Context, Complex Sentences, and Propositional Content

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Abstract
In some recent developments of semantic theory, in particular certain versions of dynamic semantics, 'internal' contexts, that is, contexts defined in terms of the interlocutors' pragmatic presuppositions or the information accumulated in the discourse have come to play a central role, replacing the notion of propositional content in favor of a notion of context change potential as the meaning of sentences. I will argue that there are a number of fundamental problems with this conception of sentence meaning and outline a way of dealing with the 'dynamic phenomena' from the perspective of the traditional distinctions between propositional content and (internal) context as well between propositional content and illocutionary force, using structured propositions and minimal discourse-driven internal context.

Notions of context play an important role in the semantics of natural language: many expressions require for their semantic evaluation taking into account circumstances of the utterance situation, the semantic evaluation of other expressions in the same or in previous sentences, or background assumptions shared by the interlocutors. Two kinds of contexts can be roughly distinguished that play an important role in recent semantic theory: *external* and *internal* context (as I call them). External notions of context include utterance contexts and indices (sequences of coordinates that can be shifted in the presence of an intensional operator). Internal contexts consist in what the interlocutors take for granted in the context of conversation or in other ways driven by the information given in the discourse. External contexts consist features of the outside reality (or some possible reality), independent of an agent's propositional attitudes. While the distinction is not clearly defined, it will be highly useful in the discussion to follow.[1]

External and internal contexts differ in the way they are characterized, but also in the way they change, and in the role they play for the meaning of sentences. External contexts differ from internal contexts especially in their behaviour with respect to complex sentences. Internal contexts systematically change with an increase of information in the discourse, both during the utterance of a sequence of sentences and the utterance of certain complex sentences, namely those with conjunctions, conditionals, or quantifiers. An external context changes, or rather is

shifted, only in virtue of the presence of an intensional operator (such as a modal or temporal operator, or an attitude verb).[2]

Internal contexts, under the influence of a number of important papers by Stalnaker, have come to play a prominent role in recent semantic theory. Driven by research on unbound anaphora and presuppositions, the use of internal contexts has given rise to a radically new conception of sentence meaning, namely that of dynamic semantics, roughly a view on which the notion of an internal context takes a more central role than (or even replaces) the notion of propositional content in the meaning of sentences, a view developed or entertained, at least at some stage, by Kamp, Heim, Groenendijk, Stokhof, Veltman, Chierchia among others.

This paper reexamines the role of internal contexts in certain dynamic semantic theories. At the same time it provides a relatively informal introduction to dynamic semantics, especially for philosophers less familiar with the original motivations and techniques associated with it.

On the traditional view, the meaning of a sentence (possibly determined by contextual factors) has been taken to be a proposition or propositional content. A proposition, as traditionally conceived, is an entity that has truth conditions essentially, can be shared by different intentional agents, and can act as the content of different kinds of propositional attitudes (e.g. belief, hope, knowledge) as well as different kinds of speech acts (e.g. assertion, request, question).[3] Propositional contents thus play a role both for an agent's mental state and for his various contributions in a conversation context.

On the dynamic semantic view, the meaning of a sentence is conceived quite differently: it is identified with the potential of the sentence to change an information state, that is, the context representing what speaker and hearer take for granted in the context of conversation. That is, the meaning of a sentence is identified with its context change potential, in the sense of an internal context. On that conception of meaning, one can say, what previously had been taken to be the pragmatic effect of assertions is now relegated to the semantics of sentences themselves. On the dynamic view, the meaning of an utterance is not primarily directed toward the world, but rather toward an information state, the information state that the utterance aims at changing. What has truth conditions, on that view, is primarily an information state, not individual sentences. Such an information state (which is generally construed formally just like propositions on the traditional view) is a state that accumulates the various contributions of the sentences uttered up to that point in the conversation.

A context (i.e. internal context) has quite a different formal status in dynamic semantic theories than in traditional theories of meaning. In a classical static semantics, contexts are usually taken as meaning-determining, determining the intension or the extension of an

expression. For example, in the case of a sentence, a context, on the classical view, helps determine either the proposition a sentence expresses or its truth value. On the dynamic semantic view, contexts are not meaning-determining, but rather meaning is taken to be context-determining, the meaning of a sentence itself being identified with its potential of changing one context to another — that is, with its 'context change potential'.

This paper concerns itself with a dynamic semantic view that needs to be distinguished from the rather diversified and large 'dynamic' research paradigm which the view, in part, gave rise to. The view in question is the view formulated in Heim (1982), Groenendijk and Stokhof (1990, 1991, 2001), Groenendjk/Stokhof/Veltman (1996). It is also a view that is closely related to Stalnaker's original papers (Stalnaker 1970, 1974, 1978). It is not a view, though, shared by all the work within the general dynamic paradigm, a lot of which has a rather technical character that is open to interpretation and may fall outside the scope of this paper. The concern of this paper thus is a particular dynamic semantic view, and only due to the lack of a more precise term will I call this view *the dynamic semantic view.* The paper proposes an account, which in a way involves a kind of dynamic process itself, but is quite different from the dynamic semantic view that is at target. The account shares features with Discourse Representation Theory (DRT) (cf. Kamp 1981, Kamp/Reyle 1996). But unlike that theory it takes as its point of departure the traditional notion of propositional content, rather than that of a discourse representation.

This paper argues that there are fundamental conceptual and empirical problems for this (or rather now *the*) dynamic semantic view and even for the way Stalnaker conceived of the role of internal contexts (which on his view play a merely proposition-individuating role). Dynamic semantic theories have been developed primarily with independent declarative sentences in mind. But serious problems arise when taking into account sentences embedded under propositional attitudes or associated with non-assertive illocutionary force, problems that in more subtle ways are observable even with independent declarative sentences.

The dynamic semantic view, though, has put into focus a number of important insights into the nature of unbound anaphora and presuppositions that do challenge traditional notion of propositional content and require at least a modification of the traditional view. In particular, it requires acknowledging truth-conditionally incomplete contents (of sentences as well as propositional attitudes) and the possibility of completing the content or truth conditions of sentences with a different kind of context than features of the utterance situation or an index, namely a context that includes discourse-related information. The insights of the dynamic semantic view in one respect turn out to be more challenging than they were meant to be: The dynamic phenomena are not limited to conversational contexts but occur also in the context of

propositional attitudes, requiring a modification of the traditional view of the content of propositional attitudes. This is not surprising, in fact, given that assertions themselves are based on (the speaker) and directed toward (the hearer) the propositional attitude of belief.

The paper first gives a presentation of the problems that that gave rise to the development of dynamic semantics and then presents an outline of a conservative extension of the traditional view of sentence meaning as propositional content which should take care of the dynamic phenomena while avoiding the difficulties of the dynamic semantic view. The two crucial features of this account are:
[1] a structured conception of content (and internal context) and
[2] a bipartite conception of sentence meaning, containing besides a propositional content a 'background', representing antecedent material for certain kinds of anaphora.
On this view it is just anaphorically driven and external contexts that play a role besides the central notion of propositional content.

1. External notions of context

In classical static semantics, the kind of context that plays a role for the meaning of sentences is usually that of an utterance context or that of an index. An utterance context consists of features of the utterance situation relevant for the evaluation of particular expressions in the language. It generally includes the speaker, the time and location of utterance, and perhaps even specifications as to what the speaker is referring to with the utterance of a part of the sentence. An utterance context gives rise to a context-dependent notion of truth. Moreover, it is usually taken to act as content-determining, determining the intension of an expression — in particular, the proposition a sentence expresses. Thus, the truth value of the sentence *it is raining now*, as well as the proposition it expresses, depends on the time of utterance. An utterance context may be responsible for determining the content of certain expressions, however deeply they are embedded. Such expressions include *now* and *actually*, as well as rigid designators (such as *I*, demonstratives, and referentially used definite descriptions).

When embedded under an attitude verb or temporal or modal operator, the context relevant for the evaluation of the truth value of a sentence may be shifted. The context will then provide a different time, world, or location than that of the utterance situation for the evaluation of the embedded sentence. A context consisting in such shiftable features of a possible utterance situation is what is called an *index* and is to be distinguished from the utterance context itself. For the evaluation of an entire sentence, the index will be the index of the utterance context

(consisting of components that make up the utterance situation). But for an embedded context, the two contexts may diverge. Utterance context and index together then give rise to a notion of truth that is relativized to two contexts: a sentence S is true or false relative to an utterance context u and an index i.[4] For example, the sentence *John might have met the actual chairman* is true relative to an utterance context u and an index i just in case there is a world w' accessible from the world w of i such that John has met the person in w' that is in chairman in w.

2. Internal contexts

In more recent developments in linguistic and formal semantics, under the influence of a number of seminal papers by Stalnaker (1970, 1974, 1978), the notions of a presuppositional context has come to play a quite prominent role, that is, a context that represents the content of the speaker's (and sometimes the speaker's and addressee's) pragmatic presuppositions — that is, roughly, the information that is taken for granted at the relevant stage in the conversation. If such a context is formally construed as a set of possible worlds, then we have what Stalnaker calls a *context set*, the set of worlds compatible with what the speaker pragmatically presupposes. A context set may also represent what the speaker accepts only hypothetically or preliminarily, as in the case of the acceptance of the antecedent of an indicative conditional.

Semanticists have come to use internal contexts not just as representing the content of pragmatic presuppositions, but also as containing crucial linguistic information about the preceding discourse, such as NPs acting as antecedents of anaphora. There may be a way, though, to subsume such information under the notion of presupposition. As Stalnaker (1998) points out, a presuppositional context may contain not only information about the world, but also information about how that information has been represented — that is, information about the discourse itself. Such information may include information about the antecedents of anaphora, and a context representing both what is pragmatically presupposed about the world and about the previous discourse is in fact the kind of context needed for the dynamic analysis of unbound anaphoric pronouns discussed later (Section 4). Semanticists using internal contexts tend to not make a commitment, though, to context being defined in terms of pragmatic presupposition.

Internal contexts differ from external ones in that they change systematically when several sentences are uttered and also during the evaluation of complex sentences such as conjunctions, quantificational sentences, and conditionals. By contrast, indices are shifted only as part of the evaluation of intensional operators (modal and temporal operators and perhaps operators

representing propositional attitudes), and utterance contexts certainly do not shift systematically during the evaluation of complex sentences.

