems that have come up in the foregoing, I don't see that it improves matters in more than one respect. Beaver shows how the satisfaction theorist can consistently adopt the argument from improbability without having to give up on the standard context-change semantics of Section 1. However, as I have pointed out in this section, it is clear that at least for conditionals this semantics is inadequate, and it still remains to be seen how a more sophisticated semantics of conditionals can be incorporated into the satisfaction framework. Secondly, Beaver's version of the improbability argument does nothing to alleviate the problems illustrated by (35)–(38). Indeed, it seems to me that if instead of asking whether the (c) propositions are more plausible than the (b) propositions, we now ask which ones are more likely to be part of the common ground, then it becomes even more questionable that there will be a majority vote for (c), as the argument from improbability requires. And finally, Beaver's version of the argument of improbability doesn't account for the difference between, e.g., (40a) and (40b).

Summarizing the results of this section and the previous two, I have argued against the idea that the proviso problem can be solved along the lines first suggested by Karttunen and Peters. I have objected against the very idea of deriving the required inferences in a two-stage process, and have criticized two arguments that have been proposed to account for the alleged strengthening of conditional presuppositions. My main conclusions are: that the conditional presuppositions which the satisfaction theory predicts are mere artefacts of that theory; that the notion that the observed inferences are to be derived in a two-stage process is ill conceived; and that there is at present no account that explains how this strengthening might be accomplished.

5. Further Problems

The main problem with the satisfaction theory is that certain of the presuppositions that it predicts are conditionalized whereas intuitively they shouldn't be. But occasionally, the theory simply fails to generate any presuppositions at all while intuitively we would like to have some. This problem arises because the theory predicts that sentences of the form $\varphi \rightarrow \psi\{\chi\}$ or $\varphi \wedge \psi\{\chi\}$ will not presuppose anything if χ already follows from φ (cf. van der Sandt 1988). This gives the right predictions in many cases, but it is not always correct, as the following examples show:

(41)a. If all countries have presidents, then the president of France probably regards himself as their cultural leader.

b. It is {possible/not true} that all countries have presidents and that the president of France regards himself as their cultural leader.

Example (41a) is taken from Soames (1982: 539), who argues that the satisfaction theory gives the correct predictions in this case, and if Soames were right about this, the same would hold for (41b). Unfortunately, however, Soames' reasoning is defective. His argument is based upon the observation that (41a) 'is *neutral* regarding whether or not the speaker assumes [that France has a president], and no utterance presupposition is heard', (ibid.) and he concludes from this that a theory which doesn't predict a presupposition in this case has the facts right. This conclusion isn't warranted, however, because only half of the observation on which it is based is correct. Soames is right in saying that, taken by itself, (41a) remains neutral with respect to the presupposition that France has a president, but this doesn't mean that it never will have this presupposition, as the satisfaction theory predicts. Rather, (41a) can be read either as presupposing or as not presupposing that France has a president, and the satisfaction theory only accounts for the latter possibility.

That both sentences in (41) have a reading on which it is presupposed that France has a president can be seen from the fact that this individual may be taken up by an anaphoric pronoun. E.g., if either (41a) or (41b) were followed by an utterance of,

(42) He is such a pompous person.

it would be perfectly clear who was being referred to. But the examples in (41) will not license this anaphoric link unless they are construed as presupposing that France has a president. It is precisely this strong reading, however, which the satisfaction theory fails to account for.

It may be objected that the problem presented by the examples in (41) is only an apparent one, and will dissolve once we allow for the possibility that the definite NP *the president of France* has a referential interpretation. For if this NP is construed referentially, it outscopes the conditional to begin with, and the seemingly problematic reading is accounted for in a straightforward manner. I will not argue against this proposal here, and merely wish to point out that the problem exemplified by the examples in (41) isn't restricted to definite NPs but can be replicated with all kinds of presupposition inducing expressions and constructions. E.g.,

(43)a. If all the boys failed the exam, then it wasn't only Fred who did so.

b. If all the boys left at the same time, then the janitor will not have noticed that Fred left.