Stalnaker originally intended presuppositional contexts to act in the same way as utterance contexts, namely as meaning-determining — in particular, determining the proposition a sentence expresses. Stalnaker regarded the change of presuppositional contexts as a matter of pragmatics (cf. Stalnaker 1975). Only in the development of dynamic semantics (Kamp (1981), Heim (1982), Groenendijk and Stokhof (1990, 1991)) has the use of presuppositional contexts given rise to a radically different conception of the relation between context and proposition expressed. On the dynamic semantic view, a sentence is not primarily associated with independent truth conditions or a proposition, but rather with a function from contexts to contexts. That is, the primary semantic function of a sentence is taken to be an operation on (internal) contexts and it is only the resulting context that constitutes a kind of 'propositional' content and has truth conditions. Thus, in the transition from Stalnaker's original views to dynamic semantics, we have a shift from a sentence being primarily associated with (context-dependent) truth conditions, as in (1a), to a sentence being primarily associated with a context change potential, as in (1b):

(1) a. S is true at u at c
b. c + S = c'

There are two different ways of conceiving of presuppositional contexts within the dynamic semantic approach. On one view, a context consists itself in truth conditions, usually construed as a set of worlds or world-variable assignment pairs. Theories within that approach are non-representational dynamic semantic theories. Two important representatives are File Change Semantics (FCS) (cf. Heim 1982, Chap. 3) and Dynamic Predicate Logic (cf. Groenendijk / Stokhof 1991). On the other view, a context is itself a representation that needs to be truth-conditionally evaluated. Theories based on that approach are representational dynamic theories. The main representative of this approach is Discourse Representation Theory (cf. Kamp 1981, Kamp / Reyle 1996), though also another version of File Change Semantics belongs here (cf. Heim 1982, Chap. 2).[5] On the non-representational dynamic view, the function of a sentence is to eliminate or change alternatives in a context. On the representational dynamic view, its function is to add elements to a representational context, which in turn needs to be interpreted. On that view, it is the construction of a context that is dynamic, whereas the context itself will have a static meaning (possibly making use of utterance context and indices in the same way as

sentences did within static semantics). On the non-representational dynamic view, a sentence operates on a set of alternatives, whereas on the representational dynamic view, it operates on a discourse representation. I what follows (up to Section 8), my main focus will be on the nonrepresentational dynamic view. Thus, what I call the dynamic semantic view will exclude representational dynamic theories. This view, I will argue, faces a number of serious problems especially with extending the account to sentences embedded under propositional attitude verbs, due to two factors:

[1] a lack of a distinction between propositional content and (internal) context

[2] a lack of a distinction between propositional content and illocutionary force or propositional attitude.

The two main motivations for the development of the dynamic semantic view were presuppositions and unbound anaphora. Let me discuss them in turn.

3. Presuppositions and the dynamic semantic view

Stalnaker used presuppositional contexts to account for the behavior of presuppositions in complex sentences within a nondynamic conception of sentence meaning, and related treatments were later developed within dynamic conceptions of meaning. Presuppositions themselves, though, do not require a dynamic conception of meaning — only unbound anaphora do, as we will see.

There is a semantic and a pragmatic notion of presupposition, and due mainly to Stalnaker (1970, 1974, 1978), a close link has been established between the two. This link is at the heart of the dynamic semantic account of the way presuppositions behave in complex sentences (the Projection Problem of presuppositions). The main problem for any account of the Projection Problem using a presuppositional context, I want to argue, the fact that this link is at least not as crucial as it has been argued.

Semantic presuppositions are either logical presuppositions or expressive presuppositions. A sentence S (logically) presupposes a proposition p just in case S is true or false only if p is true. A sentence S (expressively) presupposes a proposition p just in case S expresses a proposition in a context c only if S is true in c.[6]

The notion of pragmatic presupposition, as introduced by Stalnaker (1970, 1974) is not a relation among sentences or propositions, but a relation between agents on the one hand and propositions on the other hand. An agent pragmatically presupposes a proposition p if he takes p for granted at the relevant stage in the discourse — that is, if he accepts p (at least for the

purpose of the conversation) and takes his addressee to accept p. Pragmatic presuppositions thus are on a par with propositional attitudes. Presuppositions of simple sentences, Stalnaker states, should be pragmatically presupposed in order for the utterance of the sentence to be acceptable.

The main reason why pragmatic presuppositions or contexts defined in terms of them have become so important is the need to explain the 'projection' of (semantic) presuppositions in complex sentences — that is, to explain under what conditions complex sentences inherit presuppositions of their component sentences. The most important facts about presupposition projection are illustrated in (2):

(2) a. John came to the party, and Mary came too.
b. If John came to the party, Mary came to the party too.
c. Most students who took the exam last year took it this year again.

If the second conjunct carries a presupposition that could be satisfied by information given in the first conjunct, the presupposition will not be inherited by the entire conjunction, as in (2a). (2b, 2c) illustrate that the same holds for antecedent and consequent of conditionals and restriction and scope of quantificational sentences.

Stalnaker was the first to propose that the projection behaviour of (semantic) presuppositions in complex sentences should be explained on the basis of pragmatic presuppositions and changes in pragmatic presuppositions in the course of evaluating utterances of complex sentences (cf. Stalnaker 1974, 1978). On Stalnaker's view, indicative conditionals involve a hypothetical operation on a presuppositional context: the antecedent eliminates all the alternatives from the initial presuppositional context in which it is not true and thus sets up a *local context*. It is only relative to that local context, not the initial or *global context*, that the consequent will be evaluated. (The terminology here is not Stalnaker's, but rather that of current dynamic semantics.) The possibility of context change in the evaluation of a sentence is then to explain the projection behavior of presuppositions as follows. The semantic presuppositions carried by the consequent, as always, must be pragmatically presupposed. But those pragmatic presuppositions need to pertain only to the local context set up by the antecedent and not necessarily the initial (global) context. Hence the entire sentence will not generally pragmatically presupposed what the consequent requires to be pragmatically presupposed. Only information not expressed by the antecedent needs to be pragmatically presupposed by the entire sentence, among the information needed to satisfy the presuppositions of the consequent.

In the case of conjunctions, on Stalnaker's account, it is not the *semantics* of the conjunctive connective itself that will lead to a new local context for the satisfaction of presuppositions of a non-initial conjunct, but rather the *sequence of acceptance* of the conjuncts that goes along with the acceptance of the entire conjunction. This means, the second (and any subsequent) conjunct B of a conjunction A *and* B will be evaluated with respect to possibly a different presuppositional context than the first conjunct A, that is, B will not be evaluated with respect to the global presuppositional context, but rather with respect to the local context that results when adding the information given by the first conjunct A to the global context — i.e., the local context set up by the utterance of A. From this, it follows that the speaker, by uttering the entire conjunction A *and* B, does not have to pragmatically presuppose what he would have to pragmatically presuppose when uttering the second conjunct B alone.

For presuppositions themselves, context can be taken as proposition-determining, determining whether a sentence expresses a proposition when uttered in a situation in which certain pragmatic presuppositions obtain. But presupposition projection can also be accounted for within a dynamic account of meaning. When contexts are conceived non-representationally (rather than representationally), this leads to the *Satisfaction Theory* of presuppositions. Like Stalnaker's account, the Satisfaction Theory requires that presuppositions of simple sentences be satisfied with respect to the presuppositional context relative to which they are to be evaluated. However, Stalnaker's and the Satisfaction Theory differ with respect to the treatment of complex sentences. In the case of complex sentences, for any dynamic account, it is the meaning of the connectives or sentence-embedding operators that will determine what the contexts are that the component sentences apply to. What the Satisfaction Theory only needs to worry about is formulating the dynamic meaning of connectives in order to account for the projection of presuppositions in complex sentences.

Like Stalnaker, dynamic semantic theories generally conceive of a context, for the purpose of presupposition satisfaction, as a set of possible worlds. The meanings of connectives are then construed as follows. A conjunction applies to a context c by the first conjunct applying to c and then the second conjunct applying to the resulting local context. A negated sentences applies to a context c by first applying the scope of the negation to c (which requires that its presuppositions be satisfied with respect to c) and then taking all the alternatives in the resulting local context away from c. An (indicative) conditional applies to a context c by taking away all the alternatives from c that belong to the local context that results when applying the conjunction of the antecedent and the negation of the consequent to c. Again this will require that the presuppositions of the antecedent be satisfied with respect to c and the presuppositions of the

consequent with respect to the local context that results from applying the antecedent to c. More formally, we will have:

(3) a. $c + S = \{w \in c \mid S \text{ is true in } w\}$, if the presuppositions of S are satisfied in all $w \in c$.
undefined otherwise
b. $c + (S \,\&\, S') = (c + S) + S'$
c. $c + \neg S = c \setminus c + S$
d. $c + S \rightarrow S' = c + \neg (S \,\&\, \neg S')$

The Satisfaction Theory has an enormous appeal, since it reduces the Projection Problem of presuppositions entirely to the change of presuppositional contexts that goes along with the processing of utterances of complex sentences.

However, the Satisfaction Theory fails to distinguish between conditions on the truth of the propositional content of a sentence and the pragmatic conditions to be satisfied by the interlocutors prepositional attitudes and this gives to a serious conceptual problem. This problem applies to Stalnaker's as well as the dynamic account. It concerns the relationship between the pragmatic presuppositions of a (complex) sentence and its semantic presuppositions. Both Stalnaker's account and the Satisfaction Theory give only a specification under what conditions semantic presuppositions of component sentences (which correspond to their pragmatic presuppositions) will have to correlate with *pragmatic* presuppositions of the entire sentence. That is, both accounts derive acceptability conditions for complex sentences from the semantic presuppositions of the component sentences. But this is not sufficient as an account of presuppositions in complex sentences. Clearly, also in the case of complex sentences, pragmatic presuppositions (requirements on what has to be taken for granted in the context of the discourse) are distinct from semantic presuppositions. Complex sentences carry semantic presuppositions in just the way simple sentences do, that is, they carry preconditions for their truth or falsehood, and the truth conditions (and preconditions for truth) of sentences can be satisfied independently of anyone pragmatically presupposing anything. Thus, a sentence like *John returned* is true or false only if John had left before, independently of whether anyone has presupposed that or not, whereas the sentences *If John had left, he has now returned* is true of false regardless of whether John had left before. These preconditions for the truth or falsehood of sentences constitute fundamental semantic intuitions and need to be explained by a general theory of presuppositions. On Stalnaker's account, a presupposition-carrying sentence expresses a proposition only relative to a context set, and thus can be true or false only relative to a

presuppositional context. On the dynamic semantic account, the primary notion of truth is that of the result of a sentence's applying to a context set being true. However, sentences clearly can be true independently of anyone presupposing anything.

In dynamic semantics, the notion of truth for individual sentences does not play a primary role, but only change of a context. Technically, though, it is easy to reconstruct a notion of (context-independent) truth of an individual sentence: a sentence is true in a world w just in case the application of the sentence to the singleton of w is not the empty set:

(4) a. S is true in w iff $\{w\} + S \neq \varnothing$
b. S is false in w iff $\{w\} + S = \varnothing$

Even a notion of semantic presupposition can be defined that way:

(5) S semantically presupposes p iff for any w, if p is false in w, then $\{w\} + S$ is undefined.

Thus, notions of truth and presupposition can be formally reconstructed within the dynamic view. This could not provide a solution of the conceptual problem, though: the problem remains of how the notion of a context set should be interpreted that the Satisfaction Theory makes use of. Context sets (to which sentences apply) were originally conceived as the contents of the propositional attitude of pragmatic presupposition. But clearly this would not be a way of understanding the set $\{w\}$ in (17). Of course, the dynamic view could be taken as a merely technical representation of meaning, with its various formal notions yet to be interpreted, but the problem remains for the original conception, which meant to define the central notions it made use of.

There are also a number of serious empirical problems for the Satisfaction Theory, which have given rise to an alternative theory of presuppositions within Discourse Representation Theory, namely the Binding Theory (van der Sandt 1988, 1992, Geurts 1996, 1998, 1999). Briefly, Binding Theory emphasises the anaphoric nature of presupposition (cf. Kripke 1990). The presuppositions of *too* is clearly anaphoric, as can be seen from (6):

(6) John is in New York too.

(6) needs to relate to particular other people than John being in New York; it cannot relate to the general fact that New York is populated. Clearly this latter cannot be captured by construing

contexts as sets of possible worlds. The semantic dynamic account would have to assimilate the treatment of (certain) presuppositions to the way it treats anaphora, by representing presuppositions by prepositional variables and thus giving more structure to a context (cf. Zeevat 1992). The Binding Theory deals with the phenomenon in terms of a highly structured representational context (cf. Section 7).

The anaphoric nature of presuppositions is apparent also in attitude contexts (Geurts 1998). A well-known fact about presupposition projection with attitude reports is that, for example, the last sentence of (7a) does not presuppose that John made the mistake before (because it is preceded by a belief report providing information satisfying the presupposition), whereas (7b) (uttered out of the blue) does:

(7) a. Mary believes that John once made the mistake, and she believes that he repeated the mistake.
b. Mary believes that John repeated the mistake.

The problem for the Satisfaction Theory is that if the embedded sentence in (7b) applies to a secondary context representing the speaker's presuppositions about Mary's beliefs, this explains only why (7b) does not just presuppose that Mary believes that John made the mistake before. It does not account for the fact that the sentence is acceptable as long as the speaker presupposes (and presupposes also that Mary believes) that John made the mistake before. The generalization of which this example is indicative is that unless a presupposition is found explicitly, the presupposition has to be true relative to the context of the utterance. Let me call this the *de re effect.* The Binding Theory deals with this phenomenon by treating presuppositions generally as anaphor-like, dealing with the de re effect by giving preference to 'global accommodation', that is, insertion of an antecedent into the highest Discourse Representation Structure (cf. Section 7).

4. Unbound anaphora and dynamic semantics

The most important motivation for the dynamic semantic view is unbound anaphora. Unbound anaphora involve a presuppositional context of a different sort and in a different way than presuppositions. Unlike (nonanaphoric) presuppositions, unbound anaphora require a context that also includes discourse-related information, namely information about the antecedent of the anaphor. This is reflected in the fact that contexts for the purpose of unbound anaphora generally are construed so as to include variable assignments (on a semantic dynamic approach) or

discourse markers (on a representational dynamic semantic approach). In either of those two ways, contexts specify which objects can be assigned as values to the anaphor, given the information of the previous discourse. What follows is less a critical discussion of the dynamic treatment of unbound anaphora, but a condensed exposition of its motivations and application. Again, I will limit myself to the semantic dynamic approach and disregard the representational one.

Presuppositional contexts when they are to account for unbound anaphora cannot be used in a meaning-determining way anymore, but must be conceived dynamically. It is in fact unbound anaphora that gave rise to dynamic conceptions of contexts in the first place.

Unbound anaphora are pronouns that act like bound variables, but cannot, on any reasonable analysis, be treated as variables bound by a quantifier their antecedent might stand for. Unbound anaphora generally relate to an indefinite NP as antecedent that occurs in the preceding discourse context. More precisely, the antecedent occurs either in a previous sentence or preceding conjunct, as in (8a,b), in the antecedent of a conditional (when the anaphor occurs in the consequent of a conditional), as in (8c, d), or else in the restriction of the quantifier (when the anaphor occurs in the scope of a quantifier), as in (8e):

(8) a. John has a donkey, and he beats it.
b. John might make a mistake and not correct it.
c. If John has a donkey, he beats it.
d. If John has a dime, he puts it in the meter.
e. Everyone who has a donkey beats it.

Unbound anaphora behave like variables bound by an existentially quantified antecedent, but without that antecedent being in a position to act, on any reasonable logical analysis, as a quantifier binding the anaphor as a variable. Thus, the pronoun *it* in (8b) clearly does not stand for a unique object, but rather acts like a variable bound by the existential quantifier that *a mistake* seems to represent. The antecedent quantifier, however, is embedded in the first conjunct and hence is not able to bind a variable in the second conjunct. That is, on a compositional analysis the logical form would be ‘∃x(has(John, x) & donkey(x)) & beat(John, x)). The same problem arises when the antecedent of the pronoun is in the antecedent of a conditional or the restriction of a quantifier and the pronoun occurs in the consequent or the scope of the quantifier, as in (8c, d) and (8d), whose logical forms, compositionally obtained, would be (∃x(has(John, x) & donkey(x)) → beats(x) (for (5c)) and ∀y(∃x(has(y, x) & donkey(x)) → beats(y, x)) (for (5e)).

An unbound anaphoric pronoun can receive both a universal and an existential reading, depending on the logical and descriptive context displayed by the sentence. Thus, (8a, b) and (8d) display the existential reading and (8c, e) the universal reading.[7]

Sentences involving unbound anaphora have not always been considered challenges for the traditional notion of meaning and logical form. There is one important alternative analysis, which is more familiar to and rather popular among philosophers. This analysis, originally due to Evans (1980), is the *E-type analysis,* on which unbound anaphoric pronouns are to be replaced by an ordinary description or quantifier, so that the sentence, after the replacement, can be evaluated in the usual way.

Evans thought unbound anaphoric pronouns generally displayed a uniqueness condition and thus were to be replaced by a definite description. For (8a), this would yield 'John has a donkey and beats the donkey he owns'. However, for cases like (8b) and (8d), the only plausible option for the E-type account is to have the pronoun be replaced by an existential quantifier (*a mistake he made* in (8b) and *a dime he has* in (8d)) or by a universal quantifier (*every donkey he owns* in (8a, e)).[8] Thus, Evans's original E-type analysis will have to be extended in such a way that the unbound anaphoric pronoun would be replaced by some quantificational NP, not necessarily a definite one. But there are problems even for the extended E-type analysis: in certain contexts, neither a replacement by a description nor by a quantifier of any sort is possible. These are contexts where the unbound anaphoric pronoun is embedded in a *that*-clause, relative clause, or a conditional, as in (9a) and (9b):

(9) a. Every man who has a daughter told her teacher that she is talented.
b. If a man has a daughter, he will tell her teacher that she is talented.

(9a) and (9b) easily allow for universal readings. However, the pronouns do not allow for a replacement by a universally quantified NP (nor a description or existentially quantified NP, for that matter), since the teacher according to (9a, b) tells the teacher of each one of his daughters x that x is talented, rather than making a single utterance that every daughter of his is talented.

The dynamic approach takes sentences with unbound anaphoric pronouns to require a radically different approach to meaning, conceiving of meanings as functions from contexts to contexts, i.e. as context change potentials. The idea for using a notion of context in a dynamic way is to allow an indefinite NP to bind a variable outside its scope, on the basis of a new interpretation of indefinites and sentences with unbound anaphora. A context made up from variable assignments will provide information relevant for the evaluation of the unbound

anaphor, and it is only a context, not an individual sentence, that will have truth conditions. In particular, a sentence with an unbound anaphor will not have truth conditions in itself, but only the context that results from applying the sentence to the initial context representing the information about the antecedent.

There are various ways of construing a context on the basis of variable assignments for the purpose of unbound anaphora. Let me discuss the main features of the dynamic approach to unbound anaphora with the way contexts and dynamic meanings are conceived within Dynamic Predicate Logic (DPL) (cf. Groenendijk/Stokhof 1991). In DPL, a context is a set of variable assignments, containing those and only those assignments that assign values to the variable satisfying the conditions imposed by the context of the antecedent and previous occurrences of the same variable, as in (10):

(10) a. John beats it

b. $c + \text{John beats } x = \{g \in c \mid \langle j, g(x)\rangle \in [\textit{beat}]\}$

A context that is a set of variable assignments also has truth conditions: it is true just in case it contains at least one variable assignment.

The use of context in a dynamic way cannot limit itself to unbound anaphora, though. There is a close interaction between unbound anaphora and presuppositions, which requires integrating the context needed for unbound anaphora with that needed for presuppositions. The interaction consists in that presuppositions may themselves have to be formulated using an unbound anaphor, as in the following examples:

(11) a. John has a donkey that he used to beat. He stopped beating it.

b. If someone took the exam last year, he should take it this year again.

c. Every student who took an exam last year took it this year again.

It is for this reason that contexts must combine the information relating to presuppositions and that relating to unbound anaphora. Contexts then are best construed as sets consisting of pairs containing a world and a variable assignment. A dynamic semantics targeted at both unbound anaphora and presuppositions will then look as in (12) (cf. Groenendijk/Stokhof/Veltman 1996):

(12) a. $c + R\, t_1 \ldots t_n = \{\langle w, g\rangle \in c \mid \langle [t_1]^w, g, \ldots, [t_n]^w, g\rangle \in [R]^w\}$, if the presuppositions of '$Rt_1 \ldots t_n$' are satisfied in c

= undefined otherwise.

b. $c + (p \,\&\, q) = (c + p) + q$

c. $c + \textit{not}\ p = c \setminus \{\langle w, g\rangle \mid \{\langle w, g\rangle\} + p \neq \varnothing\}$

d. $c + \exists x\ p = \{\langle w, g\rangle \mid \exists k\ (\langle w, k\rangle \in c \,\&\, g[x]k \,\&\, \{\langle w, g\rangle\} + p \neq \varnothing\}$

e. $c + p \rightarrow q = c + (\textit{not}\ (p + \textit{not}\ q))$

According to (12a), an atomic sentence applies to a context by eliminating those alternatives that make the sentence false. The rest of (12) contains nothing new, except for (12d): an existentially quantified sentence applies to a context by changing the assignment of an object to the variable in question so as to make the scope of the existential quantifier true (‘g[x]k means ‘ k is just like g, except in what it assigns to ‘x’). It is this definition that enables an existential quantifier to bind a variable outside its scope.