If Fred is one of the boys, then (43a) is an obvious truth, but nonetheless this sentence may be construed as implying that Fred failed the exam. However, the presupposition that Fred failed the exam, which is triggered in the consequent of the conditional, is satisfied in its local context, and therefore the satisfaction theory is not in a position to account for this inference. Similarly, if all the boys left at the same time, and still assuming that Fred is one of the boys, then Fred must have left, too. So the presupposition induced by the factive in (43b) is satisfied in its local context, and therefore the satisfaction theory doesn't account for the more obvious interpretation of this sentence, according to which Fred left.

If the examples in (41) are to be analysed on the assumption that *the president of France* may be construed referentially, then how should cases like (43a) or (43b) be dealt with? Heim (1992) suggests that it might be argued that all presupposition inducers can be construed referentially, and she tries to show that this is possible, in particular, for presuppositions induced by aspectual verbs and focus particles like *too*. I will not review Heim's arguments here, and confine myself to a meta-theoretical remark. It seems to me that in appealing to the possibility (if that's what it is) of construing presuppositions referentially, she is pulling the rug from under her own theory. For it is clear that, to the extent that it relies on this option, the satisfaction theory has given up the ambition of accounting for presupposition projection in terms of an independently motivated semantics of context change. Indeed, a consistent pursuit of this strategy might very well lead to the conclusion that the satisfaction theory is simply redundant (see Geurts 1995 for further discussion).

The problem that I have discussed in the foregoing arises because, intuitively, a presupposition may project to the global context although it is locally satisfied. The second problem that I want to bring up is in a sense the mirror image of this: occasionally, a presuppositional expression may be felicitously used although the presupposition it triggers is inconsistent with its local context. The following are cases in point:

(44)a. Wilma isn't married. So it wasn't Wilma's husband who shot the burglar.

b. If Wilma isn't married, it wasn't Wilma's husband who shot the burglar.

Let χ = 'Wilma is married' and c be an arbitrary context which is consistent with χ as well as with $\neg\chi$. Operating on this c, the first sentence in (44a) results in $c' = c - c[\chi]$, and thus c' consists of all and only those worlds in c in which Wilma isn't married. We now attempt to increment this context with the second sentence, which is of the form $\neg\varphi\{\chi\}$: $c'[\neg\varphi\{\chi\}] = c' - c'[\varphi\{\chi\}]$, and $c'[\varphi\{\chi\}] = c'[\varphi]$ provided c' satisfies χ. But since c' satisfies $\neg\chi$, $c'[\varphi\{\chi\}]$ is undefined, and so $c'[\neg\varphi\{\chi\}]$ is undefined as well. Therefore, χ will have to be accommodated, and since the global context c' already satisfies $\neg\chi$, it is clear that local accommodation is called for.[18] That is to say, in order to evaluate $c' - c'[\varphi\{\chi\}]$, we accommodate χ at the stage at which $c'[\varphi\{\chi\}]$ is computed, so instead of $c' - c'[\varphi\{\chi\}]$, we compute $c' - c'[\chi][\varphi\{\chi\}]$. Now we find that $c'[\chi]$ is empty because c' already satisfies $\neg\chi$, and therefore $c'[\chi][\varphi\{\chi\}]$ is empty, too, and so $c' - c'[\chi][\varphi\{\chi\}] = c'$. This outcome is correct if we may assume that the second sentence of (44a) doesn't provide any new information in a context in which the first one is already accepted. Similarly, if we allow for local accommodation as in (44a), (44b) is predicted to be a tautology, which is arguably correct, too.