Let me summarise, on the dynamic semantic view, simple sentences express operations on contexts, and complex sentences operations that are, in some way, composed of the operations that correspond to the component sentences. This view about the meaning of simple and complex sentences goes along with a particular way of treating connectives and quantifiers, namely as instructions to apply the operations expressed by the component sentences in a certain way to the context. The dynamic view of the meaning of sentences in fact *requires* that all connectives and quantifiers (and other sentence-embedding expressions) be analysed as instructions to apply sentences to contexts in a certain way. Moreover, connectives and quantifiers will have to relate to one and the same kind of context — a context that combines the information relevant for presuppositions and for unbound anaphora. A context of this sort is the primary semantic object for sentences as well as sentence-embedding expressions to relate to. With the dynamic treatment of sentences thus goes along a dynamic treatment of sentence-embedding expressions. This at least if the component sentences should have the same meaning as independent sentences — something, of course, highly desirable for any theory of meaning.

5. Extending dynamic semantics to embedded contexts

Not only connectives and quantifiers need to be treated as instructions to change the presuppositional context, also other sentence-embedding expressions such as modals and attitude verbs have to be treated that way on the dynamic semantic account. Let me first restrict the attention to the verb *believe*.

The important observation is that within a belief context unbound anaphora and presuppositions behave just the same as in independent sentences:[9]

(13) a. Mary believes that John left. She believes that he will return.
b. Mary believes that someone broke into the apartment. She believes that he stole the silver.

In (13a), *return* is a presupposition trigger that relates back to the preceding embedded sentence. In (13b), *he* is an unbound anaphoric pronoun taking *someone* in the previous embedded sentence as antecedent — in the same way it would in a nonembedded context.

The motivations for the dynamic account thus are displayed in the same way by sentences embedded under attitude verbs as in independent contexts, which means that the dynamic account should apply to embedded sentences as well. This in turn requires that *that*-clauses embedded under attitude verbs, like independent sentences, apply to some context. This context can't be the context representing what the speaker presupposes about the world, though. Nor can it be a context representing all that the described agent actually believes. Otherwise, it would be entirely unexplained why (14), unlike (13a), presupposes that John in fact had left:

(14) Mary believes that John returned.

For presuppositions of sentences embedded under attitude or modal verbs, the following generalization holds (Karttunen 1974, Heim 1992, Geurts 1998). In the case of *believe*, without special preceding context, as in (14), the presupposition needs to be satisfied with respect to the speaker's presuppositional context (which in the relevant respect also counts as the described agent's belief); with a preceding attitude report, as in (13a), the presupposition may be satisfied with respect to the described agent's reported belief only.

This generalization means that the context to which the embedded sentence applies must be the one representing the speaker's *presuppositions* concerning the described agent's beliefs, rather than the described agent's actual beliefs. Let me call such a context *a secondary context*.[10] By contrast, the context representing the speaker's beliefs about the world is what I call a *primary context*. There clearly is a relation between secondary and primary context. In fact, a secondary context of a's belief can be obtained from a primary context c of the speaker's presuppositions about the world as in (15), where $R_{bel, a}$ is the relation that holds between a

world w and a world w' just in case w' is compatible with what the speaker presupposes about a's beliefs in w:

(15) $c_{bel,a} = \{w' \mid \exists w\ (w\ R_{bel,\,a}\ w' \ \&\ w \in c\}$

Then the context-change function expressed by the second conjunct of (14a) can be given as in (16):

(16) c+ *Mary believes that John returned* =
the context c' that differs minimally from c in that $c'_{bel,Mary} = c_{bel,Mary}$ + *John returned*

For cross-attitudinal anaphora as in (11b) the situation is somewhat different. Unlike the secondary contexts for presuppositions, sets of possible worlds, a secondary context that includes assignments cannot be defined just on the basis of the speaker's context; that is, it includes assignments that cannot be defined just on the basis of the speaker's presuppositions about what the described agent believes. Such a secondary context incorporates discourse-related information about the occurrence of variables (that is, the correlates of pronouns or formal relations between pronouns and antecedents), and this information cannot be part of the characterization of a described agent's belief. In particular, the context cannot be viewed as the set of worlds compatible with what the speaker presupposes about the described agent.

A context must then be understood in a somewhat different way, and in this respect a suggestion of Stalnaker is of help. According to Stalnaker (1979, 1996), a context may contain two different sorts of information: information about the world and information about the utterances that have been made in the discourse. The latter allows features of the utterance context to be included in the presuppositional context such as information about the time of utterance and the speaker, as well as information about the use of anaphoric pronouns and their antecedents. Construing a context as a set of pairs consisting of a world and a variable assignment would be conceiving of context as representing the information speaker and addressee share about the described agent's beliefs *and* the way the described agent's beliefs have been described. A secondary context thus would be defined as the part of the content of the speaker's pragmatic presuppositions that are about the described agent's beliefs and the way this information has been presented.

Primary and secondary contexts then differ simply in that the primary context consists in the speaker's pragmatic presuppositions about the world as well as the way this information has been

presented and a secondary context in the speaker's pragmatic presuppositions about the content of a described agent's propositional attitude and the way this information has been presented.

But then a secondary context cannot be derived from the primary context: only the worlds in a secondary context will be determined by it, not the assignments it contains. Let me call a context that includes both primary and secondary contexts a *global context.* Formally, a global context can be represented as a sequence of primary and secondary contexts. Using a doxastic accessibility relation $R_{\langle believe, a\rangle}$ for an agent *a*, the following condition on global contexts captures the relation between a primary context $c_{\langle speaker\rangle}$ and a secondary context $c_{\langle believe, a\rangle}$ representing the speaker's presuppositions about a's beliefs:

(17) For a global context c and any agent a:

$\{w \mid \exists g \langle w, g\rangle \in c_{\langle believe, a\rangle}\} = \{w \mid \exists w' (w' \in c_{\langle speaker\rangle} \,\&\, w' R_{\langle believe, a\rangle} w)\}$

A *that*-clause embedded under *believe* simply picks out the part of the content of the speaker's pragmatic presupposition that is about the relevant agent's belief. Suppose that c is the information state that corresponds to all of the speaker's pragmatic presuppositions and moreover, that $c_{\langle speaker\rangle}$ is the part of c that constitutes the primary context and $c_{\langle believe, a\rangle}$ the part of c that constitutes the secondary context carrying the information about a's belief. Then a belief report of the form *John believes that* S maps c onto a context c' minimally differing from c in that $c'_{\langle believe, John\rangle}$ is the result of adding S to $c_{\langle believe, John\rangle}$ so that (18) is satisfied:

(18) For a global context c,

c + *John believes that* S = the global context c' that differs from c minimally in that $c'_{\langle believe, John\rangle} = c_{\langle believe, John\rangle}$ + S and (17) is satisfied.

Thus, a secondary context should be characterized as a context representing the speaker's presuppositions about the described agent's belief state (or other propositional attitude) as well as perhaps information about how that belief state has been described.

The characterization of secondary contexts presents a first problem for the extension of the dynamic semantic view to attitude contexts is the characterization of secondary contexts. A secondary belief context is to be characterized as the context representing information about the described agent's belief state. But this characterization requires using a static concept of belief, a concept that is not what is expressed by the verb *believe* (when taking *that*-clauses). The verb *believe* instead gives only an instruction how to apply a sentence to a given secondary context.

The problem has to do with the more general fact that the dynamic semantic view analyses attitude reports not as being about the described agent's mental state, but about the pragmatic presuppositions that concern the agent's mental state.

6. Problems for the dynamic semantic view

6.1. Sentence-embedding expressions making a contribution to a propositional content

One problem arises with the treatment of sentence-embedding expressions (connectives, quantifiers, and sentence-embedding predicates) as expressing instructions of how to apply sentences to a context, rather than as acting primarily as content-bearing elements. In attitude contexts, it appears, meaningful expressions of natural languages always can contribute to or constitute a propositional content (rather than being mere instructions as to how to apply further embedded sentences to a secondary context). First of all, connectives in embedded sentences naturally act so as to contribute an element to a propositional content — an element that may be the focus of the attitude:

(19) a. Bill is surprised that Mary is at the party and John is at the party.
b. Bill believes that if John is at the party, Mary is there too.

In (21a) *and* and in (21b) *if* must act so as to contribute an element to the content of the surprise, rather than giving an instruction how to apply the two conjuncts to a secondary context.

Also in general presuppositions associated with particular lexical items generally may lead to a contribution to a propositional content, rather than just being conditions to be fulfilled by the context to which the sentence in question applies. The presuppositions of focus-sensitive operators such as *too* and *again* form the most interesting case. Here, it seems, the presupposition is clearly separable from the asserted content. For example in Heim (1992), the presupposition of *too* is treated as a contextual condition entirely separated form the contribution of the rest of the sentence.[11] Thus, *John left too* may be analysed, simplified, as follows on a proposition-determining view of context:

(20) $[\textit{John left too}]^c$ = $\{w \mid \text{John left in } w\}$ if c entails that someone other than John left; undefined otherwise.[12]

The sole function of *too* and *again* seems to be that of expressing a presupposition, which is then not a precondition on the applicability of a concept, but rather constitutes the entire content of the expression. The problem now is that *too* or *again,* as soon as they occur in sentences embedded under attitude verb, as below, must form part of the content of an attitude and thus part of the proposition expressed:

(21) a. Bill's wife noticed that he had given the bracelet to his mistress too.
b. John's wife got in Toronto. John is happy that he got a job in Toronto too.
(22) a. John noticed that Mary made the mistake again.
b. Mary complained she had to do it again.

In (21) and (22), the presupposition of *too* and *again* clearly may form part of the content of the noticing or the complaining.[13] For example, in (21a) may describe Bill's wife becoming aware that Bill's mistress was the receiver of the same present, that is (21a) entails the identity of the bracelet, as entailed by *too*. John's happiness in (21b) may have as its main content the fact that John got a job in the same city as Mary (as entailed by the presence of *too*), which is compatible with John not actually being happy that he got a job in Toronto. Similarly, the focusing of the noticing in (22a) and the complaining in (22b) may be the repetition of an event (the identity of an event type, instantiated twice), rather than just the occurrence of single events.

Any expression, it seems, when occurring in an embedded context can have a static meaning, constituting a propositional content or a component of a propositional content. Perhaps a given semantic dynamic theory allows for construing, derivatively, a content from the dynamic meaning of an expression (as it is in fact sometimes done). In any case, the problem requires in some form a structured conception of propositional content, namely one on which any expression, even if it does not carry any conceptual content, potentially acts as a component of a structured content.[14]

6.2. Propositional attitude verbs other than *believe*

The dynamic semantic account straightforwardly extends to sentences that are embedded under the verb *believe.* The same context change functions will then apply to a secondary context defined as the context representing what is presupposed about the described agent's belief state, a

'secondary belief context'. More problematic is the application of the dynamic semantic account to sentences embedded under attitude verbs other than *believe*. Again, those sentences will have to apply to a context. However, with attitudes other than *believe* it is less clear what that context is: it depends both on the previous discourse and the nature of the propositional attitude in question.

There are three cases to be distinguished regarding the behavior of anaphora and presuppositions in attitude contexts other than that of belief. They are illustrated below with the attitude verb *fear* (for anaphora in (23) and for presuppositions in (24)):

(23) a. Mary believes that someone might come in. She fears that he might steal something.
b. Mary fears that someone might come in. She fears that he might steal something
c. ?? Mary imagines that someone will come. But she fears that he might not see her.
(24) a. Mary believes that John had left. She fears that he might not return.
b. Mary fears that John has left. She fears that he might not return.
c. ?? Mary imagines that John has left. She fears that he might not return.

(23a) and (24a) show that a sentence embedded under *fear* may apply to a secondary belief context set up by a previous belief report. (23b) and (24b) show that such a sentence may also apply to a context representing the presuppositions about the described agent's fears, a secondary 'fear context'. (23c) and (24c), which are unacceptable, show that a secondary context of imagination is unsuitable for a sentence embedded under *fear*.

It is then not the attitude verb alone that specifies the kind of context the embedded sentences will apply to. Rather what matters is what kind of attitude is described and how the attitude relates to previously described propositional attitudes of the same agent. If a propositional attitude A relates to a previously described propositional attitude B, then B can be called the *background attitude* of A. Thus, the attitude of fear described by the second sentences in (23a) and (24a) have as their background attitude the state of belief described by the first sentence, and in (23b) and (24b) the state of fear. In general, the kind of context that a *that*-clause embedded under an attitude verb applies to must either be a context representing what is presupposed about the same attitude or what is presupposed about a related 'background' attitude.

If a particular propositional attitude comes with a background attitude, its propositional content may be truth conditionally incomplete. This is the case in examples such as (23a, b), for the propositional content expressed by *he might steal something* (where there is no uniqueness implication for unbound anaphoric pronoun *he*). Truthconditionally incomplete contents of

sentences are entirely unproblematic for the dynamic semantic account. But they pose problems for the traditional view of propositional content. Only together with the propositional content of the background attitude will *he might steal something* in (23a, b) be truthconditionally complete.[15]

What is needed, from the point of view of traditional static semantics, is allowing the content of an utterance to consist of two parts: a main *propositional content* (a truth conditionally possibly incomplete proposition) and a *background*, a set of truthconditionally incomplete propositions providing the 'anaphoric completion' of the propositional content. For (23a,b) this *bipartite popositional content* would (in first approximation) be of the form <{*someone*$_i$ *might come in*}>, *he*$_i$ *might steal something*>. The background will, at least in part, be driven by (suitably embedded) sentences in the previous discourse context, and involves a kind of formal dynamic process to be set up.

The possibility of truth-conditionally incomplete propositional contents that sentences like (23a, b) point to mean an even greater challenge for the traditional view than dynamic semantics intended it to be, namely it requires also a revision of the notion of prepositional content for attitudes. This is upon reflection not surprising: assertions are based on and directed toward propositional attitudes: the speaker wants addressee is to believe a content relative to background and for the speaker to be sincere, he should believe that content with respect to the same background too.

Belief, it appears, is always suited as a background attitude: that is, any attitude report can relate back to an attitude report describing a belief state of the same agent:

(25) Mary believes that someone is in the house. He hopes / wishes / doubts / imagines that he is sleeping.

This observation has a rather serious consequence for the dynamic semantic account. In (25), the first sentence sets up a secondary context of belief, which must be the context the second embedded sentence applies to. But that sentence is embedded under a different attitude verb. The second sentence thus can't just add information to the belief context. It rather provides information leading to a hope, desire, doubt, or imagination context.

The dynamic semantic account is then forced to analyse attitude verbs other than *believe* as doing something else than add information to a secondary belief context. More precisely, to explain the presuppositional and anaphoric behavior of other attitude verbs and their relatedness to the context of belief, a dynamic account has to identify the semantic content of those verbs

with particular operations on a context representing the agent's beliefs, thus, in effect adopting a lexical analysis of those verbs in sentence meaning - a move indeed made in the dynamic literature that concerns itself with attitude reports (cf. Asher 1987, Heim 1992). In the case of *doubt*, the operation most obviously would be that of eliminating all the alternatives that do not support the complement (making *doubt that S* basically equivalent to *believe that not S*). In the case of *want*, a suggestion by Stalnaker (1984) has been adopted by Heim and Asher, namely that a complement S of *want* imposes a preference relation among the belief alternatives with belief alternatives w supporting S being preferred over alternatives w' that differ minimally from w by not supporting S. Dynamically, this would mean eliminating those belief alternatives that do not conform to the preference order. Apart from the fact that this analysis itself may be problematic (overrationalizing desire), it raises a very serious problem for the dynamic semantic view in that it is forced into analysing attitude verbs in general as instructions to modify a belief context in some way or another. On the dynamic semantic view, sentences embedded under verbs describing mental states will always have to, in some way, apply to a belief context and yield another belief context, simply because of presuppositional and anaphoric relationships that may obtain between a belief report and a subsequent attitude report.

Clearly the assumption that the complements of *all* attitude verbs apply, in some way, to a belief context and yield another belief context is deeply problematic. It is hardly viable, and in fact conceptually misguided, to analyse every attitude verb as expressing a complex instruction for changing a secondary belief context, and thus to reduce all attitudes, in some way, to belief. Note again that *all* mental state verbs, e.g. all emotive and epistemic verbs, would have to express instructions to change a belief context, since they all allow for anaphoric links to a belief report. It just can't be that the mere possibility of presuppositional and anaphoric links among belief reports and other attitude reports requires a commitment to a conceptual reduction of *all* propositional attitudes to that of belief. But for the semantic dynamic view such a commitment seems unavoidable.

Another problem for the dynamic semantic account is that there are other attitude verbs which relate to belief, but whose complement can hardly be conceived as an operation on a state of information about belief, however complex. Examples are the verbs *ask, promise*, and *demand*:

(26) John believed there was a mistake in the paper. He asked Mary to correct it. / He promised that he would correct it. / He demanded that it be corrected.

The difficulties of extending the dynamic account to other attitude verbs are mirrored in the difficulties of making sense of the account for speech acts other than assertions, for example commands. Commands can hardly be construed as operations on a context; they relate to the world, not to shared information. Such difficulties can be traced to the fact that the dynamic account ultimately identifies the pragmatic effect of assertions with the meaning of sentences in general.

For the traditional conception of propositional content, these two problem would never arise precisely because the notion of a propositional content is not just associated with assertions or beliefs, but is meant to provide the object of any kind of propositional attitude as well as the truth conditions for assertions as well as the fulfilment conditions for other speechacts such as requests. What is needed thus is a static conception of propositional content, though possibly one on which a truth conditionally incomplete propositional content is associated with a completing background.

6.3. Other sentence-embedding predicates

There are related problems with other clausal constructions that on the dynamic semantic view would require an extremely implausible and artificial reanalysis. Many constructions with *that*-clauses can hardly be regarded as involving any kind of primary or secondary context change. These are examples:

(27) a. That S is true / possible.
b. That S may be true, but I would never claim or believe.
(28) a. The thought that it might rain bothered John.
b. The fact that it will rain ruined Mary's weekend plans.

On the dynamic semantic view, nonattitudinal predicates as in (27a) would have to be construed as complex conditions on how the *that*-clause applies to some context: *true* would simply require the *that*-clause to apply to the presuppositional context, *possible* that the addition of the *that*-clause to a context does not lead to the empty set or in the case of nonepistemic possibility applying the *that*-clause to a context by eliminating those worlds from which there is no relevantly accessible world in which the *that*-clause holds. However, (27b) obiously requires a distinction between assertability or possible belief and possible truth.

The dynamic semantic view has problems also with (28a), where the *that*-clause intuitively serves to characterize the content of a thought, and with (28b), where it serves to characterize the nature of a fact. The predicate in both cases clearly is understood as characterizing the content of the thought or the fact, rather than imposing a condition on how to apply the *that*-clause to some context.

6.4. Propositional anaphora and truth conditions of individual sentences

The possibility of propositional anaphora constitutes another problem for the dynamic semantic view, at least in the form in which it was presented. On the dynamic semantic view, contexts are the primary objects for sentences to relate to and thus for 'propositional' anaphora to pick up. However, as a matter of fact, propositional anaphora naturally pick up the content of just an individual sentence. Only if that sentence contains an unbound anaphor will what the propositional anaphor refers to have to include additional information relating to the anaphor, as the following example shows:

(29) Sue believes that someone broke into the apartment. She believes that she forgot to lock the door. She moreover believes that he stole the silver. Mary believes *that* too.

In (29), *that* can easily stand for only the content of the last *that*-clause *that he stole the silver* and not include the contribution of the preceding *that*-clause *that she forgot to lock the door*. However, what *that* stands for includes in some way the information given by *someone broke into the apartment.* But this information should count only as the background of the propositional content in question. This can be seen from the fact that it could not be the focus of Mary's doubt in (30) if *that* stands for the content *he stole the silver*:

(30) Sue believes that someone broke into the apartment. She believes that she forgot to lock the door. Mary believes that Sue locked it. Sue moreover believes that he stole the silver. Mary doubts that.

Propositional anaphora thus may themselves stand for a bipartite propositional content.

Also what *that* stands for will have truth conditions that depend only on relevant parts of Sue's secondary context — namely, the information given by the antecedent sentence *someone*

broke into the apartment — and not irrelevant information such as that given by *she forgot to lock the door*. Thus, (29) can be continued by (31), and (32) is perfectly acceptable:

(31) What Mary believes is true (but not that Sue forgot to lock the door).
(32) a. Sue believes that someone broke into the apartment. She believes that she forgot to lock the door. She moreover believes that he stole the silver.
b. What Sue believes is true (but not that Sue forgot to lock the door).

If only Sue but not Mary believes that Sue forgot to lock the door, then Sue and Mary share a content without sharing their secondary contexts. Still their shared content naturally acts as an object for pronominal reference:

(33) a. There is something Sue and Mary believe, namely that he stole the silver.
b. Mary believes what Sue believes, namely that he stole the silver.