However, the way in which these results are obtained is a dubious one, to say the least. The problem is that in both cases, local accommodation results in an empty, i.e. inconsistent, local context, which intuitively speaking doesn't seem to be right. And sure enough, a closer look at the examples in (44) reveals that there are serious problems with this account. Note that, apart from *Wilma's husband*, both examples contain a definite NP that we have ignored so far, viz. *the burglar*. This NP triggers the presupposition that there was a burglar, and accordingly both (44a) and (44b) imply that there was a burglar (again, analogous examples can be constructed with other presuppositional expressions). The satisfaction theory doesn't account for these inferences, however. The local context in which *Wilma's husband* and *the burglar* occur is the same in both cases, and we have just seen that the local context in which the former presupposition is evaluated must be empty. But then this context satisfies any proposition, and in particular that there was a burglar. Therefore, the presupposition that there was a burglar is satisfied in its local context, and doesn't impose any restrictions on the global context.

According to the satisfaction theory, presuppositions are definedness

[18] This analysis is in line with Heim's (1983) and Soames' (1989) comments on similar examples.

conditions:[19] unless further possible sources of undefinedness are taken into acount, for $c[\varphi]$ to be defined it is necessary as well as sufficient that all presuppositions in φ are satisfied in their local contexts. The proviso problem indicates, however, that local satisfaction isn't sufficient, and the first problem discussed in this section points in the same direction. The second problem indicates that local satisfaction isn't necessary either, for apparently what causes the problems with (44) is the requirement that the presupposition that Wilma is married must be satisfied by the local context in which it is triggered, which in these cases can be guaranteed only by emptying the local context altogether.

6. Diagnosis

I have tried to show that the satisfaction theory suffers from defects that manifest themselves mainly in the fact that the theory sometimes yields predictions that are too weak, and in the remainder of this paper I want to diagnose these defects and bring into sharper focus the reasons why the theory fails. This I propose to do by comparing the satisfaction theory with an alternative presupposition theory, which for reasons that will soon become clear I call the 'binding theory' of presupposition. The binding theory was originally proposed by van der Sandt (1989), and has since been taken up by several authors.[20] The main reason why I believe a comparison between the two theories to be of interest is that while the binding theory doesn't suffer from the shortcomings that beset the satisfaction theory, the two theories appear to be quite similar, conceptually speaking. Indeed, it has been suggested (Heim 1992, Zeevat 1992) that they are essentially equivalent. I believe that this suggestion is mistaken and that bringing out the differences between the theories may be instrumental in analysing the failure of the satisfaction theory.

As I already said in the introduction to this paper, I don't want to *defend* the binding theory here; this has been done elsewhere (see the references cited in note 20), and isn't necessary for my current purposes. I only want to make it clear that the binding theory doesn't run into the same problems as the satisfaction theory, because what I am interested

[19] Or appropriateness conditions or felicity conditions or whatever (see Section 1); the argument remains the same.

[20] E.g., van der Sandt and Geurts (1991), van der Sandt (1992), Zeevat (1992), Sæbø (1993), and Geurts (1993, 1995). See Zeevat (1992) for an alternative view on the relation between the satisfaction theory and the binding theory. For critical notes on the binding theory, see Beaver (1992, 1993).

here is why these problems should arise for one theory but not for the other.

The binding theory is based upon the observation that there are close parallels between the interpretation of anaphora on the one hand and presupposition projection on the other. In fact, anaphora in the usual sense of the word may be viewed as a special case of presupposition, and theories of dynamic interpretation that were originally conceived for dealing with anaphoric pronouns can easily be extended so as to account for presuppositions in general. A few examples will make it clear what this means. Consider how a sentence like (45a) might be represented in Discourse Representation Theory (Kamp 1981):

(45)a. If Theo has a wife, then Theo's wife hates sonnets.
b. [: [x: x is Theo's wife] ⇒ [z: z is Theo's wife, z hates sonnets]]

(45b) is intended as a rather schematic but nonetheless complete representation of (45a), except for one thing: the presupposition induced by the definite NP, whose counterpart in (45b) is underlined, hasn't been processed yet. Now suppose that we attempt to treat this presupposition as one would normally treat an anaphor in DRT. This implies that the presuppositional discourse marker z is on the lookout for a suitable antecedent, which in this case isn't hard to spot: x is accessible from the sub-DRS in which z is sitting, and its description matches that of z. So the presupposition can travel up to meet its antecedent, as a result of which we obtain (45c), or equivalently, (45d):