The facts about propositional anaphora in attitude contexts are mirrored in intuitions about the identity and the truth conditions of assertions of independent sentences. Thus, the truth of *he stole something* in the following discourse is only partly dependent on the truth of the preceding discourse: it only depends on the truth of the first sentence:

(34) Someone broke in. Sue forgot to lock the door. He stole something.

The truth conditions of sentences with unbound anaphora thus depend only on information involving the antecedent of the anaphor, and even that must be qualified: if the sentence with the antecedent has been uttered by a different speaker, then the truth conditions of a sentence will depend only on the information the speaker actually shares, as in the following dialogue:

(35) A: Someone has broken into the apartment.
B: He might just have stumbled in.

Moreover, it is not required that all the information an anaphor relates to be given explicitly. For example in (38), the information that the person that broke in stole the silver is only implicit:

(36) A: Someone has broken into the apartment.

B: He might try to sell the silver.

Thus, the information that completes the truth-conditions of sentences with unbound anaphora is not strictly determined by the preceding discourse, but depends also on the intentions and beliefs of the interlocutors.

What this means is that a background for the propositional content of a given sentences is just what a speaker intends; it is not strictly driven by the preceding discourse. Of course, a speaker should ideally be successful in conveying what background is intended and this is where the rules for the construction of internal contexts posited by dynamic semantic theories come in. Not strictly following those rules will result in what dynamic semanticists consider accommodation, or context repair, on the part of the hearer.

There are, of course, technical options available for the dynamic semantic view to account for propositional anaphora: by in some way turning functions into meanings. However, this alone would not account for the background of an attitude. Instead, the data indicate that propositional anaphora, like utterances of sentences, may stand for a bipartite propositional content in which the background may represent only some of the information of the preceding background.

The criticism involving propositional anaphora certainly is not all fatal. However, the dynamic semantic view would 'predict' that entire discourse as a whole should be treated as an object one most naturally makes reference to and that reference to the content of individual sentences requires additional effort or is at least derivative; but this is simply not the case.

7. Sketch of an alternative account

I now want to sketch an account of sentences with anaphora and presuppositions which is centered on the traditional notion of a propositional content. The crucial idea concerning the 'dynamic phenomena' is that such propositional contents may come with an additional part adjoined to them: certain sentences — in particular, those involving unbound anaphora and presuppositions — may have a bipartite content, with one part being the structured proposition expressed by the sentence (the propositional content), the other part being a minimal representational context, containing the intended information about antecedents of the anaphor, cast as a set of structured propositions, the background of the propositional content. The information about antecedents of anaphora that a background represents preferably comes from the preceding discourse or conversational context, but it may also represent information not explicitly presented in the previous context, as in cases of accommodation. The background then

is simply a set of structured propositions the speaker has in mind when uttering the sentence in question. In order to be sure the addressee will figure what this background is, though, the speaker better relies on previous explicit information.

I will assume that the background will be set up on the basis of anaphoric relationships of expressions in a sentence to antecedents in preceding sentences, thus representing syntactic relations beyond the sentence boundary in sense of Fiengo / May (1994) and also Groenendijk/Stokhof (1990, 1991). The the rules for setting up backgrounds are fundamentally different from the rules for setting up propositional contents, which are strictly driven by the syntactic structure of the sentence and the lexical meanings of the expressions occurring in it. There are of course principles for constructing backgrounds. However, such principles are only guidelines aiming at successfully communicating the background and not rules for updating beliefs or pragmatic presuppositions (constituting presuppositional contexts). Unlike the propositional content, the background will not be strictly structure-driven, but just be influenced, to a lesser or greater extent, by the previous discourse — in conformity with principles of cooperative communication.

On the account I am sketching, something like a dynamic process does take place in the evaluation of sentences; but it has as its goal only the construction of a background component for the static content of an individual sentence, on the part of the speaker and the hearer. The bipartite content that results has its own rules of truth evaluation and these rules may take into account external contexts (of both sorts).

A bipartite content can also serve as the object of a propositional attitude, which means the propositional content will be the focus of the attitude and the background the proper content of the relevant background attitude. The account fulfils a fundamental requirement on an account of sentence meaning, namely to distinguish between propositional content and background, for speech acts (with the background being a pragmatic presupposition) and propositional attitudes (with the background being the content of background attitude)

I will construe bipartite contents on the basis of structured propositions — the most widely accepted conception of sentence meaning in the philosophy of language (cf. Cresswell 1985, Soames 1988 among others). Structured propositions will make up both the propositional content and the background of the meaning of a sentence (in a context of utterance).

Structured propositions are particularly useful in the current context for three reasons. First, they will be complexes to which each meaningful expression of the sentence has contributed a component. Second, they require a separate formulation of truth conditions and thus allow for a joint truthconditional evaluation of propositional content and background. Third, they easily

allow for an interpretation of anaphoric relationships between an (pronominal or presuppositional) antecedent and an anaphor in the the background.

I will assume, more or less, what is standardly assumed about structured propositions. In the simplest case, a structured proposition is an n-tuple consisting of an n-place property and n-1 individuals. In more complex cases, a structured proposition may itself contain an n-tuple consisting of individuals and properties or again n-tuples thereof etc. More generally, a structured proposition is composed of n-tuples consisting of an (n-1)-place function and n-1 arguments. Such function-argument sequences or *structured complexes* will act as the intension of expressions, and they in turn can be evaluated with respect to their extension. Let [] be the evaluation function for either expressions or structured complexes. If the intension of an expression E is $<R, X_1, ..., X_n>$ (for an n-place function R and arguments $X_1, ..., X_n$) (i.e., $[E] = <R, X_1, ..., X_n>$), then the extension of E will be $R^{w, t}([X_1]^{w, t}, ..., [X_n]^{w, t})$ (i.e., $[<R, X_1, .., X_n>]^{w, t} = R^{w, t}([X_1]^{w, t}, ..., [X_n]^{w, t})$).

In the case of a quantificational sentence, the structured proposition will contain a generalized quantifier (though not in the case of an indefinite, as will be discussed below). More precisely, it will contain a pair consisting of a logical determiner and a property, where a logical determiner is a function (relative to a world) from properties to functions from properties to truth values. Thus, the structured complex expressed by a noun phrase with quantificational determiner will be as in (27a), which will have an extension as in (27b). The structured proposition expressed by a simple sentence will be as in (27c), which will have the truth conditions in (27d):

(27) a. $[[D\ N']_{NP}] = <Q, P>$, where Q = [D] and P = [N'] (in case D is quantificational)

b. $[<Q, P>]^w = Q^w(P^w)$

c. $[[NP\ VP]_{IP}] = <[NP], P'>$, where P' = [VP]

d. $[<<Q, P>, P'>]^w = 1$ iff $[<Q, P>]^w(P'^w) = 1$

A sentence connective such as *and* or *if* will always contribute a content to a structured proposition. Following Soames (1988), I will assume that the content it contributes is a relation among structured propositions. Thus, a conjunction will express a structured proposition as in (28a), where AND is the relation among structured proposition defined in (28b); a conditional will express a structured proposition as in (29a), where IF is the relation among structured propositions defined in (29b):

(28) a. [S *and* S'] = <AND, [S], [S']>

b. AND($[S]^W$, $[S']^W$) = 1 iff $[S]^W$ = 1 and $[S']^W$ = 1

(29) a. [*If* S, *then* S'] = <IF, [S], [S']>

b. IF($[S]^W$, $[S']^W$) = 1 iff $[S]^W$ = 0 or $[S']^W$ = 1

If a sentence contains an indefinite or a pronoun acting as an unbound anaphor, the indefinite or pronoun will contribute a *parametric object* to a structured proposition. Such a parametric object is to be understood as an object whose only function is to relate argument places of predicates to each other and to be replaced by real objects in the evaluation of the proposition as true or false. The formal relation of coindexing between antecedent and anaphor will require interpreting antecedent and anaphor by the same parametric object. Thus, the structured propositions expressed by the two sentences in (30a) will be (30b) and (30c), where x is a parametric object and s is the silver in question:

(30) a. Someone$_i$ broke in. He$_i$ stole the silver.

b. <<BREAK IN, x>, <PERSON, x>>

c. <STEAL, x, s>

Here the indefinite *someone* contributes a pair consisting of a parametric object and a property to the structured proposition. The extension of such a pair will not be evaluated by function application, though. Rather the property imposes a condition on the kind of anchoring function applicable to the parametric object. Thus, relative to a world w and anchoring function f, a pair consisting of a parametric object and a property will be evaluated as in (31):

(31) $[<x, P>]^{W, f}$ = f(x) if $P^W(f(x)) = 1$; undefined otherwise.

If an unbound anaphoric pronoun contributes a parametric object to the propositional content of a sentence, then the sentence will involve a background — usually the set of all the minimal asserted structured propositions expressed by sentences in the previous discourse that involve the same parametric object. For example, *he stole the silver* in the discourse context in (30a) will have the bipartite content in (32):

(32) <<STEAL, x, s>, {<BREAK IN, x>, <PERSON, x>}>

Structured simple propositions with parametric objects require a notion of truth that is relativized to an anchoring function, as in (33):

(33) For a structured proposition <P, x> with a parametric object x and property P,
for a world w and an anchoring function f, $[\langle P, x\rangle]^{w, f} = 1$ iff $P^w(f(x)) = 1$.

Generally, bipartite contents with simple propositional content involve existential quantification over anchoring functions which should make both the propositional content and the propositions in the background true. For example, the second sentence of (33a) is true if there is an anchoring function mapping x to an object that broke in and stole the silver. More generally, we have the following notion of truth for bipartite contents (with simple propositional content):

(34) For a propositional content $\langle R, X_1, ..., X_n\rangle$ and background B,
$[\langle\langle R, X_1, ..., X_n\rangle, B\rangle]^w = 1$ iff for some anchoring function f, $[\langle R, X_1, ..., X_n\rangle]^{w, f} = 1$
and for all $p \in B$, $[p]^{w, f} = 1$.

Sentences embedded under attitude verbs may also have bipartite contents, as we have seen. But also an entire attitude report can express a bipartite content. In this case, two readings of an attitude report can be distinguished: a *de re* and a *de dicto* reading, as in (35):

(35) Someone broke in. John believes that he stole something.

On the *de re* reading of (35) (on which John believes about whoever broke in that he stole something) the background {<BREAK IN, x>, <x, PERSON>} acts as the background of the propositional content of the entire attitude report. On the *de dicto* reading (on which John has a belief in a general proposition), the same background will act as both as the background for the propositional content of the attitude report and for the propositional content of the embedded *that*-clause.