(45)c. [: [x, z: x is Theo's wife, z is Theo's wife, $z = x$] ⇒ [: z hates sonnets]]
d. [: [z: z is Theo's wife] ⇒ [: z hates sonnets]]

Thus the presupposition that Theo has a wife is bound in the antecedent of the conditional, just as an ordinary anaphor might have been bound, and consequently the resulting DRS doesn't entail that Theo has a wife. It is in this sense that sentence (45a) doesn't 'inherit' the presupposition that Theo has a wife.

In this example a presupposition is bound just like an anaphor, but presuppositions cannot always be so bound (recall that the binding theory views anaphora as a species of presupposition), and in general if a presupposition cannot find a suitable antecedent, it will be accommodated. This is what happens in examples like (12a) and (12b) above, which I repeat here for convenience:

(46)a. If Theo's wife hates sonnets then his manager does so too.

b. If Theo hates sonnets then his wife does so too.

Here our initial semantic representations are (47a) and (47b), respectively:

(47)a. [: [z: z is Theo's wife, z hates sonnets] ⇒ [: Theo's manager hates sonnets]]

b. [: [: Theo hates sonnets] ⇒ [z: z is Theo's wife, z hates sonnets]]

Since in these two cases, the presupposition cannot be bound, it will be accommodated, which means, in the present framework, that the presupposition itself is to be inserted in some DRS that is accessible to it. So, in (47a) the presupposition could in principle be accommodated in the principal DRS or in the antecedent of the conditional, while in (47b) it might in addition be accommodated in the consequent. However, as in the satisfaction theory, it is assumed here that, ceteris paribus, global accommodation is preferred to local accommodation, and therefore the interpretations of (46a) and (46b) that we end up with are (48a) and (48b), respectively

(48)a. [z: z is Theo's wife, [: z hates sonnets] ⇒ [: Theo's manager hates sonnets]]

b. [z: z is Theo's wife, [: Theo hates sonnets] ⇒ [: z hates sonnets]]

These DRS's both entail that Theo has a wife, and thus the theory accounts for the intuition that both (46a) and (46b) carry this presupposition. In particular, the binding theory doesn't have problems with the latter example, which causes severe problems for the satisfaction theory, as we have seen. For the binding theory, the proviso problem simply doesn't arise.

This brief exposition of the binding theory should suffice to see that there are very close parallels between it and the satisfaction theory. To begin with, the semantic frameworks within which they are formulated are intimately related: both DRT and context-change semantics are theories of dynamic interpretation whose key concepts are similar: corresponding to the notion of context that is central to the theory of context-change semantics there is in DRT the set of DRSs that are accessible from a given DRS. And the connections between the two theories run deeper than this. Both the satisfaction theory and the binding theory construe presupposition in terms of contextual givenness: they both claim that, in principle, a presupposition must be contextually given, and both invoke accommodation as a means to restore givenness when necessary. Furthermore, they impose the same basic restriction on accommodation, viz. that under normal circumstances it must be global.

But the import of the two central notions of contextual givenness and

accommodation differs between the binding theory and the satisfaction theory. The binding theory views a presupposition as an *object*, which is expected to be present in some accessible DRS. Accommodation, according to this theory, does not (or not in the first instance) restore definedness; rather it enables an anaphoric link which, in the absence of a suitable antecedent, wasn't possible before. Thus if no appropriate antecedent object can be found, it is natural to assume that an ersatz must be provided somewhere on the path of DRSs where one was expected. Put otherwise, in view of their objectual nature, it follows naturally that, if a presupposition is to be 'saved' via accommodation, it is the presupposition itself that must be accommodated.