For attitude reports, in fact three kinds of contents can be distinguished with respect to their relationship to a background: [1] a content whose background only belongs to the embedded sentences — that is, a content of the form <R, a, <p, B>>, where R is an attitudinal relation and a an agent; [2] a content whose background is adjoined only to the propositional content of the entire attitude report — that is, a content of the form <<R, p>, B>; and [3] a content whose

background is adjoined to the overall content of the attitude report and the content of the embedded sentence — that is, a configuration of the sort <<R, a, <p, B>>, B>.[16]

By using structured propositions with backgrounds, the weak and the strong readings of unbound anaphora can be derived in the following way: conditionals and quantificational sentence can be evaluated either as a single content or as consisting of two independent contents. In the first case, only the entire conditional or quantificational proposition will have a background; in the second case, the consequent of the conditional or the scope of the quantifier will have its own background. Let us focus on conditionals (whose treatment can straightforwardly be carried over to quantificational sentences).

In the first case, then, only the propositional contents will be arguments of the conditional predicate. The content and the truth conditions of the conditional will thus be as in (36), with universal quantification over anchoring functions:

(36) For structured propositions p and q and a possible world w,
$[<IF, p, q>, B]^w = 1$ iff for every anchoring function f, $IF([p]^{w, f}, [q]^{w, f}) = 1$.

In this case, we obtain the universal reading.

In the second case, a bipartite content will act as an argument of the conditional predicate, with the following truth conditions:

(37) For structured propositions p and q and a possible world w,
$[<IF, p, <q, B>]^w = 1$ iff $IF([p]^w, [<q, B>]^w) = 1$

In this case, the contents of antecedent and consequent will each be evaluated with existential quantification over anchoring functions. Thus, if the two content arguments are of the form <P, x> and <<Q, x>, {<P, x>}>, the truth of the conditional requires if the antecedent is true, that there be an anchoring function f so that both <Q, x> and <P, x> are true with respect to f. This obviously yields the existential reading of the anaphor in the consequent.

This account shares a number of features with Discourse Representation Theory. Like DRT, the account is, in a way, representational, in that structured propositions require a separate formulation of truth conditions. Moreover, both make use of a structured representation of content. A very brief outline first of DRT. DRT considers the primary function of sentences to be their contribution to a discourse representation structure (DRS). A DRS roughly is to be understood as a way of storing the information given at a particular stage in a discourse. It will

be only the DRS resulting from the processing of an entire discourse that will be truth-conditionally evaluated, not the contributions of the individual sentences. A DRS, in the simplest case, is a pair consisting of a set of discourse markers (acting like variables) and a set of conditions associated with them. Thus, for example, (38a) leads to the DRS in (39a), and the continuation of (38a) in (38b) leads to expanding (39a) to the DRS in (39b):

(38) a. Someone broke in.
b. He stole something.
(39) a. <{x}, {PERSON(x), BREAK IN(x)}>
b. <{x, z, k}, {PERSON(x), BREAK IN(x, y), x = z, STEAL(z, k), THING(k)}>

The truth of a DRS such as (39b) in a model M requires there to be a function mapping the discourse markers in the DRS onto objects satisfying the conditions of the DRS in M:

(40) A DRS K is true in a model M iff there is an embedding function f mapping the discourse markers in K onto M.

In DRT, the dynamics only concerns the construction of a DRS. A DRS will have truth conditions that are entirely static. That is, truth conditions of DRSs themselves do not involve context change at all and in particular, do not make reference to any presuppositional context. The evaluation of DRSs will only involve external contexts — in the same way as sentences did within a traditional static semantics. Thus, DRT avoids a commitment to an analysis of all sentence-embedding operators as context change operations.

Conditional and quantificational sentences lead to implicational conditions involving two DRSs, as in (41b) and (41d) for (41a) and (41c), which have the truth conditions in (41e):

(41) a. If someone breaks in, he will steal the silver.
b. <{x}, {PERSON(x), BREAK IN(x)}> => <{y, z}, {z = x, STEAL(z, y), THING(y)}>
c. Every farmer who owns a donkey beats it.
d. <{x, y}, {FARMER(x), DONKEY(y), OWN(x, y)}> => <{u}, {u = y, BEAT(x, u)}>)
e. A DRS K => K' is true in a model M iff for every embedding function f mapping the discourse markers of K onto M, there is an extension f' of M mapping the discourse

markers of K' onto M.

The Binding Theory is a very elaborate and successful account of presuppositions within DRT (van der Sandt 1988, 1992, Geurts 1996, 1998, 1999). The basic idea is this. If a sentence S triggers a particular presupposition, then this presupposition will first be represented in the partial DRS set up by S. Subsequently, the presupposition will have to be identified with an 'antecedent' in some 'accessible' part of the overall DRS. If no antecedent of the presupposition can be found, then the presupposition must be accommodated, namely by inserting an antecedent proposition into the DRS at an appropriate place. As a matter of general principle, *global accommodation* is preferred over *local accommodation*. This accounts for the de re effect in examples like (7b), repeated here as (42):

(42) Mary believes that John repeated the mistake.

Global accommodation — accommodation of the global context — consists in inserting an antecedent at the highest level of a complex DRS — that is, into that part of the DRS that corresponds to the speaker's presuppositions rather than the described agent's beliefs. Local accommodation is accommodation of a local context — that is, insertion of an antecedent into an embedded DRS. Given the preference for global accommodation, (42b) requires inserting a proposition of the sort that John made the mistake at an earlier time at the highest level of the DRS, which means that the entire sentence will presuppose that John previously made the mistake.

Let me now give a quick evaluation of DRT within the present discussion. Within DRT, it is straightforward to identify individual contents of expressions: it is the representational objects they contribute to a DRS. Individual sentences (with or without unbound anaphora) can be associated with DRSs or partial DRSs, such as the DRS <<x, y>, {STEAL(x, y), THING(y)}> for the sentence *he stole something* in (27), and it is such partial DRSs that can be taken as the object of different propositional attitudes, allowing for a fairly straightforward treatment of anaphora and presuppositions within attitude contexts (Asher 1986, Roberts 1989, Kamp 1991, Geurts 1995, 1998). One general problem with DRT, though, is that it makes the truth conditions of the partial DRSs contributed by individual sentences dependent on the truth conditions of the entire previous (either primary or secondary) context. Another problem is that DRT uses the same rules for setting up partial DRSs that correspond to the meaning of individual sentences as for setting up the DRS representing the previous discourse context. However, whereas the

propositional content of a sentence is rather strictly determined by its syntactic structure and the words that occur in the sentence, the background a sentence relates to is driven by rules for successful communication, rather than being determined strictly by the content of sentences. Finally, theoretical point of DRT is a quite different one: DRT is meant to be a theory of understanding, of the processing of sentences on the part of the hearer. By contrast, the present approach was to explore what needs to be done from the point of view of traditional semantic theory in order to account for phenomena that gave rise to radically different semantic approaches.

Within the proposed account, presuppositions can be handled quite similarly to the way they are treated in the Binding Theory: presupposition triggers need to be indexed either with an element in the same sentence or else with an element in the background. Accommodation of presuppositions would correspond to the setting up of a background representing information not contained in the preceding discourse.

Within a structured propositions account of meaning, there is another option available, though, for presuppositions. Structured propositions should be evaluated as true of false with respect to the utterance context and an index (for modals and temporal operators) (i.e. using double indexing, cf. Lewis 1981, Kaplan 1989). Making use of conditions on the utterance context may provide an alternative way to account for global accommodation. That is, if a nonanaphoric presupposition trigger does not have an explicit antecedent, then what it presupposes must be true in the actual world, the world of the utterance context. To explore the merits of this disjunctive way of semantically 'anchoring' presuppositions goes beyond the present paper, however (but see Moltmann 2003a). Anyway, it is clear that, as in DRT, the problem of presupposition projection thus does not necessarily require linking truth-conditional properties of a sentence with propositional attitudes that may go along with the acceptance of an utterance of the sentence.

A final issue is the contribution of presupposition triggers to a propositional content. Here I will leave it with the suggestion that the propositional content of *John got a job in Toronto* too will involve as one component the non-identity relation, relating the proposition that John got a job in Toronto to the 'parallel' proposition in the background that Mary got a job in Toronto.

9. Conclusion

The dynamic semantic view involved a radical reconception of the notion of sentence meaning, making the presuppositional context the primary semantic object for sentences to relate to and

either abandoning propositions or reconstructing them on the basis of the notion of context. We have seen a number of conceptual and empirical problems arising for this approach, problems which suggest that the 'dynamic phenomena' of unbound anaphora and presuppositions are too innocent linguistic phenomena to require the radical, dynamic reconception of sentence meaning to which they had given rise. The problems we have seen point in a different direction of how sentence meaning should be conceived, namely a structured conception of content and context and at a bipartite construal of propositional content, involving a background component carrying information relevant for presuppositions and anaphora. This alternative conception of sentence meaning can be viewed as a conservative extension of traditional static semantics with structured propositions. Unbound anaphora and presuppositions themselves thus do not require an entirely different account of the meaning of sentences, connectives, sentence-embedding predicates, and operators.[17]

Backgrounds of propositional contents are to be conceived as are part of the speaker's communicative intentions, along with the intended, compositionally determined meaning of the sentence. Of course, for successfully 'communicating' a particular background, the speaker has to provide evidence for it, which is why there should be rules for the construction of a background that a speaker must rely on when aiming at communicating what background he intends. A background differs from a context in the dynamic semantic sense in that it supplements a propositional content and is not to be defined as the content of an agent's pragmatic presuppositions, though the rules that govern its set up in a given context can be viewed formally a defining a dynamic process. Backgrounds finally lay a role not only for the contents of assertions, but also for the contents of propositional attitudes of different sorts.

Notes

[1] The lack of a precise definition of the notion of internal context corresponds to a lack of a clear characterization of notions of context in most of the more recent dynamic literature.

[2] This is somewhat simplified. What is included in an external context is also governed by salience, which may change in the course of a conversation, even within a sentence, depending also on the interlocutors' shared assumptions. Such features of an external context will be neglected in what follows.

[3] Within the Fregan tradition, propositions are in fact considered mind-independent objects which have their truth conditions essentially. Due to that tradition, propositions are also considered the meanings of *that*-clauses and objects of different propositional attitudes.

The view that different speech acts can share their propositional content is familiar from Austin's (1962) and Searle's (1969) work on speech act theory.

The traditional view that I am concerned with in this paper need not maintain that propositions are objects. On the view that I defend in Moltmann (2003), for example, propositional contents, are not considered objects, but would consist in shared features of different 'attitudinal objects' such as John's belief and Mary's hope.

4 For a discussion of context and index see Lewis (1998). A classical reference concerning the distinction among two contexts is Kaplan (1986). See also Stalnaker (1970).