This is quite different from the way givenness and accommodation are viewed by the satisfaction theory. This theory construes presuppositional givenness in terms of definedness conditions that are imposed upon the local context in which a presuppositional expression occurs. If a presupposition isn't satisfied it is not because the local context fails to provide an object that was expected to be there, but rather because it doesn't contain the right kind of *information*. In a sense, therefore, an expression like *Theo's wife* triggers different presuppositions according to the two theories: whereas for the binding theory it is that a woman must be given who is married to Theo, for the satisfaction theory it must be contextually given that Theo is married.

So according to the satisfaction theory, what we accommodate is information rather than objects or representations of objects. This difference is not by itself decisive, however. The decisive difference lies in the way a link is established between presupposed and accommodated information. In the binding theory this connection is simple enough: it is the presupposition itself that must be accommodated, which is natural because presuppositions are viewed as objects. However, the satisfaction theory views a presupposition not just as information but as information which is needed *in the local context* in which the presupposition arises. The local context of a presupposition χ is denoted by an expression of the form $c[\varphi_1][\varphi_2]\ldots[\varphi_n]$, $n \geq 0$, and if the *global* context c must be revised so as to let χ be defined in its *local* context $c[\varphi_1][\varphi_2]\ldots[\varphi_n]$, then the theory is forced to predict that it is sufficient if we add $(\varphi_1 \wedge \varphi_2 \wedge \cdots \varphi_n) \rightarrow \chi$ to c. Thus presuppositional requirements are inevitably weakened because of the way they are transmitted to the global context.

The binding theory views a presupposition as an agile creature that sets itself off to either find its antecedent or become accommodated. The satisfaction theory, on the other hand, pictures presuppositions as lethargic beings that keep hanging around in the neighbourhood, content to get

local satisfaction. The main purpose of this paper was to show that presuppositions are more demanding than that.

References

Beaver, D. I.: 1992, 'The Kinematics of Presupposition', in P. Dekker and M. Stokhof (eds.), *Proceedings of the 8th Amsterdam Colloquium*. University of Amsterdam, pp. 17–36.

Beaver, D. I.: 1993, *What Comes First in Dynamic Semantics*, ILLC Prepublication Series LP-93-15, University of Amsterdam.

Chierchia, G. and S. McConnell-Ginet: 1990, *Meaning and Grammar*, MIT Press, Cambridge, Mass.

Davis, S. (ed.): 1991, *Pragmatics: A Reader*, Oxford University Press, Oxford.

Gazdar, G.: 1979, *Pragmatics. Implicature, Presupposition, and Logical Form*, Academic Press, New York.

Geurts, B.: 1993, 'Constraints on Presupposition Projection', in R. A. van der Sandt (ed.), *Presupposition and Anaphora*, Workshop Reader, Fifth European Summer School in Logic, Language, and Information, Lisbon.

Geurts, B.: 1995, *Presupposing*, Doctoral dissertation, University of Stuttgart.

Heim, I.: 1982, *The Semantics of Definite and Indefinite Noun Phases*, Ph.D. thesis, University of Massachusetts, Amherst.

Heim, I.: 1983, 'On the Projection Problem for Presuppositions', *Proceedings of the West Coast Conference on Formal Linguistics* **2**, 114–126. Reprinted in Davis (ed.) 1991: 397–405.

Heim, I.: 1992, 'Presupposition Projection and the Semantics of Attitude Verbs', *Journal of Semantics* **9**, 183–221.

Kamp, H.: 1981, 'A Theory of Truth and Semantic Representation', in J. A. G. Groenendijk, T. M. V. Janssen, and M. B. J. Stokhof (eds.), *Formal Methods in the Study of Language*, Mathematical Centre Tracts 135, Amsterdam, pp. 277–322.

Karttunen, L.: 1973, 'Presuppositions of Compound Sentences', *Linguistic Inquiry* **4**, 167–193.

Karttunen, L.: 1974,'Presupposition and Linguistic Context', *Theoretical Linguistics* **1**, 181–194. Reprinted in Davis (ed.) 1991: 406–415.

Karttunen, L. and S. Peters: 1979, 'Conventional Implicature', in C.-K. Oh and D. Dinneen (eds.), *Syntax and Semantics, Presupposition*, Vol. 11, Academic Press, New York, pp. 1–56.