5 For a discussion of the semantic and the representational dynamic approaches see Chierchia (1995). For a defense of a semantic approach over the representational one, see Groenendjk/Stokhof (1990, 1991) and for a defense of the representational over the semantic one see Geurts (1997, 1999).

6 The notion of expressive presupposition is due to Strawson; the notion of logical presupposition to Frege. For a discussion of semantic presupposition and its relation to pragmatic presupposition see especially Soames (1989), but also van der Sandt (1988).

In some of the recent dynamic literature, it is claimed that semantic presupposition should be entirely replaced by pragmatic presupposition, e.g. Geurts (1999) and especially van Rooy (to appear). There are certainly expressions, as discussed in Soames (1889), e.g. *even* or the cleft construction that just impose a pragmatic presuppositions. But this view can hardly be maintained for referential presuppositions and preconditions on the application of concepts (aspectual presuppositions (of *stop* or continue) or *factive* presuppositions), where as van Rooy (to appear) admits the condition is not just one of interlocutors have a prepositional attitude (pragmatic presupposition).

7 For a discussion of the weak and strong readings of unbound anaphora see Kanazawa (1994).

8 For modifications of Evans' original E-type analysis to account for weak and strong readings of unbound anaphora see, for example, Lappin / Frances (1995) and van der Does (1996).

9 The need for making a distinction between primary and secondary context has been pointed out first by Stalnaker (1987). See also Heim (1992) and Zeevat (1992).

[10] In these examples, it is crucial that both the sentence containing the anaphor or presupposition and the one containing the antecedent of the anaphor or the information satisfying the presupposition be embedded under verb *believe*. This is a case of what is called modal subordination, as it parallels cases with modal verbs (cf. Roberts 1989).

[11] A strict separation between presupposition and assertion is not limited to dynamic semantic accounts of presuppositions. It is also made, for example, in Karttunen/Peters (1979).

[12] Here I have disregarded the anaphoric nature of *too*.

[13] A separation between assertion and presuppositions as context conditions might also be suggested for factive presuppositions of predicates like *is interesting*, in the way given below:

(1) [*That* S *is interesting*]^c = [[*interesting*]([S])] if [S] is true in c,
undefined otherwise.

However, factive presuppositions not only need to form part of the content of an embedded sentence; they must even form part of the content of the factive clause, as seen in the nonequivalence of (2a) and (2b), where in the latter case the factive presupposition is explicitly abstracted from:

(2) a. That John solved the problem is important.
b. The proposition that John solved the problem is important.

[14] For other arguments against connectives acting as instructions to change a context see Geurts (1997, 1999).

[15] The most convincing cases of truthconditionally incomplete sentences with unbound anaphora are those involving socalled modal subordination, as in (23a, b). It has often been argued that in a sequence like *John owns a donkey. He beats it.* The indefinite is used in fact specifically, the speaker's referential intentions limiting it to a single donkey as referent. See Stalnaker (1998) for a recent expression of that view. Groenendijk and Stokhof (1992, 2001), though, hold that no uniqueness of reference obtains.

[16] Sentences with unbound anaphora embedded under modal verbs, conditionals, or tense should allow for the same two options: a background associated either with the content of the complex sentence or with the content of the embedded sentence. However, nonattitudinal intensional contexts seem to allow for only one option. As Soames (1989b) observes in connection with the E-type account of unbound anaphora, the description to replace an unbound anaphor in the scope of a modal or temporal operator or a conditional must take the same values as an antecedent that occurs outside the scope of the intensional operator. For example, the pronouns in (1) must take the same value as the antecedent, rather than denoting whatever satisfies the description *the F* in any of the circumstances the modal or temporal operator quantifies over:

(1) a. The F such that it is not a necessary truth that he is F.
b. The F has less influence because next year he won't be the F.
c. John owns a donkey and it likes carrots, but it might have been the case that it did not like carrots.

Thus, only bipartite contents of the sort <<O, p>, B> are allowed, not of the sort <O, <p, B>>, if O is a nonattitudinal intensional operator.

[17] Stokhof (2002) argues from purely philosophical considerations that semantic theory needs to take an even more radically use-theoretic shape than dynamic semantics represents. Whether or not that may be so, the point of this paper was that the 'dynamic phenomena' do not require the particular shape 'the first step in the right direction' (Stokhof) (i.e. the dynamic semantic view) has taken, but should be dealt with differently.

References

Asher, N. (1986): 'Belief in Discourse Representation Theory'. *Journal of Philosophical Logic* 15, 127-189.

---------- (1987): 'A Typology of Attitudinal Verbs and their Anaphoric Properties'. *Linguistics and Philosophy* 10, 125-197.

Austin, J.L. (1962): *How to do Things with Words*. Oxford UP, Oxford.

Chierchia, G. (1992): 'Anaphora and Dynamic Binding'. *Linguistics and Philosophy* 15.

---------- (1995): *Dynamics of Meaning*. Chicago University Press, Chicago.

Cresswell, M. (1985): *Structured Meanings.* MIT Press. Cambridge (Mass.).

van der Does, J. (1996): 'Quantifiers, Contexts, and Anaphora'. *Proceedings of the Tenth Amsterdam Colloquium*, ILLC, University of Amsterdam, Amsterdam.

Evans, G. (1980): 'Pronouns'. *Linguistic Inquiry* 11. Reprintedin G. Evans (1982): *Varieties of Reference.* Ed. By J. McDowell, Oxford UP, Oxford.

Geurts, B. (1996): 'Local Satisfaction Guaranteed: A Presupposition Theory and Its Problems'. *Linguistics and Philosophy* 19, 259-294.

---------- (1997): 'Dynamic Semantics vs. DRT'. *Zeitschrift fuer Sprachwissenschaft* 16, 209-226.

---------- (1998): 'Presuppositions and Anaphors in Attitude Contexts'. *Linguistics and Philosophy* 21, 545-601.

---------- (1999): *Presuppositions and Pronouns*. Elsevier, Oxford.

Groenendijk, J. / M. Stokhof (1990): 'Dynamic Montague Grammar'. In L. Kalman et al. (eds.): *Proceedings of the Second Colloquium on Logic and Language*. Akademia Kiado, Budapest, 3-48.

---------- (1991): 'Dynamic Predicate Logic'. *Linguistics and Philosophy* 14, 39-99.

---------- (2001): 'Meaning in Motion'. In K. von Heusinger / U. Egli (eds.): *Reference and Anaphoric Relations*. Kluwer, Dordrecht:

Groenendijk, J. / M. Stokhof / F. Veltman (1996): 'Coreference and Modality'. In S. Lappin (ed.): *Handbook of Contemporary Semantic Theory*, 179-213.

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

---------- (1983): 'On the Projection Problem for Presuppositions'. Proceedings of WCCFL 2, 114-126.

--------- (1992): 'Presupposition Projection and the Semantics of Attitude Reports'. *Journal of Semantics* 9, 183-221.

Kamp, H. (1981): 'A Theory of Truth and Representation'. In J. Groenendijk et al.(eds.): *Truth, Interpretation and Information*. Foris, Dordrecht, 1-43.

---------- (1990): ‘Prolegomena to a Structural Account of Belief and Other Attitudes'. In C.A. Anderson / D. Owen (eds.): *Propositional Attitudes*. CSLI Lecture Notes, 27 -90.

Kamp, H. / U. Reyle (1993): *From Discourse to Logic*. Kluwer, Dordrecht.

Kanazawa, M. (1994): 'Weak vs. Strong Readings of Donkey-Sentences'. *Linguistics and Philosophy* 12, 109-158.

Kaplan, D. (1989): ‘Demonstratives’. In J. Almog et al. (eds.): *Themes from Kaplan*. Oxford UP,
Oxford, 481-563.

Karttunen, L. (1974): 'Presuppositions and Linguistic Context'. *Theoretical Linguistics* 3, 181-194.

Karttunen, L. / S. Peters (1979): ‘Conventional Implicature’. In C.-K. Oh / Dinneen (eds.): *Syntax and Semantics. Presuppositions*. Vol. 11, Academic Press, New York, 1-56.

Kripke, S. (1990): 'Presuppositions and Anaphora: Remarks on the Projection Problem'. Ms. Princeton University.

Lewis, D. (1981): ‘Index, Context, and Content’. In S. Kanger et al. (eds.): *Philosophy and Grammar*. Reidel, Dordrecht.

Moltmann, F. (2003): ‘Propositional Attitudes without Propositions’. *Synthese* 135, 77-118.

---------- (2003a): ‘Presuppositions and Quantifier Domains’. Ms.

Roberts, C. (1989): ‘Modal Subordination and pronominal anaphora in discourse’. *Linguistics and Philosophy* 12, 685-721.

Searle, J. (1969): *Speech Acts. An Essay in the Philosophy of Language*. Oxford UP, Oxford.

Soames, S. (1988): 'Direct Reference, Propositional Attitudes, and Semantic Content'. In N. Salmon / S. Soames (eds.): *Propositional Attitudes*. Oxford UP.

---------- (1989a): 'Presuppositions'. In D. Gabbay / F. Guenthner (eds.): *Handbook of Philosophical Logic*, vol. IV, 553-616.

---------- (1989b): Review of Gareth Evans: *Collected Papers. Journal of Philosophy* 86.

Stalnaker, R. (1970): 'Pragmatics'. *Synthese* 22, pp. 272-289.
---------- (1974): 'Pragmatic Presupposition'. In M. Munitz / P. Unger (eds.): *Semantics and Philosophy*, New York UP, pp. 197-214.
---------- (1975): 'Indicative Conditionals'. *Philosophia* 5, pp. 269-286.
---------- (1978): 'Assertion'. In P. Cole (ed.): *Syntax and Semantics* 9. Academic Press, New York, 315-332.
---------- (1984): *Inquiry*. MIT Press, Cambridge.
---------- (1987): 'Belief Attribution and Context'. In R. Grimm / R. Merrill (eds.): *Contents and Thought*. University of Arizona Press, Tucson, pp. 143-156.
---------- (1998): 'On the Representation of Context'. *Journal of Logic, Language and Information* 7 , 3-19.
Stokhof, M. (2002): 'Could Semantics be something else'. In D. Barker-Plummer et al. (eds.): *Word, Proofs, and Diagrams*. CSLI Press, Stanord.
Van der Sandt, R. (1988): *Context and Presupposition*. Routledge, London.
---------- (1992): 'Presupposition Projection as Anaphora Resolution'. *Journal of Semantics* 9.
Van Rooy, R. (to appear): 'A Modal Analysis of Modal Subordination'. *Journal of Semantics*.
Zeevat, H. (1992): Presupposition and accommodation in update semantics'. *Journal of Semantics* 9, 379-412.