Krahmer, E.: 1993, 'Partiality and Dynamics: Theory and Application', in P. Dekker and M. Stokhof (eds.), *Proceedings of the 9th Amsterdam Colloquium*, University of Amsterdam, pp. 391–410.

Krifka, M.: 1993, 'Focus and Presupposition in Dynamic Interpretation', *Journal of Semantics* **10**, 269–300.

Lewis, D. K.: 1973, *Counterfactuals*, Harvard University Press, Cambridge, Mass.

Lewis, D. K.: 1979, 'Scorekeeping in a Language Game', *Journal of Philosophical Logic* **8**, 339–359. Reprinted in Davis (ed.) 1991: 416–427.

Sæbø, K. J.: 1993, 'Anaphoric Presuppositions and Zero Anaphora', in P. Dekker and M. Stokhof (eds.), *Proceedings of the 9th Amsterdam Colloquium*, University of Amsterdam, pp. 567–586.

Soames, S.: 1979, 'A Projection Problem for Speaker Presuppositions', *Linguistic Inquiry* **10**, 623–666.

Soames, S.: 1982, 'How Presuppositions are Inherited: A Solution to the Projection Problem', *Linguistic Inquiry* **13**, 483–545. Reprinted in Davis (ed.) 1991: 428–470.

Soames, S.: 1993, 'Presupposition', in D. Gabbay and F. Guenthner (eds.), *Handbook of Philosophical Logic IV*. Reidel, Dordrecht, pp. 553–616.
Stalnaker, R. C.: 1968, A Theory of Conditionals', in N. Rescher (ed.), *Studies in Logical Theory*, Blackwell, Oxford, pp. 98–112.
Stalnaker, R. C.: 1973, 'Presuppositions', *Journal of Philosophical Logic* **2**, 447–457.
Stalnaker, R. C.: 1974, 'Pragmatic Presuppositions', in M. K. Munitz and P. K. Unger (eds.), *Semantics and Philosophy*, New York University Press, New York, pp. 197–213. Reprinted in Davis (ed.) 1991: 471–482.
Stalnaker, R. C.: 1976, 'Indicative Conditionals', in A. Kasher (ed.), *Language in Focus*, Reidel, Dordrecht, pp. 179–196.
Van der Sandt, R. A.: 1988, *Context and Presupposition*. Routledge, London.
Van der Sandt, R. A.: 1989, 'Presupposition and Discourse Structure', in R. Bartsch, J. van Benthem, and P. van Emde Boas (eds.), *Semantics and Contextual Expression*, Foris, Dordrecht, pp. 267–294.
Van der Sandt, R. A.: 1992, 'Presupposition Projection as Anaphora Resolution', *Journal of Semantics* **9**, 333–377.
Van der Sandt, R. A. and B. Geurts: 1991, 'Presupposition, Anaphora, and Lexical Content', in O. Herzog and C.-R. Rollinger (eds.), *Text Understanding in LILOG*, Springer-Verlag, Berlin, pp. 259–296.
Van Eijck, J.: 1991, *Presupposition Failure: A Comedy of Errors*, Ms, University of Amsterdam.
Van Eijck, J.: 1993, 'The Dynamics of Description', *Journal of Semantics* **10**, 239–267.
Van Fraassen, B.: 1969, 'Presuppositions, Super-Valuations, and Free Logic', in K. Lambert (ed.), *The Logical Way of Doing Things*, Yale University Press, New Haven, pp. 67–91.
Veltman, F.: 1990, 'Defaults in Update Semantics', in H. Kamp (ed.), *Conditionals, Defaults and Belief Revision*, DYANA Report R2.5.A, Centre for Cognitive Science, University of Edinburgh, pp. 28–64.
Zeevat, H.: 1992, 'Presupposition and Accommodation in Update Semantics', *Journal of Semantics* **9**, 379–412.

Universität Osnabrück
FB 7
49069 Osnabrück
Germany